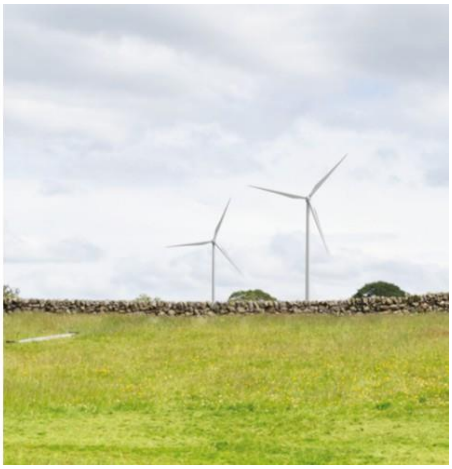
Blair Hill Wind Farm

Environmental Impact Assessment Report

Volume 1: Main Report





power for good

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Volume 1

Environmental Impact Assessment Report – Main Report

1 Introduction

1.1 Background

1.1.1 Renewable Energy Systems (RES) Ltd. (hereafter referred to as 'the Applicant') is applying to the Scottish Ministers for Section 36 (S36) consent under the terms of the Electricity Act 1989 and deemed planning permission under the terms of the Town and Country Planning (Scotland) Act 1997, to construct and operate Blair Hill Wind Farm (hereafter referred to as the 'Proposed Development'), at site centre British National Grid (BNG) 241912, 572186, excluding access track.

1.2 The Applicant

1.2.1 The Applicant 'RES', is the world's largest independent renewable energy company. At the forefront of the industry for over 40 years, RES has delivered more than 26 GW of renewable energy projects across the globe and supports an operational asset portfolio exceeding 40 GW worldwide for a large client base. RES employs more than 4,500 people and is active in 24 countries working across onshore and offshore wind, solar, energy storage and transmission and distribution.

1.2.2 Based in the Glasgow office, RES has developed, constructed or operated wind farms across Scotland since 1993. This includes the development of and/or construction of 21 wind farms in Scotland with a total generation capacity of 597 MW.

1.2.3 Drawing on decades of experience in the renewable energy and construction industries, RES has the expertise to develop, construct and operate projects which contribute to a low carbon future by providing a secure supply of sustainable, low cost, clean green energy. RES is committed to finding effective and appropriate ways of engaging with all its stakeholders, including local residents and businesses, and believes that the opinions of local people are an integral part of the development process. RES is also committed to developing long-term relationships with the communities around its projects, proactively seeking ways in which it can support and encourage community involvement in social and environmental projects near its developments; including through Community Benefit Funds and exploring options for shared community ownership.

1.3 Site and Proposed Development Description

Site Description

1.3.1 The Proposed Development is located in Dumfries and Galloway (D&G) Council area, approximately 2.7 km north of the town of Newton Stewart[1] and 4 km east of the River Cree[2]. The location of the Proposed Development is shown on **Figure 1.1**.

1.3.2 The Site comprises an area of 681.5 hectares (ha). The Proposed Development is set within open moorland and areas of commercial forestry. The elevation varies from 100 m Above Ordnance Datum (AOD) to 404 m AOD.

[1] Shortest distance between southern development boundary line and houses along the northern edge of Newton Stewart.

[2] Shortest distance between the western boundary line and the River Cree.

Overview of Proposed Development

1.3.3 The Proposed Development will comprise up to 14 turbines resulting in an overall Site generating capacity of approximately 92.4 MW enough to power around 115,700 homes[3] annually with clean, low cost electricity. The Proposed Development would contribute towards international and national targets for the generation of renewable energy and reduction in greenhouse gas emissions. The Proposed Development is described in detail in **Chapter 2: Proposed Development**.

1.3.4 The associated infrastructure will include Site access, access tracks, crane hardstand areas, underground cabling, on-site substation and control building, transformers and related switchgear, temporary construction compound, laydown area, potential excavations/borrow workings and temporary concrete batching plant. The components and layout of the Proposed Development are indicated in **Figure 1.2**.

1.3.5 The electricity produced will be exported to the electricity network at transmission level. The expected point of connection to the wider electricity network is discussed in **Chapter 2: Proposed Development**.

1.4 Purpose of the EIA Report

1.4.1 ITPEnergised was appointed by the Applicant to undertake an Environmental Impact Assessment (EIA) of the Proposed Development in accordance with The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 ('the EIA Regulations'). The EIA process is the systematic process of identifying, predicting, and evaluating the environmental impacts of a proposed development. Where appropriate, it also sets out mitigation measures designed to prevent, reduce and, if at all reasonably possible, offset potential significant adverse environmental effects. An assessment of residual effects, those expected to remain following implementation of mitigation measures, is also presented.

1.4.2 The main findings and conclusions of this EIA Report are summarised in a Non-Technical Summary (NTS), as required by the EIA Regulations. The NTS, provided as a stand-alone document, summarises the key findings of the EIA in easily accessible, non-technical language, ensuring everyone with an interest in the project can understand and access information on its predicted environmental effects.

1.4.3 This EIA Report and its NTS accompany the application for S36 consent, being submitted to the Scottish Ministers.

1.4.4 The EIA Report is split into five volumes, with the NTS forming a separate document. **Volume 1** of this EIA Report is structured as follows:

- **Chapter 1** provides an introduction to the EIA Report and its authors;
- **Chapter 2** 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 3** provides a description of the design principles, design evolution and alternatives that were considered**;**
- **Chapter 4** describes the methodology of the EIA process including the scope of the process, justification for topics scoped out of the EIA, and details of the Public Consultation process;
- **Chapter 5** outlines the planning and energy policy context;

[3] Calculated by taking the predicted annual electricity generation of the Site (based on predicted Site generation capacity of 92.4 MW), together with the Applicant's predicted capacity factor of 46.3% and dividing this by the annual average electricity figures from DESNZ showing that the annual GB average domestic household consumption is 3,239 kWh (January 2024). Final wind farm capacity will vary depending on the outcome of planning permission and the turbine selected.

- **Chapter 6** assesses the effects on landscape and visual amenity;
- **Chapter 7** assesses the effects on archaeology and cultural heritage;
- **Chapter 8** assesses the effects on ecology;
- **Chapter 9** assesses the effects on ornithology;
- **Chapter 10** assesses the effects on geology, hydrology, hydrogeology and peat;
- **Chapter 11** assesses the effects of traffic and transport;
- **Chapter 12** assesses the effects of acoustics;
- **Chapter 13** reports on the effects on climate change;
- **Chapter 14** assesses the effects on forestry;
- **Chapter 15** assesses the effects on aviation, radar and defence;
- **Chapter 16** reports on other issues including telecommunications and shadow flicker; and
- **Chapter 17** is the Schedule of Commitments.

1.4.5 **Volume 2** contains the figures that inform the EIA Report.

1.4.6 **Volume 3** contains supporting information and technical appendices for each of the technical chapters, and additional studies that have been prepared to inform the relevant assessments as reported in the EIA Report.

1.4.7 **Volume 4** is the Non-Technical Summary (NTS).

1.4.8 **Volume 5** contains Confidential Figures and Technical Appendices.

1.5 Assessment Team

1.5.1 The assessment was undertaken by ITPEnergised's environmental teams supported by external consultants. **Table 1.1** outlines the full EIA team and their experience.

Table 1.1: EIA Project Team

Consultant	Input to the EIA	Company	Experience
Gavin Spowage	EIA Project Director	ITPEnergised	BSc (Hons) Environmental and Management Sciences, MSc Environmental Management, PIEMA. 19 years' experience in environmental consultancy.
Donnette Briggs	EIA Project Manager	ITPEnergised	BSc Natural Sciences, BSc Honours (Botany), MSc Environmental Management. 15 years' experience in environmental consultancy.
Gregory Walton	EIA Assistant Project Manager	ITPEnergised	BSc (Hons) Environmental Sciences, MSc Environmental Management. 1.5 years' experience in environmental consultancy.
David Bell	Statutory and Policy Framework	David Bell Planning	BSc (Hons) Town & Country Planning, Diploma Urban Design, MCIHT, MRTPI. 30 years' experience in planning and development.
Ruth Knight	Landscape and Visual Impact Assessment	LDA Design	BA (Hons) Landscape Design and Town Planning, PGDipLA, MA Planning Policy and Practice, Chartered Member of the Landscape Institute (CMLI). Ruth is a Chartered Landscape Architect with over 22 years' experience and expertise in landscape and environmental planning, including landscape and visual impact, and advising on EIA development. Project examples include LVIAs for renewable energy projects, including preparation of proofs of evidence for a number of wind farm appeals; large scale

Consultant	Input to the EIA	Company	Experience
			residential and commercial development; and DCO nuclear power stations.
Brian Henry	Ecology Assessment	MacArthur Green	Principal Ecologist with 14 years ecology consultancy experience, leading on ecological impact assessments for onshore renewables developments, HRAs and Habitat Management Plans. Full member of the Chartered Institute of Ecology and Environmental Management (CIEEM), MASocSci Geography, MSc River Basin Management.
Flora Veitch	Ecology and Ornithology Assessments	MacArthur Green	Consultant Ecologist with 4 years ecology consultancy experience, leading on ecological technical appendices and input into ecological impact assessments for onshore renewables developments and Habitat Management Plans. BSc (hons) Animal Biology.
Sarah Sanders	Ornithology Assessment	MacArthur Green	Principal Ornithologist with 12 years ornithology consultancy experience, leading on ornithological impact assessments for onshore renewables developments, HRAs and input into Habitat Management Plans. Member of the Chartered Institute of Ecology and Environmental Management (CIEEM), BSc (hons) Zoology.
Rafe Dewar	Ornithology Assessment	MacArthur Green	Principal Ornithologist with 18 years ornithology and ecology consultancy experience, leading on ornithological and ecological impact assessments for onshore and offshore renewables developments, HRAs and Habitat Management Plans. Member of the Chartered Institute of Ecology and Environmental Management (CIEEM), BSc (hons) Zoology, MSc Environmental Sustainability.
Beth Gray	Archaeology & Cultural Heritage Assessment	SLR Consulting	MA (Hons) Archaeology. ACIfA. 8 years' experience as an archaeologist. With over 8 years of experience in the renewables sector, Beth has worked on a number of wind farms, notably, Bloch Farm (2023), Aultmore Forest (Ongoing), Euchanhead (2020) and Clashindarroch II (2020). Beth is also working on a number of projects going through the planning system
Erin Ashby	Archaeology & Cultural Heritage Assessment	SLR Consulting	MA (Hons) Archaeology, MSc Archaeology and Anthropology, PCIfA. 3 years' experience as an archaeologist. Erin is working on a number of planning applications for renewable energy at present and has notably contributed to Balmeanach Wind Farm, Kirkton, Ben Sca Wind Farm and Uisenis Wind Farm.
Artem Khodov	Acoustics Assessment	RES	Member of the Institute of Acoustics (MIOA),MSc in Acoustical Engineering, BEng in Mechanical Engineering. Six years professional experience in acoustics.
Carolyn Rollo	Traffic and Transport Assessment	Meinhardt	MA (Hons) MCIHT 16 years' experience.

Consultant	Input to the EIA	Company	Experience
Ross Agnew	Traffic and Transport Assessment	Meinhardt	BSc (Hons) MCIHT six years' experience.
Kyle McKinnon	Traffic and Transport Assessment Lead	Meinhardt	MEng MCIHT 11 years' experience.
Fraser Stewart	Traffic and Transport Assessment	Meinhardt	BEng (Hons) MCIHT eight years' experience.
Julia Rodden	Engineering Design	RES	BSc (Hons) in Earth Sciences 11 years professional experience in ground and civil engineering
David Nisbet	Hydrology, Geology and Hydrogeology Assessment	ITPEnergised	BSc (Hons) Earth Science, Associate Director, head of geology, hydrology and peat service with over 12 years' experience within a consultancy setting. David has led geology and peat assessments on many renewable and electrical transmission projects across the United Kingdom and Ireland, including PLHRA, peat management, engineering geological assessment and carbon balance calculations.
Joanna Cassidy	Hydrology, Geology and Hydrogeology Assessment	ITPEnergised	BSc (Hons) Geology, Senior Hydrologist with six years' experience within a consultancy setting. Joanna has experience in hydrology, hydrogeology and geology assessments for renewable and transmission developments. This includes EIA assessment and accompanying GWDTE and PWS Risk Assessments.
Sam Johnson	Aviation and Radar Assessment	RES	MMath Mathematics. Over 25 years' experience in radar including over 20 years working specifically with aviation and radar in the wind industry. Sam is a member of the Renewable UK Aviation Working Group, Chair of the Aviation Investment Fund Company Limited and Strategic Leadership Group Technical Theme Lead for the Scottish Government Onshore Wind Sector Deal.
Thomas Miller	Shadow Flicker Assessment and Development Design	RES	MSc Renewable Energy Systems and Technology with Distinction, PhD Chemistry; MChem Chemistry, two years' experience in wind energy industry.
Andrew Crompton	Forestry Assessment	Scottish Woodlands	Qualifications B.Sc, Dip.LE, MRICS 30 years' experience advising on forestry purchases and valuations. Significant experience in negotiating renewables options for landowners and preparation of forestry chapters in EIA reports for over 20 wind farm projects.

1.6 Availability of the EIA Report

1.6.1 In accordance with Section 18 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 application website, in the Scotsman, the Edinburgh Gazette, and in a relevant newspaper within the locality of the Proposed Development; likely to be the Galloway News.

1.6.2 Printed copies of the NTS and EIA Report are available by request from:

Blair Hill Wind Farm Project Team
Renewable Energy Systems Ltd.
Third Floor, STV,
Pacific Quay,
Glasgow,
G51 1PQ
Email:blairhill.windfarm@res-group.com
Website: https://blairhill-windfarm.co.uk/

1.6.3 Hard copies of the NTS are available free of charge, and hard copies of the EIA Report will be charged at £1,500.00 per copy. The price of the hard copy reflects the cost of producing the Landscape and Visual visualisations.

1.6.4 A printed copy of the EIA Report is available to view during normal opening hours at the following locations:

Newton Stewart Library
Church Street
Newton Stewart
DG8 6ER

John McNeillie Library
Wigtown County Buildings
Wigtown
DG8 9JH

1.6.5 Electronic copies of the EIA Report, including all figures, appendices and accompanying documents are available to view and download on the project website https://blairhill-windfarm.co.uk/ and can also be accessed at https://www.energyconsents.scot/.

1.6.6 Alternatively, a USB copy can be made available on request at a charge of £15 by emailing blairhill.windfarm@res-group.com.

1.7 Representation to the Application

1.7.1 Any representations to the application should be made directly to the Scottish Government at:

Energy Consents Unit
5 Atlantic Quay
150 Broomielaw
Glasgow
G2 8LU
Email: representations@gov.scot
Online: http://www.energyconsents.scot/

1.8 References

Scottish Government (2017). The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017. Available at: https://www.legislation.gov.uk/ssi/2017/101/regulation/18/made.

UK Government Department of Business, Enterprise and Industrial Strategy (BEIS) (2022). Subnational Electricity and Gas Consumption Statistics, Regional and Local Authority, Great Britain, 2021. Available at: https://www.gov.uk/government/statistics/subnational-electricity-and-gas-consumption-summary-report-2021. Accessed: June 2024.

UK Government (1989). Electricity Act 1989. Available at: https://www.legislation.gov.uk/ukpga/1989/29/contents.

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

2 Proposed Development

2.1 Introduction

2.1.1 This chapter provides a description of the Proposed Development site and its geographical context. It presents a description of the Proposed Development for which consent is being sought, for the purposes of informing the identification and assessment of likely significant environmental effects. This includes details of the proposed infrastructure components, as well as outline information on proposed construction methods and programme, the operation of the Proposed Development, and the approach to decommissioning.

2.2 Description of the Site

2.2.1 The Proposed Development is located approximately 2.7 kilometres (km) north of the town of Newton Stewart and 4 km east of the River Cree (refer to **Figure 1.1**) in the Dumfries and Galloway Council (DGC) area ('the Site'). The approximate site centre is at British National Grid (BNG) 241912, 572186.

2.2.2 The Site comprises an area of approximately 681.5 hectares (ha). The Proposed Development is set within open moorland and areas of commercial forestry. The elevation varies from 100 m Above Ordnance Datum (AOD) to 404 m AOD.

2.2.3 The northern extent of the Site borders the Galloway Dark Skies Park core area and buffer zones.

2.2.4 There are a number of watercourses running through the Site including Coldstream Burn, Black Burn, Glenshalloch Burn and Peat Rig Burn.

2.2.5 The environmental designations within 10 km of the Site, site-specific environmental constraints, and other wind farm developments within 45 km of the Site are discussed in **Chapter 3: Design Evolution and Alternatives**.

2.3 Description of the Proposed Development

Overview

2.3.1 The final Proposed Development layout is illustrated in **Figure 1.2** and would comprise 14 wind turbines with an indicative installed capacity of approximately 92.4 MW. In addition to the wind turbines, associated infrastructure for the lifetime of the Proposed Development will include:

- low to medium voltage transformers and related switchgear at each turbine;
- turbine foundations;
- a Site access track (providing access from the public road to the main Site boundary);
- on-site access tracks (providing access between all proposed infrastructure on the Site, as listed below);
- hardstand areas for cranes at each turbine location;
- a substation compound containing electrical infrastructure, control building, welfare facilities and communications mast;
- underground cabling; and
- watercourse crossings.

2.3.2 Temporary infrastructure required for construction would include:

- a construction compound;
- crane assist pads;

- blade laydown supports;
- boom supports;
- laydown areas;
- a concrete batching plant; and
- potential excavations/borrow pit workings.

2.3.3 The Proposed Development will provide various enhancement measures, including:

- Biodiversity enhancements (see **Figure 2.17**, as well as Chapter 8: Ecology Assessment and Technical Appendix 8.6);
- Cultural Heritage enhancements (see **Figure 2.17**, as well as Chapter 7: Cultural Heritage and Technical Appendix 7.3);
- Recreation and Access enhancements (see also the standalone Economic and Community Impact Report submitted in support of the S36 application).

Micrositing

2.3.4 To be able to address any localised environmental sensitivities, unexpected ground conditions or technical issues that are found during post-consent detailed intrusive site investigations and construction, agreement is sought for a 75 m micrositing allowance around all wind farm infrastructure, although this would be undertaken with due consideration of environmental constraints e.g. watercourses, high value habitat areas, areas of potentially deeper peat, etc.

2.3.5 The technical EIA assessments (presented in **Chapters 6 to 15**) have considered the potential for micrositing and it is considered that the proposed infrastructure could be microsited, if necessary, without resulting in potential new adverse effects. During construction, the need for any micrositing would be assessed and agreed with the relevant personnel on site, e.g. Environmental Clerk of Works (EnvCoW).

Wind Turbines

2.3.6 The Proposed Development will comprise 14 wind turbines, 12 of which would be up to 250 m tip height (refer to **Figure 1.2**), and two of which would be up to 210 m tip height. Where necessary for assessment purposes, a rotor blade diameter of 170 m has been used although the rotor blade diameter may vary (within the maximum turbine tip height) depending on turbine availability at the time of construction.

2.3.7 The proposed locations of the wind turbines have been defined to enable the EIA to fully assess the Proposed Development for which permission is being sought. The BNG coordinates denoting where each of the wind turbines are proposed to be located are listed in **Table 2.1**.

Table 2.1: Wind Turbine Coordinates

Turbine	X-coordinate	Y-coordinate	Turbine Height
T1	242473	574210	250 m
T2	242694	573636	250 m
T3	242305	573204	250 m
T4	241753	572981	250 m
T5	242474	572624	250 m
T6	241874	572364	250 m
T7	242455	572030	250 m
T8	241652	571803	250 m

Turbine	X-coordinate	Y-coordinate	Turbine Height
T9	242193	571483	250 m
T10	241546	571218	250 m
T11	242327	570903	250 m
T12	241607	570626	250 m
T13	242166	570330	210 m
T14	241645	570030	210 m

2.3.8 Each of the wind turbines comprises the following components:

- three blades;
- tower;
- nacelle;
- hub; and
- transformer and switchgear.

2.3.9 Each wind turbine will have a nacelle mounted on a tapered tubular steel, or steel and concrete hybrid tower. The concrete hybrid tower would comprise multiple high pressurised concrete sections with steel tube segments attached. The design of the tower will be subject to turbine manufacturer requirements. The nacelle will contain the gearbox or direct drive, the generator, the transformer and other associated equipment. The hub, and rotor assembly, including three blades, will be attached to the nacelle.

2.3.10 An elevation drawing of a typical turbine is illustrated in **Figure 2.1a** and **Figure 2.1b.** The wind turbines will be of a typical modern, three-blade, horizontal axis design in semi-matt white or light grey with no external advertising or lettering except for statutory notices.

2.3.11 The switchgear will be sited within external transformer housing a few metres away from the tower, within the turbine's permanent hardstand area, as can be seen on **Figures 2.2a** and **2.2b**.

Turbine Lighting

2.3.12 Air Navigation Order Article 222 requires turbines exceeding a tip height of 150 m to display aviation lighting to indicate their presence. Dispensations for reduced lighting schemes can be agreed with the Civil Aviation Authority (CAA), according to the guidance provided in CAP-7643. For the Proposed Development, only six of the turbines (T1, T4, T5, T10, T11 and T14) would be lit – see **Figure 15.1**. This was agreed with the CAA (see letter dated 13thDecember 2024 in **Volume 3**). The lighting design is discussed in more detail in **Chapter 15: Aviation, Radar and Defence**.

Wind Turbine Foundations and Hardstands

2.3.13 Typical wind turbine foundations consist of steel reinforced concrete. They are expected to comprise of gravity type or piled type foundations. Typical illustrations of each foundation type are provided in **Figures 2.2a** and **2.2b**. Until detailed ground investigations have been undertaken, the exact size and depth of foundations required cannot be accurately defined. However, for the purposes of this EIA Report, typical dimensions have been assumed as described below.

2.3.14 Concrete gravity bases would be located underground which would require prior excavation of ground. The amount of ground to be removed would depend on site-specific conditions at each turbine location. Peat, topsoil and other materials would be removed from the turbine foundation footprint area and stored so that it may be used later for reinstatement.

2.3.15 Concrete for the construction of the turbine foundations will be prepared on-site at a temporary concrete batching plant. The location of the proposed concrete batching plant

is indicated on **Figure 1.2**, and a typical drawing of a concrete batching plant is provided in **Figure 2.10**.

2.3.16 Turbine foundations will likely be circular, with a footprint of approximately 25 m diameter at subformation, and 10.8 m diameter finished surface footprint consisting of approximately 5.8 m diameter tower base and 5 m gravel path. Hybrid concrete towers would consist of approximately 9.1 m diameter tower base and 5 m gravel path.

2.3.17 The final foundation design will be specific to the Site conditions as verified during detailed pre-construction site investigations and will depend on the wind turbine suppliers specifications. In the unlikely event that ground conditions are unsuitable for the standard foundation design as described above, an alternative foundation design may be required, although it is not expected that this would materially affect the conclusions of the EIA.

Crane Hardstands

2.3.18 To enable the construction of the wind turbines, temporary crane hardstand area and turning area at each turbine location will be required to accommodate assembly cranes and construction vehicles. This will comprise several crushed stone hardstand areas measuring approximately 1,030 m^2 in total per turbine location. The likely temporary crane hardstand arrangement is indicated in **Figure 1.2**, and an illustration of a typical crane hardstand is provided in **Figure 2.3**. However, the actual dimensions will be subject to the specifications required by the selected turbine manufacturer and crane operator and following detailed site investigations prior to construction commencing. After turbine erection is completed, the temporary hardstand areas would be reinstated.

2.3.19 Detailed construction drawings with final dimensions will be available prior to the commencement of construction once the final turbine model has been selected.

2.3.20 Each turbine will have a permanent hardstand area of approximately 3,000 m^2 and temporary hardstand area of approximately 1030.5m^2– the locations of these are indicated on **Figure 1.2**. These permanent hardstand areas will remain in place for the life of the Proposed Development to facilitate operational maintenance.

Site Entrance and Access Tracks

2.3.21 Access to the Site will be gained via an existing forestry track connected to the A712. An indicative drawing of the proposed site entrance is presented in **Figure 2.5**, and indicative drawing of the Old Edinburgh Road Junction is provided in **Figure 2.6**. The access track will be approximately 11.5 km long, have approximately 4.5 m running width with a 0.5 m shoulder either side (total width of 5.5 m) and will require a new watercourse crossing over the Penkiln Burn (see **Figure 2.9**) to accommodate the required construction traffic and abnormal indivisible load vehicles. The existing Auchenleck Bridge is located further upstream than the proposed new Penkiln Burn crossing but this was assessed as unsuitable for abnormal indivisible load vehicles and therefore a new watercourse crossing is required. A new section of track will be required at this watercourse crossing and this is illustrated on **Figure 1.2** and in **Technical Appendix 11.1**.

2.3.22 Visibility splays at the Old Edinburgh Road junction have been considered. This section of road has no posted speed limit and is therefore subject to National Speed Limit. In accordance with the Design Manual for Roads and Bridges (DMRB) CD 109 Highway link design and CD 123 Geometric design of at-grade priority and signal-controlled junctions the associated Y-distance for visibility would normally be a desirable minimum of 215 m. Due to the lightly trafficked nature of Old Edinburgh Road at this location, the collection of reliable speed surveys has not been possible. There are however a number of mitigating factors which would suggest a reduced visibility splay would be satisfactory at this location:

- Old Edinburgh Road is understood to be used for local access and forestry activity only. As such, the majority of users are familiar with the road.

- The width of Old Edinburgh Road is not conducive to high traffic speeds;
- The condition and alignment of Old Edinburgh Road are not conducive to high traffic speeds; and
- Due to forestry activity, the majority of vehicles using Old Edinburgh Road are classified as 'heavy vehicles' and speeds would be controlled through operation plans by FLS.

2.3.23 Based on the above, a desirable minimum of 215 m is not considered as in-keeping with the condition and usage of Old Edinburgh Road. **Figure 2.6** demonstrates the visibility splays which can be achieved at proposed junctions on Old Edinburgh Road.

2.3.24 Access to the turbine locations would be gained via a network of onsite tracks, some of which would consist of existing tracks which will require upgrading to be able to facilitate the required construction and abnormal indivisible load vehicles. The access track layout has been designed in order to maximise the use and upgrade of existing tracks as far as reasonably practicable. It is anticipated that approximately 3 km of existing tracks will require upgrading, and approximately 8.5 km of new tracks will require to be constructed. **Figure 2.4** presents an indicative drawing of a typical on-site access track.

2.3.25 The access tracks would generally be unpaved (stone surface) and of a total width of 5.5 m (including a 0.5 m shoulder on either side). Turning heads of sufficient size to accommodate articulated vehicles would also be provided at several locations.

2.3.26 The need for access track drainage will be established on-site during construction. A drawing of typical access track cross drainage is provided in **Figure 2.7**.

Watercourse Crossings

2.3.27 The tracks providing access to the proposed wind turbines and other infrastructure will need to cross surface watercourses at several locations. While avoiding watercourses and minimising required watercourse crossings was one of the main principles influencing the design of the Proposed Developments, largely due to the nature of the topography of the Site, the Proposed Development will require a total of 42 watercourse crossings, of which 37 are existing crossings, and only five are proposed new crossings. The five proposed new watercourse crossings are shown on **Figure 1.2**. The locations of all of the watercourse crossings are shown on **Figures 10.1** and discussed in more detail in **Chapter 10: Geology, Hydrology and Peat** and in **Technical Appendix 10.1**.

2.3.28 Of the five new crossings, one will be a single span bridge (referred to as the Penkiln Burn crossing – see **Figure 2.9**), two will be a culvert (bottomless arch or closed), and two will be a single span structure or culvert depending on detailed design. **Figure 2.8** presents a typical water crossing.

2.3.29 The final detailed design for all watercourse crossings, will be addressed through an appropriately worded condition and in accordance with the requirements of the *Water Environment (Controlled Activities) (Scotland) Regulations 2011* (CAR).

Construction Compounds

2.3.30 A temporary construction compound and a will be required during construction. The location of this compound is shown in **Figure 1.2.** An indicative layout of a typical construction compound is provided in **Figure 2.15**. The temporary construction compound will comprise an area of approximately 4 000 m^2.

2.3.31 The proposed location of the compound is on firm ground and avoid habitats of highest sensitivity. Prior to commencing construction work, a detailed appraisal of the area will be undertaken, including the applicable ecological checks and trial pits and /or boreholes to confirm the nature of the sub-strata.

2.3.32 The detailed location, size and engineering properties of the construction compound will be confirmed prior to the start of construction, after the turbine supplier and model have been confirmed.

2.3.33 The main construction site office and compound will comprise temporary cabins to be used for the site offices, the monitoring of incoming vehicles and welfare facilities for site staff including toilets; parking for construction staff visitors and construction vehicles; secure storage for tools and small parts; a receiving area for incoming vehicles; and security fencing around the compound.

2.3.34 The compound will include storage areas for the various components, fuels and materials required for construction. The major structural components of the turbines would be delivered directly to Site. Temporary lay-down areas will be provided for parking and unloading vehicles

2.3.35 There will be a sealed bunded area where fuel and oil storage tanks will be situated, to prevent potential contamination. In accordance with SEPA guidance the bunded area will be situated a minimum of 50 m from any watercourse to reduce the risk of pollution entering the watercourse.

2.3.36 Temporary downward lighting may be required at the temporary construction compound and at work areas during working hours for health and safety of personnel. It is not anticipated that lighting will be required outside of working hours. The lighting would be directional in accordance with Institute of Lighting Professionals (ILP) guidance and mounted on the individual portacabins.

2.3.37 The construction compound and lay down areas would be constructed by first stripping the topsoil/peat, which would be stored in a mound for subsequent reinstatement at the end of the construction period, as described in **Chapter 10: Geology, Hydrology and Peat** and **Technical Appendix 10.2**. Care will be taken to maintain separate stockpiles for turf and the different soil/peat types to prevent mixing during storage. A geotextile would then be placed on the sub-stratum, which would be overlain by a working surface of stone.

2.3.38 Reinstatement would involve removing the stone and underlying geotextile before carefully ripping the exposed substrate and replacing the excavated soil/peat.

Substation and Control Buildings

2.3.39 The Proposed Development includes a substation compound which will accommodate a substation building and an operation control building. The compound footprint area will be approximately 6,400 m^2 . It will be constructed of compacted stone on a suitable formation stratum, including reinforced concreate foundations for the buildings and ancillary equipment. The substation compound would contain one step-up transformer, associated switchgear, telecommunications mast and ancillary equipment suitable for a transmission connection to the electricity grid system. The wind farm control building required at the substation compound would accommodate metering equipment, switchgear, the central computer system and electrical control panels. In addition to the control building, a welfare building will be installed for all personnel. **Figures 2.11** and **2.12** present indicative layout and elevation drawings of the proposed substation compound. This is indicative and the design and layout are subject to change once the expected point of connection is known, refer to the section on Grid Connection, below.

2.3.40 The telecommunications mast is expected to be up to 10 m tall and set within the substation and control building compound area. An indicative drawing of a typical telecommunications mast is shown in **Figure 2.13**.

2.3.41 Within the substation compound, the control building is likely to comprise a single storey unit measuring approximately 15 m x 10 m with a pitched roof as shown in **Figure 2.12**.

2.3.42 The final designs for the substation and operation control buildings will incorporate sustainable design features such as a living green roof (see also **Technical Appendix 8.6**) and will be agreed with DGC.

2.3.43 Lighting will be kept to a minimum and will be limited to working areas only and will comply with health and safety requirements. Lighting will be down lit and linked to timers and movement sensors so that light pollution is kept to a minimum.

Cables

2.3.44 The wind turbines envisaged for use on the Proposed Development would initially generate electricity at 690 – 1,000 V. This typically needs to be stepped up to the on-site distribution voltage of 33 kV via an ancillary transformer. Each wind turbine will be connected to the substation compound via underground electrical cables.

2.3.45 Cable trenches will accommodate these electrical cables, including communication cables and the earthing cable network. **Figure 2.14** presents the typical cable trench cross section that shall be adopted across the site. Where cables need to cross access tracks or hardstands, they will be routed through ducts.

2.3.46 The layout of the cable trenches within the site would generally run adjacent to the access tracks where possible. The route would be marked above ground with clearly identified posts, spaced at suitable intervals along the length.

Borrow Pits

2.3.47 To minimise the volume of imported material brought onto the Site and any associated environmental impact, borrow pits may be used to source stone for the construction of access tracks, hardstand areas and compound construction. A borrow pit is an area where material has been excavated for use at another location.

2.3.48 Borrow Pits will also be investigated to determine the suitability of stone for use as concrete aggregate, removing the need to import to the batching plant from off site.

2.3.49 Five potential borrow pit search areas have been identified on-site, as indicated in **Figure 1.2**. These have been identified based on the anticipated availability and accessibility of aggregate material required for the construction of the tracks, hardstands and construction compounds, and also to avoid environmentally sensitive areas such as deeper peat, higher value habitat areas, watercourses, sites of archaeological and cultural heritage sensitivity, etc., as far as practicable. These borrow pit search areas are shown as the maximum potential area of borrow pit extraction, but it is not anticipated that these areas would be fully exploited.

2.3.50 The total estimated quantity of stone required is estimated to be achieved from an area of approximately 18,000 m^2. This quantity of stone would likely require at least five borrow pits of approximately 60 m x 60 m, although the size of the borrow pits could be larger or smaller within the borrow pit search areas depending on ground conditions. An indicative drawing of a typical 60 m x 60 m borrow pit is presented in **Figure 2.16**.

2.3.51 A Borrow Pit Management Plan will be agreed with Scottish Environment Protection Agency (SEPA) and DGC prior to the commencement of construction. An outline Borrow Pit Management Plan is included in **Technical Appendix 10.6**.

Grid Connection

Connection to Grid

2.3.52 The grid connection does not form part of the application for the Proposed Development. Any required consent for the grid connection would typically be sought by Scottish Power Transmission, the Transmission Owner (TO) for this area of grid network. The TO will be

responsible for the consenting, construction and operation and maintenance of the grid connection. For information, the proposed point of connection for the Proposed Development into the electricity grid system is at the substation compound. The Proposed Development would most likely be connected to a new proposed substation adjacent to Glenlee Substation, approximately 20 km north east of the site.

Grid Connection Route

2.3.53 The connection would likely be completed via a 132 kV trident wooden pole overhead line (OHL). The exact arrangement of this grid connection is subject to detailed design by the TO, however it is envisaged that this would follow the existing grid route of Newton Stewart-Glenlee 132 kV Over Head Line, where possible. This route passes adjacent to the Penkiln Burn to the south east of the site, before continuing north east towards Clatteringshaws Loch. It passes north of Clatteringshaws Loch before following the Craigshinnie Burn to Glenlee Substation.

2.3.54 Should further detailed studies determine that a grid connection to another transmission entry point prove more suitable, the TO will advise the Applicant in due course. Any final grid connection route and associated consents would be the responsibility of the TO and this route would require further studies and would be subject to a separate consenting process and EIA if required.

Proposed Environmental, Heritage and Access Enhancements

2.3.55 Several environmental, heritage and recreational access enhancements have been incorporated into the design of the Proposed Development and are presented on **Figure 2.17**.

Biodiversity Enhancement

2.3.56 A Biodiversity Enhancement and Management Plan (BEMP) will be implemented during the life of the project which will offer opportunities for interrelated environmental enhancements at the Site with respect to peat, biodiversity and forestry. An Outline BEMP is attached as **Technical Appendix 8.6** and is discussed in more detail in **Section 8.9** of **Chapter 8: Ecology**.

Broadleaved Woodland Creation

2.3.57 The Site currently has a relatively low diversity of tree species as woodland resource is dominated by commercial conifer plantation. It is proposed that, as part of the Proposed Development, a riparian area of semi-natural appearing broadleaved woodland would be created in the long-term. The creation of woodland has multiple beneficial biodiversity effects such as creating structure and new breeding, shelter and foraging habitats for a range of species, from terrestrial and aquatic invertebrates to birds, bats and fish. There are also many secondary benefits of woodland creation, such as natural flood attenuation, shade, carbon sequestration and helping to mitigate the effects of climate change.

2.3.58 Specifically, riparian planting would also improve the ecological quality of watercourses (e.g., through allochthonous material inputs, thermoregulation, erosion reduction), create shelter opportunities (e.g., for otter), establish improved habitat corridors (e.g., for bats) and provide shading to watercourses and a source of nutrient inputs and aiding in temperature regulation and cover for fish. The planting proposals across specific areas on the Site would also benefit black grouse through enhanced shelter and foraging habitats and the connectivity of these locally.

Peatland Restoration / Enhancement

2.3.59 Several areas have been identified on-site as suitable areas to undertake peatland restoration. Such measures would aim to enhance the existing and degraded peatland

habitats on site. Peatlands are important for preventing and mitigating the effects of climate change, preserving biodiversity and minimising flood risk. The improvement of these habitats will also be of benefit to local flora and fauna, including the upland bird assemblage.

Acid Grassland Restoration

2.3.60 There are currently large areas of dense and continuous bracken within the Site. Dense bracken habitats are of negligible conservation value. The aim with respect to bracken areas will be to remove and control the bracken in order to allow the local acid grassland habitats to naturally regenerate and maintain this throughout the lifetime of the Proposed Development. The control of bracken will extend the amount of grassland present and improve the floral diversity of the area and increase wildflower cover for insects and pollinators, the replacement of tall dense bracken with open grassland habitats here may also create further lekking site opportunities for black grouse that are present locally.

Living Green Roofs

2.3.61 Living green roofs will be installed on the control and welfare buildings within the substation compound. The living green roofs will provide a growing substrate in which a diverse mix of native grasses and wildflowers would be sown. Planting with a wide range of native species to support the greatest diversity of species will maximise the green roofs biodiversity potential. Living green roofs may be used by birds; however, their key benefit is increasing local floral diversity and providing key habitat for invertebrates and pollinators.

Cultural Heritage Enhancements

2.3.62 There are six Scheduled Monuments and a number of non-designated heritage assets, ranging from prehistoric to post-medieval in date, located near the Proposed Development. The Site has been in use for thousands of years, with the prehistoric assets indicating a use of the landscape for funerary and ritualistic practices and the post-medieval assets being agricultural in nature. The sites of archaeological and cultural significance are identified and discussed in detail in **Chapter 7** of this EIA Report.

2.3.63 Due to the location and condition of the Site at present, these archaeological and cultural heritage assets are not accessible to the large majority of the public. Part of the Proposed Development includes enhancing accessibility to the heritage assets. It is proposed that a network of new and upgraded footpaths will form a signposted heritage trail through the Site as indicated in **Figure 2.17**. The proposed heritage trail is discussed in more detail in **Section 7.10** and **Technical Appendix 7.3** of this EIA Report.

2.3.64 A summary of the proposed enhancement measures is outlined below:

- Enhancement of appreciation points at the assets along with the provision of Interpretation Boards to further the understanding and experience of the monuments as depicted in **Figure 7.4**.
- Creation of designated pathways to access monuments and limit foot erosion.
- Improvement of existing parking availability to provide more access to appreciate the monuments.
- Outreach to local communities in the form of presentation by industry leaders for furthering understanding of the history in the area.
- Excavation and publication of results of any archaeological investigations within Site with local groups/Student Summer Schools in conjunction with Local Universities or Colleges. This would be subject to agreement with the local authority.
- Removal of intrusive vegetation upon Garlies Castle (SM) once agreement has been secured with Scottish Ministers in line with HES under Scheduled Monument Consent.

- A LiDAR survey of the Site to assist local groups in visually understanding their history; and
- Appointment of a Heritage Ranger to oversee and implement the measures outlined above.

2.3.65 More detail on proposed cultural heritage enhancements is provided in **Technical Appendix 7.3.**

Recreational Access Enhancement

2.3.66 Once the Proposed Development is operational, the wind farm tracks will be opened to the public to increase access to the countryside. Where possible, footpaths and tracks would be suitably equipped to enable wheelchair access, with further options currently still being explored. Recreation and access benefits are also discussed in the Socio-Economic and Community Benefit Impact Report submitted as part of the application for Section 36 consent, alongside this EIA Report.

2.3.67 Parts of the Site will continue to be used for farming and forestry operations during the operational phase of the Proposed Development, and as such, responsible access will be promoted throughout the Site.

2.4 Health and Safety during Construction, Operation and Decommissioning

2.4.1 The construction site would be managed and operated in accordance with Health and Safety and Work etc. Act 1974 and comply with relevant Health and Safety Regulations, including:

- The Management of Health and Safety at Work Regulations 1999;
- Electricity Safety, Quality and Continuity Regulations 2002; and
- Construction (Design and Management) (CDM) Regulations 2015.

2.4.2 In awarding any civil, electrical or other contracts for the construction of the Proposed Development the appointed contractor is obligated by law to follow the CDM Regulations implemented by the Health and Safety Executive (HSE). These are based on standard procedures that are adapted to take account of all site specific requirements. The CDM Regulations require due consideration is given to construction workers and the public, with risk assessments and method statements created to cover all risks identified including access rights across the site.

2.4.3 The Applicant will appoint a Principal Designer to ensure all the CDM Regulations are correctly implemented, and to compile a Health and Safety File, which would be used in the operational phase of the Proposed Development. Additionally, a representative from the Applicant would be at the Proposed Development during the construction period. This person would be empowered to halt any or all construction works if they believe correct health and safety procedures are not being adhered to. Similar procedures for site workers, visitors and civilians must be drawn up for the operational phase. The HSE can investigate safety aspects of the Proposed Development and visit at any time if there are any concerns.

Public Safety During Construction

2.4.4 Throughout the construction phase of the Proposed Development, the relevant statutory requirements would be adhered to. All potentially hazardous areas would be fenced off and all unattended machinery will be stored in the temporary construction compound or immobilised to prevent unauthorised use. In addition, signage will be placed at each

possible entrance to the Site and in areas where there may be further danger, for example around open borrow pits.

2.4.5 Site security and access during the construction period would be governed under Health and Safety at Work Act 1974 and associated legislation.

2.4.6 Prior to construction of the Proposed Development, an Outdoor Access Management Plan (OAMP) will be prepared in consultation with DGC. It will detail the maintenance of safe public access routes within and around the Site during construction and long-term public access during operation of the Proposed Development.

2.4.7 Throughout construction, measures to manage diversion routes would be agreed with the relevant authorities. The diversion routes would be clearly marked and for safety reasons would direct the user away from any areas of construction. It is proposed that further details would be provided in an Outdoor Access Management Plan post consent.

2.4.8 Although members of the public have the right to roam land in Scotland under the Land Reform (Scotland) Act 2003 there will be restricted access around the Proposed Development during the construction phase for health and safety purposes.

2.5 Construction

2.5.1 The Proposed Development will be constructed over a period of approximately 24 months and is anticipated to commence in 2029. Construction would include the principal activities listed within the indicative construction programme as provided in **Table 2.2** below.

Table 2.2 Indicative Construction Programme

Month	Mobili-sation	Site Entrance & Access Tracks	Crane Hardstands	Turbine Foundations	Substation	Cable Installation	Turbine Deliveries	Turbine Erection	Testing, Commis-sioning & Energisation	Demobilisation & Operational Take Over
1										
2										
3										
4										
5										
6										
7										
8										
9										
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24										

Construction Activities

2.5.2 The construction of the Proposed Development will involve the following:

- Upgrading of the existing forestry access track to enable construction traffic to access the Site from the A712. The access track would also require the installation of a new section of track and a single-span bridge across a watercourse;
- Felling of areas of forestry alongside the access track and in select strategic locations within the main site (felling areas identified in **Chapter 14**);
- Opening of borrow pit(s) within borrow pit search areas to win aggregate for track and hardstand construction;
- Construction of permanent new on-site tracks required to access the wind turbine positions. These would be used by civil engineering plant and construction equipment;
- Upgrading of existing tracks where required;
- Construction of a secure site compound and storage area for the Site office facilities and storage of materials and components;
- Installation of hardstands and outrigger pads for the support of the cranes that will be used to erect the wind turbines;
- Construction of the foundations for the support of the wind turbine structures;
- Wind turbine delivery, assembly and erection;
- Installation of transformers in separate housing alongside each wind turbine;
- Installation of high-voltage electrical cabling, communication cabling and earthing;
- Installation of Supervisory Control and Data Acquisition (SCADA) system;
- Construction of the substation and control buildings;
- Commissioning of site mechanical and electrical equipment;
- Reinstatement and landscaping, removal of temporary site offices, reseeding verges and areas around turbine bases;
- Installation of accessible footpaths to enable wheelchair access to the Site, if / where practicable; and
- Installation of the proposed heritage trail and information signs.

Construction Materials

2.5.3 The main materials likely to be required for the construction of the access tracks, turbine and substation foundations, and hardstand areas, are as follows:

- crushed stone;
- geotextile;
- cement;
- sand;
- concrete;
- steel reinforcement; and
- electrical cable.

2.5.4 Should surface water run-off or groundwater enter excavations during construction of the turbine foundations, appropriate pumping measures away from watercourses will be implemented to ensure the works are safely carried out and the excavation is sufficiently dry to allow concrete placement. Once the concrete is cast, the excavated material will be used for backfill and compacted to the required design density. Once this backfill is completed, the crane hardstand areas will be constructed.

Traffic & Transportation

2.5.5 A detailed Transport Assessment has been undertaken which provides details regarding transport and access to the Site (refer to **Chapter 11**).

2.5.6 Traffic associated with the construction and maintenance of the Proposed Development falls into two main categories, namely Abnormal Indivisible Loads (AIL) and Construction /

Maintenance Loads. The AILs are those that will require an escort, either by private contractor or by police escort. Construction / maintenance loads are those that do not require any special escort or permissions and are only influenced by normal traffic regulations.

2.5.7 The Applicant will ensure that the vehicles will be routed as agreed with DGC, Transport Scotland and Police Scotland, to minimise disruption and disturbance to local residents and road users. Further details regarding transport and access can be found in **Chapter 11** of this EIA Report.

Construction Hours

2.5.8 Normal construction hours will be between 07:00 and 19:00 Monday to Friday and 07:00 and 13:00 on Saturdays and bank holidays. These times have been chosen to minimise disturbance to local residents. It must, however, be noted that out of necessity due to weather conditions and health and safety requirements, some generally quiet activities, for example AIL deliveries (which are controlled by Police Scotland) and the lifting of the turbine components, may occur outside the specified hours stated. Any construction outwith these hours will be in line with the noise limits as assessed in **Chapter 12** and advance warning of any works outwith the agreed working hours will be provided to DGC and local residents.

Construction Workforce

2.5.9 A detailed construction workforce schedule, i.e. employee number through the construction programme and likely shift patterns would not be known until the contract for building the wind farm has been granted, however the maximum number of staff likely to be on-site at any one time would be 35.

Local Supply Chain

2.5.10 The Applicant is committed to ensuring that, wherever reasonably practicable, local contractors and employees are used in all aspects of wind farm development. The major opportunities arise during the construction phase when suitably qualified local firms are invited to bid for different aspects of construction, such as foundation laying and electrical works.

2.5.11 Construction materials are normally sourced locally (i.e. within the county) and local transport and plant hire companies used wherever possible.

2.5.12 Expenditure in the local economy during the development, construction and operation of wind farms varies from project to project due to various factors including project size, project duration, and the availability of local suppliers. In recent years, the Applicant has seen typical spend with local stakeholders, suppliers and service providers in the region of £279,000 per wind turbine during the development, construction and first year of project operation. In some cases, it has been possible to significantly improve on this number.

2.5.13 The Blair Hill Wind Farm, if consented, could generate the following during the development and construction phase:

- £12 million Gross Value Add (GVA) and support *c*.128 job years in Dumfries and Galloway, and
- £33 million GVA and *c*.360 job years across Scotland (with peak employment of 183 jobs).

2.5.14 The expenditure required for the operations and maintenance of the Proposed Development could generate each year:

- £1.1 million GVA and support *c*.6 jobs in Dumfries and Galloway; and
- £2.4 million GVA and *c*.19 jobs across Scotland.

2.5.15 For further detail on expected socio-economic impacts of the Proposed Development, refer to the Economic and Community Impact Report of Blair Hill Wind Farm, a standalone report to be submitted alongside this EIA Report as part of the application for Section 36 consent.

2.6 Environmental Management

Construction Environmental Management Plan

2.6.1 An Outline Construction Environmental Management Plan (OCEMP) is attached as **Technical Appendix 17.1**. The OCEMP sets out the general principles of the environmental management that is to be implemented during construction, to ensure that all mitigation measures as set out within this EIA Report are carried out, as well as complying with any conditions of consent and environmental regulatory requirements. The OCEMP has been developed in accordance with 'Good Practice During Wind Farm Construction' (NatureScot, 2024). The OCEMP will be expanded upon and developed in more detail by the contractor responsible for undertaking the construction works prior to the commencement of construction.

2.6.2 The CEMP shall describe how the Applicant will ensure suitable management of the following environmental issues during construction of the Proposed Development:

- noise and vibration;
- dust and air pollution;
- surface and ground water;
- ecology (including protection of habitats and species);
- cultural heritage;
- waste (construction and domestic);
- pollution incidence response (for both land and water); and
- site operations (including maintenance of the construction compound, working hours and safety of the public).

2.6.3 The CEMP is anticipated to include, or cross-reference to, the following documentation:

- Construction Methodology Statements (CMSs);
- Construction Traffic Management Plan (CTMP);
- Pollution Prevention Plan (PPP);
- Site Waste Management Plan (SWMP);
- Drainage Management Plan (DMP);
- Peat Management Plan (PMP) (refer to an outline plan in **Technical Appendix 10.4**);
- Biodiversity Enhancement Management Plan (BEMP) (refer to an outline plan in **Technical Appendix 8.6**); and
- Any agreed mitigation plan(s), e.g. a Written Scheme of Investigation (WSI) for management of potential direct impacts on cultural heritage assets and potential archaeological finds.

2.6.4 The contractor and/or Applicant shall consult with DGC, SEPA, NatureScot and Historic Environment Scotland (HES) on relevant aspects of the CEMP. The contractor shall amend and improve the CEMP as required throughout the construction and decommissioning period.

2.6.5 The CEMP shall contain details of all environmental mitigation required during construction and details on how the contractor will implement and monitor this mitigation. The CEMP will also contain details on how the contractor will liaise with the public and landowners and how queries or complaints will be responded to.

2.6.6 The Applicant will engage an Environmental Clerk of Works (EnvCoW) onsite during the construction phase. The EnvCoW will be responsible for communicating environmental information and monitoring the construction process on site to provide advice and to ensure

that the measures within the CEMP are followed. The roles and responsibilities of the personnel responsible for implementation of the CEMP will be set out in the CEMP itself.

2.6.7 Specific requirements of the CEMP for each of the environmental topics assessed within the EIA are provided in the relevant EIA Report chapters and an outline CEMP is provided in **Technical Appendix 17.**

Pollution Prevention

2.6.8 Prior to commencement of construction, a pollution prevention strategy, contained within the CEMP, will be agreed with the SEPA to ensure that appropriate measures are put in place to protect watercourses and the surrounding environment.

2.6.9 As with any wind farm development, during the construction stage there are potential risks to the quality of the water environment in water bodies, watercourses and local drains. The occurrence of incidents which result in adverse impacts to the water environment mostly arise from poor site practice; therefore, careful attention will be paid to the appropriate guidance and policies to reduce the potential for these to occur (refer to **Chapter 10: Geology, Hydrology and Peat** for further details).An outline Pollution Prevention Plan (OPPP) has been developed for the Proposed Development and is presented in **Technical Appendix 17.2**.

Pre-Construction Surveys

2.6.10 Detailed surveys have informed the design process of the Proposed Development. However, certain design elements are dependent on wind turbine model and manufacturer, therefore detailed construction details will be decided once the final wind turbine model has been confirmed.

2.6.11 Pre-construction surveys will be undertaken to update the ecological and ornithological baseline and to perform detailed geotechnical ground surveys, further details of these are provided in the relevant technical chapters.

2.6.12 The Applicant will engage an Ecological Clerk of Works (ECoW) onsite during the construction phase. The ECoW will be responsible for pre-construction surveys and will monitor the construction process on site to provide advice in relation to ecological and ornithological matters, and to ensure that the measures within the CEMP relating to ecology and ornithology are followed.

2.7 Operation and Maintenance

2.7.1 The lifetime of the Proposed Development is envisaged to be 50 years from the final commissioning to commencement of decommissioning.

2.7.2 The Proposed Development would be maintained throughout its operational life by a service team. The service team would comprise operation management, operations technicians and support functions undertaking the scheduled and unscheduled maintenance throughout the year. This team would either be employed directly by the developer or by the turbine manufacturer. Management of the wind farm would typically include turbine maintenance, health and safety inspections and civil maintenance of tracks, drainage and buildings.

Public Safety During Operation

2.7.3 Wind farms have a proven track record for safety. A very small number of wind turbines have been known to suffer mechanical damage through lightning strikes or mechanical failure. Experience on operational wind farms has shown that allowing the public to access an operating wind farm does not lead to a compromise with respect to safety issues.

2.7.4 Companies supplying products and services to the wind energy industry operate to a series of international, European and British standards. A set of product standards for wind energy equipment has been developed by the International Electrotechnical Commission - IEC 16400. There are a number of British Standards that correspond to it, for example; BS EN 61400-1 ed3.0: 2005 "Wind turbines – Part 1: Design requirements".

2.7.5 The Applicant will commit to installing turbines and components that meet BS EN 61400-1 ed3.0.

2.7.6 Public access to the Site after construction has been completed would be returned, although with some specific improvements to footpath infrastructure to facilitate public access which have been proposed as part of the Proposed Development. Appropriate warning, directional and identification signs for the purposes of health & safety would be installed on the turbines, transformers and at the substation compound. Access to these would be restricted to wind farm personnel. At all times, these facilities will be locked. Additionally, safety and/or directional signs will be placed at strategic points across the site, particularly on the public routes to inform members of the public that they are entering a wind farm, to make them aware of potential hazards and provide direction for emergency services should the need arise. Appropriate warning signs would be installed concerning restricted areas such as transformers, switchgear, metering systems and the substation compound. All on-site electrical cables will be buried with relevant signage. Any signage would be agreed with the relevant authorities prior to installation. It is proposed that further details would be provided in an Outdoor Access Management Plan post consent.

2.7.7 No resulting safety risks are expected as a result of public access to the Proposed Development.

Turbine Monitoring and Control

2.7.8 Wind turbine models being considered for the Site would operate automatically and have sensors to detect any instabilities or unsafe operation during high wind speeds. Should sensors placed within the nacelle and tower of the turbine detect any other malfunction in operation or should wind speeds increase over maximum operational thresholds, the brakes would be automatically applied in order to rapidly shut the turbine down.

Meteorological Effects

2.7.9 Blade icing in Scotland is likely to be a rare occurrence, therefore icing conditions are expected to be benign. The design of the Proposed Development has taken into account the possibility of ice throw occurring and turbines have been sited in locations to ensure that the rotor blades do not oversail any public roads to minimise the risk from ice fall. To further minimise the risk, public notices will be displayed at new and existing access points to the site, alerting members of the public and staff accessing the site of the possible risk of ice throw under certain weather conditions.

2.7.10 If the cause of the shutdown was high wind speeds, then the wind turbine would automatically begin operation once the average wind speed reduced to within operational levels. Under other causes of shutdown, e.g. through malfunction, the wind turbine would remain shut down and in a safe condition (i.e. commonly with the blades orientated 90° to the wind direction) until restarted by wind farm personnel following satisfactory investigation. This procedure ensures safe operation of turbines to protect members of the public walking, cycling or riding past turbines during the operational phase. In addition, the vibrometers in the nacelles would detect rotor imbalance in blades caused by icing and the turbine's control and monitoring system would shut the turbines down under these conditions. The wind turbines are also equipped with lightning protection equipment so that strikes would be conducted from the nacelle down the tower into the earth.

Turbine Servicing and Repair

2.7.11 Turbine manufacturers have specific maintenance requirements; however, it is anticipated that turbine maintenance activities will include the following:

- Civil maintenance of tracks and drainage;
- Scheduled routine maintenance and servicing;
- Unplanned maintenance or call outs;
- High Voltage (HV) and electrical maintenance; and
- Blade inspections.

2.7.12 In the unlikely event that a major turbine component requires replacement, vehicles will use the new access tracks and permanent hardstands, which will be retained during the operational phase to allow access.

2.7.13 Health and safety implications of turbine servicing and repair will be controlled in a similar way to the construction phase.

Operational Workforce

2.7.14 A team of several staff including engineer fitters would supervise the operation of the wind turbine installation and would visit the Proposed Development to conduct routine maintenance. The frequency of these visits would depend on the manufacturer's requirements.

Operation Environmental Management Plan (OEMP)

2.7.15 The Applicant will implement an Operation Environmental Management Plan (OEMP). Similar to the CEMP, the OEMP will set out the mitigation measures described in the EIA Report, and how the Applicant will manage and monitor environmental effects throughout the operation of the Proposed Development. The OEMP will also be developed in consultation with DGC, SEPA, NatureScot and HES where relevant.

2.8 Decommissioning

2.8.1 At the end of the Proposed Development's operational lifespan of 50 years, it will be decommissioned, unless further consent is sought for life extension or repowering. The environmental effects of decommissioning are considered to be similar to those during construction, excluding the loss of habitat which will have already occurred under construction.

2.8.2 Prior to decommissioning, a Decommissioning and Restoration Plan (DRP) will be produced to reflect the legislation, policy and best practice in place at the time, and will be agreed with the relevant statutory authorities.

2.8.3 The Site access route used for construction of the Proposed Development is also anticipated to be used for decommissioning.

2.8.4 It is anticipated that certain components of the wind turbines will be dismantled and removed from site for disposal and/or recycling as appropriate and in accordance with regulations in place at the time. It is proposed to leave the buried portion of the foundations of the wind turbines *in situ* on decommissioning. This is in line with current best practice and is considered to have less impact on the hydrological system which will have established itself during the lifetime of the wind farm, than complete removal of the foundations.

2.9 Climate Change and Carbon Considerations

2.9.1 Increasing atmospheric concentrations of greenhouse gases (GHGs), including carbon dioxide (CO_2) - also referred to as carbon emissions - are resulting in climate change. A

major contributor to this increase in GHG emissions is the burning of fossil fuels. With concern growing over climate change, reducing its cause is of utmost importance. The replacement of traditional fossil fuel power generation with renewable energy sources provides high potential for the reduction of GHG emissions. This is reflected in UK and Scottish Government climate change and renewable energy policy and commitments. The relevant aspects of such policies are summarised in **Chapter 5: Statutory and Policy Framework**.

2.9.2 Whilst the Proposed Development will reduce carbon emissions by replacing the need to burn fossil fuels for power, carbon emissions will result from the component manufacturing, transportation and installation processes associated with the Proposed Development. There is also the potential for carbon fixers and sinks to be lost through the clearing of vegetation during construction. There must, therefore, be a sufficient balance between the carbon reduction associated with renewable energy development and that which is produced through construction and fabrication processes and lost through site preparation. **Chapter 13: Climate Change Assessment** of this EIA Report considers the carbon balance in detail and presents the Carbon Calculator used to determine the overall contribution of the Proposed Development to a reduction in carbon emissions in **Technical Appendix 13.1**.

2.9.3 Taking into consideration the carbon emissions of the production, transportation and construction of the various wind farm components and anticipated environmental effects of the construction, operation and decommissioning of the Proposed Development (see **Chapter 13: Climate Change Assessment**), it is expected that savings of over 8 million tonnes of CO_2 over the project lifespan compared to equivalent generation from fossil fuels.

2.10 Community Benefit

2.10.1 This section presents a brief summary of the proposed community benefits that would be implemented should the Proposed Development gain consent. Further information on the Proposed Development's socio-economics impacts can be found in the Economic and Community Impact Report, submitted alongside this EIA Report.

Community Benefits Package

2.10.2 If consented, the Proposed Development will deliver a tailored community benefits package worth £5,000 per MW (or equivalent) of installed capacity per annum, that is aligned with the priorities of the community. This process has involved feedback from the community and community groups who have engaged with the Applicant during the pre-application consultation process. Based on a total installed capacity of 92.4 MW, the Proposed Development could generate up to £462,000 per annum towards the community benefits package.

2.10.3 A Local Electricity Discount Scheme (LEDS) is being proposed as part of the community benefits package to deliver direct and tangible benefits to people living and working closest to the Proposed Development in the form of an annual discount to electricity bills.

Potential for Shared Ownership

2.10.4 The Applicant is also interested to understand whether there is any appetite from the community in exploring the potential for shared ownership of the Proposed Development, in line with Scottish Government's aspirations on community ownership[1].

[1] Local Energy Scotland is the independent body that manages the Scottish Government's Community and Renewable Energy Scheme (CARES). https://localenergy.scot/hub/shared-ownership/.

2.11 References

BEIS - Department for Business, Energy and Industrial Strategy (2021). Digest of United Kingdom Energy Statistics 2021. Available at: https://www.gov.uk/government/statistics/renewablesources-of-energy-chapter-6-digest-of-united-kingdom-energy-statistics-dukes

Civil Aviation Authority (2016), CAP 764: Policy and Guidelines on Wind Turbines. Accessed at: https://publicapps.caa.co.uk/modalapplication.aspx?catid=1&pagetype=65&appid=11&mode=detail&id=5609 [accessed July 2024].

Design Manual for Roads and Bridges (2020). LA 104 – Environmental Assessment and Monitoring.

NatureScot *et.al*. 2024. Good Practice during Wind Farm Construction. Available at: https://www.nature.scot/doc/good-practice-during-wind-farm-construction

Scottish Government (2011). Water Environment (Controlled Activities) (Scotland) Regulations 2011. Available at: http://www.legislation.gov.uk/ssi/2011/209/contents/made

Scottish Government's Control of Woodland Removal Policy (2009). Available at: https://forestry.gov.scot/support-regulations/control-of-woodland-removal

UK Statutory Instruments (2016), The Air Navigation Order Part 8 Chapter 2 Article 222. Accessed at: https://www.legislation.gov.uk/uksi/2016/765/article/222/made [accessed July 2024].

3 Design Evolution and Alternatives

3.1 Introduction

3.1.1 The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (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. Paragraph 5(2)(d) of the EIA Regulations requires that an EIAR includes *"a description of the reasonable alternatives studied by the developer, which are relevant to the development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment"*.

3.1.2 Part 2 of Schedule 4 of the EIA Regulations similarly 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".

3.1.3 This chapter provides information on how the Proposed Development site was identified by the Applicant as a suitable location for a wind energy development, as well as the design iteration process undertaken to arrive at the final development layout and design.

3.1.4 The iterative design process provides an opportunity to consider a range of environmental impacts and integrate technical and environmental considerations into the iterative design of the Proposed Development, allowing potential environmental effects to be considered, avoided and minimised. Environmental impacts are therefore considered within the Proposed Development design layout from the earliest stage.

3.1.5 The final design of the Proposed Development represented in this EIAR was arrived at following iterative consideration of many alternative design configurations, including positioning of turbines, turbine scale, layout and design of tracks and ancillary infrastructure. This chapter describes the design iteration process from which the Proposed Development design was selected.

3.1.6 The final design for the Proposed Development is described in Chapter 2: Proposed Development and is shown on **Figure 1.2**.

3.2 Site Location, Site Selection and Consideration of Alternatives

Site Selection

3.2.1 The Applicant utilises a sophisticated Geographic Information System (GIS) model for site selection which seeks to mirror planning, environmental, technical and commercial constraints. The GIS model is updated regularly when new data becomes available or when other factors change. Where available and appropriate, the GIS model incorporates published advice from statutory consultees.

3.2.2 The Applicant's use of the GIS model enables objective and consistent treatment of the whole country to assist with site selection.

3.2.3 The GIS model is based upon a combination of generalised and graded suitability layers covering environmental, economic, and technical aspects, known as 'key layers'. All key layers are assessed using a 0% – 100% suitability scale, represented by a 0 – 1 score, where 0 represents unsuitable and 1 represents 100% suitability.

3.2.4 The key layers included in the GIS model are as follows:

- wind speed;
- proximity to housing;
- natural and built heritage constraints; and
- slope constraint.

3.2.5 In addition, for each site, a visual sweep of the following 'informative layers' is carried out:

- national and local planning policy / development plans / spatial frameworks (as discussed in Chapter 5: Legislative and Policy Context);
- Ministry of Defence (MoD) tactical training areas;
- international, national and local designated sites;
- electromagnetic links and utilities;
- proximity to other wind farm sites (pre-planning, consented and operational); and
- other information gleaned from maps or knowledge of the area such as masts, undesignated parks, tourist attractions, etc.).

3.2.6 These informative layers are included in the GIS model for information, but not scored and combined into the results.

3.2.7 The Applicant undertook an analysis of its GIS model for the Proposed Development site, which scored medium to excellent preferability on all inputs. The combination of the scored layers resulted in an overall good score for the Site.

Consideration of Alternatives

3.2.8 Paragraph 5(2)(d) of the EIA Regulations requires that the EIAR includes a description of reasonable alternatives studied by the developer, which are relevant to the development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment.

3.2.9 As noted in Planning Advice Note (PAN) 1/2013, "Whilst the Directive and the Regulations do not expressly require the applicant to study alternatives, those alternatives which are in any case considered as part of the project planning and design process must be assessed, and an outline of the main alternatives studied by the applicant included in the EIA Report. The EIA Report must also give an indication of the main reasons for the choice made, taking into account the environmental effects".

3.2.10 The Applicant has considered a number of alternative turbine layouts for the Proposed Development, as outlined in Section 3.4. The finalised layout is the 10th iteration of the design since the project was acquired by the Applicant as a development opportunity.

3.2.11 The main alternatives including layout, turbine specification, location, size and scale have been considered for the Proposed Development. Section 3.4 explores these options and explains how the final design of the Proposed Development has evolved.

3.2.12 As for other sites entirely, the Applicant uses a range of criteria to select sites for the development of renewable energy projects. As part of the growth plans for the development of renewable energy projects, the Applicant is continually assessing potential onshore wind farm sites. This involves a desk-based assessment utilising secondary data and GIS to identify constraints at a particular site. Sites that are not deemed suitable at one given time (i.e. 'the alternatives') may at a later date be re-assessed in respect of technical and environmental constraints and opportunities, as well as up to date planning policy. Hence, for commercial reasons and in accordance with PAN 1/2013, it is not possible to disclose the names or positions of the alternative sites.

Do Nothing Scenario

3.2.13 In the absence of the Proposed Development, it is anticipated that the current land uses within the Site would continue as plantation forestry and sheep grazing. While this would mean no anticipated adverse environmental impacts arising due to the construction and operation of the Proposed Development, the do nothing scenario would also mean that the proposed community benefits to be derived from the operation of the proposed wind farm would not be realised, there would be no contribution to national net-zero targets and the expected beneficial impacts of the Proposed Development including biodiversity enhancement and improved access would also not be realised.

Alternative Designs

3.2.14 The Proposed Development's design has been revised nine times in response to various factors, including:

- environmental constraints information derived from desktop studies followed by detailed site investigations;
- pre-application consultation responses received from consultees;
- feedback gathered during the initial pre-application public consultation event; and
- technical design constraints associated with the proposed infrastructure to be utilised.

3.2.15 The various iterations of the Site layout are presented on **Figures 3.1** to **3.4** and discussed in more detail, below.

Alternative Access Routes

3.2.16 For abnormal load delivery to Site (turbine blade, tower and nacelle components) the access route from King George V Docks to Site is taken forward as the preferred access route. This has been reviewed against a series of alternative routes centred around various Port of Entry (PoE) points for abnormal loads including the Port of Ayr, Stranraer Harbour, Loch Ryan Port and Kirkcudbright.

3.2.17 It has been established through the production of an Abnormal Loads Route Assessment (ALRA), in conjunction with consultation with the port authorities, abnormal load hauliers and roads authorities (Transport Scotland for trunk roads and local authority for local roads) that King George V Docks would be the preferred delivery route for abnormal loads.

3.2.18 From each alternative PoE the access route constraints were reviewed. Constraints such as tight turns, third party land requirements, structures, including those overhead and other obstructions were considered within the ALRA preparation.

Alternative Turbine Towers

3.2.19 During the design process, it was determined that it may not be possible to transport the tower sections of a standard steel tubular tower to the Site, turbine manufacturer dependent. As a result, an alternative turbine tower has been assessed, namely a hybrid tower which utilises sections of steel and sections of concrete (described in **Chapter 2: Proposed Development**).

3.3 Key Issues and Constraints

3.3.1 Once the site was identified, key issues and constraints for consideration in the design process were established through a combination of desk-based research, extensive field survey and consultation (through the EIA scoping process). The design process considered the following key issues and constraints:

- landscape designations and visual amenity;

- archaeological and cultural heritage assets;
- sensitive fauna;
- sensitive habitats;
- watercourses, private water supplies and sensitive surface water features;
- topography and ground conditions;
- public road accessibility;
- recreational and tourist routes;
- proximity of residential properties;
- aviation and defence constraints; and
- presence of utilities.

3.3.2 Information in respect of the survey work to identify various key issues and constraints and how they have contributed to the layout design has been investigated in greater detail in the technical chapters of this EIA Report (**Chapters 6 to 15**).

3.3.3 The identification of key issues and constraints during the iterative process has allowed for issues to be addressed and the careful placement of infrastructure for the Proposed Development within the Site. This allowed the Applicant and EIA team to facilitate effective mitigation, with potentially significant impacts avoided or minimised as far as reasonably practicable through the design process.

Environmental Designations

3.3.4 **Figure 3.1** shows sites with environmental designations within 10 km of the Proposed Development. A brief summary of these is provided below, with full descriptions provided in the relevant technical chapters of the Environmental Impact Assessment (EIA) Report.

3.3.5 The following designations are situated outwith the Site boundary but within 5 km (distances below from the Site boundary to the designation at its nearest point):

- Galloway Dark Skies park, adjacent to the northern boundary of the Site;
- Wood of Cree - Special Area of Conservation (SAC), Site of Special Scientific Interest (SSSI) & Royal Society for the Protection of Birds (RSPB) reserve, (~3.4 km west);
- Glentrool Oakwoods SSSI and SAC (~3.5 km north);
- Galloway Oakwoods SAC (~3.7 km west);
- Merrick Kells SSSI and SAC (~4 km north),
- Lower River Cree SSSI (~4.2 km south) and Talnotry Mine SSSI (~4.4 km east);
- Newton Stewart Conservation Area (~3.1 km south);
- 74 areas of Ancient Woodland, including an area adjacent to the southern boundary and another small area adjacent to the eastern boundary of the Site;
- 13 Scheduled Monuments, the closest located approximately 600 m west of the Site boundary; and
- 121 Listed Buildings – 6 Category A, 49 Category B and 66 Category C.

3.3.6 The following environmental designations are located between 5 km and 10 km from the Site boundary:

- Talnotry Mine SSSI (~5 km east), Cairnaber SSSI (~5.2 km), Cairnsmore of Fleet SSSI (~6.2 km), Ellergower Moss SSSI (~6.9 km northeast), Ring Moss SSSI (~8.2 km southwest), Cree Estuary SSSI (~8.4 km southeast);
- Wigtown Bay LNR (~7.8 km south)
- River Bladnoch SAC (~8.3 km north);
- 86 areas of Ancient Woodland;
- 9 Scheduled Monuments

- 44 Listed Buildings – 1 Category A, 25 Category B and 18 Category C.

Site-Specific Environmental Constraints

3.3.7 Following desk-based assessments and fieldwork in line with applicable established guidance (discussed in each technical chapter of this EIA Report), sufficient environmental baseline data was gathered to identify the environmental constraints within and immediately surrounding the Site. This information was used to inform the development of the layout of the Proposed Development through an iterative design process, as discussed in more detail below.

3.3.8 The site-specific constraints which were used to inform the evolution of the design of the Proposed Development are presented and discussed in each technical chapter of this EIA Report.

Cumulative Developments

3.3.9 **Figure 6.8** shows the locations of other relevant onshore wind farm developments, including those that are operational, under construction, consented, in planning, or in scoping within 45 km of the Proposed Development at the time of assessment (October 2024). Potential cumulative effects with these developments have been assessed throughout the EIA Report, where there is sufficient information.

3.3.10 Further detailed discussion on the approach to cumulative assessment is presented in each technical chapter as relevant.

3.4 Design Process

3.4.1 The principles of the EIA process require that site selection and layout design be iterative and constraint-led, to ensure that potential environmental impacts as a result of the Proposed Development are avoided or minimised, as far as reasonably possible.

3.4.2 This section will review the principles of the layout design and alternatives options for the Proposed Development.

Design Principles

3.4.3 As part of the iterative approach adopted by the Applicant, a number of design principles have been incorporated into the Proposed Development as standard practice, including the following:

- consideration of the underlying landscape and its scale;
- consideration of operational, consented and proposed wind turbines neighbouring the Site;
- consideration of the size and scale of the Proposed Development appropriate to the location and proximity to residential properties;
- sensitive siting of the proposed infrastructure incorporating appropriate buffer distances from environmental and archaeological receptors to avoid or reduce effects;
- maximising the re-use of existing tracks as much as possible to access proposed wind turbine locations;
- optimising the alignment of new access tracks and hardstands taking due consideration to the topography of the Site, to minimise cut and fill, minimise the impact on sensitive peatland habitats and reduce landscape and visual effects;
- minimising watercourse crossings and encroachment on watercourse avoidance buffers;

- consideration of inclusion of borrow pit search areas to minimise the volume of the stone required to be imported to the Site;
- using the latest wind turbine technology, consisting of more efficient and larger turbines where these can be reasonably accommodated within the landscape, as supported by the Onshore Wind Policy Statement (OWPS) (Scottish Government 2022);
- maximising the potential energy yield of the Site through the employment of co-located technology in optimal locations (wind and battery storage);
- Applying the waste management hierarchy; and
- Identifying potential opportunities for environmental enhancement, recreational access improvement and community benefits.

3.4.4 The following principles were applied during the design of the on-site tracks:

- Tracks make use of existing infrastructure and tracks wherever possible;
- Track length was kept to a minimum to reduce the requirement for stone and land-take and to reduce construction time;
- Gradients were kept to acceptable levels to accommodate the requirements of delivery vehicles to allow construction plant to move safely around the Proposed Development area;
- Tracks were routed to avoid sensitive archaeological, hydrological and ecological features as far as practicable; and
- Tracks were routed to avoid areas of deepest peat.

Design Evolution

3.4.5 The layout of the Proposed Development has been an iterative process which started in 2023 each time taking into consideration information gathered through Site assessments or comments from consultees, as well as the professional judgement of technical experts.

3.4.6 Since the submission of the EIA Scoping Report and the receipt of the EIA Scoping Opinion the Applicant has undertaken design iterations to maximise the capacity of the Proposed Development while minimising the environmental impacts.

Design Iterations

3.4.7 The main iterations of the turbine layout have been separated into 10 key stages and are described below within **Table 2.2** and shown on **Figures 3.2**, **3.3** and **3.4**. These iterations have taken into consideration the on-site environmental and engineering constraints to reduce the impacts on the wider landscape, archaeological features and avoid watercourses and sensitive habitats.

Table 3.1: Summary of Design Iterations

Design Iteration	Figure	Date	Key Parameters	Main drivers for change
A	3.2	February 23	• 29 Turbines; • All turbine heights 210 m; • Initial red line boundary.	N/A – Initial Layout
B	3.2	April 23	• 25 Turbines; • All turbine heights: 250 m; • Initial red line boundary.	Scheduled Monuments and consultation with HES, archaeologically sensitive areas, proximity to Wood of Cree and property to the west. Turbine heights increased to maximise yield.
C (Scoping Layout)	3.2	May 23	• 22 Turbines; • All turbine heights: 250 m; • Initial red line boundary.	Archaeologically sensitive areas and assets.
D	3.2	November 23		Baseline environmental survey data (e.g. peat, ecology, etc.). Intervisibility between Scheduled Monuments.
E	3.3	January 24	• 18 Turbines; • All turbine heights: 250 m; • Initial red line boundary.	Scheduled Monuments and consultation with HES
F	3.3	January 24	• 18 Turbines; • Turbine heights: • T1 – T15: 250 m, • T16-T18: 210 m. • Initial red line boundary.	Residential Visual Amenity concerns (reduced tip heights for some turbines).
G	3.3	February 24		All environmental factors (collaborative design workshop).
H (Design Chill)	3.3	March 24	• 16 Turbines; • Turbine heights: • T1 – T14: 250 m, • T15-T16: 210 m. • Reduced red line boundary.	Scheduled Monuments and consultation with HES

Design Iteration	Figure	Date	Key Parameters	Main drivers for change

I (Design Freeze)	3.4	June 24	• 15 Turbines;
			• Turbine heights:
			  ○ T1 – T13: 250 m,
			  ○ T14-T15: 210 m.
			• Slight change to the red line boundary along sections of the main access track.
				Axis of alignment of Chambered Cairn.
				Further environmental survey data (e.g. peat, ecology, hydrology, etc.).
				Realignment of access track at watercourse crossing near Auchinleck Bridge along the main access track.
				Slight amendment of red line boundary along sections of the track to include forestry management felling areas.

J (Proposed Development)	1.2 and 3.4.	October 24	• 14 Turbines;
			• Turbine heights:
			  ○ T1 – T12: 250 m,
			  ○ T13-T14: 210 m.
				Removal of a turbine (previously labelled T5 in Layout I) to reduce potential impacts on the integrity of the cultural heritage setting of Dalvaird Cairn (SM1015).

Layout A (Pre-Application Layout)

3.4.8 Layout A was the initial layout developed primarily based on topographical and wind resource parameters. This design incorporated 29 turbines up to 210 m in height with the overarching engineering objective of designing a wind farm that is 'buildable' and optimised in terms of harnessing the wind resource on and around the Site.

3.4.9 This layout was submitted as part of the pre-application advice request to DGC and to HES on 15th February 2023. HES advised that the main concerns were the direct impacts to the prehistoric scheduled monuments within the Site, potential impacts on their setting, and disruption of the key relationships between the monuments in the area within and surrounding the Proposed Development Site. Each Scheduled Monument (SM) was discussed, and specific concerns raised relating to the potential impacts of the Proposed Development as presented in Layout A on the SMs. In response to the advice received from HES, four turbines were removed from Layout A, which resulted in Layout B (discussed below).

Layout B

3.4.10 As mentioned above, following pre-application advice from HES regarding Layout A, four turbines were removed . The removal of these turbines also increased the distance between the remaining turbines and the Wood of Cree Reserve and a residential property at Cordorcan. Buffers from mapped watercourses on Site were also applied. The slopes on the Site and the required separation ellipses were key drivers influencing this layout and played a significant role in the iterations of all subsequent layouts. The overarching engineering aim was to design a wind farm that is ‘buildable’ and optimised in terms of harnessing the wind resource on and around the Site.

3.4.11 This design included 25 turbines up to 250 m in height, and the red line boundary covered an area of 1,234.9 Ha. However, it was evident at this early stage that more adjustments could be made to reduce potential impacts on the Scheduled Monuments and other cultural heritage assets within the Site boundary. Turbines were strategically located further away from archaeologically sensitive areas, with a 250 m avoidance buffer being established around Scheduled Monuments, and 20 m avoidance buffers around other cultural heritage assets.

3.4.12 This layout was submitted to Historic Environment Scotland (HES) and Dumfries and Galloway Council (DGC) for comment and input to the design. No formal response was received from DGC at this stage.

Layout C (Scoping Layout)

3.4.13 Following consultation with HES on Layout B, several changes were made to the turbine layout, including the removal of three more turbines (shown as T20, T21 and T22 on Layout A), and consequent realignment of the remaining 22 turbines, resulting in Layout C. The named turbines were removed from the layout to avoid potential direct impacts on the cultural heritage assets located in the area around T20, T21 and T22 of Layout B. Layout C had 22 turbines (all up to 250 m in height), and no changes were made to the red line boundary. All changes were implemented to facilitate mitigation through design for the designated cultural heritage assets within the Site.

3.4.14 This layout was used to scope the EIA and was presented on Figure 2.2 of the Blair Hill Wind Farm EIA Scoping Report, dated 27th July 2023. This layout was also presented at the first public exhibition held in October 2023. Feedback from the public exhibitions included concerns over proximity of turbines to Garlies Castle (SM7916) and this was incorporated at a later stage (see discussion of Layout G, below).

Layout D

3.4.15 Following environmental baseline studies, including Phase 1 peat probing and National Vegetation Classification (NVC) surveys, Layout C underwent revision; turbine locations were altered where required to avoid areas of potentially deeper peat and sensitive habitat areas, as far as practicable.

3.4.16 T1, T2 and T3 were removed to avoid impacting on cultural heritage assets and to avoid interrupting the intervisibility between Dalvaird Cairn (SM1015) and Cordocan Cairn (SM10385), and to prevent obscuring the wider setting of Dalvaird Cairn (SM1015).

3.4.17 Each revision required the turbine layout to be optimised for wind resource and checked for changes to potential engineering constraints.

Layout E

3.4.18 In their Scoping Response, HES identified potential settings impacts on the Scheduled Monuments that would require further investigation. HES attended an accompanied visit to the Site in November 2023 which included a visit to each Scheduled Monument within the Site boundary with wireline drawings that were held up at arms' length to demonstrate the likely views of the proposed wind farm from those locations.

3.4.19 Following the Site visit, HES provided comments and recommendations at a meeting with the Applicant and followed up in writing. The design was subsequently adjusted to remove a further four turbines to address HES's concerns relating to the potential impacts on cultural heritage setting of the identified Scheduled Monuments. HES raised concerns about the views between the Scheduled Monuments, and the alignment of the chambered cairn near Nappers' Cottage (SM5676) and potential intersection of the alignment with the turbines. This required further investigation by the Applicant which was undertaken at a later stage in the design process (described below for Layout H).

3.4.20 Additionally, several ecological constraints were updated following field surveys, though these had a minor impact on the overall design.

Layout F

3.4.21 Following an initial landscape and visual assessment of Layout E, one of the properties to the south-east of the Site boundary was identified as potentially being subjected to overbearing effects from the three closest turbines which were T16, T17, and T18. These were all located within 1.5 km of the property and would likely also be visible on approach to the property from the public access road. Potential residential visual amenity effects were preliminarily identified using wirelines that were produced specifically to inform design. Based on these, the tip heights of T16, T17 and T18 were reduced from 250 m to 210 m. The extent of the potential visual amenity effects on the property would be further evaluated at a later stage. Reduction in turbine heights were also favoured in relation to Garlies Castle (SM7916), which reduced potential impact on the castle, and its approaches.

3.4.22 Turbine heights across the rest of the Site were also tested with the use of wirelines and ZTVs, which indicated that turbines at a height of 250 m were largely screened by adjacent landform in views from the north and east and were capable of being accommodated in the landscape where views would be possible in locations to the south and west.

3.4.23 In addition, following the landscape and visual assessment of Layout E, revisions to the layout helped to ensure that visibility of the Proposed Development was reduced from key viewpoints, such as Merrick to the north where visibility was reduced from six turbines to three blade tips, and from Newton Stewart and Wigtown to the south where the spread of turbines in the view was reduced.

3.4.24 Layout F was taken forward into a collaborative design workshop which was attended by all members of the EIA team as well as the Applicant's key project design personnel.

Layout G

3.4.25 A design review workshop was held in February 2024 between key environmental technical specialists and the Applicant's key project personnel (including design engineers). Each of the turbines, the access tracks and other ancillary infrastructure were examined against the technical and environmental constraints to ensure that the infrastructure avoided sensitive constraints as far as possible.

3.4.26 Turbines T3, T5, and T16 were relocated from areas of high ecological sensitivity, particularly blanket bog and wet dwarf shrub heath. This adjustment required the repositioning of other turbines within the layout to optimise wind resource and account for other engineering constraints.

Layout H (Design Chill)

3.4.27 Layout H, the design iteration that was arrived at following the EIA Team design workshop, was submitted to HES for another round of comments and input. Based on the feedback received, the archaeology avoidance buffer in the western part of the Site was extended, with the following changes:

- Turbine T9 was removed to avoid impacting on the setting and likely alignment of the chambered cairn near Nappers Cottage (SM5676); and
- Turbine T18 was removed to avoid impacting on the setting of Garlies Castle (SM7916) in the south of the Site.

3.4.28 A visit to Glenshalloch was undertaken to inform the Residential Visual Amenity Assessment. The recommendation following this visit was also to remove T18, thereby increasing the distance between the nearby property of Glenshalloch and the nearest turbine.

3.4.29 Other turbines were consequently moved slightly to optimise wind resource and were once again checked against engineering constraints to ensure 'buildability'.

3.4.30 Due to the removal of all infrastructure from the west and south-western parts of the Site, the red line boundary was reduced. The revised red line boundary covered an area of 625.9 hectares (ha) (excluding the access track).

3.4.31 This layout was presented at the public exhibition held in May 2024.

Layout I

3.4.32 Following Design Chill (Layout G), further targeted studies were undertaken to refine the layout as far as possible.

3.4.33 Phase II peat probing was undertaken in and around areas where infrastructure would be constructed, e.g. turbine foundation and hardstand areas, access tracks, borrow pit areas, construction compound areas etc. The data from the Phase II peat probing surveys was fed into the design, with the result that some of the ancillary infrastructure was relocated or realigned to avoid areas of deeper peat and sensitive habitats.

3.4.34 Hydrology surveys were conducted at this stage. Survey results were taken into consideration and led to T2 of Layout G being removed from the layout, and T9 of Layout G being moved to avoid a watercourse that was not previously evident from available mapping.

3.4.35 The alignment of the chambered cairn was found to be 85 degrees at Nappers Cottage (SM5676) and was determined in line with the relevant guidance which was confirmed through a site visit. Upon advice, T10 was relocated as far south of its previous location as possible without infringing on other environmental constraints such as watercourse avoidance buffers and sensitive habitats. The relocation of T10 further south has moved it

out of alignment with the chambered cairn's axis. The movement of T10 necessitated the very minor relocation of two other turbines to optimise wind resource. Ancillary infrastructure was adjusted to suit the realignment of the turbines.

3.4.36 This layout was intended to be frozen design of Blair Hill Wind Farm, however further feedback from HES necessitated a further amendment (see next section)

3.4.37 The frozen design of the Blair Hill Wind Farm consisted of 13 turbines up to 250 m in height and 2 turbines up to 210 m in height,

3.4.38 **Layout I is shown on Figure 3.4**.

Layout J (Design Freeze)

3.4.39 Layout I was modified to remove a turbine (previously labelled Turbine 5 in Layout I) to reduce the potential for significant adverse impacts on the integrity of the setting at Dalvaird Cairn (SM1015). This was to reduce the potential of feeling enclosed by the proposed development. The Frozen Design was also adjusted to incorporate the realignment of the access track to cross at a proposed new watercourse crossing near Auchinleck Bridge. Layout J, the final layout of the Proposed Development is presented in **Figure 1.2** and **Figure 3.4**, and consists of twelve wind turbines of 250 m to tip, and 2 wind turbines of 210 m to tip (see Table 2.1 in **Chapter 2: Proposed Development**), connected by access tracks which have been designed to take account of both environmental constraints and technical (engineering) requirements and constraints.

Site Access and Site Tracks

3.4.40 The proposed access to the Site has been carefully considered throughout the design process. The entrance to the Proposed Development is through a privately owned forestry track connected to the A712.

Borrow pits

3.4.41 Borrow pits are required as a source of rock to be used in the construction of the tracks, hardstandings and foundations. During design optimisation, the locations of infrastructure and track design was refined to minimise the volume of earthworks and cut and fill required to construct the Proposed Development. Potential locations for the borrow pits were identified based upon a review of geological mapping and Site reconnaissance. The total number and size of borrow pit search areas was selected to meet the estimated volume of rock required to construct the tracks, crane hardstands and foundations.

3.4.42 If the Proposed Development is consented, further intrusive geotechnical investigation would be carried out to identify which of the borrow pit locations would yield the required quality of rock for each aspect of the infrastructure.

Compounds

3.4.43 The locations of the temporary construction compounds, batching plant, control building and substation are shown in **Figure 1.2**. These have been considered through the iterative design process and have been sited to avoid areas of deep peat and watercourses with the aim of limiting the effects on sensitive habitats. Steep areas have been avoided to reduce the requirement for cut and fill. The construction compounds have also been located for practical purposes; to control traffic entering the Site, to be located close to turbines and to facilitate construction of the substation.

3.5 References

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

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 (2019). Climate Change (Emissions Reduction Targets) (Scotland) Act 2019. Available at: https://www.legislation.gov.uk/asp/2019/15/contents/enacted

Scottish Government (2022). Onshore Wind: Policy Statement 2022. Available at: https://www.gov.scot/publications/onshore-wind-policy-statement-2022/

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

4 Approach to Environmental Impact Assessment

4.1 Introduction

4.1.1 This chapter of the EIA Report sets out the approach taken to produce the Environmental Impact Assessment (EIA) for the Proposed Development.

4.1.2 The EIA process aims to assist Scottish Ministers in their determination of the application by identifying where significant environmental effects are predicted. This assessment has been completed in conjunction with consultation with statutory consultees, interested parties and the general public.

4.1.3 The structure of the EIA Report follows the requirements of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 and relevant good practice guidance. The EIA Report comprises a Non-Technical Summary (NTS), the main EIA Report text, accompanying figures and technical appendices.

4.1.4 This chapter is structured as follows:

- overview of the relevant legislation, policy and guidance;
- an outline of the EIA process utilised;
- the scope of the assessment completed;
- details of the assessment of potential effects;
- the consultation undertaken; and
- the assumptions, likely limitations and uncertainty.

4.1.5 This chapter is supported by **Appendix 4** – ECU Scoping Opinion.

4.2 Legislation, Policy and Guidelines

4.2.1 During the EIA, a number of legislative and best practice documents have informed the process.

4.2.2 The European Commission Directive 2011/92/EU, amended in 2014 by Directive 2014/52/EU, requires that certain projects, both public and private, must be assessed with regards to their impacts on the environment. This is currently implemented in respect of Section 36 consents by the Electricity Works. (Environmental Impact Assessment) (Scotland) Regulations 2017 ('the EIA Regulations').

4.2.3 The EIA process and structure of the EIA Report follow the criteria listed within the EIA Regulations.

4.2.4 The Proposed Development is considered to fall within Schedule 2 of the EIA Regulations, by nature of it being classed as a generating station which requires consent under Section 36 of the Electricity Act. The criteria for considering whether a Schedule 2 development requires the preparation of an EIA is set out in Schedule 3 of the EIA Regulations. The Applicant has voluntarily accepted that an EIA is required to be undertaken. The information provided within this EIA Report has been prepared in accordance with the Directive and the EIA Regulations.

4.2.5 Paragraph 3(2)(a) of Schedule 9 of the Electricity Act requires the Scottish Ministers when considering applications under Section 36 to have regard to the matters mentioned in 3(1)(a) (i.e. the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings

and objects of architectural, historic or archaeological interest.) The information required to enable the Scottish Ministers to have regard to such matters is included in the EIA Report.

4.2.6 In addition to the above, the regulations and best practice of core relevance to the EIA process and which have been taken into account in undertaking this assessment are as follows:

- National Planning Framework 4 (NPF4) (Scottish Government, 2023);
- Planning Advice Note 1/2013: Environmental Impact Assessment (Scottish Government, 2013);
- Planning Circular 1/2017: Environmental Impact Assessment Regulations (Scottish Government, 2017);
- IEMA Environmental Impact Assessment Guide to: Delivering Quality Development (IEMA, 2020).
- Good Practice During Wind Farm Construction 4th Edition (Scottish Government et al., 2019);
- Assessing the Cumulative Impact of Onshore Wind Energy Developments (NatureScot, 2021);
- Siting and Designing Wind Farms in the Landscape Version 3a (SNH, 2017); and
- Environmental Impact Assessment Handbook Version 5 (SNH, 2018).

4.2.7 Additional topic-specific legislation, policy and guidance documents are noted within the technical assessment chapters of this EIA Report (**Chapters 6 to 16**).

4.3 Legal Framework for the EIA

Overall EIA Process

4.3.1 For the EIA process to be as effective as possible it is approached as an iterative process throughout the design stage, rather than a single assessment performed once the design is finalised. When used as an iterative process, the findings of the EIA can be incorporated within the design of the proposal to provide an optimum design with regard to the Applicant's requirements and the environment.

4.3.2 The findings of the EIA are presented in this EIA Report, which has been prepared in accordance with the EIA Regulations.

4.3.3 The broad approach which has been followed in undertaking the EIA is presented in this chapter and an overview of the methodology adopted for each technical study is provided within the respective technical chapters (**Chapters 6 to 16**).

Screening and Scoping

4.3.4 Screening is the process by which it is determined whether or not an EIA should be conducted for a proposed development. As set out above, the Proposed Development falls within Schedule 2 of the EIA Regulations. Schedule 3 of the EIA Regulations sets out criteria that should be considered in determining whether a Schedule 2 development is likely to have significant environmental effects and hence require a formal EIA.

4.3.5 The Applicant recognised that the Proposed Development would have the potential to have significant environmental effects, and therefore, an EIA would be required. Therefore, rather than undertaking a formal EIA screening process, the Applicant voluntarily elected to undertake an EIA.

4.3.6 The EIA scoping process is undertaken to identify the potentially significant environmental issues which should be considered when assessing the potential effects of the Proposed Development, and an EIA Scoping Opinion may be obtained from the Energy Consents Unit (ECU).

4.3.7 An EIA Scoping Opinion was requested from the ECU through the submission of an EIA Scoping Report. The EIA Scoping Report contained details of the Site baseline and the Proposed Development. It also proposed which environmental impacts would be assessed in the EIA, and the assessment methodologies that would be used.

4.3.8 The ECU consulted with a variety of statutory and non-statutory consultees before providing an EIA Scoping Opinion in November 2023, with an addendum to the Scoping Opinion being issued in February 2024. This information has informed the Proposed Development's EIA. This EIA Report is based on the ECU Scoping Opinion and Addendum received as included in **Appendix 4**.

4.3.9 Direct consultation has also been undertaken with consultees, to confirm and agree the approach and scope of technical surveys and assessments on a topic-by-topic basis. Details of relevant consultations are included in each technical chapter as appropriate.

4.3.10 A summary of how the Scoping responses received would be addressed in this EIA Report was provided to the ECU within an EIA Gatecheck Report in July 2024.

4.4 The EIA Process

4.4.1 EIA is the systematic process of compiling, assessing, presenting and mitigating all the significant environmental effects of a proposed development. The assessment is designed to inform the decision-making process by way of setting out the likely environmental profile of a project. Identification of potentially significant adverse environmental effects then leads to the design and incorporation of appropriate mitigation measures into both the design of the scheme and the way in which it is constructed and operated.

4.4.2 The main steps in the EIA assessment process for the Proposed Development have been:

- Baseline surveys (where appropriate) to provide information on the existing environmental character of the Proposed Development Site and the surrounding area.
- Consideration of the possible interactions between the Proposed Development and the existing and predicted future site conditions. These interactions or effects are assessed using criteria based on accepted guidance and best practice.
- Using the outline design parameters for the Proposed Development, prediction of the environmental effects, including direct, indirect, cumulative, short, medium and long-term, permanent and temporary, beneficial and adverse effects.
- Identification of mitigation measures designed to avoid, reduce or offset adverse effects, and introduce and enhance beneficial effects.
- Assessment of the significance of any residual effects after mitigation, in relation to the sensitivity of the feature impacted upon and the magnitude of the impact predicted, in line with the methodology identified below.
- Identification of any uncertainties inherent in the methods used, the predictions made, and the conclusions drawn during the course of the assessment process.
- Reporting of the results of the EIA in this EIA Report.

Assessment of Effects

4.4.3 Throughout the assessment, a distinction has been made between the term 'impact' and 'effect'. The EIA Regulations refer to the requirement to report the significance of 'effects'. An impact has been defined as the physical change of the characteristics of the receiving environment as a result of the Proposed Development (e.g. shadow flicker from wind turbines), whereas an effect refers to the significance of this impact (e.g. a significant residual shadow flicker effect on residential properties). These terms have been adopted throughout this EIA Report to present a consistent approach to the assessment and evaluation of effects and their significance.

4.4.4 In some instances, particularly in relation to the Landscape and Visual Impact Assessment (LVIA), the term 'change' is used interchangeably with 'impact'. The LVIA classifies the level of physical and perceptual change to the receiving environment as the 'magnitude of change' in line with the recommendations of the Guidelines for Landscape and Visual Impact Assessment third edition (GLVIA3) (Landscape Institute, 2013). This terminology should be considered interchangeable with 'magnitude of impact' and should be regarded as having the same meaning.

4.4.5 Within this EIA Report, the assessment of effects for each environmental topic takes into account the environmental impacts of the construction, operational and decommissioning phases of the Proposed Development; and how the environmental baseline is expected to evolve in the absence of the Proposed Development (the 'do-nothing' scenario).

4.4.6 In order to determine whether or not the potential effects of the Proposed Development are likely to be 'significant' a number of criteria are used. These significance criteria vary between topics but generally include:

- international, national and local designations or standards;
- relationship with planning policy;
- sensitivity of the receiving environment;
- magnitude of impact;
- reversibility and duration of the effect; and
- inter-relationship between effects.

4.4.7 Effects that are considered to be significant are identified within the EIA Report. The 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. For example, a high magnitude of impact on a low sensitivity receptor will have an effect of lesser significance than the same impact on a high sensitivity receptor. **Table 4.1** below is used as a guide to demonstrate the relationship between the sensitivity of the identified receptor and the anticipated magnitude of an impact. Professional judgement is, however, equally important in verifying the suitability of this guiding 'formula' to the assessment of the significance of each individual effect. Therefore, the table below may change between technical assessments, as is outlined in the respective technical chapters of the EIA Report (**Chapters 6 to 16**).

Table 4.1: Guide to the Inter-Relationship between Magnitude of Impact and Sensitivity of Receptor

		Sensitivity of Receptor/Receiving Environment to Change			
		High	Medium	Low	Negligible
Magnitude of Impact	High	Major	Moderate to Major	Minor to Major	Negligible
	Medium	Moderate to Major	Moderate	Minor	Negligible
	Low	Minor to Moderate	Minor	Negligible to Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

4.4.8 The following terms are used in the EIA Report, unless otherwise stated, to determine the level of effects predicted to occur:

- **major** beneficial or adverse effect – where the Proposed Development would result in a major improvement (or deterioration) to the existing environment;

- **moderate** beneficial or adverse effect – where the Proposed Development would result in a moderate improvement (or deterioration) to the existing environment;
- **minor** beneficial or adverse effect – where the Proposed Development would result in a minor improvement (or deterioration) to the existing environment; and
- **negligible** – where the Proposed Development would result in no discernible improvement (or deterioration) to the existing environment.

4.4.9 Using professional judgement and with reference to relevant guidance, the majority of the assessments within this EIA Report consider effects of moderate or greater significance to be significant, with those of minor significance or less to be non-significant. If there are deviations from this these will be clearly stated within the individual technical chapters.

4.4.10 Summary tables are provided at the end of each technical chapter of the EIA Report that outline:

- the predicted effects associated with an environmental issue;
- the appropriate mitigation measures required to address these effects; and
- the subsequent overall residual effects.

4.4.11 Distinction has also been made between direct and indirect, short and long term, permanent and temporary effects.

Cumulative Effects

4.4.12 Part 5 of Schedule 4 of The EIA Regulations sets out the matters that require to be incorporated within EIA Reports. The EIA Regulations state that EIA Reports should include an assessment of *"the cumulation of effects with other existing and/or approved development, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources"*.

4.4.13 Cumulative effects are those which result from incremental changes caused by past, present or reasonably foreseeable future actions resulting from the introduction of the Proposed Development. These cumulative effects cover the combined effect of individual impacts from the Proposed Development and combined impacts of several developments, as noted within the guidance document "Assessing the Cumulative Impact of Onshore Wind Energy Developments" (NatureScot, 2021). Developments considered in addition to the Proposed Development are existing and other proposals, covering all major developments, including other wind farms.

4.4.14 Within this EIA Report, cumulative effects for each technical discipline are covered as required on a chapter by chapter basis with a summary of overall effects included in the residual effects in **Chapter 17**.

4.4.15 The key cumulative wind farm developments considered are shown within **Figure 6.8**.

4.5 Scope of the EIA

Technical Scope

4.5.1 The technical scope of the EIA covers all the impacts mentioned in **Table 4.2** below, with the following exceptions relating to technical topics where these have been scoped out of the EIA.

Spatial Scope

4.5.2 The spatial scope of the EIA, i.e., the geographical coverage of the assessment undertaken, has taken account of a number of factors, in particular:

- the extent of the Proposed Development, as defined by the planning application boundary (refer to **Figure 1.1**);
- the nature of the baseline environment, sensitive receptors and the likely impacts that could arise; and
- the distance over which predicted effects are likely to remain significant and in particular, the existence of pathways which could result in the transfer of effects to a wider geographical area than the extent of the proposed physical

Temporal Scope

4.5.3 For the purposes of the EIA, if approved, construction is expected to last for approximately 24 months. The proposed operational life for the Proposed Development is 50 years, after which time it will be decommissioned.

4.5.4 For construction effects, the assessment takes into account the time of day that works are likely to be undertaken, for example if any night-time working is required to minimise disruption to road users. Proposed works are to be undertaken between 08:00 to 19:00 Monday to Friday and 08:00 to 13:00 on Saturdays, unless agreed otherwise or in the case of emergency works.

4.6 EIA Report

4.6.1 Schedule 4 of the EIA Regulations specifies the "*information for inclusion in Environmental Impact Assessment Reports*". **Table 4.2** below details where the information has been provided within the EIA Report.

Table 4.2: Requirements of Schedule 4 of the EIA Regulations and where they have been addressed in this EIA Report

Required Information (Schedule 4 of the EIA Regulations)	Relevant Reference within this EIA Report
1. A 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.	The Proposed Development is described in **Chapter 2**, including information on anticipated construction methods and the operation of the Proposed Development. The land use requirements during construction and operational phases are also described in **Chapter 2**. Expected residues and emissions are addressed, where relevant, in the appropriate technical chapters of this EIA Report.
2. 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.	**Chapter 3** of the EIA Report describes the design iteration process and details how the Proposed Development was chosen, and the environmental constraints taken into consideration in determining the final layout which is the subject of the Application.
3. A description of the relevant aspects of the current state of the environment (the 'baseline scenario') and an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of relevant information and scientific knowledge.	A description of the existing environment and how it would be expected to evolve in the absence of the Proposed Development is provided within each technical chapter.
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 (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.	The receptors potentially affected by the Proposed Development are detailed within each of the technical chapters. Effects of population and human health are assessed in relation to visual impacts (**Chapter 6**), traffic and transport (**Chapter 11**), acoustic assessment (**Chapter 12**) and shadow flicker (**Chapter 16**). Biodiversity is covered in the ecology and ornithology chapters (**Chapter 8 and 9**). Impacts on soils and water are covered in the geology, hydrology and hydrogeology chapter (**Chapter 10**). Impacts on air quality have been scoped out; relevant mitigation measures for air quality are captured in the outline CEMP (**Technical Appendix 17.1**). Material assets are addressed through the assessment of cultural heritage effects and other chapters as appropriate. Landscape effects are discussed in **Chapter 6.**
5. A description of the likely significant effects of the development on the environment resulting from, inter alia: the construction and existence of the development, including, where relevant, demolition works; the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources; the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste; the risks to human health, cultural heritage or the environment (for example due to accidents or disasters); the cumulation of effects with other existing and/or approved development, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources;	The predicted significant effects of the Proposed Development are reported after relevant mitigation measures have been applied to an identified effect, in each of the technical chapters of the EIA Report. Effects have been predicted in relation to both the construction / decommissioning and operational phases of the Proposed Development, including the nature of these effects and their duration. The overall approach and methods used in the assessment of environmental impacts are discussed within **Chapter 4** (i.e. this chapter). Prediction methods are discussed in detail within each relevant technical chapter of the EIA Report.

Required Information (Schedule 4 of the EIA Regulations)	Relevant Reference within this EIA Report
the impact of the development on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the development to climate change; 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, beneficial and adverse effects of the development. This description should take into account the environmental protection objectives established at Union or Member State level which are relevant to the development including in particular those established under Council Directive 92/43/EEC3 and Directive 2009/147/EC.	
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.	An overview of the methodology of the assessment is provided in **Section 4.4** while the individual technical chapters provide details of each technical assessment (**Chapter 6 to 16**).
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 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.	The overall approach to mitigation is discussed in **Section 4.4**. Specific mitigation measures are reported in each relevant technical section of the EIA Report and in schedule of committed mitigation measures presented in **Chapter 17.**
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. Relevant information available and obtained through risk assessments pursuant to legislation of the European Union such as Directive 2012/18/EU of the European Parliament and of the Council or Council Directive 2009/71/Euratom or relevant assessments may be used for this purpose provided that the requirements of this Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies.	The predicted significant effects of the Proposed Development are reported after relevant mitigation measures have been applied to an identified impact, in each of the technical chapters of the EIA Report. An assessment of major accidents and/or disasters was scoped out.
9. A non-technical summary of the information provided under points 1 to 8.	A **Non-Technical Summary (NTS)** is presented as Volume 4 of the EIA Report.
10. A reference list detailing the sources used for the descriptions and assessments included in the EIA Report.	References are provided at the end of each chapter of the EIA Report.

4.7 Consultation

Regulatory Consultation

4.7.1 Consultation is a key component of the EIA process. In order to inform the EIA, there has been ongoing consultation with statutory consultees, engagement through correspondence and meetings, as required.

4.7.2 Consultation with organisations who were contacted either directly by the Applicant or by the ECU through the formal EIA application process, is described as appropriate in each technical chapter of this EIA Report.

Public Consultation

4.7.3 A standalone Pre-Application Consultation (PAC) Report has been prepared which gives details of the correspondence, online and in-person public consultation and other discussions which have taken place with the communities closest to the Proposed Development Site. The PAC Report also details findings of that work and illustrates the ways in which community engagement has helped identify potential issues arising from the emerging development proposal, and where appropriate, shape the final proposal which is now the subject of application for Section 36 consent.

4.7.4 The Applicant is grateful to the local community for their input into the pre-application community engagement process and for their participation in the discussions.

4.8 Consideration of Alternatives

4.8.1 Paragraph 5(2)(d) and Schedule 4 of the EIA Regulations requires the consideration of alternatives and an indication of the reasons for selecting the site, except where limited by constraints of commercial confidentiality.

4.8.2 The Applicant has an ongoing search for potential onshore wind farm sites. This involves a desk-based assessment utilising secondary data and a Geographical Information System (GIS) to identify constraints at a particular site. Sites that are not deemed suitable at one given time (i.e. 'the alternatives') may at a later date be re-assessed, hence, for commercial reasons and in accordance with PAN 1/2013, it is not possible to disclose the names or positions of the alternative sites.

4.8.3 The Applicant considered a number of alternative layouts and different scales of wind turbine for the Proposed Development, to arrive at the design for which consent is sought. A full description of the iterative design process is provided in **Chapter 3** of this EIA Report.

4.9 Assumptions, Limitations & Uncertainty

4.9.1 The EIA process is designed to enable informed decision-making based on the best available information about the environmental implications of a proposed development. However, there will always be some uncertainty inherent in the scale and nature of the predicted environmental effects as a result of the level of detailed information available at the time of assessment, data reliability or uncertainty, the potential for minor alterations to the Proposed Development following completion of the EIA Report and/or the limitations of the prediction processes.

4.9.2 A number of assumptions were made during the EIA process and are detailed below:

- The principal land uses adjacent to the Site remain unchanged during the course of the Proposed Development's lifetime.

- Current applications for wind energy projects are included within the assessment of cumulative effects for each technical aspect.
- Information provided by third parties (including publicly available information and databases) is correct at time of submission.

4.9.3 Specific assumptions may also be made with regards to the individual technical disciplines, which are detailed within each technical chapter.

4.9.4 The main limitation to the assessment has been that while the baseline conditions have been assumed to be accurate at the time of surveying, due to the dynamic nature of the environment, these conditions may change during site preparation, construction and operation.

4.9.5 There is also the potential for a degree of necessary flexibility as certain aspects of the Proposed Development may be subject to change until a detailed design has been finalised. The maximum design envelope has been considered to ensure a robust assessment and any design flexibility will not exceed these. This flexibility can come in the forms of:

- wind turbine selection;
- foundation and infrastructure design; and
- micro-siting of the wind turbines and associated infrastructure which may change due to investigation findings or implementation of mitigation measures.

4.9.6 Any limitations to the EIA are summarised in each technical chapter, where relevant, together with the means proposed to mitigate these.

4.9.7 Information on the construction of the Proposed Development has been developed by the project team based on professional judgement and outline design works, on the most likely methods of construction, plant, access routes and working areas etc. for the purposes of the EIA. The final choice of optimum construction methods will rest with the Contractor and may differ from those used in this assessment, with any such uncertainty stated in the EIA Report. Any changes to these methods will remain within the maximum design envelope.

5 Statutory & Policy Framework

5.1 Introduction

5.1.1 This chapter of the Environmental Impact Assessment Report (EIA Report) describes the legislative and policy background relevant to the Proposed Development. It refers to energy and planning policy at a national and local level. It provides an objective summary of the energy and planning policy considerations that have been taken into account in the preparation of the Environmental Impact Assessment (EIA) in order to ensure that it provides appropriate information for the consideration of an application for the Proposed Development.

5.1.2 This chapter does not include an assessment of the Proposed Development against planning policy; a separate Planning Statement has been prepared to support the application and should be referred to for a detailed planning policy appraisal.

The Statutory Framework

The Electricity Act 1989

5.1.3 The Proposed Development will have an installed capacity of over 50 megawatts (MW). In Scotland, onshore renewable energy developments that have capacity to generate over 50 MW require consent from the Scottish Ministers under the Electricity Act 1989 (the Electricity Act). In such cases, the Planning Authority is a statutory consultee in the development management process and procedures.

5.1.4 In an application under Section 36 of the Electricity Act, the Development Plan does not have primacy in the decision-making process. The provisions of Schedule 9 of the Electricity Act are relevant to the assessment of the Proposed Development.

5.1.5 Schedule 9, Sub-paragraph 3(2), requires the Scottish Ministers to have regard to:

"(a) the desirability of the matters mentioned in paragraph (a) of sub-paragraph (1) above; and (b) the extent to which the person by whom the proposals were formulated has complied with his duty under paragraph (b) of the sub-paragraph."

5.1.6 The duties referred to in Schedule 9 sub-paragraph 3 (1) (a) and (b) of the Electricity Act do not apply to the Applicant, but the matters set out in Sub paragraph 3(1)(a) to which the Scottish Ministers must have regard are:

"…. the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest;"

5.1.7 At sub-paragraph 3(3), the Scottish Ministers [are required to…] *"avoid, so far as possible, causing injury to fisheries or to the stock of fish in any waters."*

5.1.8 The provisions of Schedule 9 of the Electricity Act set out a number of features to which regard must be had by the Scottish Ministers and such features have been fully taken into account in the iterative design process and assessed in terms of the EIA process.

The Town & Country Planning (Scotland) Act 1997

5.1.9 The principal planning statute in Scotland is the Town and Country Planning Act (Scotland) 1997 (the 1997 Act) as amended by The Planning etc. (Scotland) Act 2006 and by the Planning (Scotland) Act 2019 (the 2019 Act).

5.1.10 Section 57(2) of the 1997 Act provides:

"On granting a consent under section 36 or 37 of the Electricity Act 1989 in respect of any operation or change of use that constitutes development, the Scottish Ministers may direct that planning permission for that development and any ancillary development shall be deemed to be granted, subject to any conditions (if any) as may be specified in the direction".

5.1.11 Section 25 of the 1997 Act states that:

"Where, in making any determination under the planning Acts, regard is to be had to the development plan, the determination shall be made in accordance with the plan unless material considerations indicate otherwise".

5.1.12 Section 57(2) of the 1997 Act makes no reference to the provisions of section 25 which requires regard to be had to the provisions of the Development Plan. The Courts have confirmed that section 57(3) does not apply section 25 to a decision to make a direction to grant deemed planning permission pursuant to section 57(2)[1].

5.1.13 The Scottish Ministers will determine the application having considered the statutory duties in Schedules 8 and 9 of the Electricity Act, so far as relevant, and all relevant considerations or matters, one of which will be relevant aspects of the statutory Development Plan.

5.2 Renewable Energy Policy: Summary

5.2.1 In recent years, United Kingdom (UK) and Scottish Government policies have focussed increasingly on concerns about climate change. Each tier of Government has developed targets, policies and actions to deal with the climate crisis and generate more renewable energy and electricity.

5.2.2 The UK Government retains responsibility for the overall direction of energy policy, although some elements are devolved to the Scottish Government. The UK Government has published a series of policy documents setting out how targets can be achieved. Onshore wind generation, located in Scotland, is identified as an important technology to achieve these various goals.

5.2.3 The Scottish Government has published a number of policy documents and its own targets. The most relevant policy, legislative documents and more recent statements published by the Scottish Government include:

- The Scottish Energy Strategy (December 2017);
- The Scottish Government's declaration of a Climate Emergency (April 2019);
- The Scottish Climate Change Plan Update (December 2020);
- The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 and the legally binding net zero target for 2045;
- The Onshore Wind Policy Statement (December 2022); and
- The Draft Energy Strategy and Just Transition Plan (January 2023).

5.2.4 The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 amends the Climate Change (Scotland) Act 2009 and requires that "The Scottish Ministers must ensure that the net Scottish emissions account for the net-zero emissions target year is at least 100% lower than the baseline (the target is known as the "net-zero emissions target"). The target year is 2045 and the Act also sets out interim targets.

5.2.5 The targets legally bind the Scottish Ministers and have been legislated to set the framework for Scotland's response to the Climate Emergency.

[1] William Grant & Sons Distillers Limited, Court of Session [2012] CSIH 28.

5.2.6 The Proposed Development relates to the generation of electricity from renewable energy sources and comes as a direct response to national planning and energy policy objectives.

5.2.7 The Proposed Development would make a contribution to the attainment of emissions reduction, renewable energy and electricity targets at both the Scottish and UK levels. Detailed reference to the renewable energy policy framework is provided in the Planning Statement.

5.3 National Planning Framework 4 (NPF4)

5.3.1 NPF4 came into force on 13 February 2023.

5.3.2 Section 13, of the 2019 Act amends Section 24 of the 1997 Act regarding the meaning of the statutory Development Plan, such that for the purposes of the 1997 Act, the Development Plan for an area is taken to consist of the provisions of:

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

5.3.3 Strategic Development Plans no longer form part of the Development Plan.

5.3.4 A key provision of the 2019 Act (Section 13) is that in the event of any incompatibility between the provisions of NPF4 and a provision of an LDP then whichever of them is the later in date will prevail. That will include where an LDP is silent on an issue that is now provided for in NPF4.

5.3.5 As explained, for the purposes of Section 36 decision making, Section 25 of the 1997 Act is not engaged, however NPF4 forms a significant material consideration in the overall decision-making process.

The National Spatial Strategy: Delivery of Sustainable Places

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

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

5.3.7 The principles are stated as playing a key role in delivery the United Nations Sustainable Development Goals and the Scottish Government's National Performance Framework[2].

5.3.8 The Spatial Strategy is aimed at supporting the delivery of:

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

5.3.9 Page 6 of NPF4 addresses the delivery of sustainable places. Reference is made to the consequences of Scotland's changing climate, and it states, *inter alia*:

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

[2] The Scottish Government National Performance Framework sets out 'National Outcomes' and measures progress against a range of economic, social and environmental 'National Indicators'.

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

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

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

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

5.3.11 Six National Developments support the delivery of sustainable places, one being 'Strategic Renewable Electricity Generation and Transmission Infrastructure'. A summary description of this National Development is provided at page 7 of NPF4 as follows:

"Supports electricity generation and associated grid infrastructure throughout Scotland, providing employment and opportunities for community benefit, helping to reduce emissions and improve security of supply".

5.3.12 Page 8 of NPF4 sets out 'Cross-cutting Outcome and Policy Links' with regard to reducing greenhouse gas emissions. It states:

"The global climate emergency and the nature crisis have formed the foundations for the spatial strategy as a whole. The regional priorities share opportunities and challenges for reducing emissions and adapting to the long-term impacts of climate change, in a way which protects and enhances our natural environment."

5.3.13 A key point in this statement is that the climate emergency and nature crisis are expressly stated as forming the foundations of the national Spatial Strategy. Recognising that tackling climate change and the nature crisis is an overriding imperative which is key to the outcomes of almost all policies within NPF4.

National Developments

5.3.14 NPF4 sets the approach to planning and development to help achieve a net zero, sustainable Scotland by 2045. It continues the planning policy approach of identifying 'national developments' which refers to the allocation of national development status to certain classes of development. There are three categories of national development proposed namely 'liveable places, productive places and sustainable places'.

5.3.15 Page 97 of NPF4 sets out that 18 National Developments (NDs) have been identified. These are described as: *"significant developments of national importance that will help to deliver the spatial strategy … National development status does not grant planning permission for the development and all relevant consents are required".*

5.3.16 It adds that:

"Their designation means that the principle for development does not need to be agreed in later consenting processes, providing more certainty for communities, businesses and investors. … In addition to the statement of need at Annex B, decision makers for applications for consent for national developments should take into account all relevant policies".

5.3.17 Annex B of NPF4 sets out the various NDs and its related Statements of Need. It states (page 99) that:

"The statements of need set out in this annex are a requirement of the Town and Country Planning (Scotland) Act 1997 and describe the development to be considered as a national development for consent handling purposes".

5.3.18 Page 103 of NPF4 describes ND3 'Strategic Renewable Electricity Generation and Transmission Infrastructure' and it states:

"This national development supports renewable electricity generation, repowering, and expansion of the electricity grid.

A large and rapid increase in electricity generation from renewable sources will be essential for Scotland to meet its net zero emissions targets. Certain types of renewable electricity generation will also be required, which will include energy storage technology and capacity, to provide the vital services, including flexible response, that a zero carbon network will require. Generation is for domestic consumption as well as for export to the UK and beyond, with new capacity helping to decarbonise heat, transport and industrial energy demand. This has the potential to support jobs and business investment, with wider economic benefits.

The electricity transmission grid will need substantial reinforcement including the addition of new infrastructure to connect and transmit the output from new on and offshore capacity to consumers in Scotland, the rest of the UK and beyond. Delivery of this national development will be informed by market, policy and regulatory developments and decisions."

5.3.19 The location for ND3 is set out as being all of Scotland and in terms of need it is described as:

"Additional electricity generation from renewables and electricity transmission capacity of scale is fundamental to achieving a net zero economy and supports improved network resilience in rural and island areas."

5.3.20 Reference is made to the designation and classes of development which would qualify as ND3, and it states in this regard:

"A development contributing to 'Strategic Renewable Electricity Generation and Transmission' in the location described, within one or more of the Classes of Development described below and that is of a scale or type that would otherwise have been classified as 'major' by 'The Town and Country Planning (Hierarchy of Developments) (Scotland) Regulations 2009', is designated a national development:

(a) on and off-shore electricity generation, including electricity storage, from renewables exceeding 50 megawatts capacity;

(b) new and/or replacement upgraded on and offshore high voltage electricity transmission lines, cables and interconnectors of 132kv or more; and

(c) new and/or upgraded Infrastructure directly supporting on and offshore high voltage electricity lines, cables and interconnectors including converter stations, switching stations and substations."

5.3.21 The Proposed Development, having a capacity which exceeds the 50 MW threshold set for a ND means it would have national development status as per these provisions of NPF4. The Proposed Development is of national importance for the delivery of the national Spatial Strategy.

5.3.22 The Strategy requires a "*large and rapid increase*" in electricity generation from renewables and the National Spatial Strategy makes it clear (NPF4, page 6) that "*we must make significant progress*" by 2030.

National Planning Policy

5.3.23 The relevant national planning policies are:

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

Policy 1 (Tackling the climate and nature crisis)

5.3.24 Policy 1 states that: "when considering all development proposals significant weight will be given to the global climate and nature crisis".

Policy 3 (Biodiversity)

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

"LDPs 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: facilitating the creation of nature networks and strengthening connections between them to support improved ecological connectivity; restoring degraded habitats or creating new habitats; and incorporating measures to increase biodiversity, including populations of priority species.

a) Development proposals will contribute to the enhancement of biodiversity, including where relevant, restoring degraded habitats and building and strengthening nature networks and the connections between them. Proposals should also integrate nature-based solutions, where possible.

b) Development proposals for national or major development, or for development that requires an Environmental Impact Assessment 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.

c) Proposals for local development will include appropriate measures to conserve, restore and enhance biodiversity, in accordance with national and local guidance. Measures should be proportionate to the nature and scale of development. Applications for individual householder development, or which fall within scope of (b) above, are excluded from this requirement.

d) 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 4 (Natural Places)

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

"LDPs will identify and protect locally, regionally, nationally and internationally important natural assets, on land and along coasts. The spatial strategy should safeguard them and take into account the objectives and level of their protected status in allocating land for development. Spatial strategies should also better connect nature rich areas by establishing and growing nature networks to help protect and restore the biodiversity, ecosystems and natural processes in their area.

a) Development proposals which by virtue of type, location or scale will have an unacceptable impact on the natural environment, will not be supported.

b) Development proposals that are likely to have a significant effect on an existing or proposed European site (Special Area of Conservation or Special Protection Areas) and are not directly connected with or necessary to their conservation management are required to be subject to an "appropriate assessment" of the implications for the conservation objectives.

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:

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

vii. Any significant adverse effects on the qualities for which the area has been designated are clearly outweighed by social, environmental or economic benefits of national importance. All Ramsar sites are also European sites and/or Sites of Special Scientific Interest and are extended protection under the relevant statutory regimes.

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.

e) The precautionary principle will be applied in accordance with relevant legislation and Scottish Government guidance.

f) Development proposals that are likely to have an adverse effect on species protected by legislation will only be supported where the proposal meets the relevant statutory tests. If there is reasonable evidence to suggest that a protected species is present on a site or may be affected by a proposed development, steps must be taken to establish its presence. The level of protection required by legislation must be factored into the

planning and design of development, and potential impacts must be fully considered prior to the determination of any application.

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".

Policy 5 (Soils)

5.3.27 Policy 5 'Soils' seeks to protect carbon-rich soils, restore peatlands and minimise disturbance to soils from development and states:

"LDPs should protect locally, regionally, nationally and internationally valued soils, including land of lesser quality that is culturally or locally important for primary use.

a) 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.*
- *iii. b) Development proposals on prime agricultural land, or land of lesser quality that is culturally or locally important for primary use, as identified by the LDP, will only be supported where it is for:*
- *iv. Essential infrastructure and there is a specific locational need and no other suitable site;*
- *v. Small-scale development directly linked to a rural business, farm or croft or for essential workers for the rural business to be able to live onsite;*
- *vi. The development of production and processing facilities associated with the land produce where no other local site is suitable;*
- *vii. The generation of energy from renewable sources or the extraction of minerals and there is secure provision for restoration; and*
- *viii. In all of the above exceptions, the layout and design of the proposal minimises the amount of protected land that is required.*

c) Development proposals on peatland, carbon rich soils and priority peatland habitat will only be supported for:

- *i. Essential infrastructure and there is a specific locational need and no other suitable site;*
- *ii. The generation of energy from renewable sources that optimises the contribution of the area to greenhouse gas emissions reductions targets;*
- *iii. Small-scale development directly linked to a rural business, farm or croft;*
- *iv. Supporting a fragile community in a rural or island area; or*
- *v. Restoration of peatland habitats.*

d) Where development on peatland, carbon-rich soils or priority peatland habitat is proposed, a detailed site specific assessment will be required to identify:

- *i. the baseline depth, habitat condition, quality and stability of carbon rich soils;*

ii. the likely effects of the development on peatland, including on soil disturbance; and
iii. the likely net effects of the development on climate emissions and loss of carbon.

This assessment should inform careful project design and ensure, in accordance with relevant guidance and the mitigation hierarchy, that adverse impacts are first avoided and then minimised through best practice. A peat management plan will be required to demonstrate that this approach has been followed, alongside other appropriate plans required for restoring and/ or enhancing the Site into a functioning peatland system capable of achieving carbon sequestration.

e) Development proposals for new commercial peat extraction, including extensions to existing sites, will only be supported where:

i. the extracted peat is supporting the Scottish whisky industry;
ii. there is no reasonable substitute;
iii. the area of extraction is the minimum necessary and the proposal retains an in-situ residual depth of part of at least 1 metre across the whole site, including drainage features;
iv. the time period for extraction is the minimum necessary; and
v. there is an agreed comprehensive site restoration plan which will progressively restore, over a reasonable timescale, the area of extraction to a functioning peatland system capable of achieving carbon sequestration".

Policy 6 (Forestry, Woodland and Trees)

5.3.28 Policy 6 seeks to protect and expand forests, woodland and trees and states:

"LDPs should identify and protect existing woodland and the potential for its enhancement or expansion to avoid habitat fragmentation and improve ecological connectivity, helping to support and expand nature networks. The spatial strategy should identify and set out proposals for forestry, woodlands and trees in the area, including their development, protection and enhancement, resilience to climate change, and the expansion of a range of types to provide multiple benefits. This will be supported and informed by an up to date Forestry and Woodland Strategy.

a) Development proposals that enhance, expand and improve woodland and tree cover will be supported.

b) Development proposals will not be supported where they will result in:

i. Any loss of ancient woodlands, ancient and veteran trees, or adverse impact on their ecological condition;
ii. Adverse impacts on native woodlands, hedgerow and individual trees of high biodiversity value, or identified for protection in the Forestry and Woodland Strategy;
iii. Fragmenting or severing woodland habitats, unless appropriate mitigation measures are identified and implemented in line with the mitigation hierarchy;
iv. Conflict with Restocking Direction, Remedial Notice or Registered Notice to Comply issued by Scottish Forestry.

c) Development proposals involving woodland removal will only be supported where they will achieve significant and clearly defined additional public benefits in accordance with relevant Scottish Government policy on woodland removal. Where woodland is removed, compensatory planting will most likely be expected to be delivered.

d) Development proposals on site which include an area of existing woodland or land identified in the Forestry and Woodland Strategy as being suitable for woodland creation will only be supported where the enhancement and improvement of

woodlands and the planting of new trees on the Site (in accordance with the Forestry and Woodland Strategy) are integrated into the design".

Policy 7 (Historic Assets and Places)

5.3.29 Policy 7 has a stated intent to protect and enhance historic assets and places. It states:

"a) 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 the Historic Environment Records.

d) Development proposals in or affecting Conservation Areas will only be supported where the character and appearance of the Conservation Area and its setting is preserved or enhanced.

h) 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.

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.

l) Development proposals affecting a World Heritage Site or its setting will only be supported where their Outstanding Universal Value is protected and preserved.

o) 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 have archaeological significance which is not understood and may require assessment.

Where impacts cannot be avoided they should be minimised. Where it has been demonstrated that avoidance or retention is not possible, excavation, recording, analysis, archiving, publication and activities to provide public benefit may be required through the use of conditions or legal/planning obligations.

When new archaeological discoveries are made during the course of development works, they must be reported to the planning authority to enable agreement on appropriate inspection, recording and mitigation measures."

Policy 11 (Energy)

5.3.30 Policy 11 has a stated intent: *"To encourage, promote and facilitate all forms of renewable energy development onshore and offshore.*

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

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

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

5.3.33 Policy 11 'Energy' states:

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

i. Wind farms including repowering, extending, expanding and extending the life of existing wind farms.
ii. Enabling works such as grid transmission and distribution infrastructure;
iii. Energy storage such as battery storage and pumped storage hydro;
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 Park and National Scenic Areas will not be supported.

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

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

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

i. impacts on communities and individual dwellings, including, residential amenity, visual impact, noise and shadow flicker;
ii. significant landscape and visual impacts, recognising that some impacts are to be expected from some forms of renewable energy. Where impacts are localised and /or appropriate design mitigation has been applied, they will generally be considered to be acceptable.
iii. public access, including impact on long distance walking and cycling routes and scenic routes;
iv. impacts on aviation and defence interests including seismological recording;
v. impacts on telecommunications and broadcasting installations, particularly ensuring that transmission links are not compromised;
vi. impacts on road traffic and on adjacent trunk roads, including during construction;
vii. impacts on historic environment;
viii. effects on hydrology, the water environment and flood risk;
ix. biodiversity including impacts on birds;
x. impacts on trees, woods and forests;
xi. proposals for the decommissioning of developments, including ancillary infrastructure, and site restoration;
xii. the quality of site restoration plans including the measures in place to safeguard or guarantee availability of finances to effectively implement those plans; and
xiii. cumulative impacts.

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

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

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

5.4 National Planning Guidance

5.4.1 Planning Advice Notes (PANs) set out detailed advice from the Scottish Government in relation to a number of land use planning topics. Relevant PANs are summarised in **Table 5.1** below.

Table 5.1: Relevant PANs

Title	Summary Content of Document
PAN 1/2013 Environmental Impact Assessment (as amended)	Provides information on the role local authorities and consultees play as part of the EIA process, and how the EIA can inform development management.
PAN 60 (2000) Planning for Natural Heritage	Advises developers on the important of discussing their proposals with the planning authority and Scottish Natural Heritage (SNH) (now NatureScot) and use of the EIA process to identify the environmental effects of development proposals and seek to prevent, reduce and offset any adverse effects in ecology and biodiversity.
PAN 75 (2005) Planning for Transport	The objective of PAN 75 is to integrate development plans and transport strategies to optimise opportunities for sustainable development and create successful transport outcomes.
PAN 1/2011 Planning and Noise	This PAN provides advice on the role of the planning system in helping to prevent and/or mitigate any potential adverse effects of noise. It promotes the principles of good acoustic design and promotes a sensitive approach to the location of new development.
PAN 2/2011 Planning and Archaeology	The PAN is intended to inform local authorities and other organisations of how to process any archaeological scope of works within the planning process.
PAN 51 Planning, Environmental Protection and Regulation (Revised 2006)	Details the role of the planning system in relation to the environmental protection regimes.

5.5 The Local Development Plan & Relevant Policies

5.5.1 The Development Plan for the Dumfries and Galloway Council (DGC) area is as follows:

- the Dumfries and Galloway Local Development Plan 2 (the LDP) (adopted October 2019); and
- LDP2 'Wind Energy Development: Development Management Considerations' Supplementary Guidance (February 2020) (the SG).

5.5.2 The SG contains at Appendix C, the 'Dumfries and Galloway Wind Farm Landscape Capacity Study' (the DGWLCS).

Key LDP Policies

5.5.3 **Policy IN1 'Renewable Energy'** relates to renewable energy proposals in general and is as follows:

"The Council will support development proposals for all renewable energy generation and/or storage which are located, sited and designed appropriately. The acceptability of any proposed development will be assessed against the following considerations:*

- *landscape and visual impact;*
- *cumulative impact;*
- *impact on local communities and individual dwellings, including visual impact, residential amenity, noise and shadow flicker;*
- *the impact on natural and historic environment (including cultural heritage and biodiversity);*
- *the impact on forestry and woodlands;*
- *the impact on tourism, recreational interests and public access.*

5.5.4 *To enable this assessment sufficient detail should be submitted, to include the following as relevant to the scale and nature of the proposal:*

- *any associated infrastructure requirements including road and grid connections (where subject to planning consent);*
- *environmental and other impacts associated with the construction and operational phases of the development including details of any visual impact, noise and odour issues;*
- *relevant provisions for the restoration of the site;*
- *the scale of contribution to renewable energy generation targets;*
- *effect on greenhouse gas emissions; and*
- *net economic impact, including local and community socio-economic benefits such as employment, associated business and supply chain opportunities.*

** Acceptability will be determined through an assessment of the details of the proposal including its benefits and the extent to which its environmental and cumulative impacts can be satisfactorily addressed."*

5.5.5 **Policy IN2 'Wind Energy'** is specific to wind energy developments and is as follows:

"Assessment of all wind farm proposals:

The Council will support wind energy proposals that are located, sited and designed appropriately. The acceptability of any proposed wind energy development will be assessed against the following considerations:*

Renewable energy benefits:

The scale of contribution to renewable energy generation targets, effect on greenhouse gas emissions and opportunities for energy storage.

Socio-economic benefits:

Net economic impact, including local and community socio-economic benefits such as employment, associated business and supply chain opportunities.

Landscape and visual impacts:

The extent to which the landscape is capable of accommodating the development without significant detrimental landscape or visual impacts, including effects on wild land; and

That the design and scale of the proposal is appropriate to the scale and character of its setting, respecting the main features of the Site and the wider environment and that it addresses fully the potential for mitigation.

Cumulative impact:

The extent of any cumulative detrimental landscape or visual impact or impacts on existing patterns of development from two or more wind energy developments and the potential for mitigation.

Impact on local communities and residential interests:

The extent of any detrimental impact on communities, individual dwellings, residents and local amenity, including assessment of the impacts of noise, shadow flicker, visual dominance and the potential for associated mitigation.

Impact on infrastructure:

The extent to which the proposal addresses any detrimental impact on road traffic, adjacent trunk roads and telecommunications, particularly ensuring transmission links are not compromised.

Impact on aviation and defence interests:

The extent to which the proposal addresses any impacts arising from location within an area subject to potential aviation and defence constraints, including the Eskdalemuir Safeguard Area.

Other impacts and considerations:

a) the extent to which the proposal avoids or adequately resolves any other significant adverse impact on the natural environment, including biodiversity, forests and woodland, carbon-rich soils, hydrology, the water environment and flood risk, the historic environment, cultural heritage, tourism and recreational interests and public access.

b) the extent to which the proposal addresses any physical site constraints and appropriate provision for decommissioning and restoration.

**Acceptability will be determined through an assessment of the details of the proposal including its benefits and the extent to which environmental and cumulative impacts can be addressed satisfactorily."*

Other LDP Policies

5.5.6 **Policy OP1 'Development Considerations'** is an overarching policy that sets out general development considerations. It highlights that development will be assessed against various considerations depending on the scale, nature and location of the proposal including general amenity; historic landscape; landscape; biodiversity and geodiversity; transport and travel; sustainability; and the water environment.

5.5.7 **Policy OP2 'Design Quality and Placemaking'** is an overarching policy that sets out general considerations in relation to design quality of new development. It highlights that development proposals should achieve high quality design in terms of their contribution to the existing built and natural environment, contributing positively to a sense of place and local distinctiveness.

5.5.8 **Policy ED11 'Dark Skies'** relates to the Council's support for the Galloway Forest Dark Sky Park. The Council will assess proposals for development on their merit where they do not adversely affect the objectives of the Dark Sky Park designation.

5.5.9 **Policy HE1 'Listed Buildings'** sets out certain considerations that apply to development proposals that impact on the character or appearance of a listed building or its setting.

5.5.10 **Policy HE2 'Conservation Areas'** sets out that the Council will support development within or adjacent to a Conservation Area that preserves or enhances the character and appearance of the area.

5.5.11 **Policy HE3 'Archaeology'** sets out that the Council will support development and protects significant archaeological and historic assets and protect the wider historic environment from adverse effects.

5.5.12 **Policy HE4 'Archaeologically Sensitive Areas'** sets out that the Council will support development that safeguards the character, archaeological interest and setting of Archaeologically Sensitive Areas as designated by the Council.

5.5.13 **Policy HE6 'Gardens and Designed Landscapes'** sets out that the Council will support development that protects or enhances the significant elements, specific qualities, character, integrity and setting, including key views to and from, gardens and designed landscapes included in the Inventory of Gardens and Designed Landscapes or the Non-Inventory List. Proposals that would have a detrimental effect on the specific quality, character or integrity of a garden or designed landscape will not be approved unless it is demonstrated that the proposal has benefits of overriding public interest.

5.5.14 **Policy NE2 'Regional Scenic Areas'** sets out that development within, or which affects Regional Scenic Areas, may be supported where the Council is satisfied that the landscape character and scenic interest for which the area has been designated would not be significantly adversely affected.

5.5.15 **Policy NE4 'Sites of international importance for biodiversity'** sets out that development proposals likely to have a significant effect on an existing or potential Special Protection Area, existing or candidate Special Area of Conservation or Ramsar site, including developments outwith a site, will require an appropriate assessment and will only be permitted where inter alia the development does not adversely affect the integrity of the site.

5.5.16 **Policy NE5 'Species of international importance'** sets out that development proposals that would be likely to have an adverse effect on a European Protected Species will not be permitted unless it can be shown inter alia that the development would not be detrimental to the maintenance of the population of the species at a favourable conservation status in its natural range, and that there is no satisfactory alternative and the development is required for preserving public health or safety or for other areas of overriding public interest.

5.5.17 **Policy NE6 'Sites of national importance for biodiversity and geodiversity'** sets out that development affecting Sites of Special Scientific Interest and other national nature conservations will only be permitted where inter alia it will not adversely affect the integrity of the area or the qualities for which it has been designated or that any such adverse effects are clearly outweighed by social, environmental or economic benefits of national importance.

5.5.18 **Policy NE7 'Forestry and Woodland'** sets out that proposals should seek to ensure that ancient and semi-natural woodlands and other woodlands with high nature conservation value are protected and enhanced.

5.5.19 **Policy NE8 'Trees and Development'** sets out that where it is not possible to retain woodland then appropriate replacement planting will be required. Any such replacement planting scheme would be located where possible within the region and follow guidance contained within the Forestry and Woodland Strategy.

5.5.20 **Policy NE11 'Supporting the water environment'.** It sets out that the Council will not permit development which would result in deterioration in the status of a waterbody or which would likely impede the improvements in waterbody status as set out in the Solway Tweed River Basin Management Plan, unless there are exceptional justifying circumstances.

The policy further sets out that if culverting of waterbodies should only be carried out where acceptable mitigation measures would be put in place to protect habitats, passage of fauna, and river form and flow.

5.5.21 **Policy NE12 'Protection of water Margins'** relates to protection of water margins. It sets out that where new development is proposed adjacent to or in the vicinity of waterbodies, the water margins will be protected unless there are compelling reasons to justify why this should not be done.

5.5.22 **Policy NE15 'Protection and Restoration of Peat Deposits as Carbon Sinks'** relates to the protection and restoration of Peat Deposits as Carbon Sinks. It sets out that the Council will safeguard and protect peat deposits. Where renewable energy generating development is proposed the balance of advantage in terms of climate change mitigation must be with the proposed development.

5.5.23 **Policy T1 'Transport Infrastructure'** sets out that development proposals will be appraised to determine their effects on the performance of the strategic and regional highway network.

Supplementary Guidance

5.5.24 The LDP2 'Wind Energy Development: Development Management Considerations' Supplementary Guidance (February 2020) (the "SG") provides further detail in support of the development management considerations in Policy IN2 'Wind Energy'. It sets out a statement on the main factors that are to be taken into account in reaching planning decisions and details the criteria contained in the policy.

5.5.25 As noted, the SG contains at its Appendix C, the 'Dumfries and Galloway Wind Farm Landscape Capacity Study' (the DGWLCS).

5.6 Summary

5.6.1 This chapter has set out the legislative background, a summary of the national energy policy framework, and the national and local planning policies and guidance relevant to the consideration of the Proposed Development. It provides an objective summary of the energy and planning policy considerations that have been taken into account in the preparation of the EIA Report in order to ensure that it provides the appropriate information for the consideration of the application for consent.

5.6.2 As noted, the policy appraisal for the Proposed Development is contained in a separate, standalone Planning Statement.

5.7 References

The Climate Change (Emissions reduction targets) (Scotland) Act 2019. Available at https://www.legislation.gov.uk/asp/2019/15/enacted

Scottish Government (2023), The Draft Energy Strategy and Just Transition Plan. Available at Draft Energy Strategy and Just Transition Plan - gov.scot (www.gov.scot)

Scottish Government (2022), The Onshore Wind Policy Statement. Available at Onshore wind: policy statement 2022 - gov.scot (www.gov.scot)

Scottish Government (2022), National Planning Framework 4. Available at National Planning Framework 4: revised draft - gov.scot (www.gov.scot)

Dumfries & Galloway Council (2023), Local Development Plan. Available at: https://www.dumgal.gov.uk/planning/Plans-and-Policies

6. Landscape & Visual Impact Assessment

6.1. Executive Summary

6.1.1. This chapter considers the potential for significant effects upon landscape and visual receptors associated with the construction, operation and decommissioning of the Proposed Development as described in Chapter 2.

6.1.2. Baseline conditions to inform the design and assessment of the Proposed Development have been established through desk study, site visits and consultation with key consultees.

6.1.3. In terms of landscape character, the site is located partially within Landscape Character Type (LCT) 172 – Upland Fringe – Dumfries & Galloway and LCT 181 – Rugged Uplands with Forest – Dumfries & Galloway two turbines located within LCT 172 – Upland Fringe – Dumfries & Galloway. An area of the Site without wind turbines extends into LCT 180. The site access track passes through LCTs 172, 176 and 181.

6.1.4. The Proposed Development is located to the east of the River Cree, across a series of low hills directly south west of the larger Minnigaff Hills. At present, the site and wider landscape is used for a mixture of commercial forestry and pasture. The town of Newton Stewart, and the adjacent village of Minnigaff, lie approximately 2.7 km south of the closest proposed turbine on the River Cree.

6.1.5. The site is located within the Galloway Forest Regional Scenic Area. It is also adjacent to the Galloway Dark Sky Park and 4.7 km south of the Merrick Wild Land Area.

6.1.6. The assessment indicates that there would be significant effects on parts of the following landscape and visual receptors (there would be no significant nighttime effects):

- Daytime effects
  - LCT172 Upland Fringe – Dumfries and Galloway;
  - LCT 181 – Rugged Uplands with Forest – Dumfries & Galloway;
  - LCT 180 – Rugged Uplands - Dumfries & Galloway;
  - Moor of Barclye between the Lamachan Hill/Curleywee group of hills, Penkiln Burn and the River Cree visual receptor group;
  - South and west facing slopes of the Lamachan Hill/Curleywee group of hills visual receptor group;
  - River Cree and Penkiln Burn valleys, including Newton Stewart and the road corridors of the A75 and A714 visual receptor group; and
  - Galloway Hills Regional Scenic Area.
- Daytime cumulative effects
  - LCT172 Upland Fringe – Dumfries and Galloway;
  - LCT 181 – Rugged Uplands with Forest – Dumfries & Galloway;
  - LCT 180 – Rugged Uplands - Dumfries & Galloway;
  - LCT 174 - Plateau Moorland with Forest - Dumfries & Galloway;
  - LCT 160 - Narrow Wooded River Valley – Dumfries & Galloway;
  - LCT 180 - Rugged Uplands - Dumfries & Galloway - 9.4km, north east;
  - Moor of Barclye between the Lamachan Hill/Curleywee group of hills, Penkiln Burn and the River Cree visual receptor group;
  - Lamachan Hill/Curleywee group of hills visual receptor group;
  - River Cree and Penkiln Burn valleys, including Newton Stewart and the road corridors of the A75 and A714 visual receptor group;
  - Roads, residents and recreational landscapes within the moorland landscapes west of the site from the A714 to 20km from the closest proposed wind turbine visual receptor group;

- Southern Upland Way within 7.5km of the Proposed Development; and
- Galloway Hills Regional Scenic Area.

6.2. Introduction

6.2.1. This chapter provides an assessment of the potential landscape and visual effects of the Proposed Development as described in Chapter 2 and the likely significant effects resulting from the construction and operation of the proposed wind turbines and associated infrastructure.

6.2.2. 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 effects, including direct, indirect and cumulative effects;
- describe the mitigation measures proposed to address the likely significant effects;
- assess the residual effects remaining following the implementation of mitigation measures.

6.2.3. The chapter is supported by:

- **Technical Appendix 6.1** - Glossary and Methodology;
- **Technical Appendix 6.2** – Viewpoint selection process;
- **Technical Appendix 6.3** – Viewpoint Descriptions;
- **Technical Appendix 6.4** – Wild Land Area Assessment; and
- **Technical Appendix 6.5** – Residential Visual Amenity Assessment.

6.2.4. **Figures 6.1 – 6.40** are referenced in the text where relevant.

6.3. Legislation, Policy and Guidance

6.3.1. A full review of planning policy of relevance to the Proposed Development can be found in the Chapter 5: Statutory and Policy Framework. A Planning Statement also accompanies this application. Only those policies of direct relevance to this Landscape and Visual Impact Assessment (LVIA) are considered below. Landscape designations and policy areas set out in the policy description below are illustrated on **Figure 6.2**.

National Planning Policy

6.3.2. Relevant national planning policy is expressed in the National Planning Framework 4 (February 2023)(NPF4). NPF4 sets out the spatial principles, regional priorities, national developments and national planning policy for Scotland. It is supported by development specific guidance within the "Onshore Wind: Policy Statement 2022".

6.3.3. Key policies contained within NPF4 that are of relevance to this LVIA include:

- Policy 4: Natural Places
  - Paragraph d) states *"Development proposals that affect a site designated as a local … 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."

The Proposed Development is located within the Galloway Hills Regional Scenic Area (RSA) and consideration of the effects on the integrity of the area or the qualities for which it has been identified are considered in the Assessment of Potential Effects.

- Paragraph g) states *"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."

The Proposed Development is located outside the Merrick Wild Land Area, but a Wild Land Area Assessment is included at **Technical Appendix 6.4** at the request of consultees.

- Policy 11: Energy
  - Paragraph e) states *"… 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; …"

  Effects on residential visual amenity, visual impacts, landscape impacts and impacts on public access are assessed within this Chapter.

Local Planning Policy

6.3.4. The site lies within the western half of the Dumfries and Galloway Council (DGC) area. Current local planning policy is described within the following adopted document:

- Dumfries and Galloway Local Development Plan 2 (LDP2) (October 2019)

6.3.5. South Ayrshire Council and East Ayrshire Council are also located within the study area (see **Figure 6.2**). Policy for these council areas identifies locally valued landscapes and their purposes of designation. The following local plans have been reviewed, noting that their only relevance is in advising of the interests which these Councils seek to protect, since their policies cannot be applied in Dumfries and Galloway:

- South Ayrshire Local Development Plan (2022) – which identifies the Galloway Forest Dark Sky Park, Local Landscape Areas (LLA) and Gardens and Designed Landscapes (GDL); and
- East Ayrshire Proposed Local Development Plan 2 (April 2024) – which identifies the proposed Galloway National Park, GDL, Wild Land and Galloway Forest Dark Sky Park.

Dumfries and Galloway Local Development Plan 2 (LDP2) (2019)

6.3.6. The following adopted policies will be relevant to the Proposed Development in the context of this LVIA:

- **Policy ED11: Dark Skies** which requires lighting on development proposals to be appropriate to the nature of the development and not to adversely affect the objectives of the Dark Sky Park designation. It notes the supplementary guidance relating to the Dark Sky Park (see below).

- **Policy HE2: Conservation Areas** requires new development to preserve or enhance the character, appearance and setting of conservation areas, whilst also maintaining or enhancing the quality of views within, from and into the area.
- **Policy HE6: Gardens and Designed Landscapes** sets out the considerations for the protection of landscapes, including the protection of the setting, character and key views.
- **Policy NE1: National Scenic Areas** (NSAs) states that development will not be permitted where it adversely affects the integrity or qualities of a NSA or where adverse effects are not clearly outweighed by social, environmental or economic benefits of national importance.
- **Policy NE2: Regional Scenic Areas** (RSAs) requires development to respect the special qualities of RSAs. Development affecting RSAs will only be permitted where there are no significant effects on the RSA or there is a specific need for development in that location.
- **Policy NE3: Areas of Wild Land** states that development will not be supported if it affects Wild Land unless significant effects on the qualities of these areas can be substantially overcome. As set out in NPF4 Policy 4, *"effects of development outwith wild land areas will not be a significant consideration"*.
- **Policy IN1: Renewable Energy** states development proposals will be supported where they are located, sited and designed appropriately. The policy provides considerations against which proposals should be assessed and information on the level of detail that should be included.
- **Policy IN2: Wind Energy** is supported by 'Supplementary Guidance: Wind Energy Development' (see below) and sets out the issues that will be considered for all specific proposals.

Local Guidance and Baseline Studies

6.3.7. In addition to the policy document identified above, there are local guidance and baseline documents as follows:

- The Dumfries and Galloway LDP2 Wind Energy Development: Development Management Considerations Supplementary Guidance (February 2020) is adopted supplementary guidance. The supplementary guidance provides further detail to support policy IN2: Wind Energy alongside the Dumfries and Galloway Wind Farm Landscape Capacity Study (DGWLCS) which is attached as an appendix to the supplementary guidance. The DGWLCS was last updated in June 2017 and provides an assessment of the sensitivity of landscape character types to wind energy developments; it includes recommendations that can be used to inform strategic development planning. However, as set out at paragraph 3.6.6 of the 'Onshore Wind: Policy Statement 2022' guidance of this type *"should not be used in isolation to determine the acceptability of a development type in landscape terms and do not replace the need for individual LVIAs and/or Environmental Assessments for individual proposals, however they will continue to be a useful tool in assessing the specific sensitivities within an area"*.
- Dumfries and Galloway LDP2 Dark Skies Friendly Lighting Supplementary Guidance (February 2020) which supports Policy ED11: Dark Skies. It provides good lighting practice to protect the quality of the Dark Sky Park and the wider region.
- Dumfries and Galloway LDP2 Regional Scenic Areas Technical Paper (January 2018) which defines Dumfries and Galloway's regional scenic areas.
- South Ayrshire Landscape Wind Capacity Study (August 2018) which sets out the landscape sensitivities to wind development for landscape character types within South Ayrshire.
- South Ayrshire Supplementary Guidance: Dark Sky Lighting (August 2016) which provides good lighting practice to protect the quality of the Dark Sky Park.

- East Ayrshire Supplementary Guidance: Dark Sky Park Lighting (July 2017) which supplements LDP Policy: TOUR 4 - The Dark Sky Park. It provides good lighting practice to protect the quality of the Dark Sky Park.

6.3.8. These form part of the documented baseline and are reviewed in the relevant Sections below, with accompanying commentary on the implications for the development siting and design and the assessment methodology, as appropriate.

6.4. Consultation

6.4.1. A formal scoping report was issued to the Energy Consents Unit (ECU) in July 2023 and a response was provided in November 2023. A summary of consultation responses relevant to the landscape and visual assessment is set out in **Table 6.1** below.

6.4.2. Additional subsequent responses have been received from Mountaineering Scotland and Dumfries and Galloway Council in relation to the Gatecheck Report submitted in July 2024. These responses are also addressed in **Table 6.1** below.

6.4.3. Further detail on the agreement of viewpoints is set out in **Technical Appendix 6.2**.

Table 6.1: Summary of Consultation Responses

Consultee	Consultation	Consultation Response	Applicant Action
ECU	Scoping Opinion (13/11/2023)	"As the maximum blade tip height of turbines exceeds 150m the LVIA … must include a robust Night Time Assessment with agreed viewpoints to consider the effects of aviation lighting and how the chosen lighting mitigates the effects."	An assessment of night-time effects, including those on the designated Dark Sky Park is included within this chapter. A reduced lighting scheme, whereby nacelle lighting is required on only six of the proposed turbines, has been agreed with the Civil Aviation Authority (CAA) and is considered in this Chapter.
NatureScot	Scoping Opinion (03/10/2023)	"Landscape and visual impacts of the Proposed Development are a key concern, including cumulative impacts with other wind farms in the wider area, and impacts from the visible aviation lighting that will be required due to turbine height."	An assessment of landscape and visual impacts, including cumulative and night-time effects, are included within this chapter.
		"The site of the proposal is bordered on two sides by the Galloway Forest Park which, since 2009, has been designated as the Galloway International Dark Sky Park. These are places where people have committed to keeping the skies dark, primarily by controlling light pollution. An assessment of the impacts of turbine lighting on the Dark Skies Park, particularly its core area, should be carried out, and include night time photomontages from key locations."	An assessment of night-time effects, including those on the designated Dark Sky Park is included within this chapter.
		"We are content for the variation applications for Cornharrow and Fell Wind Farm proposals to be used in the assessments."	Cornharrow and Fell Wind Farm variations are considered within this assessment.
Dumfries and Galloway Council	Scoping Opinion (02/02/2024)	The list of representational viewpoints is not adequate in its scope, and some of the representative viewpoints are not thought relevant. Further representation is needed across a range of sensitive visual receptors.	A revised list of viewpoints was submitted to DGC on 17/04/2024. The LVIA will be undertaken based on the revised list of VPs in the absence of a further response from DGC.
		The LVIA must test the landscape effects on individual landscape character types / units directly and indirectly affected.	This will be undertaken as part of the LVIA.
		Cumulative sequential visual assessments are required for Blair Hill from key routes, taking in the impacts of the Blair Hill scheme in itself from along the routes, and in combination with other schemes. Routes recommended for sequential visual assessment are: A75, A712, A714, NCR 7, and the Merrick hill route.	Noted. This will be considered as part of the cumulative assessment section of the LVIA.
		Full photomontage visualisations to NatureScot / LI guidance standards are required for all viewpoints within 15 km and any others specifically listed; the suggested 5 km is too tight a threshold to reduce the specification of visualisations.	Full photomontages will be prepared for all viewpoints within 5km and a range of viewpoints at other distances. Most viewpoints within 15km will have full photomontages, with justification provided for those where photomontages are not included.
		No representative nighttime visualisations have been proposed, or any details regarding proposed mitigation of the effects of aviation lighting. Nighttime impacts are anticipated to be a key issue for the Blair Hill proposals due to the prominence of the scheme over wide ranging views and in the context of sensitive night time receptors, which include the Galloway Forest Dark Sky Park and the Merrick WLA. As such both more details of the lighting scheme proposed, including mitigation measures, and the scope of the information available for assessment should be fully set out at scoping stage. In this case (degree of effects, sensitivity of receptors in wide range of contexts) a greater number of full nighttime visualisations may be required than NatureScot recommendations, to represent typical night-time effects adequately.	See comments below in relation to night-time effects. Reference will be made to the Dark Sky Park and the Merrick WLA.
		In terms of other schemes Blair Hill would not relate to the wider pattern of development. The scheme would set a precedence for development giving rise to this range of impacts in both Dumfries and Galloways primary mountain resource, the Galloway Hills, and one of its highly valued coastal landscapes, Wigtownshire Bay. The only comparably inappropriate proposal was California Wind farm, dismissed at appeal.	Noted.
		The proposed study areas for the Environmental Impact Assessment is considered too tight, with respect to visual impacts. Given the prominence of Blair Hill, with wide ranging views, particularly across extensive lower lying area to the south and west, and in the local and wider context of highly sensitive landscape, visual and nighttime receptors, the study areas should be greater than those proposed. Recommended detailed study areas: landscape character 15 km (as recommended in the Scoping Report), visual day	Noted. Study areas for visual day and nighttime assessments will be extended to 20km.

Consultee	Consultation	Consultation Response	Applicant Action
		and night time at least 20 km.	
		The siting of Blair Hill in a prominent position in transitional landscapes, with a high degree of theoretical visibility over extensive lower lying settled lowland landscapes to the west (Wigtownshire Moors) and south (Machars and Wigtownshire Bay / surroundings), and in the immediate setting of nationally and regionally designated rugged uplands (the Galloway Hills), mean that the scheme would give rise to wide ranging landscape impacts in terms of landscape character, scale and setting issues, and also landscape value.	Noted.
		It is anticipated that Blair Hill has potential to give rise to significant and marginally significant direct and indirect landscape effects on the following landscape character types / units, as classified in the 2017 DGWLCS: • The host unit: Merrick Rugged Granite Uplands with Forest (LCT 19a) – 19 turbines. • The secondary host unit: Glentrool Upland Fringe (LCT 16) – 3 turbines. • Adjacent unit: Merrick Rugged Granite Upland (LCT 21). • Adjacent unit: Cairnsmore Foothills with Forest (LCT 18a). • Adjacent unit: Cree unit of Narrow Wooded Valley (LCT 4), comprising both the Cree and Penkiln Burn valleys. • Adjacent unit: Glentrool Plateau Moorlands with Forest (LCT 17a). • Nearby unit: Machars Drumlin Pasture in Moss and Moor Lowland (LCT 12). • Nearby unit: Wigtown and Cree Coastal Flats (LCT 2). • Nearby unit (thought limited intervisibility): Palnure Narrow Wooded Valley (LCT 4). • 10-15km range unit: Cairnsmore Coastal Granite Uplands (LCT 20). • 10-15km range unit: Cairnharrow Foothills (LCT 18). • 10-15km range unit: Cairnharrow Upland Fringe (LCT 16). • 10-15km range unit: Machars Drumlin Pasture (LCT 13).	Noted. Impacts on all of these LCTs are assessed in this Chapter of the EIAR.
		Blair Hill is in the immediate setting of a complex and small scale local landscape that forms the setting and recreational environs of Newton Stewart and Minnigaff. The Very Large size of the turbines, and their prominent position in relation to sensitive valley, fringe and upland landscapes means that a particularly high degree of significant landscape effects would be anticipated; these local landscape effects should be considered carefully in the LVIA.	Noted.
		In this case the LVIA must undertake a detailed landscape character assessment at up to approximately 5 km from the scheme, as determined by the local characteristics and key views, but as a guide bounded by: A75 bypass to Newton Stewart to the south, the A712 to the southeast, the Penkiln Burn valley up to Auchinleck, Garlick Hill to the east, Larg Hill to the north, Craigmurchie and the Loch of Cree to the west, including the Castle Stewart designed landscape and bounded by the B7027, the Challoch Moss road to the A75 to the southwest.	Noted.
		Features and areas to include in the more detailed landscape character assessment, but this list may not be exhaustive: • The group of craggy Rugged Granite Upland (LCT 21) summits, comprising Larg Hill, Lamachan Hill, Curleywee, the associated tops, and upper slopes and ridges. • The open areas of the Rugged Granite Uplands with Forest (LCT 21a), including the northwest Blair Hill site, and landmark open summits of Garlick and Craigmurchie Hills. • The tract of Glentrool Upland Fringe (LCT 16), which is a landscape where the high wildlife and cultural heritage interest contribute to the local landscape character and scenery. Notable features include relict settlements and field systems, historic deer parks, castle ruins, prehistoric monuments, and some of the region's iconic bluebell woods. • Western area of Cairnsmore Foothills with Forest (LCT 18a), which is partially occupied by the Kirroughtree, Cairnsmore and Bargaly designed landscapes (NIDL), and also the	Noted.

Consultee	Consultation	Consultation Response	Applicant Action
		Kirroughtree Forest, which is a recreational resource. • The sensitive valley landscape of the Cree unit of Narrow Wooded Valley (LCT 4), comprising both the Cree and Penkiln Burn valleys. • Glentrool Plateau Moorlands with Forest (LCT 17a), including the historic fields over White Hill, and the designed landscapes od Castle Stewart (NIDL). • Farmlands of the Drumlin Pasture in Moss and Moor Lowland (LCT 12) between the minor Challoch Moss road, the A75, and the Cree valley. • Newton Stewart and Minnigaff.	
		With respect to landscapes of national concern the Merrick WLA is a concern, and also the Galloway Hills Forest Park, which is a candidate National Park. The Galloway Hills Forest Park also broadly coincides with the Galloway Dark Sky Park. In terms of regional designations, it is anticipated that day and nighttime effects from Blair Hill on the following Regional Scenic Areas would potentially be significant, and should be considered with respect to any key viewpoints and night-time effects: • The Galloway Hills RSA / Galloway Forest Dark Sky Park. • Mochrum Lochs RSA. • The Machars Coast RSA.	Effects on the designations and the Merrick WLA will be assessed within the LVIA.
		With respect to potential effects on other aspects of local landscape value, it is anticipated that day and nighttime effects from Blair Hill may be problematic for the following designed landscapes (Inventory and Non Inventory) would potentially be significant, and should be considered by the Blair Hill LVIA (and cultural heritage section of the ES) with respect to any designed qualities, key viewpoints, setting issues, and night-time effects: • Garlieston House Inventory Designed Landscape (IDL), long range to the south, with potential visibility from coast and elevated outlooks. Garlieston House has promoted walking routes, so high amenity value. • Castle Stewart Non Inventory Designed Landscape (NIDL), short range across the Cree valley, with potential outlook from more open and elevated areas. The Penninghame House estate has promoted walking routes, and possibly a hotel, so high amenity value. • Kirroughtree NIDL, short range due south near Minnigaff, with Conifers Leisure Park and the Creebridge Hotel. Potentially high amenity value, although most of the designed landscape is likely to be enclosed from wider views north by the lie of the land. • Cairnsmore NIDL, short-medium range south, but at least partially enclosed by intervening landform. A right of way passes through this designed landscape, so of some public amenity value. • Bargaly NIDL, short-medium range south, and thought to be enclosed by Bargaly glen sides. Minor road up the western boundary, otherwise unknown public amenity value. • Merton Hall NIDL, Shennanton House NIDL, and Craighlaw NIDL all lie close to the A75 at medium range to the southwest. Merton Hall appears to orientate towards the Blair Hill site, and a public right of way runs through the designed landscape. It is thought Shennanton House is enclosed by woodland without an orientation eastwards; although Blair Hill may occupy the backdrop setting to the designed landscape, as appreciated from the minor road to the west. Craighlaw Tower and designed landscape are likely to have some outlook, but it is thought no public access. • Barholm NIDL lies at medium range to the south nearby to Creetown. Outlook is anticipated from the open areas of this designed landscape, and the public road / Old Military Road up the eastern boundary. • Mochrum Park NIDL and Barnbarroch NIDL lie at medium-longer range to the southwest; any effects are not anticipated to be significant, but outlooks should be site verified as part of the LVIA.	Effects on these designed landscapes will be considered as relevant, with cross-reference made to Chapter 7 of the EIAR: Cultural Heritage.
		It is anticipated that Blair Hill Wind Farm would potentially give rise to a range of significant and marginally-significant daytime visual effects on the following receptors.	The RVAA will test residential receptors within 3 km of the closest turbine, as set out in the Scoping Report.

Consultee	Consultation	Consultation Response	Applicant Action
		• Residential receptors: local properties dispersed, in hamlets and small settlements, generally within 3km, but possibly up to 6km if properties orientate to the site. The effects on the views, outlook and visual amenity should be assessed from all properties within at least 2 km in the RVVA and also sampled at this and longer ranges in the LVIA, particularly where properties coincide with other public interests. • Hill walkers; visual, combined cumulative visual, and sequential cumulative visual effects for walkers on key routes in the Galloway Hills, including hill routes up Lamachan and Curleywee, the Rhinns of Kells, particularly to the south such as Meikle Millyea, and also the Merrick hill route to Glentrool. • SUW walkers where outlooks to the Galloway Hills remain a feature of the route, locally over Glenvernoch Fell and crossing the upper Cree valley; and potentially in to the longer range. SUW walkers are considered high sensitivity. The effects on the views, outlook, and visual amenity should be assessed from representative viewpoints for specific important views and reveals, and also with a sequential assessment. • Other recreators and visitors to the Galloway Forest Park, using the visitor centres and promoted routes through the forest and its environs. Galloway Forest Park visitors are considered high sensitivity. The effects on the views, outlook, and visual amenity should be assessed from representative viewpoints for specific important views and reveals, and key destinations. • Visitors staying in Newton Stewart, Minnigaff, or the various hotels and leisure centres in the wider environs. Such visitors are considered highly sensitive, but may for the most part be covered by representational viewpoints for residents.	Hill walkers and users of the SUW will be considered as receptors as part of the LVIA. Representative views from the Galloway Forest Park and settlements are dealt with below. These receptor groups will be considered within the LVIA.
		The following receptors would be sensitive to aviation lighting on dark skies: • Residential viewpoints; particularly Newton Stewart and Minnigaff, but also more distant settlements such as Creetown Wigtown, Kirkcowan, smaller villages and hamlets across the Machars, and also including dispersed properties across the Machars and Wigtownshire Moors at medium to longer range. • Caravan parks, chalet, and camping sites in and around Newton Stewart and at longer range around Wigtownshire Bay. • Galloway Dark Sky Park, including recreational facilities such as visitor centres, and promoted routes. • The Merrick Wild Land Area, including the Merrick hill path, and other routes up popular summits. • SUW viewpoints, such as Glenvernoch Fell, and potentially important outlooks at longer range.	A scheme to minimise required lighting has been agreed with CAA based on the final layout of the Proposed Development. Revisions to the scheme have sought to reduce visibility of the required lighting within the Dark Sky Park. There would be no visibility of lighting from Merrick. At most there would be one light visible within the WLA as a result of the agreed scheme. Visibility would be largely limited to within 5km of the proposed turbines within the Dark Sky Park. The effect of the reduced lighting scheme is discussed in this chapter. NatureScot guidance (Guidance on Aviation Lighting Impact Assessment (NatureScot, 2024)) is clear that health and safety should be considered when choosing night-time viewpoints. Viewpoints have been selected in adherence to that guidance. Cumulative lighting effects will be considered where existing schemes are lit. The reduced lighting scheme will be discussed in Chapter 2 of the EIAR (Project Description), Chapter 6 (LVIA) and Chapter 15 (Aviation).
		Detailed responses on viewpoint selection.	See **Appendix 6.2** for detailed responses on viewpoint agreement.
		Routes for sequential assessment: A75 between Glenluce and Newton Stewart, and Carsluith and Newton Stewart, in both directions as far as relevant. - Sequential assessment for Blair Hill in itself, and also other development, likely to include: Carscreugh and Barlockart Moor; and more distant Wigtownshire Moors schemes in long range views from the south, Aries, Glenchamber, Artfield Fell.	Sequential assessment will be included within the LVIA for this route, including within the cumulative assessment
		Routes for sequential assessment: A714 between the DGC border to the north and Wigtown in the south, in both directions as far as relevant. - Sequential assessment for Blair Hill in itself, and also other development, likely to include: scoping schemes Balunton and Glenvernoch; and more distant Wigtownshire Moors schemes in long range views from the east, Kilgallioch and Aries.	Sequential assessment will be included within the LVIA for this route, including within the cumulative assessment
		Routes for sequential assessment: NCR 7 between Cairnfore on the DGC border to the north, and Creetown in the south, in both directions as far as relevant. - Sequential assessment for Blair Hill in itself, and also any other development, thought unlikely to include other schemes.	Sequential assessment will be included within the LVIA for this route, including within the cumulative assessment
		Routes for sequential assessment: Consider popular hill routes in the Galloway Forest Park, e.g. The Merrick path between the summit and descent to Culsharg. - Sequential	Sequential assessment will be included within the LVIA for this route, including within the cumulative assessment

Consultee	Consultation	Consultation Response	Applicant Action
		assessment for Blair Hill in itself, and other development, likely to include scoping schemes Balunton and Glenvernoch, and more distant Wigtownshire Moors schemes.	
		It is recommended that the Developer review all the identified viewpoints and decide on the most appropriate to do full assessments and visualisations for. To do this all the viewpoints should be site checked to help determine the most representative and worst case scenarios. This initial assessment could form an Appendix in the ES, and baseline photographs usefully provided to illustrate the key points.	As requested, this viewpoint analysis is included as an Appendix to the LVIA.
		Night-time representative viewpoints for photomontage visualisations; No proposed nighttime visualisations have been nominated yet. It is noted that NatureScot generally recommends three or four. However, in this case more may be required given the prominence of the turbines and also the large number and spread of sensitive nighttime receptors, including two nationally valued landscapes: the Galloway Forest Dark Sky Park and the Merrick WLA. It is noted that the Galloway Forest Park and surroundings is also being considered as one of the candidate National Parks.	See comments above in relation to night-time effects. Reference will be made to the candidate National Park, but effects will not be assessed on the candidate area given its current status.
		Based on the combination of VPs and further DGC recommendations, initial thoughts: • Newton Stewart and Minnigaff • Wigtown • A75 travelling northwest, possibly Fishery Point, or VP 8. • A75 travelling east from Barlae, potentially approx. GR: 29 3 61 1, and GR: 32 5 62 9. Check wcs. • A712 / Queensway approaching Newton Stewart, possibly GR: 44 2 67 8. • Challoch Church.	VP2 in Newton Stewart, VP8 on the A75, VP9 at Kirkcowan (will be VP most relevant to A75 travelling east from Barlae) and VP10 at Wigtown (whichever location is selected as the final option) are proposed as night-time visualisations. Revised ZTVs show almost no visibility from the A712. Challoch Church not proposed to be added to list of viewpoints.
		Cumulative nighttime effects; There are a number of consented lit schemes in the Wigtownshire Moor cluster, Stranoch 2, Kilgallioch Extension, Artfield Forest; and with in-planning Mid Moile which would also be lit.	Noted.
		The LVIA must undertake a cumulative assessment of Blair Hill in addition to these schemes in relation to sensitive nighttime receptors, particularly the Galloway Forest Dark Skies Park / Merrick WLA / Galloway Hills RSA, where it is anticipated cumulative interactions would occur, and that Blair Hill would be a significant addition.	Noted. This will be considered in the cumulative assessment as appropriate.
		Mitigation measures; With respect to applicant information the LVIA must comply fully with the NatureScot guidance (2020), see 3.3.1 above. The LVIA must also come forwards in the first application with a full scheme of mitigation for aviation lighting, including: • Radar activated lighting if available. • A reduced lighting scheme with cardinal turbines only lit and visible tower lights avoided. • Reduced lighting intensity to respond to conditions / visibility; lights dimming from 2000cd to 200cd when visibility >5km. • Light buffers to focus lighting upwards.	As stated above, a scheme has been agreed with CAA following design freeze for the scheme.
		Overview; Blair Hill is well-separated from other operational and consented wind farm schemes. Operational and consented schemes in the Wigtownshire Moors cluster are in the case of Blair Hill for the most part at least 15 km away, and not thought to be likely to give rise to significant cumulative interactions individually; the closest are operational Aries and Kilgallioch, and consented Kilgallioch Extension, all to the west. However the wider Wigtownshire Moors cluster will give rise to cumulative interactions on common landscape and visual receptors, where Blair Hill would represent a significant addition.	Noted.
		Scoping schemes; There are two other scoping schemes, Balunton and Glenvernoch, which while at >5km from Blair Hill should be considered in the cumulative considerations as they would give rise to potentially cumulative daytime and nighttime impacts and are coming through the planning system at the same time. GLVIA3 gives provision for including scoping schemes, where the local authority considers it absolutely necessary. I do in this case in order to gauge setting impacts on the Galloway Hills, including views into the hills and views from them.	Noted - details of proposals will be obtained as far as they are publicly accessible.

Consultee	Consultation	Consultation Response	Applicant Action
		Approach to cumulative assessment, method and reporting; LVIAs take different approaches to the cumulative assessments. Where operational schemes are assessed in the LVIA, commentary should still be brought forwards into the cumulative assessment regarding how a proposal would add cumulatively to this baseline, even if the 'counting' per se is undertaken at the LVIA stage. It is the nature of effects and merits of the proposed scheme that requires to be brought out, so that impacts, and potential mitigation can be fully understood and optimised.	Noted.
		Depending on the approach to the cumulative assessment a development scenario with all in-application schemes should also be included in the cumulative assessment. With the exception of Blair Hill, it is thought that there are no outstanding in-planning schemes that need to be considered in the Wigtownshire Moors and wider area, but this should be confirmed with the DGC planning officer.	Noted.
		Key design viewpoints; It is recommended that alternative scenarios of both the wind farm footprint and turbine size are tested through an iterative design process, using comparative ZTVs and wire lines, with turbines numbered, to scope out the extent and ranges of turbine heights avoiding the most harmful effects. This is considered particularly important for Blair Hill.	An iterative approach was taken to the design process (see Section 2.4 of this Gatecheck Report), with wirelines and ZTVs being produced at key stages to inform turbine positioning and taking cognisance of potential residential visual amenity effects, in addition to wider potential L&V impacts. This iterative process informed the decision to remove a turbine (T18) and to reduce turbine tip heights of T14 and T15 (as labelled in the Final Layout) from 250 m to 210 m.
		Scenarios of alternative turbine heights should be tested in local and wider views. Alternative turbine heights, and specifically below 150m should be tested in relation to receptors that would be sensitive to aviation lighting to avoid / minimize such effects.	Alternative tip heights were evaluated early on in the design process and were weighed up against various factors such as likely potential environmental impacts, transport challenges, topography and related engineering challenges, and the need to generate renewable energy, as well as taking into account statutory and planning requirements and best practice guidance. The various scenarios were tested in local and wider views using both ZTVs and wirelines at key stages during the iterative design process. The outcome of this process was the proposed development of 13 turbines at 250 m to tip, and two at 210 m to tip. See also Section 2.4 of this report.
		Blair Hill is proposed across fringe and upland slopes, which orientate south, southwest, and west, and are subdivided by forest blocks, the Blair Hill turbines do not occupy a logical or clearly contained site. The layout and relationship to underlying landform would be unlikely to present a balanced wind farm image.	Noted. The key landscape and visual design objectives were set out in Section 2.2.1 of this Gatecheck Report and were used during the iterative design process to inform the layout. The Proposed Development presented in Figure 9, and which will be discussed in Chapter 2 of the EIAR, is the result of the application of those L&V design principles in conjunction with other environmental and engineering constraints.
		D&G Council request the following provide the following to meet NatureScot (2017 and 2020) and LI (2019) guidance: • Cumulative wirelines, with other existing, consented, in-planning windfarms / wind turbines labelled / numbered • Photomontage / cumulative photomontage, with existing and consented windfarms / wind turbines labelled / numbered • Visualisations to show aviation lighting, for an agreed list of sensitive viewpoints • ZTV to show areas affected by aviation lighting	A list of VPs and the types of images to be submitted in the EIAR for each VP was supplied.
		D&G Council requests the following: • A ZTV showing areas that would be affected by aviation lighting. • Wirelines indicating the effects of aviation lighting for each turbine for every viewpoint, marking the position of any aviation lighting. • Assessment of aviation lighting for each representative viewpoint; and sequential effects along the SUW. • Full aviation lighting photomontage visualizations for particularly sensitive receptors such as: ◦ Residential interest including dispersed properties and larger settlements. ◦ Recreational interest sensitive to dark skies and lighting issues, the SUW, Merrick hill route and other popular paths, NCR7. ◦ Galloway Forest Dark Sky Park.	- A ZTV will be included showing the extents of visibility of the agreed aviation lighting scheme. - Those turbines that will include aviation lighting will be identified on the wirelines for each representative viewpoint. - Effects of aviation lighting will be considered for all representative viewpoints and landscape and visual receptors. - A list of photomontages was provided.

Consultee	Consultation	Consultation Response	Applicant Action
		◦ Landscapes sensitive to aviation lighting: Galloway Hills RSA, Machars Coast RSA, Mochrum Lochs RSA, Merrick WLA. ◦ Other recognised remote or otherwise sensitive areas. • Future full photomontage visualisations for any of the viewpoints as indicated as being required based on wireline information	
		The LVIA must come forward in the first application with a full scheme of mitigation for aviation lighting, including: • Radar activated lighting if available. • A reduced lighting scheme with cardinal turbines only lit and visible tower lights avoided. • Reduced lighting intensity to respond to conditions / visibility; lights dimming from 2000cd to 200cd when visibility >5km. • Light buffers to focus lighting upwards	As stated above, a reduced lighting scheme has been agreed with the CAA , and this agreed mitigation has been set out in the EIAR and used to inform the night-time visual impact assessment.
	Gatecheck response (06/08/2024)	Further detailed comments were received from Dumfries and Galloway Council, some of which reiterated points made above.	These comments were received after the design freeze for the application. However, points made will be considered post application and further discussion had with Dumfries and Galloway Council to resolve where possible.
	Response to draft visualisations (02/09/202424)	I've just had another flick through the visualisations. Looks like it isn't complete, there are several viewpoints from where worst-case scenario photomontages should be provided, but have been shown only in wireline format here. Turbines must be shown very clearly in all montages with their full potential to stand out in the landscape reflected. This is essential to enable potential impacts to be fully appreciated. I have noted from other RES projects (e.g. Bloch) that for no obvious reason, viewpoints from where turbines will clearly be visible in the landscape have been incomplete (I've looked for montages that would logically have been included, and haven't been).	The full photomontages are included in the EIA Report.
		I am concerned about the tiny viewpoint maps used habitually by this consultant. Other than identifying the viewpoint locations, they aren't helpful as they don't provide context – other LVIAs include entire pages showing, as best as possible, the area (quadrant?) of the region over which the viewer will be looking. Anyone reviewing LVIA visualisations benefits significantly from this – I can provide a few examples if required from recent projects we have been working on (Cloud Hill, another case that Colin and I are both working on includes good examples). I would strongly encourage the landscape consultant putting together the LVIA to adopt this more helpful approach please.	Viewpoint locations are also provided on the ZTV studies to show wider context.
		Also we will ask that the night-time visualisations accurately represent 2000 candela intensity, again so that anyone viewing the LVIA can appreciate the worst-case scenario of the lighting being on during poor lighting conditions at full output.	Nighttime visualisations will be in line with the guidance and will show the worst-case scenario, as per the methods that were put forward in the Blair Hill Wind Farm Scoping Report.
		I will be in touch again once I've had time to review the visualisations in terms of design/appearance – hopefully in plenty of time to enable the developer to consider design mitigation prior to submission of the Section 36 application to Ministers.	The Applicant would welcome the opportunity to collaborate further, post-submission.
	Response to draft visualisations (04/09/202424)	Reviewing the recent visualisations again, and taking into consideration the photography (which is already done from 2 of the viewpoints), I can't think why photomontages wouldn't be included for the 4 x viewpoints listed – the turbines would be likely to be visible from VP5 and VP11, and although there isn't currently a photograph from VP21 or 22, unless the viewpoints are screened from the proposed wind farm (in which case VPs might be relocated?) we would expect them to be the subject of full photomontages.	See **Appendix 6.2** for detailed responses on viewpoint agreement.
Mountaineering Scotland	Scoping Opinion (01/09/2023)	"Mountaineering Scotland suggests that the viewpoints could be improved to provide better assessment of impact on hillwalkers as a key receptor. The scoping for Blair Hill proposes four viewpoints at over 30km distance yet ignores hills in close proximity to the Proposed Development. Viewpoints would benefit from including Lamachan Hill (c.3km distance), Millfore (c.5km) and Corserine (c.15km). Mountaineering Scotland endorses viewpoints 6, 7 and 11."	Following a review of the viewpoints, additional viewpoints have been included as wireframes at Lamachan Hill (VP21), Millfore (VP22) and Meikle Millyea (VP23) in response to Mountaineering Scotland's request. As discussed in **Technical Appendix 6.2**, the requested viewpoint at Corserine has been relocated to Meikle Millyea due to greatly reduced visibility from Corserine following layout changes. Refer also to **Figure 6.5** (Bare ground Zone of Theoretical Visibility (ZTV)).

Consultee	Consultation	Consultation Response	Applicant Action
	Post-scoping email correspondence (22/05/2024)	"The applicant has accepted two of our suggestions and included them for wireframe assessment, which we appreciate. However we are concerned about the third summit we suggested, Corserine, which the applicant has declined in favour of another summit on the Rhinns of Kells ridge. The reasoning supplied in the document, for VP23 Meikle Millyea, was that this is a replacement for Corserine as a "revised layout has resulted in almost no visibility from Corserine". We are unable to confirm if this is the case or not until there is visual evidence. Corserine is the more significant and popular of these two summits, although a round from Forrest Lodge can include them both. The matter here is whether a revised layout alters visibility from Corserine, or if the bulk of Curlywee would mask visibility from Meikle Millyea. We won't know until we see evidence in visualisations. The importance here is that the views between the summits in this part of the region is especially important as windfarms dominate views in all arcs of view apart from this mountainous core that includes Cairnsmore of Carsphairn, the Rhinns of Kells and to the Merrick in the Range of the Awful Hand. It is our opinion that the intervisibility of views within and between this mountainous country deserves greater consideration in planning assessment than the surrounding moorland uplands which have already been subject to renewables development – it is regionally significant in a southern Scotland context. Corserine is an important component of this, and we request the applicant to demonstrate the visibility of the proposed turbines from the Corserine trig point, instead of asserting no visibility and offering another viewpoint that may or may not be obscured by another hill. Wireframes from both Corserine and Meikle Millyea may resolve this."	
Cree Valley Community Council	Scoping Opinion (October 2023)	"With regard to landscape and visual matters. We do not agree with the approach suggested. The Proposed Development is a Windfarm in a Regional Scenic Area on the edge of the Galloway Forest Park. The site is contiguous with the large tract of unspoilt wild land which forms the Minnigaff Hills. The Minnigaff Hills are the uplands of Minnigaff Parish, Scotland's largest Parish, and include the Merrick. The wind farm site is 6km from the Merrick WLA, being conjoined to it by unpopulated wild upland, identical in landscape character to the Merrick WLA. The Minnigaff Hills are perceived by both locals and visitors as being a single tract of wild land The wild undesignated hills of Larg, Lamachan and Curleywee are not perceived as either separate or different to the WLA designated hills of Benyellary and Craignaw. The EIAR cannot ignore this reality. If consented the Blair Hill Windfarm Farm has the potential to have significant adverse effects on the visual amenity of the Minnigaff Hills and the Merrick WLA with consequent significant adverse effects on the local tourist economy and the quality of life of local residents. The impacts on the Merrick WLA must be included in the EIAR."	An assessment of landscape and visual impacts, including those on landscape character and designated landscapes, are included within this chapter. The methodology utilised within this assessment is based on best practice guidance, including the Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA3)[1]. It has been tried and tested at appeal and on numerous wind farm developments across Scotland.
		"With regard to the study areas, we do not agree that a zone of 3km radius is sufficient for the RVAA study area for this Development. … It is proportionate to state that any house with a clear view of the Blair Hill Wind farm and situated within 5km of any turbine will require a RVAA to be carried out otherwise	The Landscape Institute's Technical Guidance Note (TGN) on Residential Visual Amenity Assessment (RVAA)[2] states that there are "no standard criteria for defining the RVAA study area nor for the scope of the RVAA, which should be determined on a case-by-case basis taking both the type and scale of Proposed Development, as well as the landscape and visual context, into account." It further states that "being able to see a Proposed Development from a property is no reason to include it in the RVAA." 2.5 km is a typical study area for turbines of this scale and has been deemed appropriate

[1] Landscape Institute with the Institute of Environmental Management and Assessment (2013). The Guidelines for Landscape and Visual Impact Assessment, 3rd Edition. Routledge, Oxon.
[2] Landscape Institute. (March 2019). Residential Visual Amenity Assessment (RVAA) Technical Guidance Note 2/19. Available at: https://www.landscapeinstitute.org/technical-resource/rvaa/

Consultee	Consultation	Consultation Response	Applicant Action
		the Blair Hill EIAR will be incomplete and not fit for purpose. The zone for RVAA should be set at 5 km."	for the Proposed Development, following detailed analysis within the RVAA. The RVAA is included at Technical Appendix 6.5.
		Detailed responses on viewpoint selection.	See **Appendix 6.2** for detailed responses on viewpoint agreement.
		The Glenvernoch Wind Farm which is in the pre application stage must be included in the Cumulative Assessment.	Glenvernoch Wind Farm is included within the list of cumulative sites.
Royal Burgh of Wigtown Community Council	Scoping Opinion (09/10/2023)	The turbines are all much larger than any now operating in Galloway and the impact on the landscape and the Wild Land (designated by Dumfries and Galloway Council) will be significant. They will be visible from many places and, particularly for us, on the road from Wigtown to Newton Stewart.	An assessment of landscape and visual effects, including those on Merrick Wild Land Area is included within this chapter.
		We support the submissions made to you by the Cree Valley Council.	See response above.

6.5. Assessment Methods and Significance Criteria

Scope of Assessment

6.5.1. *"Landscape and Visual Impact Assessment is a tool used to identify and assess the significance of and the effects of change resulting from development on both the landscape as an environmental resource in its own right and people's views and visual amenity."* (Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA3), para. 1.1).

6.5.2. Paras. 2.20-2.22 of the same guidance indicate that the two components (assessment of landscape effects, and assessment of visual effects) are *"related but very different considerations"*.

6.5.3. The assessment method for this LVIA draws upon the following established guidance:

- GLVIA3;
- Landscape Character Assessment Guidance for England and Scotland (Scottish Natural Heritage and The Countryside Agency, 2002);
- LI Technical Guidance Note 02/2019 Residential Visual amenity assessment (RVAA);
- Landscape Institute's Technical Guidance Note 02/21: Assessing landscape value outside national designations;
- LI Technical Guidance Note 06/19 Visual Representation of development proposals;
- NatureScot Guidance on Aviation Lighting Impact Assessment;
- Visual Representation of Wind Farms; and
- NatureScot Assessing the Cumulative Landscape and Visual Impact of Onshore Wind Energy Developments.

6.5.4. The methodology is described in more detail in **Technical Appendix 6.1.**

Methodology

Study Area

6.5.5. It is accepted practice within landscape and visual assessment work that the extent of the study area for a development proposal is broadly defined by the visual envelope of the Proposed Development and the anticipated extent of visibility arising from the development itself, based on the Zone of Theoretical Visibility (ZTV) study. In this case a study area of 45 km from the proposed turbines is considered appropriate to cover all potentially material landscape and visual impacts. Further detailed study areas are included as follows:

- 15 km from the proposed wind turbines for detailed assessment of effects on landscape character (daytime);
- 20 km from the proposed wind turbines for nighttime effects;
- 45 km from the proposed wind turbines for cumulative effects; and
- 3 km from the proposed wind turbines for the residential visual amenity assessment.

Desk Study / Field Survey

6.5.6. A baseline study has been conducted to establish the existing and future baseline conditions at the Site and in the surrounding area.

6.5.7. For this assessment, this has comprised a desk-based review of the relevant current national and local planning policy, designations, character assessments and other key considerations.

6.5.8. Zone of Theoretical Visibility (ZTV) studies have been undertaken to help identify the potential visual effects and therefore the scope of receptors likely to be affected. This has been tested on-site during fieldwork in September 2023 and April 2024.

6.5.9. Full details of the approach to the baseline study are included within **Technical Appendix 6.1.**

Assessment Terminology and Judgements

6.5.10. A full glossary is provided in **Technical Appendix 6.1**. The key terms used within this assessment, as derived from GLVIA3, are:

- **Susceptibility** and **Value** – which contribute to **Sensitivity** of the receptor;
- **Scale, Duration** and **Extent** - which contribute to the **Magnitude** of effect; and
- **Significance** – which results from the combination of **Sensitivity** and **Magnitude**. A final statement is then made on whether the effect is considered significant in relation to the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017.

6.5.11. These terms are described in more detail below.

Assessment Criteria

Sensitivity Criteria

Landscape Sensitivity

6.5.12. Susceptibility of landscape character areas is influenced by their characteristics and is frequently considered (though often recorded as 'sensitivity' rather than susceptibility) within documented landscape character assessments and capacity studies. For wind projects, characteristics of relevance include landscape scale; landform and landscape pattern; perceptual qualities such as remoteness and tranquillity; views and visibility, including intervisibility with adjacent landscapes; and degree of man-made influence. Landscape susceptibility is described as high, medium or low.

6.5.13. Susceptibility of designated landscapes is influenced by the nature of the special qualities and purposes of designation and/or the valued elements, qualities or characteristics, indicating the degree to which these may be unduly affected by the development proposed. These special qualities and purposes are usually identified in legislation or policy that creates the designation, or in management plans for the designated areas. Landscape designation susceptibility is described as high, medium or low.

Table 6.2: Landscape Susceptibility

	Higher	⟷	Lower
Landscape susceptibility	The characteristics of the landscape offer limited scope to accommodate the type of development proposed without fundamental change to the baseline landscape character.	⟷	The characteristics of the landscape are robust and resilient to the type of development proposed.
Landscape designation susceptibility	The special qualities and purposes of designation offer limited scope to accommodate the type of development proposed without fundamental	⟷	The special qualities and purposes of designation are robust and resilient to the type of development proposed.

	change.		

6.5.14. Landscape value is *"the relative value that is attached to different landscapes by society"* (GLVIA3, page 157). Consideration is given to designations at both the national and local level. The Landscape Institute's 'Technical Guidance Note 02/21: Assessing landscape value outside national designations' provides a series of criteria to consider for those areas of landscape outside of nationally designated landscapes, which are natural heritage; cultural heritage; landscape condition; associations; distinctiveness; recreational value; perceptual (scenic) qualities; perceptual (wildness and tranquillity) qualities; and function. Landscape value is described as National/International, Local, Community or Limited, with the following definitions:

Table 6.3: Landscape Value

National/International	Landscapes which are nationally or internationally designated for their landscape value.
Local	Locally or regionally designated landscapes; also areas which documentary evidence and/or site observation indicates as being more valued than the surrounding area.
Community	Landscape which is appreciated by the local community but has little or no wider recognition of its value.
Limited	Despoiled or degraded landscape with little or no evidence of being valued by the community.

6.5.15. Landscape sensitivity is assessed by combining the considerations of susceptibility and value described above.

Table 6.4: Landscape Sensitivity

Landscape Sensitivity		Susceptibility		
		High	**Medium**	**Low**
Value	**National/International**	High	High-Medium	Medium
	Local	High-Medium	Medium	Medium-Low
	Community	Medium	Medium-Low	Low
	Limited	Low	Low-Negligible	Negligible

Visual Sensitivity

6.5.16. For visual receptors, susceptibility and value are closely linked - the most valued views are also likely to be those where viewer's expectations will be highest. Susceptibility of visual receptors is primarily a function of the expectations and occupation or activity of the receptors (GLVIA3, para 6.32). The value attributed relates to the value of the view, e.g. a National Trail is nationally valued for access, not necessarily for the available views. Consequently, separate criteria for susceptibility and value are not provided and instead typical examples of the types of visual receptor for each rating of sensitivity are indicated below **Table 6.5**.

Table 6.5: Visual Sensitivity

Visual Receptor Sensitivity		Susceptibility		
		High	Medium	Low
Value	National/International	High ([1])	High-Medium ([4])	Medium ([8])
	Local/District	High-Medium ([2])	High-Medium ([5])	Medium ([8])
	Community	High-Medium ([3])	Medium ([6])	Medium-Low ([9])
	Limited	Medium	Medium-Low ([7])	Low ([10])

1. Visitors to valued viewpoints or routes which people might visit purely to experience the view, e.g. promoted or well-known viewpoints, routes from which views that form part of the special qualities of a designated landscape can be well appreciated; key designed views; panoramic viewpoints marked on maps.
2. People in locations where they are likely to pause to appreciate the view, such as from local waypoints such as benches; or at key views to/from local landmarks. Visitors to local attractions, heritage assets or public parks where views are an important contributor to the experience, or key views into/out of Conservation Areas.
3. People in the streets around their home, or using public rights of way, navigable waterways or accessible open space (public parks, open access land).
4. Users of promoted scenic rail routes.
5. Users of promoted scenic local road routes.
6. Users of cycle routes, local roads and railways.
7. Outdoor workers.
8. Users of A-roads which are nationally or locally promoted scenic routes.
9. Users of sports facilities such as cricket grounds and golf courses.
10. Users of Motorways and A-roads; shoppers at retail parks, people at their (indoor) places of work.

Magnitude of Effect

6.5.17. The Magnitude of effect is informed by combining the scale, duration and extent of effect. Scale of effect identifies the degree of change which will arise from the development. Duration of effect identifies the time period over which the change to the receptor as a result of the development will arise. Extent of effects indicates the geographic area over which the effects will be felt.

Table 6.6: Magnitude of Effect

	Higher	⟷	Lower
Scale	Total or major alteration to key elements, features, qualities or characteristics of the landscape or view, such that post development the baseline will be fundamentally changed.	⟷	Very minor alteration to key elements, features, qualities or characteristics of the landscape or view, such that post development the baseline will be fundamentally unchanged with barely perceptible differences.
Duration	The change is expected to be permanent and there is no intention for it to be reversed.	⟷	The change is expected to be in place for 0-2 years and will be reversed, fully mitigated or no longer occurring beyond that timeframe.
Extent	Effects would be experienced	⟷	Effects would be experienced at

	over a wide geographic area.		the Site level or within its immediate context.

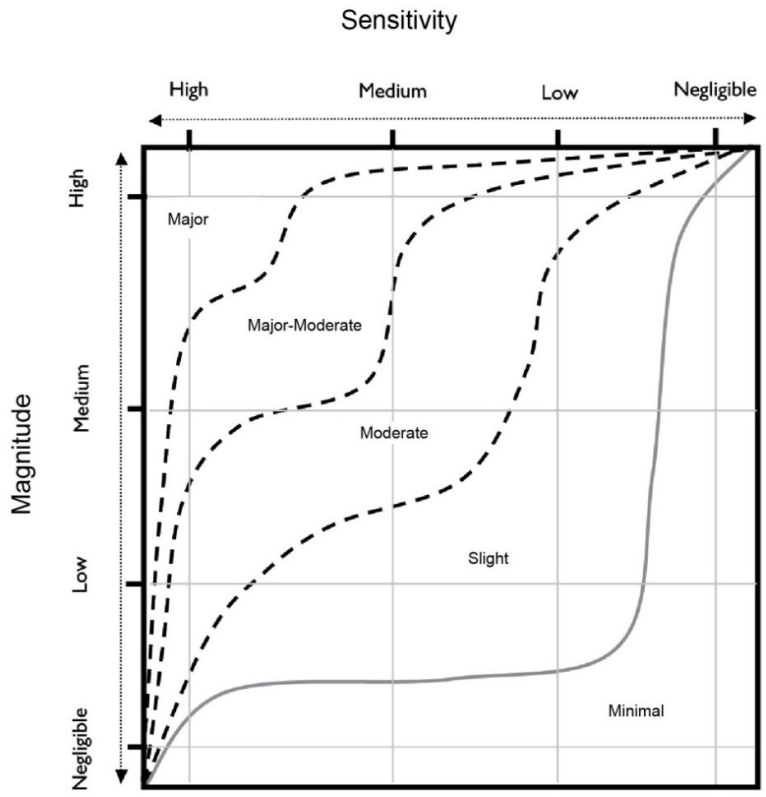
6.5.18. The effects are considered to be reversible as after a period of 50 years the wind farm will be removed, unless a further application to extend the life of the Proposed Development is applied for and granted, or an alternative application to 'repower' with new wind turbines and associated infrastructure is applied for and granted. The effects of the Proposed Development on the landscape are substantially reversible.

6.5.19. Judgements on the magnitude of landscape effect (nature of landscape effect) are recorded as high, medium, low or negligible and are guided by **Table 6.6** above. Scale is the primary factor in determining magnitude; magnitude will typically be judged to be the same as scale, but may be higher if the effect is particularly widespread and long lasting, or lower if it is constrained in geographic extent or timescale. Where the Scale of effect is judged to be Negligible the Magnitude is also assumed to be Negligible and no further judgement in relation to Magnitude is required.

Significance Criteria

6.5.20. The process of forming a judgement as to the degree of significance of the effect is based upon the assessments of magnitude of effects and sensitivity of the receptor to come to a professional judgement of how important this effect is. This judgement is illustrated by **Diagram 6.1** below:

Diagram 6.1: Significance



6.5.21. The significance ratings indicate a 'sliding scale' of the relative importance of the effect, with Major being the most important and Minimal being the least. Effects that are Major-Moderate or Major are considered to be Significant in EIA terms. Effects of slight significance or less are *"of lesser concern"* (GLVIA3, para 3.35) and Not Significant in EIA terms. Moderate effects are considered to be potentially significant and professional

judgment is used to determine whether the effect in question is Significant or Not Significant, with analysis provided to justify the rating. An effect is likely to be assessed as Significant where the sensitivity of the receptor combined with magnitude of change results in a degree of effect that is towards the higher end of the Moderate range (illustrated in Diagram 2 above). It should also be noted that whilst an effect may be Significant, that does not necessarily mean that such an impact should be found unacceptable, or should necessarily be regarded as an *"undue consequence"* (GLVIA3, para 5.40).

6.5.22. Where intermediate ratings are given, e.g. "Moderate-Slight", this indicates an effect that is both less than Moderate and more than Slight, rather than one which varies across the range. In such cases, the higher rating will always be given first; this does not mean that the impact is closer to that higher rating but is done to facilitate the identification of the more significant effects within tables. The judgments relating to intermediate ratings may also be used for judgements of Magnitude.

Beneficial / Neutral / Adverse

6.5.23. Effects are defined as Beneficial, Neutral or Adverse. Neutral effects are those which overall are neither Adverse nor Beneficial but may incorporate a combination of both.

6.5.24. The finding of a Significant effect and the decision regarding whether an effect is beneficial or adverse are entirely separate. For example, a rating of Major and Beneficial would indicate an effect that was Significant and Positive. An effect identified as Major and Adverse would also be Significant in EIA Regulation terms.

6.5.25. Whether an effect is Beneficial, Neutral or Adverse is identified based on professional judgement. GLVIA3 indicates at paragraph 2.15 that this is a *"particularly challenging"* aspect of assessment, particularly in the context of a changing landscape.

6.5.26. For wind farm developments, on a precautionary basis, it is assumed that most effects are Adverse, unless effects are of such a small magnitude that they are barely perceivable and are therefore considered to be Neutral.

Nighttime Assessment

6.5.27. All structures of 150 m and above in height require mandatory visible spectrum aviation lighting. Nighttime assessment of visible aviation lighting for onshore wind turbines on landscape and visual receptors is a relatively new area. Emerging best-practice, including NatureScot Guidance on Aviation Lighting Impact Assessment (2024)[3], is followed in undertaking this assessment.

6.5.28. A study area of 20 km for nighttime effects has selected as appropriate for this assessment. Beyond 20 km lighting from other sources, such as from settlements, roads or cumulative schemes, will result in the Proposed Development being seen as a minor element within the view. The NatureScot Guidance indicates:

"The study area will normally be a smaller area than used in the LVIA day-time assessment. Experience suggests that a study area of between approximately 10km - 20km, depending on the extent of predicted visibility and relevant sensitivities, should be sufficient to ensure significant effects are captured".

6.5.29. The site lies adjacent to Galloway Dark Sky Park (see **Figure 6.2**) and nighttime effects on this designated landscape are assessed as part of the Nighttime Assessment.

[3] NatureScot. (September 2024). Guidance on Aviation Lighting Impact Assessment. Available at: https://www.nature.scot/doc/guidance-aviation-lighting-impact-assessment#appendices

Effects on Landscape Character

6.5.30. The NatureScot Guidance on Aviation Lighting Impact Assessment concentrates predominantly on the visual effects of nighttime lighting, although it does not overtly exclude the need to consider effects on landscape character at night. However, the findings of the Scottish Ministers in the Crystal Rig IV decision (Case reference WIN-140-8, ECU reference ECU00000607) indicate in the first paragraph on page 12 of the Decision Notice that:

"It is noted that the Reporters conclude that proposed aviation lighting would be a visual impact alone and consider that without being able to see and fully appreciate the features of the landscape and the composition of views, it is not possible to carry out a meaningful landscape character assessment. The Scottish Ministers concur with this conclusion".

6.5.31. As a result, this LVIA does not consider the effects of lighting on landscape character.

Effects on Visual Receptors

6.5.32. For visual receptors, the assessment will take account of the different importance attached to views in the night-time environment. Generally, the value attached to night-time views is considered to be low unless there is a particular feature that can be best appreciated in the hours of darkness or are more likely to be visited at night. This may include areas promoted for dark sky tourism and views of stars and the night sky that are only possible in particularly dark areas or views of well-known landmarks that are lit up at night.

6.5.33. The susceptibility of receptors also differs at night reflecting the different activities people undertake in the hours of darkness. For example, drivers using roads at night tend to be more focused on the road and the area illuminated by their headlights than during the day and may have oncoming headlights, cat's eyes or other reflective signage drawing their attention, resulting in lower susceptibility. This is particularly the case on unlit rural roads that may be narrow and winding. On the other hand, people taking part in activities requiring darkness, such as stargazing, would be of higher susceptibility. **Technical Appendix 6.1 provides** further detail on the approach taken to visual receptor sensitivity at night and the factors that influence the visibility of aviation lighting, as set out in NatureScot's Guidance on Aviation Lighting Impact Assessment.

6.5.34. In addition, a separate report by Dr Stuart Lumsden on the 'Visibility of Aviation Warning Lights' is provided for the Proposed Development at **Technical Appendix 6.6**. This expands on the six factors set out at paragraph 30 of NatureScot's 'Guidance on Aviation Lighting Impact Assessment' that can influence the effects of aviation lighting, which include:

- the number and perceived intensity of visible aviation lights
- the distance and angle of view to the lights
- the prevailing atmospheric conditions
- the changing illumination that results from the different phases of the moon
- the saturation of darkness and seasonality changes
- the appearance of other baseline lighting in the landscape

6.5.35. Additional or expanded factors explained in more detail in the report by Dr Stuart Lumsden include:

- Dark adaptation - Full dark adaptation takes time (it can be up to 30 minutes for the full switch to "rod-only" vision though a moderate degree is obtained within the first few minutes when both rods and cones are active). Someone who is in, or emerging from, a lit environment (e.g. a house) will therefore have limitations on how faint an object they can immediately see, and only gradually will fainter objects appear

visible to them. Where street lighting exists in a settlement the chance of full dark adaptation is limited. Even indirect emission (such as streetlights scattered back off the ground) can have a significant impact on adaptation.

- Contrast effect - if there is any background light, whether that be streetlights, more distant man-made light pollution, or natural background light such as twilight, or a moon at or near full, the eye is also limited by a contrast effect. The effect varies with the brightness of the background and whether cones or rods are more dominant. In the earliest phase of twilight, the sky will be too bright to see any but the very brightest stars for example … any additional light source will make it "harder" to see faint distant lights, whether those be aviation lights or stars.
- Meteorological Characteristics – analysis of meteorological record relating to visibility indicates that most of the time when the aviation lighting will operate at 2000 candela will be in conditions where they will not be seen much beyond 5km.
- Attenuation of Light – the presence of aerosols attenuates light (reduces its intensity) as it passes through the atmosphere. Even good visibility can lead to notable reduction in the observed brightness and make the light appear fainter. Only viewpoints nearer than about 5km see the lights as notably brighter when in "high-mode" (2000 candela light can be automatically dimmed to 10% of peak intensity (200 candela) when visibility is in excess of 5 km) than in good weather. For this visual assessment, a worst-case approach is applied which considers the effects of 2,000 candela lights.
- Light intensity - the intensity of light emissions reduces as the vertical elevation angle changes. Table 6.7 below sets out the reduction in light intensity in relation to the varying vertical angle.

Table 6.7: Turbine lighting intensity in candelas (cd)

Vertical Angle	Turbine Lighting Intensity	
	2000cd light	200cd light
0° to 3°	2000cd	200cd
0° to -1°	2000cd to 750cd	200cd to 75cd
-1° to -2°	750cd to 80cd	75cd to 8cd
-2° to -3°	80cd to 40cd	8cd to 4cd
-3° to -4°	40cd to 10cd	4cd to 1cd
Below -4°	Below 10cd	Below 1cd

Cumulative Assessment

6.5.36. Cumulative assessment relates to the assessment of the effects of more than one development. It can be defined as the additional changes caused by a proposed development in conjunction with other similar developments, and in this case relates to the effects of the Proposed Development with other operational, consented or proposed wind farm developments.

6.5.37. A search area of 45 km from the site (typically of a similar scale to the study area) has been agreed with key stakeholders. In terms of selecting which wind turbine proposals within the study area should be included, NatureScot Guidance 'Assessing the Cumulative Impact of Onshore Wind Energy Developments' (2021)[4] advises that:

[4] NatureScot. (March 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

"An assessment of cumulative impacts associated with a specific development proposal should encompass the effects of the proposal in combination with:

- *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."* [para. 26] – note that this category also includes recently refused applications which may yet be appealed.

6.5.38. For this assessment, the following detailed criteria are used for the cumulative assessment:

- Full detail (including wind turbine locations and heights – sourced from planning application details via the Energy Consent Unit or local authority websites) is included for wind farms of 50 m to tip (or greater) within the full 45 km study area. The 45 km radius is applied flexibly such that wind farms only just beyond this distance and/or those that are judged to be particularly relevant to the assessment based on the assessed effects of the Proposed Development are also included in full detail.
- A cut-off for finalising the sites of 5 July 2024 was initially used, with a final review undertaken at the end of November 2024, to allow sufficient time for visualisations to be prepared to inform this LVIA.
- The visualisations model all wind farm developments within 45 km of the proposed turbines.

6.5.39. These criteria were proposed in the formal EIA Scoping Report (July 2023) and further discussed, where relevant, with key stakeholders (refer to **Table 6.1**).

6.5.40. Schemes which are in scoping are noted for context but are not included within the assessment unless they have become active applications by the cut off date for inclusion in the cumulative assessment. This is because reliable information with respect to the scheme design is not available for these schemes and any assessment could not therefor have any degree of certainty. The exception to this is the scheme at Glenvernoch, which has been included in the assessment due to its proximity to the Site (approximately 5.2 km to the west of the closest proposed turbine).

6.5.41. The cumulative assessment examines the same landscape and visual receptors as the assessment for the Proposed Development. The assessment is informed by cumulative ZTVs, showing the extent of visual effects of the schemes in different colours to illustrate where visibility of more than one development is likely to arise. Cumulative wireframes have been prepared which show each of the developments in different colours so that they are each readily identifiable.

6.5.42. In addition, the effects on users of routes through the area, from which wind farms may be sequentially visible as one passes through the landscape are also considered. This assessment is based on the desk study of ZTVs and aerial photography, and site visits to travel along the routes being assessed.

6.5.43. It is important to note the following:

- Operational and consented wind farms are treated as being part of the landscape and visual baseline i.e. it is assumed that consented schemes will be built except for occasional exceptions where there is good reason to assume that they will not be constructed. Reflecting this, the main LVIA assesses effects on the basis that these developments are (and will be for consented developments) in place as part of the baseline.
- Schemes 'in planning' are assessed via a series of scenarios involving one or several of the other developments being consented along with (or before) the Proposed

Development. Two assessment ratings are provided for each scenario – one which indicates the combined effects if all of the schemes in that scenario were consented together (combined effects); and one which indicates the additional effects that consenting the application scheme would have if the other schemes were already consented (incremental effects).

6.5.44. For each assessed receptor, combined effects may be the same as for the application scheme, or greater (where the influence of multiple schemes would increase effects, or where schemes in planning other than the application scheme would have the predominant effects).

6.5.45. For each assessed receptor, incremental effects may be the same as for the application scheme, or reduced (where the influence of other schemes in planning would be such that were they consented and considered to be part of the baseline, the incremental change arising from the addition of the application scheme would be less).

Residential Visual Amenity Assessment

6.5.46. Wind farms are generally regarded as being a form of development for which it is appropriate to undertake a residential visual amenity assessment, as the scale of development is such that the wind turbines may lead to effects being perceived as 'overbearing' or 'overwhelming' as set out within the Landscape Institute's Residential Visual Amenity Assessment (RVAA) Guidance (LI TGN 02/19) (2019).

6.5.47. For the Proposed Development a 3km study area for the RVAA has been selected. The full methodology for the study, including the selection of the study area, in line with LI TGN 02/19, is set out within **Technical Appendix 6.5.**

6.5.48. Cross references are made between the LVIA and the RVAA as follows:

- where viewpoints are located close to properties, this is noted in the RVAA;
- the availability of views from properties towards the Proposed Development will be noted where relevant within the LVIA (for example in respect of effects on settlements); and
- an overview of visual effects on the properties covered by the RVAA will be provided within the summary of the LVIA.

Distances

6.5.49. Where distances are given in the assessment, these are approximate distances between the nearest wind turbine and the nearest part of the receptor in question, unless stated otherwise.

6.6. Baseline

6.6.1. An overview of the baseline study is provided in this section, presenting a review of the key local guidance documents and all of the landscape and visual receptors identified within the extent of the study area.

6.6.2. This section presents an initial assessment of all the identified receptors and sets out which receptors merit further detailed consideration in Section 6.7: Assessment of Potential Effects; and which receptors are not taken forward for further assessment, as effects *"have been judged unlikely to occur or so insignificant that it is not essential to consider them further"* (GLVIA3, para. 3.19). Full baseline descriptions are provided alongside the assessment of effects for those receptors taken forward to Section 6.7, for ease of reference.

6.6.3. Both this baseline study section and Section 6.7 describe landscape character and visual receptors before considering designated landscapes. It is common for designations to

encompass both character and visual considerations within their special qualities or purposes of designation. It therefore makes a more natural reading sequence to draw together those aspects of character and views which relate to the designation if they have been described earlier in the report.

Zone of Theoretical Visibility (ZTV) Studies

6.6.4. ZTV studies have been generated based on the layout of the Proposed Development shown in **Figure 1.2** and the candidate wind turbine sizes as described in Chapter X. The ZTVs have been used as a tool to inform the professional judgements during the iterative design process (see **Chapter 3: Design Evolution and Alternatives**).

6.6.5. The ZTV studies are shown on **Figures 6.5** and **6.6** and indicate areas of potential visibility. In accordance with NatureScot guidance 'Visual Representation of Wind Farms' (2017) the analysis has been prepared using a topographic model alone (**Figure 6.5**) and including woodlands and settlements (with heights derived from NEXTMAP25 surface mapping data) as visual barriers to provide a more realistic indication of potential visibility (**Figure 6.6**).

6.6.6. The ZTV studies have been used to determine which landscape and visual receptors are likely to be affected and merit detailed consideration in the assessment of effect, and those which are unlikely to have visibility.

6.6.7. Further ZTV studies have been prepared to support the assessment of landscape character (**Figure 6.7**), cumulative effects (**Figures 6.9-6.11**) and effects of nighttime lighting (**Figure 6.13**).

6.6.8. It should be borne in mind that the ZTVs represents a theoretical model of the potential visibility of the Proposed Development. In reality, landscape features such as trees, hedgerows, embankments, landform and / or buildings found on the ground, but not accounted for within the surface mapping dataset, are likely to combine to screen the Proposed Development to a greater degree. It should be noted that there is active forestry within the area, resulting in the felling and replanting of some areas of woodland modelled in the ZTV study (**Figure 6.6**) which may result in localised variations to the visibility pattern. As a result, the extent of actual visibility experienced on the ground may differ to that suggested by the ZTV study.

ZTV and Zone of Visual Influence (ZVI)

6.6.9. The ZTV studies shown on **Figures 6.5** and **6.6** show that the majority of views are screened to the north and east. This is due to the height of the adjacent hills that lie north and east of the site.

6.6.10. The figures indicate that the Proposed Development will theoretically be visible in areas outside of woodland within 5 km of the proposed wind turbines, except on the northern faces of the of hills to the north of the site, around Creebridge to the south, and within areas of Newton Stewart and Minnigaff.

6.6.11. Between 5-15 km theoretical visibility to the north and east is notably reduced, with patches of visibility largely restricted to the summits and higher slopes of taller hills such as Merrick (see Viewpoint 7), Corserine (see Viewpoint 23), Meikle Millyea (see Viewpoint 22) and at Benniguinea Lookout (see Viewpoint 11). There is a slight increase in theoretical visibility on the first hills to the east of the site at Cairnsmore of Fleet (see Viewpoint 6). To the south, theoretical visibility between 5-15 km continues across much of the landscape, due to the low, flat and semi-open nature of the area; this is broken intermittent by small to medium sized areas of woodland. There are large areas of forest to the west and theoretical visibility is shown from most of the open areas between the trees.

6.6.12. Further from the site, between 15-25 km, theoretical visibility becomes even more limited to the north and east, where few areas of theoretical visibility are shown. To the south, the pattern of visibility continues in much the same manner as before, whilst in the west the extent of theoretical visibility reduces due to the areas of woodland and the rising topography.

6.6.13. Beyond 25 km no theoretical visibility is shown to the north; theoretical visibility to the east is limited to very infrequent areas, primarily consisting of blade visibility only (see Viewpoint 17); and to the south areas of theoretical visibility continue across the low-lying landscape as before, albeit with a slight reduction in its extent. To the west, theoretical visibility is shown on the elevated hills between 25-35 km and on the coast at Luce Sands within the same distance; beyond 35 km patchy theoretical visibility is shown along areas of coastline and on the east facing slopes of the Rhins of Galloway. No theoretical visibility is shown within Stranraer.

6.6.14. The anticipated main areas of visibility, hereafter referred to as the 'Zone of Visual Influence' (ZVI), is described below. A ZVI is used to refine the theoretical visibility indicated by the ZTV, based on site observations and detailed study of the ZTVs.

6.6.15. Site observations confirm that the ZVI will extend approximately:

- 4.5 km north to Lamarchan Hill and Larg Hill;
- 15 km north-east to Corserine;
- 16 km to the east to Cairnsmore or Black Craig of Dee (isolated locations);
- 9 km to the south-east to Cairnsmore of Fleet;
- 25 km to the south and south-west;
- 15 km to the west to the cluster of operational and consented wind farms at and around Airies Fell and Kilgallioch; and
- 21 km to the north west to the hill summits around Pinbreck Hill and Shalloch (isolated locations).

6.6.16. Based on fieldwork observations, whilst there may be some areas with visibility of the proposed wind turbines beyond the ZVI, it is judged that landscape or visual receptors outside the ZVI described above will experience Negligible change and are not assessed in further detail in this report.

Current Baseline

Landscape Character

6.6.17. Paragraphs 5.13-5.15 of GLVIA3 indicate that landscape character studies at the national or regional level are best used to *"set the scene"* and understand the landscape context. It indicates that Local Authority Assessments provide more detail and that these should be used to form the basis of the assessment of effects on landscape character – with (appropriately justified) adaptation, refinement and interpretation where required.

6.6.18. In Scotland, NatureScot commissioned a series of regional Landscape Character Assessments (LCAs) in the 1990s which mapped the landscape character of all of Scotland and typically covered individual planning authority areas.

6.6.19. Following a review, these assessments were superseded by NatureScot's 2019 Landscape Character Assessment which provides a unified approach to Landscape Character Types (LCTs) across planning authority areas and take into account the latest available data.

6.6.20. NatureScot's 2019 Landscape Character Assessment will be used as the basis consideration of effects on landscape character for this assessment.

6.6.21. The DGWLCS was produced prior to NatureScot's 2019 assessment and utilises the 1998 LCAs. These areas remain broadly similar to those within NatureScot's assessment and information within the DGWLCS will be utilised to inform the assessment of effects on

landscape character, particularly in relation to key characteristics and the susceptibility of the landscape to change. Where character areas differ between the 2019 assessment and the DGWLCS, these changes will be described and reasonable inferences will be made in transposing this information.

6.6.22. The relevant LCTs are shown on **Figure 6.3**.

National Landscape Character

6.6.23. There is no 'high level' national landscape character assessment for Scotland, instead landscape character is assessed at a local level within NatureScot's 2019 Landscape Character Assessment.

Local Landscape Character

6.6.24. Only those LCTs within 15 km of the nearest wind turbine are included in this assessment, as LCTs beyond 15 km would not experience more than Negligible effects on character, given the reduction of effects with distance, the theoretical visibility pattern shown on the ZTV (see **Figure 6.7**) and the existing pattern of wind farm development (see **Figure 6.8**) across the study area. **Figure 6.7** has been prepared which overlays the ZTV study (**Figure 6.6**) with the landscape character areas/types shown on **Figure 6.3** to inform the narrative below. The NatureScot Landscape Character Assessment (2019) provides the reference for landscape character areas/types within this 15 km area, with the DGWLCS particularly informing consideration of susceptibility.

NatureScot Landscape Character Assessment (2019)

6.6.25. The Site, including access track, spans across four landscape character types (LCTs) with the majority of wind turbines located within the southern end of LCT 181 – Rugged Uplands with Forest – Dumfries & Galloway two turbines located within LCT 172 – Upland Fringe – Dumfries & Galloway. An area of the Site without wind turbines extends into LCT 180. The site access track passes through LCTs 172, 176 and 181.

6.6.26. The following LCTs are located within the 15 km study area for the assessment of effects on landscape character but are excluded from more detailed assessment on the basis that effects are likely to be Negligible:

- LCT 78 - Plateau Moorland - Ayrshire (10.4`` km, north west) - this LCT has limited visibility of the Proposed Development as indicated by the ZTV studies at **Figure 6.6** and **6.7** and lies predominantly outwith the 15 km study area for effects on landscape character. Due to the distance and limited visibility the Proposed Development will exert minimal influence on this LCT, and the character of the area is unlikely to be significantly altered.
- LCT 82 – Southern Uplands with Forest – Ayrshire (14 km, north west) – this LCT is almost entirely outside the study area and would have no visibility of the Proposed Development.
- LCT 83 – Rugged Upland - Ayrshire (11.5 km, north) – this LCT has limited visibility of the Proposed Development as indicated by the ZTV studies at **Figure 6.6** and **6.7** and lies predominantly outwith the 15 km study area for effects on landscape character. Due to the distance and limited visibility the Proposed Development will exert minimal influence on this LCT, and the character of the area is unlikely to be significantly altered.
- LCT 160 – Narrow Wooded River Valley – Dumfries & Galloway (11.9 km, south) – this LCT is characterised as a narrow incised valley with wooded slopes and enclosing pasture floors. Due to the nature of the LCT there would be very minimal visibility of the Proposed Development, as indicated by the ZTV studies at **Figures 6.6** and **6.7**. As such, the Proposed Development is unlikely to alter the enclosed, inward-looking character of this area.

- LCT 160 - Narrow Wooded River Valley – Dumfries & Galloway (14.4 km, south east) – this LCT is almost entirely outside the study area and would have no visibility of the Proposed Development.
- LCT 167 - Moss and Forest Lowland (13.3 km, south-west) - this LCT is located predominantly outside the study area. There would be minimal visibility of the Proposed Development, as indicated by the ZTV studies at **Figures 6.6** and **6.7**, and existing wind turbine development is already present to the west of this LCT. As such, the Proposed Development is unlikely to alter the exposed and undeveloped character of this area.
- LCT 176 – Foothills with Forest – Dumfries & Galloway (11.8 km, south east) – this character type has no visibility of the Proposed Development and lies outwith the ZVI, as indicated by the ZTV studies at **Figures 6.6** and **6.7**. As such, the Proposed Development is unlikely to alter the character of this area.
- LCT 181 - Rugged Uplands with Forest - Dumfries & Galloway (5.0 km, north east) - this LCT has limited visibility of the Proposed Development as indicated by the ZTV studies at **Figure 6.6** and **6.7.** Due to the limited visibility the Proposed Development will exert minimal influence on this LCT, and the character of the area is unlikely to be significantly altered.

6.6.27. Effects on the LCTs listed in **Table 6.8** are assessed within Section 6.7, with baseline descriptions provided alongside the assessment of effects for ease of reference. **Table 6.8** also provides cross reference to the LCTs used within the DGWLCS.

Table 6.8: LCTs to be assessed

NatureScot 2019 Landscape Character Types	Distance and Direction from Site	DGWLCS reference to the 1998 LCTs
LCT 158 - Coastal Flats - Dumfries & Galloway	4.4 km, south	LCT 2: Coastal Flats
LCT 160 - Narrow Wooded River Valley – Dumfries & Galloway	1.6 km, south	LCT 4: Narrow Wooded River Valleys
LCT 160 – Narrow Wooded River Valley – Dumfries & Galloway	4.5 km, south east	LCT 4: Narrow Wooded River Valleys
LCT 168 – Drumlin Pasture in Moss and Moor Lowland	3.3 km, south west	LCT 12: Drumlin Pasture in Moss and Moor Lowland
LCT 169 - Drumlin Pastures	10.0 km, south	LCT 13: Drumlin Pastures
LCT 172 – Upland Fringe – Dumfries & Galloway	Includes part of site	LCT 16: Upland Fringe
LCT 172 – Upland Fringe – Dumfries & Galloway	8.7 km, south east	LCT 16: Upland Fringe (small area in the east of this LCT now within LCT 176 - Foothills with Forest - Dumfries & Galloway)
LCT 174 - Plateau Moorland with Forest - Dumfries & Galloway	1.5 km, west	LCT 17a: Plateau Moorland with Forest
LCT 175 - Foothills - Dumfries & Galloway	13.2 km, south east	LCT 18: Foothills
LCT 176 - Foothills with Forest - Dumfries & Galloway	Includes site access track	LCT 18a: Foothills with Forest
LCT 179 - Coastal Uplands	6.7 km, east	LCT 20: Coastal Granite

NatureScot 2019 Landscape Character Types	Distance and Direction from Site	DGWLCS reference to the 1998 LCTs
		Uplands
LCT 180 – Rugged Uplands - Dumfries & Galloway	Includes part of site	LCT 21: Rugged Granite Upland (small differences along the south east boundary of this LCT)
LCT 180 - Rugged Uplands - Dumfries & Galloway	9.4 km, north-east	LCT 21: Rugged Granite Upland (small differences along the south east boundary of this LCT)
LCT 181 – Rugged Uplands with Forest - Dumfries & Galloway	Includes part of site	LCT 21a: Rugged Granite Upland with Forest
LCT 181 - Rugged Uplands with Forest - Dumfries & Galloway	7.8 km, east	LCT 21a: Rugged Granite Upland with Forest

Visual Receptors

6.6.28. Visual receptors are *"the different groups of people who may experience views of the development"* (GLVIA, 3rd edition, para 6.3). The ZTV studies, baseline desk study and site visits have been used to identify those groups who may be significantly affected.

6.6.29. The different types of groups assessed within this report encompass local residents; people using key routes such as roads; cycle ways, people within accessible or recreational landscapes; people using Public Rights of Way and Core Paths; or people visiting key viewpoints. In dealing with areas of settlement, Public Rights of Way and local roads, receptors are grouped into areas where effects might be expected to be broadly similar, or areas which share particular factors in common.

6.6.30. 26 representative viewpoints have been selected to assess the effects on visual receptors. In addition, specific viewpoints have been identified where there are key promoted viewpoints within the study area. No illustrative viewpoints to *"demonstrate a particular effect or specific issues, which might, for example, be the restricted visibility at certain locations"* (GLVIA, 3rd edition, para 6.19) have been utilised.

Visual Environment of the Site

6.6.31. As shown on **Figure 6.1**, the Proposed Development is located to the east of the River Cree, across a series of low hills directly south west of the larger Minnigaff Hills. At present, the site and wider landscape is used for a mixture of commercial forestry and pasture. There are a number of cairns and standing stones (identified and described in **Chapter 7: Cultural Heritage**), primarily within the western end of the site, which are accessible via the farm/forestry tracks from the minor road along the River Cree, as well as from recreational routes that are part of the Wood of Cree. Minor burns, including Black Burn, Cordorcan Burn, Coldstream Burn, Glenshalloch Burn and Peak Rig Strand fall within the Site, typically flow down the hill slopes before following the Site boundaries. The hydrology of the Site is described in more detail in **Chapter 10: Geology, Hydrology and Peat**.

6.6.32. **Figure 6.4** shows the topography of the Site, which is lowest in the south at approximately 140 m AOD and rises to approximately 480 m AOD in the north of the site. A number of hills, included Benailsa (404 m AOD) and Glenmalloch Hill (254 m AOD) contribute to the rolling character of the Site. Beyond the Site, the Minnigaff Hills, which form part of the Galloway Hills, rise to the north and east of the Site; towards the south

and west the landscape is largely flat within 15 km of the site, towards the mouth of the River Cree and Wigtown Bay.

6.6.33. The town of Newton Stewart, and the adjacent village of Minnigaff, lie approximately 2.7 km south of the closest proposed turbine on the River Cree. These settlements are accessed by the A714 from the north and south, the A712 from the east, and the A75 from the south-east and west. There are a number of smaller settlements, individual properties and farmstead close to the Site, these are concentrated on the lower lying land to the south and west (see **Figure 1** in **Technical Appendix 6.5**).

6.6.34. The Proposed Development is not located adjacent to any operational, consented or proposed wind farms as shown on **Figure 6.8**. In general, commercial-scale cumulative sites are located beyond approximately 14.2 km to the west, 19.5 km north-west, 28.9 km north and 27.5 km to the north east. The nearest operational wind farms are Airies Fell and Kilgallioch Wind Farms which lie approximately 14.2 km and 14.9 km to the west.

Visual Receptor Groups

6.6.35. Visual effects are assessed for groups of visual receptors within close proximity of each other and that are judged to experience similar visual effects arising from the Proposed Development. These are referred to as 'visual receptor groups' and include motorists on local roads, users of rights of way and open spaces, and local residents or visitors to settlements.

6.6.36. The following visual receptor groups have been identified within the extent of the ZVI and are taken forward for detailed assessment in Section 6.7. The extents of the Visual Receptor Groups are described in the following sections.

6.6.37. It is judged that for those visual receptors located outside of the ZVI there will be little to no visibility of the Proposed Development, and that effects will be Negligible. Visual receptors located outside of the ZVI are not taken forward for detailed assessment.

Table 6.9: Visual Receptor Groups taken forward for assessment

Visual Receptor Group Name	Location / Description
(1) Moor of Barclye between the Lamachan Hill/Curleywee group of hills, Penkiln Burn and the River Cree (up to 300 m north, 150 m east, 3.5km south and 4km west)	Recreational visitors to the Moor of Barclye and Wood of Cree, residents of isolated properties and users of the local roads and the wider landscape around the site (see Viewpoint 1).
(2) Lamachan Hill/Curleywee group of hills (up to 1.5 km north west, 3.5 km north east and 5.5 km east)	Recreational visitors to the southernmost hills of the Galloway Hills (see Viewpoints 21 and 22).
(3) River Cree and Penkiln Burn valleys, including Newton Stewart and the road corridors of the A75 and A714 (up to 4.8 km south, 5.5 km south west and 4 km west)	Residents and visitors within the town and public open spaces of Newton Stewart, including road users approaching the town (see Viewpoints 2, 20 and 26). This group excludes the major roads which are assessed separately as key routes.
(4) Merrick and the Rhinns of Kells (up to 11.3 km to the north and 16.5 km north east)	Recreational visitors to Merrick and the Rhinns of Kells, including the visitor centre at Glen Trool (see Viewpoints 5, 7 and 23).
(5) Cairnsmore of Fleet and highpoints east of the site (up to 9.5 km east and 8.8 km south east)	Recreational visitors to Cairnsmore of Fleet and the surrounding area (see Viewpoint 6).

Visual Receptor Group Name	Location / Description
(6) River Cree Valley and Wigtown Bay from the A75 to 20 km from the closest proposed wind turbine, including residents of Creetown	Residents and visitors within the town and public open spaces of Creetown and isolated properties in the valley of the River Cree, and users of the local roads and the wider landscape (see Viewpoints 3, 8 and 10). This group excludes the major roads which are assessed separately as key routes.
(7) Roads, residents and recreational landscapes within the drumlin landscapes south west of the site between the A75 and the A714 to 20 km from the closest proposed wind turbine, including residents of Wigtown and Kirkcowan	Residents and visitors within the settlements and public open spaces of Wigtown and Kirkcowan, and isolated properties in the drumlin landscapes and users of the local roads and the wider landscape (see Viewpoints 9, 10 and 12). This group excludes the major roads which are assessed separately as key routes.
(8) Roads, residents and recreational landscapes within the moorland landscapes west of the site from the A714 to 20 km from the closest proposed wind turbine	Residents and visitors to isolated properties in the moorland landscapes and users of the local roads and the wider landscape (see Viewpoints 4 and 14). This group excludes the major roads which are assessed separately as key routes.

Roads and Rail

6.6.38. The following key road routes lie at least partly within the ZVI and are considered in detail in the Assessment of Effects (Section 6.7):

- A712 (3.3 km, south) – which runs north east from Newton Stewart to Crocketford, passing largely through forest within the ZVI.
- A714 (3.5 km, west) – which runs broadly north west from Braehead, passed the site, towards Girvan.
- A75 (4.9 km, south) – which winds east to west through the study area, including along the southern edge of Newton Stewart.
- A746 (17.4 km, south) – which routes south from the junction with the B7085 at Braehead to Glasserton. Along with the A747 this forms the main route around the Machars peninsula.

6.6.39. The Glasgow South Western railway line, which routes from Glasgow to Stranraer via Ayr, passes through the north western corner of the ZVI. Viewpoint 13 is located near Barhill Station (see **Figure 6.27**), adjacent to the route. At its closest point within the ZVI this railway line is located approximately 20.5 km north west of the Proposed Development. The railway line is excluded from detailed assessment as the majority of the route is located outside the ZVI due to landform and vegetation along the route, and beyond the agreed 20 km study area for visual impacts.

Long Distance Routes

6.6.40. The following long distance walking route is located within the ZVI and is considered in the Assessment of Effects (Section 6.7):

- Southern Upland Way (5 km, north).

National, Regional and Local Cycle Routes

6.6.41. **Figure 6.2** shows the National Cycle Routes (NCRs) present in the study area. The following routes are located within the ZVI and are considered in detail in the Assessment of Effects at Section 6.7:

- NCR7 (3.1 km, west); and
- NCR73 (4.8 km, south)

Specific Viewpoints

6.6.42. Specific viewpoints are those chosen because they are key and sometimes promoted viewpoints within the landscape, including for example specific local visitor attractions, viewpoints in areas of particularly noteworthy visual and/or recreational amenity such as landscapes with statutory landscape designations, or viewpoints with particular cultural landscape associations. DGWLCS notes key views towards the host LCTs, which are considered to be specific viewpoints. Those with visibility of the Proposed Development and are considered in the Assessment of Effects at Section 6.7 are:

- Merrick (11.3 km, north) – included as Viewpoint 7; and
- Cairnsmore of Fleet (8.6 km, south east) – included as Viewpoint 6.

6.6.43. No specific viewpoints of relevance to this assessment are identified within the South Ayrshire Landscape Wind Capacity Study or the East Ayrshire Landscape Wind Capacity Study.

6.6.44. There are no specific viewpoints identified on OS Maps that face towards the Proposed Development within the ZVI.

Landscape Designations, Mapped Interests and Landscape Value

Designated Landscapes and Mapped Interests

6.6.45. Landscape designations and mapped interests are shown on **Figure 6.2**.

Dark Sky Parks

6.6.46. The following Dark Sky Park lies within the ZVI and is considered in detail as part of the night-time assessment in the Assessment of Effects at Section 6.7:

- Galloway Dark Sky Park (150 m to park boundary and core area, north)

National Scenic Areas (NSA)

6.6.47. The Fleet Valley NSA (15.6 km, south east) is excluded from detailed assessment on the grounds that the ZTV study (**Figure 6.6**) show no theoretical visibility across this NSA, indicating that effects are unlikely to occur.

Regional Scenic Areas (RSA)

6.6.48. The following RSAs are located within Dumfries and Galloway and lie within the ZVI and are considered in detail in the Assessment of Effects:

- Galloway Hills RSA (includes the Site). NB. Galloway is under consideration to be a new National Park. Whilst this is acknowledged, the process to designate a National Park and determine its boundary is currently ongoing and the area is not assessed as having National Park status at this time;
- Mochrum Lochs RSA (16.4 km, south-west); and
- Machars Coast RSA (20.8 km, south) –this RSA included in the Assessment of Effects as it is located on the periphery of the agreed study area for visual effects.

6.6.49. The Solway Coast RSA (23 km, south-east) is not considered for detailed assessment within the Assessment of Effects, as the ZTVs (see **Figures 6.5** and **6.6**) show only very minor visibility. Due to the lack of visibility and the distance of the RSA from the Proposed Development, effects are unlikely to be more than Negligible on the designated landscape.

Local Landscape Areas (LLA)

6.6.50. The following LLAs are located outside of Dumfries and Galloway and lie within the ZVI and are considered in detail in the Assessment of Effects at Section 6.7:

- High Carrick Hills (12.8km, north).

6.6.51. The following LLAs are within the ZVI but excluded from the detailed assessment:

- Doon Valley (11.3 km, north) – this LLA would experience no theoretical visibility of the Proposed Development (see **Figure 6.6**) indicating that effects on this designated landscape are unlikely to occur.

Gardens and Designed Landscapes (GDL)

6.6.52. GDLs are identified on **Figure 6.2**, but none lie within the 20 km study area agreed for the assessment of visual effects.

Wild Land

6.6.53. Wild Land Areas (WLAs) are not a landscape designation, but rather a mapped interest. The following WLA lies within the ZVI and is considered in detail in the Wild Land Area Assessment at **Technical Appendix 6.4**:

- Merrick WLA (4.7 km, north east)

Local Landscape Value

6.6.54. Within the study area there are a number of features that contribute to the value of the landscape and townscape value.

6.6.55. Areas with national or international designations or recognition are deemed to be of National/International value. Within the ZVI this includes the Galloway Dark Sky Park, Merrick WLA and Fleet Valley NSA.

6.6.56. Landscape within the study area designated as a RSA, LLA or GDL is considered to be of Local/District value. Where these areas are also covered by national or international designations the higher value takes precedence.

6.6.57. Beyond the areas stated above, the parts of the study area that lie within the ZVI are judged to be of Community value.

Future Baseline

6.6.58. It is anticipated that the land within and surrounding the Site will continue to be used for a mixture of commercial forestry and pasture and the character of the site is therefore unlikely to undergo significant change.

6.6.59. The Site is located within a large area of forestry that covers much of the local area. The cyclical nature of commercial forestry will give rise to some visual changes in the surrounding area through the felling and replanting of trees. See also **Chapter 14: Forestry** for a discussion of the likely future forestry baseline conditions.

6.6.60. There is potential that the baseline of cumulative developments could change in advance of the construction of the Proposed Development (anticipated around 2029), but all available information on known planning applications has been considered in the Assessment of Cumulative Effects.

6.7. Assessment of Potential Effects

6.7.1. This section sets out the effects that the Proposed Development will have on both landscape and visual receptors. The effects are considered to be reversible as after a

period of 50 years the wind farm will be removed, unless a further application to extend the life of the Proposed Development is applied for and granted, or an alternative application to 'repower' with new wind turbines and associated infrastructure is applied for and granted. Whilst 50 years is regarded as Permanent for the purposes of this assessment, the effects of the Proposed Development on the landscape are reversible.

Construction and Decommissioning Effects

6.7.2. Key potential impacts during the construction of the wind turbines and associated infrastructure would be short-term, with the construction programme anticipated to be 24 months in duration. Activities would include the movement of vehicles, construction of foundations, areas of hardstanding, access tracks, site entrances, the substation compound and the temporary construction compound, the opening and restoration of borrow pits and the use of large cranes to erect the wind turbines.

6.7.3. The footprint of each of the wind turbines is relatively small, and the ground works associated with the bases, temporary construction compound and access would be largely screened beyond 2 km from the Site. The main effects that would arise would be from visibility of cranes and the erection of wind turbines. These effects would be different in nature to those experienced once the Proposed Development is complete, but similar in their magnitude and significance for the duration of the construction period.

6.7.4. Construction effects are assumed to be broadly the same as operational effects whilst cranes or standing wind turbines are on-site. Before and after the turbines are on-site, effects from all other construction activities would be restricted to localised, short term, temporary views of construction activity, which would not give rise to significant effects. Construction activities would not give rise to significant landscape character or visual effects over and above those of the operational Site. The primary effects arising would be from the wind turbines and this assessment therefore focuses on the operational effects.

6.7.5. Decommissioning effects would be largely similar to those during construction, albeit in reverse. These effects are considered synonymous to the construction effects and are not discussed separately.

Operational Effects on Landscape Character

6.7.6. The Proposed Development is situated across a series of low hills directly south west of the larger Minnigaff Hills. The north of the Site is typical of its LCT 181 – Rugged Uplands with Forest – Dumfries & Galloway, with a combination of forestry, very little development, rugged granite hills and rocky prominence, cliffs and boulders. The south of the Site is typical of LCT 172 – Upland Fringe – Dumfries & Galloway, which has a transitional feel between lowland pastures and upland areas, and consists of high, gently rolling pastures, with locally uneven topography with numerous minor valleys and ridges.

6.7.7. Large scale effects would occur across the site itself, extending north and east approximately 1.5 km to the top of Larg Hill and Benera, south approximately 1.8 km to the minor road between Cumloden and Garlies Castle, and west between 1 km and 1.4 km to the low hills at The Thieves Standing Stones and Cumloden Deer Park.

6.7.8. Large-medium scale effects would occur up to approximately 3.8 km to the north east at Lamachan Hill and Curlywee and 2.7 km to the east at the top of Black Benwee, reducing to Medium scale by the next hill tops at Millfore and Drigmorn Hill. To the south and south east, Medium scale effects would continue approximately 3.7 km and 4.6 km at the edge of LCT172 and open areas within the forestry to the east of Minnigaff. To the south west and west, Medium scale effects would continue approximately 4 km to the A714.

6.7.9. Small scale effects would occur along the high points to the north, north east, east and south, such as Merrick, Corserine, Meikle Millyea, Cairnsmore of Fleet and Blairs Hill. To

the south and south west, small scale effects would occur across the lowland drumlin landscapes, up to approximately 14.5 km, to the northern edge of Wigtown and the north eastern edge of Kirkcowan. To the north west, small scale effects would extend to the boundary between LCT174 and LCT78, approximately 10.2 km.

6.7.10. Beyond these areas the scale of effects will quickly diminish to Negligible, predominantly due to the effect of landform, but also due to the presence of existing wind farms to the north and west, which already exert an influence on the character types.

6.7.11. Descriptions for each of the assessed LCTs are briefly summarised below, along with an assessment of effects which is informed by site-based observations.

NatureScot Landscape Character Assessment (2019)

6.7.12. **LCT172 Upland Fringe - Dumfries and Galloway** (includes the Site) – as illustrated by **Figure 6.3** LCT172 encompasses the transitional landscape of gently rolling pastures that occurs between the uplands and the lowlands. A narrow band across the southern edge of the Site, including two of the proposed wind turbines, fall within this LCT. The LCT continues to the south of the site, including the Moor of Barclaye (see Viewpoint 1, **Figure 6.15**), Knockman Wood, Garlies Castle and Glenshalloch Hill. The key characteristics are defined in NatureScot's 2019 Landscape Character Assessment as:

- *"Elevated roll"Elevated rollImproved and rough grassland in close proximity."Elevated roll "Elevated roll Improved and rough grassland in close proximity.lHedgerow banks and treelines along roads in some lower areas.lDry stone dykes.*
- *Squared areas of forestry.*
- *Contrast between wide open areas and more intimate landform.*
- *Panoramic views over valley and coastal lowlands.*
- *Small bridges over incised burns.*
- *Notable landmark features, including Iron Age fortifications, designed landscapes and grand houses."*

6.7.13. In the DGWLCS this character type was previously included under its former title of LCT16 – Upland Fringe 'Hill Fringes' (Glentrool Fringe). The DGWLCS states that there are *"no opportunities to accommodate turbines >50m high in this landscape character type without significant effects occurring on key sensitivities"* within this LCT.

6.7.14. The DGWLCS identifies the landscape sensitivity as High for large and medium typology turbines (>50m) which, in terms of this assessment, is considered to be High susceptibility. This LCT lies entirely within the Galloway Hills RSA, increasing the value of LCT172 to Local across the LCT. Sensitivity is judged to be High-medium.

6.7.15. Effects on the area to the south of the Site will be of large scale, reducing to a medium scale around the Moor of Barclaye and south of Penkiln Burn, where the landform and forestry provides some visual separation from the Proposed Development. There would be direct effects on the fabric of this LCT. These effects would occur across the immediate context of the site within the LCT and be of High Magnitude, Major-Moderate (**Significant**) and Adverse.

6.7.16. **LCT 181 - Rugged Uplands with Forest - Dumfries & Galloway** (includes the Site) – as illustrated by **Figure 6.3**, LCT81 forms a wide swathe through the centre of the site, which continues northwards towards Glentrool and the uplands south of Merrick. It is found on the lower slopes of granite hill masses around the Merrick and Cairnsmore of Fleet, and identified as an area with predominant forestry cover. The key characteristics are defined in NatureScot's 2019 Landscape Character Assessment as:

- *"Dark green sitka spruce dominated forests on lower slopes of rugged granite uplands, forest cover reflecting the large scale topographic changes beneath.*

- *Monotony of sitka spruce broken through use of larch, and more carefully designed areas of clearfell. Some deciduous planting at forest edges and along roads, particularly in forests which are well used by tourists.*
- *Views through clearings of rugged granite hills, speckled white against brown where granite outcrops against heather.*
- *Rough rocky nature of underlying landscape is exposed in areas of clearfell.*
- *Visitor facilities within Forest Parks, such as toilets, picnic areas and signs."*

6.7.17. In the DGWLCS this character type was previously included under its former title of LCT 21a: Rugged Granite Upland with Forest (Merrick). The DGWLCS states *"the Merrick area, although more visually contained in general, is seen from summits and ridges on the Merrick and Rhinns of Kells"*. However, the site and its immediate context to the south are largely screened from these high points by the lower hills immediately to the north and north east.

6.7.18. The DGWLCS identifies the landscape sensitivity as High for larger typology turbines (>50m) which, in terms of this assessment, is considered to be High susceptibility. The DGWLCS also references the Merrick Wild Land Area, Regional Scenic Area and Galloway Forest Park as increasing landscape value. The majority of this LCT, excluding the site, lies within the Park Boundary of the Dark Sky Park, as well as entirely within the Galloway Hills RSA, increasing the value of LCT181 to National across the majority of the LCT and Local across the site. Sensitivity is judged to be High to High-medium.

6.7.19. Effects within the site will be of large scale, continuing across Garlick Hill and Benera to the east and towards The Thieves Standing Stones to the west. Beyond the higher ground of Craigmurchie to the north west, effects would reduce to a medium scale. Across the majority of the rest of the LCT, the extensive areas of forestry would prevent visibility of the Proposed Development and effects on landscape character would be negligible. There would be direct effects on the fabric of this LCT. Large scale effects would occur across the immediate context of the site within the LCT and be of High Magnitude, Major (**Significant**) and Adverse.

6.7.20. **LCT 180 – Rugged Uplands - Dumfries & Galloway** (Includes part of the Site) - as shown on **Figure 6.3**, this LCT contains the highest peaks within the study area, including the Merrick. The key characteristics are defined within NatureScot's Landscape Character Assessment as:

- *"Massive rugged peaks, rising steeply with craggy sides.*
- *Heather covered slopes, contrasting with white granite outcrops.*
- *Exposed 'highland' landscape.*
- *Dark cliffs and peripheral ridges.*
- *Numerous water features such as lochs and small burns.*
- *Forests on lower slopes.*
- *Open and wild character."*

6.7.21. LCT 180 is described as *"dramatic mountainous scenery, with wild, open and highland character which is distinct within the region. They contrast with the smoother, more rounded hills of the Southern Uplands"*. In the DGWLCS this character type was previously included under its former title of LCT 21: Rugged Granite Upland (Merrick). The DGWLCS states LCT 180 has *"often complex landform and land cover, the distinctive backdrop these high and rugged hills provide to more settled, lowland areas and the strong sense of remoteness and naturalness associated with these uplands are key constraints. Visual sensitivity is increased due to the presence of well-used walking routes on the ridge of the Rhinns of Kells and to the Corbett hills of Merrick and Corserine"*.

6.7.22. The DGWLCS identifies the landscape sensitivity as High for larger typology turbines (>50m) which, in terms of this assessment, is considered to be High susceptibility. The

DGWLCS also references the Merrick Wild Land Area, Regional Scenic Area and Galloway Forest Park, as well as the recreational use of the area, as increasing landscape value. The majority of this LCT lies within the Core Area of the Dark Sky Park and around half of the LCT lies within the Merrick Wild Land Area, as well as being entirely within the Galloway Hills RSA, increasing the value of LCT 180 to National across the whole of the LCT. Sensitivity is judged to be High.

6.7.23. As described 6.7.76.7.10at the start of this section on Operational Effects on Landscape Character, effects in the south of LCT 180 would be of a large scale up to approximately 1.5 km from the closest proposed turbines, to the top of Larg Hill. Beyond this, the scale of effect would reduce to a large-medium scale by the next set of hill tops, including Lamachan Hill and Curlywee to the north east and Black Benwee to the east, where the intervening landform and forestry allows a degree of separation to be introduced, and Medium by Millfore and Drigmorn Hill. Across much of the rest of the LCT, the landform would prevent visibility of the Proposed Development and effects on landscape character would be negligible, with the exception of the highest hills such as Merrick, where effects of a small-negligible scale would be experienced as a result of glimpsed views of turbine blades within panoramic views. Large scale effects would occur within the immediate context of the site within this LCT and Large-medium to Medium scale effects across a slightly wider extent. These effects are assessed to be of High-medium to Medium Magnitude, Major (**Significant**) and Adverse.

6.7.24. **LCT 176 - Foothills with Forest - Dumfries & Galloway (**Includes the Site access track) - as shown on **Figure 6.3**, this LCT includes extensive forestry and forms the foothills to Cairnsmore of Fleet to the south east of the site. It includes high points such as Blairs Hill and Crammery Hill in the south and Brockloch and Darnaw towards the centre, as well as Clatteringshaws Loch. The key characteristics are defined within NatureScot's Landscape Character Assessment as:

- *"Dark green blanket of forest covering undulating foothills.*
- *Changing landscape with areas with large and medium scale forestry operations and wind farm development.*
- *Forested areas dominated by Sitka Spruce, interspersed with mixed conifers and broadleaf planting, undergoing felling and replanting in large coupes.*
- *Tall mature conifers at roadside.*
- *Areas of more complex, locally distinctive and smaller-scale landscapes, with semi-improved pasture with walled enclosures on open ground, occasional lochs and estate policies, distinctive ridges and landmark summits.*
- *Areas of relict landscape with remains of pre-improvement settlement and agriculture clustered in burn valleys.*
- *Wind farms, locally defining the character in some areas of central Dumfries and Galloway."*

6.7.25. Within the context of the site, these characteristics are present, with the exception of the presence of existing wind farms. In the DGWLCS this character type was previously included under its former title of LCT 18a: Foothills with Forest (Cairnsmore). The study notes that *"Visual sensitivity is increased because of the recreational use of this landscape and the presence of the promoted tourist route of the A712"* and that Cairnsmore of Fleet provides the backdrop to the LCT. The study also states that *"There is no scope for siting large or medium typologies (turbines >50m) within this landscape without incurring significant adverse landscape and visual impacts on a number of key sensitivity criteria".*

6.7.26. The DGWLCS describes LCT176 as having High sensitivity to very large typology turbines (150 m+) within the LCT. However, the only element of the Proposed Development that would be located within this LCT would be the access track, which is predominantly an upgrade to existing tracks with an improved junction on to the Old Edinburgh Road and a

new crossing over Penkiln Burn at the edge of the LCT. Susceptibility to an upgraded access track and to wind turbines located in an adjacent LCT is therefore assessed to be medium, given the existing presence of forestry access tracks and the enclosed and inward looking character of this wooded valley landscape. Approximately half of this LCT is within the Park Boundary of the Dark Sky Park, and it is entirely within the Galloway Hills RSA, increasing the value of LCT176 to National across approximately half of the LCT and Local across the remainder. Sensitivity is judged to be High-medium to Medium.

6.7.27. As described6.7.76.7.10 at the start of this section on Operational Effects on Landscape Character, effects within approximately 4.6 km of the proposed wind turbines to the south east of the Proposed Development would be of Medium scale, between Newton Stewart and the Kirroughtree Forest in areas where the ZTVs show potential visibility. This includes the area through with the proposed access track would pass, upgrading existing forestry tracks. From areas of potential visibility of the proposed wind turbines elsewhere in LCT176, predominantly hill tops to the east and south east of the Proposed Development, the scale of effect would reduce to Medium-small and small scale as a result of distance from the Proposed Development. Across much of the rest of the LCT, the extensive areas of forestry, combined with the landform, would prevent visibility of the Proposed Development and effects on landscape character would be Negligible. Medium scale effects would occur within the immediate context of the site within this LCT and Medium-small to Small scale effects across a slightly wider extent. These effects are assessed to be of Medium-low to Low Magnitude, Moderate to Moderate-slight (**Not Significant**) and Adverse.

6.7.28. **LCT 174 - Plateau Moorland with Forest - Dumfries & Galloway** (1.5 km, west) – as shown on **Figure 6.3**, this is an extensive LCT located to the west of the site, covering the eastern Wigtownshire Moors. It occurs where the underlying plateau is predominantly covered with forest, creating a forest-dominated landscape. The key characteristics are defined within NatureScot's Landscape Character Assessment as:

- *"Elevated flat or gently undulating landscape of large scale.*
- *Dominance of forestry, with a consistent blanket of dark green, superimposed on plateau moorland, currently being restructures as part of felling rotations, and to accommodate wind farm development.*
- *Some large-scale open plateau moorland components within the area, and smaller pockets of open ground.*
- *Rough grass, farmland and heathland in un-forested areas.*
- *Dark horizons formed by forest margins.*
- *Evidence of historic and pre-historic land use in un-forested areas.*
- *Sparsely populated, but with some pockets of settled farmland.*
- *Occasional loch basins, which are a focus for some recreational and tourist facilities.*
- *Wind farm development of forested or recently clear-felled areas north-western, western and south-western areas.*
- *Remote and exposed character."*

6.7.29. In the DGWLCS this character type was previously included under its former title of LCT 17a: Plateau Moorland with Forest. The study notes that *"There would be a High sensitivity to the Very Large typology (turbines >150 m high) comprising new developments principally due to cumulative effects that would be likely to occur with some operational wind farms which comprise substantially smaller turbines and on the Galloway Hills, Merrick WLA and smaller scale diverse landscape features."* The operational Aries and Kilgallioch Wind Farms are located in the west of this LCT and the consented Kilgallioch Wind Farm Extension will also be in the same vicinity.

6.7.30. The DGWLCS describes LCT174 as having High sensitivity to very large typology turbines within the LCT. However, in relation to very large turbines located within an adjacent LCT, susceptibility is considered within this LVIA to be High-medium, given that views

towards the Galloway Hills are noted as an important characteristic. Approximately a quarter of this LCT is within the Park Boundary of the Dark Sky Park. A smaller area of the LCT falls within the Galloway Hills RSA. The majority of LCT174 is of Community value, with a small area of National value in the east. Sensitivity is judged to be Medium, increasing to High in the east of the LCT.

6.7.31. As shown by the ZTV studies (**Figures 6.5** and **6.6**), the main areas of visibility within LCT174 would be the open areas such as Glenvernoch Fell (see also Viewpoint 4 at **Figure 6.18**) and Lodens Moss/Craigmoddie Fell, which are the larger unforested areas within the LCT. In addition, there are smaller, more open areas within the LCT, such as around Glentrool Village and visitor centre (See also Viewpoint 5 at **Figure 6.19**), alongside areas where there has been forestry felling. As described6.7.76.7.10 at the start of this section on Operational Effects on Landscape Character, effects within the closest parts of LCT174 to the Proposed Development, where a south eastern promontory of the LCT extend into the Wood of Cree and Moor of Barclye, effects on the character of the LCT would be of Large-medium scale, for a Limited extent of the LCT. Beyond this area, effects would reduce to Medium-small to Small scale around Glentrool and east facing areas at Glenvernoch Fell. Beyond these areas, the combination of extensive areas of Forestry and the proximity of existing operational wind farms would reduce the scale of effect of the Proposed Development to Negligible for the majority of the rest of the LCT. Large-medium scale effects would occur within the immediate vicinity of the site within this LCT and Medium-small to Small scale effects would also occur across a slightly wider extent. These effects are assessed to be at worst of Medium-low Magnitude, Moderate (**Not Significant)** and Adverse.

6.7.32. **LCT 160 - Narrow Wooded River Valley - Dumfries & Galloway** (1.6 km, south) – as shown on **Figure 6.3**, this LCT follows the River Cree and Penkiln Burn to the south and south west of the site, extending through Newton Stewart. It is a narrow valley, largely enclosed by woodland. The key characteristics are defined within NatureScot's Landscape Character Assessment as:

- *"Narrow incised valleys with wooded slopes enclosing pasture floors.*
- *Small pastures and arable fields enclosed by hedges/fences in lower reaches and drystone dykes in upper reaches.*
- *Dominant broadleaf (semi-natural) woodland character with conifers on higher slopes.*
- *Lush trough-shaped river valleys with pasture/arable floors enclosed by deciduous wooded slopes.*
- *Riparian trees and woodlands following meandering river courses in lower reaches.*
- *Narrow lanes following valleys and linking isolated houses, occasional settlements and providing access to higher moorland.*
- *Clusters of prehistoric landscapes and settlement up some valleys, notably in Eskdale.*
- *Numerous arched stone bridges over the rivers.*
- *Intimate unspoilt landscape focussing on river views with some adjacent policy landscape."*

6.7.33. These features, particularly including the narrow lanes and farmed floors with enclosing woodland, are present throughout this area of LCT160. In the DGWLCS this character type was previously included under its former title of LCT 4: Narrow Wooded River Valleys (Cree). The study notes that *"The often small scale of the valleys, their narrowness and low relief, together with the diverse patterns of the vegetation and settlement, severely limits scope for larger wind farm typologies.*

6.7.34. The DGWLCS describes LCT160 as having High sensitivity to large and medium typology turbines within the LCT. However, in relation to very large turbines located within an adjacent LCT, susceptibility is considered within this LVIA to be Medium, given that views

are noted to be more river focused and the LCT is generally enclosed. A small area of this LCT to the west of the Site is within the Park Boundary of the Dark Sky Park, with the majority of the LCT located within the Galloway Hills RSA, increasing the value of LCT160 to Local, with a small area of National value. Sensitivity is judged to be Medium with a small area of High-medium.

6.7.35. As described6.7.76.7.10 at the start of this section on Operational Effects on Landscape Character, effects within the south of this LCT, in the areas where the ZTV studies indicate potential visibility, would be of Medium scale. This would be as a result of the effect of landform and woodland combining to reduce the visibility of the proposed turbines, in combination with the distance from the Proposed Development (see also Viewpoint 20 at **Figure 6.34** and Viewpoint 26 at **Figure 6.40**). Further north in the LCT, beyond approximately Penninghame Estate pond, Castle Stewart, effects would reduce to Small scale in areas shown to have potential visibility by the ZTV studies. Medium scale effects would occur beyond the immediate context of the site for a small proportion of this LCT and Small scale effects across a wider extent of the LCT. These effects are assessed to be of Medium to Low Magnitude, Moderate to Slight (**Not Significant**) and Adverse.

6.7.36. **LCT 168 – Drumlin Pasture in Moss and Moor Lowland** (3.3 km, south-west) – as shown on **Figure 6.3**, this is an extensive LCT to the west of the site, consisting of an *"extensive and repeated pattern of small, rounded, elongated mounds and higher, irregular shaped hills rising out of low-lying areas of flat wetland, moss and flood plain which in places has been forested"*. The key characteristics are defined within NatureScot's Landscape Character Assessment as:

- *"Prominent pasture drumlins, set in flatter moss and moor, bounded by hedges and drystone walls to form medium sized fields.*
- *Colour contrast between green drumlins and brown moss and moor.*
- *Scattered antiquities including standing stones and cairns.*
- *Relatively poor road network connecting isolated houses/farmsteads.*
- *A few small forests and policy landscapes.*
- *Intimate scale and complexity of drumlin landscape."*

6.7.37. In the DGWLCS this character type was previously included under its former title of LCT 12: Drumlin Pasture in Moss and Moor Lowland. The study notes that the LCT is relatively easy to access and well settled in the drumlin areas. It also highlights that the combination of landform and vegetation mean that views within this LCT tend to be intermittent. Barlockhart Moor Wind Farm is partially located within the western extremity of this LCT.

6.7.38. The DGWLCS describes LCT168 as having High sensitivity to large typology turbines within the LCT. However, in relation to very large turbines located within an adjacent LCT, susceptibility is considered within this LVIA to be Medium, given the acknowledged level of enclosure provided by the drumlin landform. A small area on the eastern edge of the LCT is located within the Galloway Hills RSA. The majority of LCT168 is of Community value, with a small area of Local value in the east. Sensitivity is judged to be Medium-low, increasing to Medium along the eastern boundary of the LCT.

6.7.39. LCT168 is located to the south west of the A714, and as described at the start of this section on Operational Effects on Landscape Character, effects as a result of the Proposed Development beyond this route would be of Small scale up to approximately 14.5 km from the closest proposed wind turbine. This corresponds with the location of Kirkcowan (see Viewpoint 9 at **Figure 6.23**), beyond which the combination of distance from the Proposed Development and the presence of existing wind farms to the west would reduce the scale of effects to Negligible. Small scale effects would occur across an Intermediate geographic area of the LCT. These effects are assessed to be of Low Magnitude, Slight (**Not Significant**) and Adverse.

6.7.40. **LCT 158 - Coastal Flats - Dumfries & Galloway** (4.4 km, south) – as shown on **Figure 6.3**, this LCT follows the valley of the River Cree as it widens out into Wigtown Bay. It is a flat estuarine area, bordered by salt marsh. The key characteristics are defined within NatureScot's Landscape Character Assessment as:

- *"Coastal flats are generally extremely flat and low lying, although the coastal plain and coastal parkland have some gentle undulations.*
- *More varied topography in the Nith Estuary.*
- *Exposed with long views over the flats, as they merge with the Solway waters out to sea and distant views of opposite coastline.*
- *A more intimate feel to coastal parkland enhanced by the minor road network, abundant trees and the generally well-managed appearance.*
- *Large to medium sized fields of improved pasture, more lush in parkland areas, with some arable cultivation. Fields enclosed by hedgerows or fences, or a combination of both, although sheep grazed salt marsh is traditionally unenclosed.*
- *Predominantly rural character with generally sparse, isolated settlements and occasional caravan/camping parks, contrasting with occasionally larger towns such as Annan.*
- *Policy landscapes around large houses and farmsteads in coastal parkland.*
- *Varied tree cover, with generally few woodlands or shelterbelts, except in coastal parkland where trees and small woodlands create intimacy. Some coastal moss areas contain large dominating coniferous forests, creating dark green bands on the skyline (others are being restored to moss moorland).*
- *Wet vegetation in areas of coastal moss.*
- *Telegraph poles, power lines and farm structures are very evident as they break the flat horizon in flat estuarine areas.*
- *Major communication routes for road, rail and power lines on coastal plain.*
- *Man-made drainage features on coastal parkland.*
- *Open network of small burns dissecting merse areas."*

6.7.41. Along the River Cree, the landform is flat with open views. Whilst there is little settlement within the LCT, Newton Stewart, Wigtown and Creetown are located along its boundaries and the A75 is a prominent feature in the east of the LCT. In the DGWLCS this character type was previously included under its former title of LCT 2: Coastal Flats (Wigtown & Cree/Fleet Fringe). The study notes that the steep-sided landmark hill of Cairnsmore of Fleet *"provides a distinctive backdrop to these coastal flats and contribute to the highly scenic wider landscape composition of sea, coast and uplands"*. It also notes *"There is no scope for siting larger development typologies (turbines >50m) within this character type without incurring significant adverse landscape and visual impacts on a number of key sensitivity criteria"*.

6.7.42. The DGWLCS describes LCT158 as having High sensitivity to large and medium typology turbines within the LCT. However, in relation to very large turbines located within a nearby LCT, susceptibility is considered within this LVIA to be Medium, given that views are characteristically out towards the Solway Firth or part of the context to Cairnsmore of Fleet. The north and east of this LCT are located within the Galloway Hills RSA, with the southern tip located in the Machars Coast RSA. The eastern tip of the LCT falls within the Fleet Valley NSA, increasing the value of LCT158 to National across the small area within the NSA, Local across the areas covered by the RSA and Community value for the remainder. Sensitivity is judged to be High to Medium.

6.7.43. LCT158 is located to the south of Newton Stewart, and as described6.7.76.7.10 at the start of this section on Operational Effects on Landscape Character, effects as a result of the Proposed Development beyond the settlement would be of Small scale up to approximately 14.5 km from the closest proposed wind turbine. This corresponds with the location of Creetown and Wigtown (see Viewpoint 8 at **Figure 6.22** and Viewpoint 10 at

Figure 6.24), beyond which the combination of distance from the Proposed Development and the focus of views being out into the Solway waters as much as inland towards Cairnsmore of Fleet and the foothills around it, would reduce the scale of effects to Negligible. Small scale effects would occur across an Intermediate geographic area of the LCT. These effects are assessed to be of Low Magnitude, Moderate to Slight (**Not Significant**) and Adverse.

6.7.44. **LCT 160 - Narrow Wooded River Valley - Dumfries & Galloway** (4.5 km, south-east) – as illustrated on **Figure 6.3**, this area of LCT 160 lies to the south east of the site, along the valley of Palnure Burn. The key characteristics of this LCT remain as described 6.7.32in relation to the earlier section of LCT160 above.

6.7.45. Within this area of LCT160, landform combines with forestry to create enclosure along the valley, as experienced when travelling along the minor roads. In the DGWLCS this character type was previously included under its former title of LCT 4: Narrow Wooded River Valleys (Palnure).

6.7.46. The DGWLCS describes LCT160 as having High sensitivity to large and medium typology turbines. However, in relation to very large turbines located within a nearby LCT, susceptibility is considered within this LVIA to be Medium, given that views are noted to be more river focused and the LCT is generally enclosed. The whole of the LCT is located within the Galloway Hills RSA, increasing the value of LCT160 to Local. Sensitivity is judged to be Medium.

6.7.47. As described6.7.76.7.10 at the start of this section on Operational Effects on Landscape Character, effects beyond approximately 4.6 km to the south east of the Proposed Development would be of Small scale. Within this LCT, the narrow valley with steep wooded sides is the key characteristic, with the Proposed Development likely to be peripheral to those features. As shown by the ZTVs, potential visibility of the Proposed Development would be limited to the west facing slopes as a result of the surrounding landform. Across much of the rest of the LCT, there would be no visibility of the Proposed Development and effects on landscape character would be Negligible. Small scale effects would occur across a small proportion of the LCT. These effects are assessed to be of Low Magnitude, Slight (**Not Significant**) and Adverse.

6.7.48. **LCT 179 - Coastal Uplands** (6.7 km, east) – as shown on **Figure 6.3**, this LCT covers Cairnsmore of Fleet and is a bold rounded granite massif which rises steeply from the surrounding lowland coastal area at the head of Wigtown Bay. The key characteristics are defined within NatureScot's Landscape Character Assessment as:

- *"Rugged granite hills, rising steeply from coast combined with rough, hummocky areas of 'till plain'.*
- *Mix of improved pasture and rough grazing.*
- *Gorse, rocky outcrops and boulders interspersed in field of rough grassland in rougher, rockier areas.*
- *Some contrasting areas of smoother topography and better quality pasture.*
- *Granite stone walls and scattered farmsteads with buildings in granite or of predominantly grey or white colouring.*
- *Some policy parkland.*
- *Forested hill slopes, including Mabie and Dalbeattie Forests.*
- *Visitor facilities such as waymarked forest trails and picnic areas."*

6.7.49. Parkland is not a feature of this area of LCT179, and visitor facilities are not prevalent, but all of the other key characteristics are present. In the DGWLCS this character type was previously included under its former title of LCT 20: Coastal Granite Uplands (Cairnsmore Coastal Granite). The study notes that *"Cairnsmore of Fleet forms a landmark feature which is highly visible from surrounding settled lowland landscapes"* and a *"strong sense of naturalness is associated with this upland landscape; this*

especially pronounced given its location within more populated and modified lowland landscapes".

6.7.50. The DGWLCS describes LCT179 as having High sensitivity to large and medium typology turbines within the LCT. However, in relation to very large turbines located within a nearby LCT, susceptibility is considered within this LVIA to be High-medium, given that panoramic views are noted as a key characteristic of the LCT. The northern and eastern edges of this LCT are located within the Park Boundary of the Dark Sky Park. The majority of the remainder of this area of LCT179 is within the Galloway Hills RSA. The value of LCT179 is assessed to be National across the small area within the Dark Sky Park and Local across the remainder. Sensitivity is judged to be High-medium.

6.7.51. As described6.7.76.7.10 at the start of this section on Operational Effects on Landscape Character, effects from Cairnsmore of Fleet (see Viewpoint 6 at **Figure 6.20**), and in the case of this LCT the west facing slopes where they aren't covered with forestry, would be of Small scale as a result of the Proposed Development. From these areas, the Proposed Development would form a new feature in panoramic views, in an area of the views that contains views of more distant existing wind farms. Across much of the rest of the LCT, the landform would prevent visibility of the Proposed Development and effects on landscape character would be Negligible. Small scale effects would occur across a small proportion of the LCT. These effects are assessed to be of Low Magnitude, Moderate to Slight (**Not Significant**) and Adverse.

6.7.52. **LCT 181 - Rugged Uplands with Forest - Dumfries & Galloway** (7.8 km, east) – as illustrated on Figure 6.3, this area of LCT 181 lies to the east of the site, on the lower slopes of granite hill masses around Cairnsmore of Fleet, and identified as an area with predominant forestry cover. The key characteristics of this LCT remain as described at 6.7.16in relation to the earlier section of LCT181 above.

6.7.53. In the DGWLCS this character type was previously included under its former title of LCT 21a: Rugged Granite Upland with Forest (Cairn Edward). The DGWLCS states *"This landscape is largely uninhabited and although there is some recreational use of the area, views from within this landscape are limited by forest cover and landform".*

6.7.54. The DGWLCS identifies the landscape sensitivity as High-medium for large typology turbines (>50m) within the LCT. However, in relation to very large turbines located within a nearby LCT, susceptibility is considered within this LVIA to be Medium, given the enclosed nature of the loch areas within the LCT. The majority of this LCT lies within the Park Boundary of the Dark Sky Park, as well as within the Galloway Hills RSA, increasing the value of this area of LCT181 to National across the majority of the LCT. Sensitivity is judged to be High-medium to Medium.

6.7.55. As described at the start of this section on Operational Effects on Landscape Character, effects from the high points within this area of LCT181 (see Viewpoint 11 at **Figure 6.25**) would be of Small scale as a result of the Proposed Development. From these areas, the Proposed Development would form a new feature in panoramic views, with landform screening elements of the Proposed Development from view, in an area of the views that contains views of more distant existing wind farms. Across much of the rest of the LCT, the landform combined with areas of forestry would prevent visibility of the Proposed Development and effects on landscape character would be Negligible. Small scale effects would occur across a small proportion of the LCT. These effects are assessed to be of Low Magnitude, Slight (**Not Significant**) and Adverse.

6.7.56. **LCT 172 - Upland Fringe - Dumfries & Galloway** (8.7 km, south-east) – as illustrated on **Figure 6.3**, this area of LCT 172 lies to the south-east of the Site, across an area of gently rolling pasture interspersed with areas of woodland either side of Moneypool Burn. The key characteristics of this LCT remain as described at 6.7.12in relation to the earlier section of LCT172 above. The DGWLCS indicates that typical characteristics include "*a*

rolling and occasionally knolly landform and an often diverse cover of broadleaved woodlands, planted policy features and small enclosed pastures, particularly evident on lower slopes. These landscapes are settled and commonly feature a rich archaeological and historic heritage". This is true of the area at Cairnharrow.

6.7.57. The DGWLCS previously identified this area as LCT 16 Upland Fringe (Cairnharrow Fringe), and also lists this area as having High susceptibility to large and medium typology turbines (>50m) within the LCT. However, in relation to very large turbines located within a nearby LCT, susceptibility is considered within this LVIA to be Medium, given that views are generally said to be enclosed or face away from sensitive skylines within the LCT. This LCT is entirely within the Galloway Hills RSA, with a small area forming part of the Fleet Valley NSA, increasing the value of LCT176 to National across the small area within the NSA and Local across the remainder. Sensitivity is judged to be High-medium to Medium.

6.7.58. Effects within this LCT would be experienced predominantly from north and west facing valley slopes along Moneypool Burn and the River Cree. As described6.7.76.7.10 at the start of this section on Operational Effects on Landscape Character, Medium-small to Small scale effects would occur within this LCT in areas with potential visibility of the Proposed Development, due to the distance between the site, the localised vegetation and the presence of the A75 corridor, which creates a sense of separation between this character type and the Proposed Development. Effects would occur across a small proportion of this area of LCT172 and would be of Medium-Low to Low magnitude, Moderate to Slight (**Not Significant**) and Neutral.

6.7.59. **LCT 180 - Rugged Uplands - Dumfries & Galloway (**9.4 km, north east) - as illustrated on Figure 6.3, this area of LCT180 lies to the north east of the Site, covering the Rhinns of Kells. The key characteristics of this LCT remain as described 6.7.20in relation to the earlier section of LCT180 above.

6.7.60. In the DGWLCS this character type was previously included under its former title of LCT 21: Rugged Granite Upland (Rhinns of Kells). The DGWLCS states "*Wind farm development located in the Southern Uplands landscapes LCTs 19 and 19a are particularly visible from the Rhinns of Kells area in views to the north-east*".

6.7.61. The DGWLCS identifies the landscape sensitivity as High for larger typology turbines (>50m) within the LCT. However, in relation to very large turbines located within a nearby LCT, susceptibility is considered within this LVIA to be High-medium, given that panoramic views are noted as a key characteristic of the LCT. The majority of this part LCT180 lies within the Galloway Hills RSA, with a small area in the west of the LCT covered by the Park Boundary of the Dark Sky Park, increasing the value of LCT180 to Local across the majority of this area of LCT180, with localised areas of National value. Sensitivity is judged to be High-medium.

6.7.62. As described at the start of this section on Operational Effects on Landscape Character, effects from the high points within this area of LCT180 (see Viewpoint 23 at **Figure 6.37**) would be of Small scale as a result of the Proposed Development. From these areas, the Proposed Development would form a new feature in panoramic views, with landform screening elements of the Proposed Development from view. Across much of the rest of the LCT, the landform combined with areas of forestry would prevent visibility of the Proposed Development and effects on landscape character would be Negligible. Small scale effects would occur across a small proportion of the LCT. These effects are assessed to be of Low Magnitude, Slight (**Not Significant)** and Adverse.

6.7.63. **LCT 175 - Foothills - Dumfries & Galloway** (13.2km, south-east) – as shown on **Figure 6.3**, this LCT covers the lower hills between Wigtown Bay and Cairnsmore of Fleet and is gently undulating with wounded hill. The key characteristics are defined within NatureScot's Landscape Character Assessment as:

- *"Generally undulating land between 170 and 250 metres, with rounded peaks. Higher in the west, up to nearly 550 metres with craggier peaks.*
- *Foothills dissected by incised valleys.*
- *Semi-improved pasture enclosed in medium-large fields by stone walls. Grazed by sheep and cattle. Some rough pastures and heath on higher ground.*
- *Trees in sheltered pockets with some copses on top of hills.*
- *Many scattered farmsteads and small settlements.*
- *Network of minor roads.*
- *Numerous archaeological sites particularly Bronze Age funerary and ritual sites and Iron Age settlements and forts."*

6.7.64. Peaks within this area of LCT175 are towards the higher end of those described in the key characteristics, with copses less of a feature on these tops. In the DGWLCS this character type was previously included under its former title of LCT 18: Foothills (Cairnharrow). The study notes that *"Although the large scale and open character of these hills would be less sensitive to wind farm development, these hills are not extensive and this, together with their importance in providing a rugged open backdrop to settled coasts and valleys, severely limits opportunities for larger typologies. This landscape is highly visible from surrounding settled coasts and valleys".*

6.7.65. The DGWLCS describes LCT175 as having High sensitivity to large typology turbines within the LCT. However, in relation to very large turbines located within a nearby LCT, susceptibility is considered within this LVIA to be High-medium, given that panoramic views are noted as a key characteristic of the LCT. The majority of this area of LCT175 is within the Galloway Hills RSA, with small areas in the east and south of the LCT falling within the Fleet Valley NSA, increasing the value of LCT158 to National across the small areas within the NSA and Local/District across the remainder. The value of LCT175 is assessed to be National across the small areas within the NSA and Local across the remainder. Sensitivity is judged to be High-medium.

6.7.66. As described at the start of this section on Operational Effects on Landscape Character, effects from the high points within this area of LCT175 would be of Small scale as a result of the Proposed Development. From these areas, the Proposed Development would form a new feature in panoramic views, with landform screening elements of the Proposed Development from view, in an area of the views that contains views of more distant existing wind farms. Across much of the rest of the LCT, the landform combined with areas of forestry would prevent visibility of the Proposed Development and effects on landscape character would be Negligible. Small scale effects would occur across a small proportion of the LCT. These effects are assessed to be of Low Magnitude, Slight (**Not Significant**) and Adverse.

6.7.67. **LCT 169 - Drumlin Pastures** (10.0 km, south) – as shown on **Figure 6.3**, this LCT covers the large low lying areas of the Machars to the south of the site, west of Wigtown. The key characteristics are defined within NatureScot's Landscape Character Assessment as:

- *"Distinctive elongated mounds with smoothly convex outlines, creating an undulating landform.*
- *Smooth convex slopes of improved pasture, grazed by sheep and cattle.*
- *Localised rugged knolls with gorse.*
- *Medium scale fields with prominent wall and hedgerow patterns accentuating topography.*
- *Small settlements and scattered farmsteads served by extensive network of minor roads."*

6.7.68. The Machars area of LCT169 exhibits all of these characteristics. In the DGWLCS this character type was previously included under its former title of LCT 13: Drumlin Pastures (Machars). The study notes that *"The Drumlin Pastures are particularly sensitive to wind*

farms sited in adjacent landscapes towards their margins where turbines on nearby back drops and sky lines can dominate the smaller scale of the farmed and settled landscape, and impinge on the setting of features within them, detracting from general visual amenity and views. Extended and multiple developments in surrounding uplands could dominate landmark features, or successively, surround the area and would be seen from well used roads and settlement".

6.7.69. The DGWLCS describes LCT169 as having no scope to locate the large or medium typologies (turbines >50m) within the LCT. However, in relation to very large turbines located within a nearby LCT, susceptibility is considered within this LVIA to be Medium, given the acknowledged level of enclosure provided by the drumlin landform. There are no landscape designations covering this LCT and value is therefore assessed to be Community. Sensitivity is judged to be Medium-low.

6.7.70. LCT169 is located to the south of Newton Stewart, and as described6.7.76.7.10 at the start of this section on Operational Effects on Landscape Character, effects as a result of the Proposed Development beyond the settlement would be of Small scale up to approximately 14.5 km from the closest proposed wind turbine. This corresponds with the location of Wigtown (see Viewpoint 10 at **Figure 6.24**), beyond which the combination of distance from the Proposed Development with landform and vegetation, would reduce the scale of effects to Negligible. Small scale effects would occur across an Intermediate geographic area of the LCT. These effects are assessed to be of Low Magnitude, Slight (**Not Significant**) and Adverse.

Operational Visual Effects

Visual Aids

6.7.71. Wirelines and photomontage visualisations, prepared in accordance with NatureScot's Visual Representation of Wind Farms guidance, have been used to aid the assessment. These were generated from a 3-dimensional model of the proposed wind turbines, Site and surrounding topography. Key landmarks and compass bearings were used to match the modelled views to the photographs.

6.7.72. The proposed borrow pits are not modelled due to their temporary nature. Other elements of low-level infrastructure, such as the substation compound and access tracks are not modelled due to the general lack of visibility of these features when compared to the proposed wind turbines.

6.7.73. The photographs, wirelines and photomontages are shown on **Figures 6.15-6.40** supporting this LVIA. A detailed description of the methods by which the wirelines and photomontages were prepared is included in **Technical Appendix 6.1**. The visualisations are numbered according to the viewpoint that they show (e.g. VP_01 for Viewpoint 1), with a suffix indicating the type of visualisation (BP – baseline panorama and wireline (including cumulative schemes), WL – wireline, PM – photomontage, NP – night photomontage.

6.7.74. The viewpoint description, description of effects and scale of effect for each viewpoint (refer to **Figure 6.5** and **6.6** for locations) is set out within **Technical Appendix 6.3**. The scale of effect for each viewpoint is summarised in **Table 6.10**:

Table 6.10: Representative Viewpoints

Viewpoint Reference & Location	Distance, Direction	Scale of Effect	Sensitivity	Magnitude	Significance	Positive / Neutral / Adverse
Viewpoint 1 - Drumwhirn Cairn, Moor of Barclye	2.6 km, south-west	Large-medium	High-medium (recreational users of open access land)	High	Major and significant	Adverse
Viewpoint 2 - Corsbie Road, Newton Stewart	4.5 km, south	Medium	High-medium (residents, recreational users of footpath) Medium (road users)	Medium	Major-moderate and significant Moderate and not significant	Adverse
Viewpoint 3 – Sustrans National Cycle Route 73/A714 south of Newton Stewart	6.4 km, south	Medium	High-medium (recreational users of surrounding countryside) Medium (cyclists, users of A714 as part of the 'South West Coastal 300')	Medium	Moderate and not significant	Adverse
Viewpoint 4 - Glenvernoch Fell / Hill of Ochiltree	8.6 km, west	Medium-small	High-medium (recreational users of open access land/ promoted route)	Medium-low	Moderate and not significant	Adverse
Viewpoint 5 - NCR7 on Minor Road North of Glentrool Village	8.0 km, north-west	Small	High-medium (recreational users of surrounding countryside) Medium (cyclists, users of local road)	Low	Slight and not significant	Adverse
Viewpoint 6 - Cairnsmore of Fleet	8.6 km, south east	Medium-small	High (recreational visitors to recognised viewpoint)	Medium-low	Moderate and not significant	Adverse

Viewpoint Reference & Location	Distance, Direction	Scale of Effect	Sensitivity	Magnitude	Significance	Positive / Neutral / Adverse
Viewpoint 7 – Merrick	11.3 km, north	Small-negligible	High (recreational visitors to recognised viewpoint)	Negligible	Minimal and not significant	Neutral
Viewpoint 8 - A75 near Creetown	13.1 km, south-east	Medium-small	High-medium (residents, recreational users of surrounding countryside) Medium (users of A75 as part of the 'South West Coastal 300')	Medium-low	Moderate and not significant	Adverse
Viewpoint 9 – Kirkcowan	12.7 km, south-west	Medium-small	High-medium (residents, recreational users of surrounding countryside) Medium (road users)	Medium-low	Moderate and not significant	Adverse
Viewpoint 10 - NCR73 on Minor Road North of Wigtown	14.0 km, south	Small	High-medium (residents, recreational users of surrounding countryside) Medium (cyclists, road users)	Low	Slight and not significant	Adverse
Viewpoint 11 - Benniguinea Lookout	14.1 km, east	Small	High-medium (recreational users of surrounding countryside)	Low	Slight and not significant	Adverse
Viewpoint 12 - Mochrum Lochs RSA, Moor of Drumwall	19.2 km, south-west	Small-negligible	High-medium (recreational users of surrounding countryside) Medium (road users)	Negligible	Minimal and not significant	Neutral

Viewpoint Reference & Location	Distance, Direction	Scale of Effect	Sensitivity	Magnitude	Significance	Positive / Neutral / Adverse
Viewpoint 13 - Minor Road near Barhill Station	20.5 km, north-west	Small-negligible	High-medium (recreational users of surrounding countryside) Medium (road users)	Negligible	Minimal and not significant	Adverse
Viewpoint 14 - Southern Upland Way near Artfield Fell	20.6 km, west	Small-negligible	High-medium (recreational users of open access land/ promoted route)	Negligible	Minimal and not significant	Neutral
Viewpoint 15 - A746 North of Whithorn	29.1 km, south	Small-negligible	High-medium (residents, recreational users of surrounding countryside) Medium (users of A746 as part of the 'South West Coastal 300')	Negligible	Minimal and not significant	Adverse
Viewpoint 16 - Byne Hill	31.9 km, north-west	Negligible	High-medium (recreational users of surrounding countryside)	Negligible	Minimal and not significant	Neutral
Viewpoint 17 - A712 east of Corsock	36.2 km, east	Negligible	High-medium (recreational users of surrounding countryside) Medium (road users)	Negligible	Minimal and not significant	Neutral
Viewpoint 18 - Southern Upland Way near Stranraer	37.5 km, south-west	Negligible	High-medium (recreational users of open access land/ promoted route) Medium (road users)	Negligible	Minimal and not significant	Neutral

Viewpoint Reference & Location	Distance, Direction	Scale of Effect	Sensitivity	Magnitude	Significance	Positive / Neutral / Adverse
Viewpoint 19 - Sandhead	37.8 km, south-west	Negligible	High-medium (residents, recreational users of surrounding countryside) Medium (road users)	Negligible	Minimal and not significant	Neutral
Viewpoint 20 - Monigaff Parish Church	3.4 km, south	Medium	High-medium (residents, recreational users of surrounding countryside) Medium (road users)	Medium	Major-moderate and significant Moderate and not significant	Adverse
Viewpoint 21 - Lamachan Hill	3.0 km, north-east	Large-medium	High-medium (recreational users of surrounding countryside)	High-medium	Major-moderate and significant	Adverse
Viewpoint 22 - Millfore	5.4 km, north-east	Large-medium	High-medium (recreational users of surrounding countryside)	High-medium	Major-moderate and significant	Adverse
Viewpoint 23 - Meikle Millyea	12.3 km, north-east	Medium-small	High-medium (recreational users of surrounding countryside)	Medium-low	Moderate and not significant	Adverse
Viewpoint 24 - Innerwell Fishery approach	21.7 km, south	Small	High-medium (recreational users of surrounding countryside) Medium (road users)	Low	Slight and not significant	Adverse
Viewpoint 25 - Penninghame Estate pond, Castle Stewart	4.3 km, west	Medium	High-medium (recreational users of surrounding countryside)	Medium	Moderate and not significant	Adverse

Viewpoint Reference & Location	Distance, Direction	Scale of Effect	Sensitivity	Magnitude	Significance	Positive / Neutral / Adverse
Viewpoint 26 - Challoch Church	4.0 km, south west	Large-medium	High-medium (recreational users of surrounding countryside) Medium (road users)	High-medium	Major-moderate and significant	Adverse

6.7.75. Each of the viewpoints is a 'sample' of the potential effects, representing a wide range of receptors – including not only those actually at the viewpoint, but also those nearby, at a similar distance and/or direction.

6.7.76. From these viewpoints it can be seen that:

- The extent of **Large** and **Large-Medium** scale effects, where the Proposed Development will form a major or semi-major alteration to key elements, features, qualities and characteristics of the view such that the baseline will be fundamentally changed, will generally be limited to locations in close proximity to the Site, up to approximately 5 km from the closest proposed wind turbine, where there are views looking directly at the Site and these is little intervening vegetation or topography to reduce the scale of effects.
- The extent of **Medium** or **Medium-Small** scale effects extends to approximately 13 km from the closest proposed wind turbines in locations where there are open views towards the Proposed Development from areas without the influence of existing wind farm developments. For locations where views are less open or that are not elevated above the Site, the extent of this scale of effect would be less extensive.
- Beyond approximately 14 km from the site boundary, the scale of effects will reduce to **Small** or **Small-Negligible** due to a greater sense of separation by the landform and vegetation and/or the wider presence of other wind farms within the view. In more distant views the size of the turbines mean that they often remain visible; Small scale effects will persist in longer views where there is a lack of screening between the viewer and the Proposed Development.
- Where the development will either be screened from visual receptors by changes in landform or vegetation within the landscape, or the development will form a very limited change in views, the scale of effect will be **Negligible**.

Visual Receptor Groups

6.7.77. This part of the visual assessment focuses on effects on groups of visual receptors, within close proximity of each other and that are judged to experience similar visual effects arising from the Proposed Development. These are referred to as 'visual receptor groups' and include motorists on local roads, users of rights of way and open spaces, and local residents or visitors to settlements. The assessment incorporates effects on views from public spaces and streets within settlements (or around the houses in areas with isolated dwellings), and the routes and accessible landscape in the surrounding countryside. Residents and visitors within these communities are assessed to be of High-Medium sensitivity. The visual receptor groups used for this assessment are set out in **Table 6.9** above.

6.7.78. The assessment of effects on settlements focuses on the visual amenity of public spaces, though views from groups of dwellings will also be noted in the descriptions where appropriate. Effects on private residential amenity are a separate matter, and only

require assessment when a development is likely to have effects over the Residential Visual Amenity Threshold referred to in LI TGN 02/2019. These effects are included within the Residential Visual Amenity Assessment in **Technical Appendix 6.5**.

6.7.79. This section should be read in conjunction with the viewpoint descriptions in **Technical Appendix 6.3** which provide a detailed description of views across the study area.

Moor of Barclye between the Lamachan Hill/Curleywee group of hills, Penkiln Burn and the River Cree (up to 300 m north, 150 m east, 3.5 km south and 4 km west)

6.7.80. This visual receptor group covers the undulating, lower-lying land north of Newton Stewart, which includes the site and visual receptors at individual homes and farmsteads, waymarked walking routes and the recreational areas of the Wood of Cree. Viewpoint 1 (**Figure 6.15**) lies within this visual receptor group. These local residents and recreational visitors are assessed to be of High-medium sensitivity.

6.7.81. As described in **Technical Appendix 6.3**, from Viewpoint 1 the Proposed Development would be located beyond the closest low hill at Knockman Wood, which would partially screen turbines 11 to 14. The remainder of the proposed turbines would be clearly and openly visible on slopes to the north east of the cairn, with the landform and forestry woodland screening the bases of the towers from view. Viewpoint 1 is more open and elevated than many areas within this visual receptor group, due to the undulating landform and areas of plantation forestry.

6.7.82. As set out at the start of this section on Operational Visual Effects, as informed by **Table 6.10** and the viewpoint descriptions in **Technical Appendix 6.3,** effects would be Large or Large-medium scale close to the site. Within this visual receptor group, there would be relatively open views from much of the area, with localised undulations in landform screening the bases of some of the turbine towers. Further south in the visual receptor group, there would be areas where the combination of landform and forestry would screen views of the Proposed Development, as shown by the ZTV studies (**Figures 6.5** and **6.6**). Large scale effects would arise across a wide geographic area of this High-medium sensitivity receptor group, within the site and its immediate context, and would be of High magnitude, Major (**Significant**) and Adverse. In the south of this visual receptor group, within and around Knockman Wood, there would be no visibility of the Proposed Development and effects would be Negligible (**Not Significant**) and Neutral.

Lamachan Hill/Curleywee group of hills (up to 1.5 km north west, 3.5 km north east and 5.5 km east)

6.7.83. This visual receptor group covers the closest hills to the site, immediately to the north and east. Visual receptors include recreational visitors to the area, which form the southernmost hills of the Galloway Hills. Viewpoints 21 and 22 (**Figures 6.35** and **6.36**) lie within this visual receptor group. These recreational visitors are assessed to be of High-medium sensitivity.

6.7.84. As described in **Technical Appendix 6.3**, the Proposed Development would be visible on the slopes to the south of Lamachan Hill, with the landform of the hill screening parts of the towers from view. All of the Proposed Development would be visible, in a different area of the view from existing wind farm developments. From Millfore the Proposed Development would be visible on the slopes to the south west, with the landform of the hill screening parts of the towers from view. All of the Proposed Development would be visible, with some existing wind farm developments to the west of the site being visible behind the Proposed Development. From north and east facing slopes of these hills, there would be no visibility of the Proposed Development due to the landform, as shown by the ZTV studies (**Figures 6.5** and **6.6**).

6.7.85. As set out at the start of this section on Operational Visual Effects and within **Table 6.10** and the viewpoint descriptions in **Technical Appendix 6.3,** effects would be Large-

medium scale from the south and west facing slopes of these hills, as well as from the hill tops. Large-medium scale effects would arise across these areas in the immediate vicinity of the site and would be of High-medium magnitude, Major-moderate (**Significant**) and Adverse. From the north and east facing slopes, there would be no visibility of the Proposed Development and effects would be Negligible (**Not Significant**) and Neutral.

River Cree and Penkiln Burn valleys, including Newton Stewart and the road corridors of the A75 and A714 (up to 4.8 km south, 5.5 km south west and 4 km west)

6.7.86. This receptor group includes the town of Newton Stewart including its public spaces. It also includes core paths (see **Figure 6.1**), other recreational users and users of local roads approaching the town along the valleys of the River Cree and Penkiln Burn. It excludes users of the A75 and A714, which are assessed separately as longer distance roads under the heading 'Roads and Rail' below. Viewpoints 2, 20 and 26 (**Figures 6.16, 6.34** and **6.40**) lie within this visual receptor group. These local residents and recreational visitors are assessed to be of High-Medium sensitivity. Users of local roads, none of which are identified as scenic routes, are assessed to be of Medium sensitivity.

6.7.87. As described in **Technical Appendix 6.3**, from locations within Newton Stewart where there would be views towards the Proposed Development, such as Viewpoint 2, the proposed wind turbines would be seen on the rising slopes in the middle distance, in front of the Lamachan / Curleywee group of hills. The Proposed Development would not be located on the hills themselves, with the nacelles generally appearing at around the height of the hilltops. Visual receptors would have direct views of the Proposed Development between trees and woodland, with the turbines being clearly visible in front of the hills to the north.

6.7.88. From locations on the northern edge of Newton Stewart with potential visibility of the Proposed Development, such as Viewpoint 20, the Proposed Development would be seen in the middle distance of the view, located beyond nearby trees and vegetation, within the wider undulating landscape to the north. All of the turbines would break the skyline, rising above the landform, but would be partially screened by nearby trees and vegetation. The turbines would be seen alongside other urban detractors such as electricity pylons which also represent large scale vertical structures within the view.

6.7.89. From open locations to the north of Newton Stewart, such as Viewpoint 26, the Proposed Development would be located beyond the closest low hill at Knockman Wood, which would partially screen Turbines 7, 9 and 11 to 14, with the woodland adding further to the screening. The remainder of the proposed turbines would be clearly and openly visible on slopes to the north east of the church, with the landform screening the bases of the towers from view.

6.7.90. As set out at the start of this section on Operational Visual Effects and within **Table 6.10** and the viewpoint descriptions in **Technical Appendix 6.3**, effects would be Large or Large-medium scale within this visual receptor group, in the areas where potential visibility of the Proposed Development. From the northern edge of Newton Stewart, Viewpoints 2 and 20 demonstrate that there would be some filtering of views of the Proposed Development by intervening vegetation and to a lesser extent landform. East of the town, along the Penkiln Burn valley, woodland and forestry mean that views of the Proposed Development would be intermittent. To the north west of the town, along the valley of the River Cree, there would be stretches of the valley with relatively open views towards the Proposed Development, with intervening landform screening parts of some of the turbine towers. Medium-large scale effects would arise in the immediate vicinity of the site within this High-medium sensitivity receptor group, with Medium scale effects across a slightly wider geographic extent, and would be of High-medium to Medium magnitude, Major-moderate (**Significant**) and Adverse.

6.7.91. Elsewhere in Newton Stewart, the built form would prevent views towards the Proposed Development from most locations. Along stretches of Penkiln Burn the landform and forestry would also prevent visibility of the Proposed Development. Effects would be Negligible (**Not Significant**) and Neutral.

Merrick and the Rhinns of Kells (up to 11.3 km to the north and 16.5 km north east)

6.7.92. This visual receptor group covers the higher and most frequently visited hills in the Galloway Hills to the north and north east. Visual receptors include recreational visitors to the hills. Viewpoints 5, 7 and 23 (**Figures 6.19, 6.21** and **6.37**) lie within this area. These recreational visitors are assessed to be of High-Medium sensitivity.

6.7.93. The most frequently used approach to Merrick is from the car park on Loch Trool, adjacent to Bruce's Stone. This route follows the valley of Buchan Burn, passing Culsharg bothy, then climbing through an area of recently replanted forestry to Benyellary and across the Neive of the Spit to Merrick. As shown on the ZTV studies, for large stretches of this route there would be no potential visibility of the Proposed Development. Blade tips are shown to be potentially visible on the south west facing slopes of Benyellary, the eastern end of the Neive of the Spit and the south facing slopes of Merrick. **Figure 6.9** shows the visibility of existing and consented wind farms and shows that from almost all of these stretches of the approach to Merrick already have visibility of existing wind farms.

6.7.94. From the areas in the vicinity of Glentrool Visitor Centre, represented by Viewpoint 5, the Proposed Development would be partially seen on the rising slopes in the middle distance, behind the woodland around Glentrool. The landform would also partially screen the Proposed Development. Road users and cyclists travelling south along NCR 7 would have partial views of the Proposed Development above woodland, with the turbines appearing of a similar height to the middle distance trees. Closer to the Visitor Centre itself, vegetation around the car parks and the track to Loch Trool would largely screen any visibility of the Proposed Development, with only occasional glimpsed views possible.

6.7.95. From Merrick and its approaches, represented by Viewpoint 7, the majority of the Proposed Development would be screened by intervening landform of the lower hills between Merrick and the site to the south. Visibility of the Proposed Development would be limited to the blade tips of turbines, which would appear slightly above the landform in the mid-ground. The Proposed Development would be barely perceptible in the day time, forming a much smaller part of a wider panoramic view.

6.7.96. As set out at the start of this section on Operational Visual Effects and within **Table 6.10** and the viewpoint descriptions in **Technical Appendix 6.3,** effects would be Small-negligible scale from Merrick and this would apply to the main approach route as well where potential visibility is indicated. Within the Merrick area of this visual receptor group, this is due to the limited blade tips of the Proposed Development that would be visible. These effects would arise across a relatively wide geographic extent of this High-medium sensitivity receptor group and would be of Low-negligible magnitude, Slight (**Not Significant**) and Adverse.

6.7.97. The most frequently used approach to the Rhinns of Kells is from a parking area at Forrest Lodge to the east of the hills, taking a circular walk to cover the main tops of Corserine, Meikle Millyea and Milldown. As shown on the ZTV studies, from the highest hills there would be potential visibility of some of the hubs of the Proposed Development and from the south west facing slopes there would be visibility of blade tips. Similar to the approach to Merrick, the majority of these stretches there is visibility of existing wind farms, with further stretches of this route having visibility of existing wind farm development but not the Proposed Development. From these more distant hills in the Rhinns of Kells, represented by Viewpoint 23 at Meikle Millyea, the Proposed

Development would be visible on the slopes to the south of the Lamachan/Curleywee group of hills, with the landform of the hills largely screening the towers from view. Only Turbines 2, 3 and 6 would break the horizon in these views.

6.7.98. As set out at the start of this section on Operational Visual Effects and within **Table 6.10** and the viewpoint descriptions in **Technical Appendix 6.3**, effects would be Medium-small scale from the Rhinns of Kells area of this visual receptor group. From these hills, the intervening landform would partially screen the Proposed Development from view. Medium-small scale effects would arise across a small geographic extent of this High-medium sensitivity receptor group and would be of Medium-low magnitude, Moderate (**Not Significant**) and Adverse.

Cairnsmore of Fleet and highpoints east of the site (up to 9.5 km east and 8.8 km south east)

6.7.99. This visual receptor group covers the highest hill tops to the east of the site. Visual receptors include recreational visitors to these hills. Viewpoint 6 (**Figure 6.20**) lies within this area. These recreational visitors are assessed to be of High-medium sensitivity.

6.7.100. From these high points, as represented by Viewpoint 6, the Proposed Development would be visible on the foothills to the north of Cairnsmore of Fleet. All of the Proposed Development would be visible, in front of existing, more distant wind farms. The Proposed Development would appear in front of the landform in the distance, with only blade tips of three proposed turbines breaking the skyline.

6.7.101. As set out at the start of this section on Operational Visual Effects and within **Table 6.10** and the viewpoint descriptions in **Technical Appendix 6.3,** effects would be Medium-small scale from this elevated location. Within this visual receptor group, there would be relatively open views from north west facing slopes, outside of areas of forestry. Medium-small scale effects would arise across much of this higher ground on the north facing slopes and would be of Medium-low magnitude, Moderate (**Not Significant**) and Adverse.

River Cree Valley and Wigtown Bay from the A75 to 20 km from the closest proposed wind turbine, including residents of Creetown

6.7.102. This visual receptor group covers the low lying valley floor of the River Cree and its transition to the banks of Wigtown Bay. It also covers the settlement of Creetown, including its public spaces, and core paths and other recreational routes and minor roads within the valley. It excludes users of the A75, which are assessed separately as longer distance roads under the heading 'Roads and Rail' below. Viewpoints 3, 8 and 10 (**Figures 6.17, 6.22** and **6.24**) lie within this area. These local residents and recreational visitors are assessed to be of High-Medium sensitivity. Users of local roads, none of which are identified as scenic routes, are assessed to be of Medium sensitivity.

6.7.103. As described in **Technical Appendix 6.3**, the Proposed Development would be seen on the rising slopes in front of the Lamachan / Curleywee group of hills, beyond much of the woodland on the rising valley side. Closer to the site, such as at Viewpoint 3, the Proposed Development would not appear to be located on the hills themselves, with the nacelles of most proposed turbines located below the skyline and only blades above the height of the hilltops. Visual receptors with more open parts of this northern part of the visual receptor group, such as travelling north along NCR 73, would have direct views of the Proposed Development above woodland, with the turbines being clearly visible in front of the hills to the north, although not aligned with the orientation of the cycleway. From many other nearby locations, vegetation closer to the viewer would interrupt views towards the Proposed Development.

6.7.104. Further south within the visual receptor group, such as around Creetown and Wigtown (Viewpoints 8 and 10), the Proposed Development would be visible on rising landform in the distance, with the blades of many of the proposed wind turbines breaking the skyline.

The prominence of the turbines towers reduces with the backdrop of rising landform. The western and southern areas of the Proposed Development are more visually prominent from these areas.

6.7.105. As set out at the start of this section on Operational Visual Effects and within **Table 6.10** and the viewpoint descriptions in **Technical Appendix 6.3**, effects would range from Medium to Small, influenced by the level of intervening vegetation and landform. Within this visual receptor group, those areas closer to Wigtown Bay often have greater visibility of the Proposed Development with less vegetation obstructing views. Further east and west in the visual receptor group, there are areas where the combination of landform and woodland provides some screening of parts of the Proposed Development. Medium scale effects would arise across a relatively small geographic extent of this High-medium sensitivity receptor group, relating to locations south of Newton Stewart where vegetation does not obscure visibility. These effects would be of Medium magnitude, Moderate (**Not Significant**) and Adverse. Small scale effects are likely to occur across a wider geographic extent of the visual receptor group. These effects would be of Low magnitude, Slight (**Not Significant**) and Adverse.

6.7.106. Beyond the areas described above in the visual receptor group, visibility of the Proposed Development would be limited. Effects in areas shown by the ZTV studies to have no visibility would be Negligible (**Not Significant**) and Neutral.

Roads, residents and recreational landscapes within the drumlin landscapes south west of the site between the A75 and the A714 to 20 km from the closest proposed wind turbine, including residents of Wigtown and Kirkcowan

6.7.107. This visual receptor group covers the rural landscape to the south west of the site, including the settlements of Wigtown and Kirkcowan, the open spaces and recreational routes associated with them and the minor roads between them. Viewpoints 9, 10 and 12 (**Figures 6.23, 6.24** and **6.26**) lie within this area. These local residents and recreational visitors are assessed to be of High-Medium sensitivity. Users of local roads, none of which are identified as scenic routes, are assessed to be of Medium sensitivity.

6.7.108. As described in **Technical Appendix 6.3**, around Kirkowan (Viewpoint 9) the towers of the Proposed Development would be partially screened by intervening landform and vegetation. The tops of the towers and blades of all the turbines would be visible. The blade tips of all turbines would break the skyline and would be visible in the above the rising backdrop of the landform within Galloway Forest Park. From within Kirkowan, visibility of the Proposed Development would be more limited.

6.7.109. Around Wigtown (Viewpoint 10) the Proposed Development would be visible on the rising ground of the foothills within Galloway Forest Park. Turbines T7, T9, T11 and T13 would sit entirely below the ridgeline and recede below the higher landform beyond the site. Blade tips of the remaining turbines break the skyline and would be seen above the ridgeline. The towers of all the turbines would be visible. From within Wigtown, visibility of the Proposed Development would be more limited.

6.7.110. From more rural areas in the south of this visual receptor group, including the Mochrum Lochs Regional Scenic Area (Viewpoint 12), the Proposed Development would be visible on the rising ground of the foothills within Galloway Forest Park. Much of the Proposed Development would be screened from view by the landform, with blade tips of the turbines breaking the skyline and seen above the ridgeline. The towers of most turbines would be largely screened.

6.7.111. As set out at the start of this section on Operational Visual Effects and within **Table 6.10** and the viewpoint descriptions in **Technical Appendix 6.3,** effects would vary from Medium-small to Small-negligible scale across this visual receptor group, varying both with distance and the influence of the drumlin landform and wooded areas. Medium-small

scale effects would occur closer to the site, in locations where the drumlins and large woodlands influence visibility less. Medium-small scale effects would arise across a moderate geographic extent of this High-medium sensitivity receptor group, and would be of Medium-low magnitude, Moderate (**Not Significant**) and Adverse.

6.7.112. Small-negligible scale effects would generally occur further to the south west, in locations where the woodland and landform provide a greater screening effect. Small-negligible effects would occur across a smaller geographic extent of this visual receptor group, and would be of Low-negligible magnitude, Slight (**Not Significant**) and Adverse.

Roads, residents and recreational landscapes within the moorland landscapes west of the site from the A714 to 20km from the closest proposed wind turbine

6.7.113. This visual receptor group covers the rural landscape to the west of the site, including the moorland areas between woodlands, recreational routes associated with them and the minor roads between them. Viewpoints 4 and 14 (**Figures 6.18** and **6.28**) lie within this area. These local residents and recreational visitors are assessed to be of High-Medium sensitivity. Users of local roads, none of which are identified as scenic routes, are assessed to be of Medium sensitivity.

6.7.114. As described in **Technical Appendix 6.3**, from Viewpoint 4 the full extent of the Proposed Development would be visible in the middle distance, along the lower hills to the south of the Lamachan / Curleywee group of hills and partially in front of Cairnsmore of Fleet, with the base of some turbines located behind local undulations. From this location turbines 1 to 6 would appear on the skyline, with turbines 7 to 14 appearing against the backdrop of rising landform.

6.7.115. From Viewpoint 14 on the Southern Upland Way and other more distant areas to the west, the full extent of the Proposed Development would be visible in the distance, along the lower hills to the south of the Lamachan / Curleywee group of hills, with the towers of turbines 11 to 14 located behind local undulations.

6.7.116. As set out at the start of this section on Operational Visual Effects and within **Table 6.10** and the viewpoint descriptions in **Technical Appendix 6.3**, effects would vary from Medium-small to Small-negligible scale across this visual receptor group, varying both with distance and the influence of wooded areas and existing operational wind farms. Medium-small scale effects would occur closer to the site, in locations where the moorlands are more open and there is less woodland to influence visibility. Medium-small scale effects would arise across a small geographic extent of this High-medium sensitivity visual receptor group, and would be of Medium-low magnitude, Moderate (**Not Significant**) and Adverse.

6.7.117. Small-negligible scale effects would generally occur further to the west, in locations where the woodland and landform provide a greater screening effect and/or existing wind farms are prominent in views. Small-negligible effects would also occur across a small geographic extent, and would be of Low-negligible magnitude, Slight (**Not Significant**) and Adverse.

Road and Rail

6.7.118. No rail routes were identified that require detailed assessment.

6.7.119. **A712** (3.3 km, south) – this road lies to the south of the site and within the study area runs north-east from Newton Stewart along the north west edge of Kirroughtree Forest. The closest views of the Proposed Development from this route would be from the stretch of the road closest to Newton Stewart. From this stretch of the route, when driving northwards, views of the Proposed Development would broadly look in the direction of travel. These views would be over intervening vegetation and landform. Effects from this stretch of the route would be of Medium to Medium-small scale.

6.7.120. Beyond this, the road is set down in the landform and would have no visibility of the Proposed Development, with the exception of higher ground to the east 25-35 km from the Proposed Development and around 36 km from the Proposed Development (see Viewpoint 17 at **Figure 6.31**). These views would be occasional and intermittent from the isolated locations to the east in the vicinity of Viewpoint 17. Effects from these more distant stretches of the route would be of Negligible scale.

6.7.121. Drivers using this route are of Medium sensitivity, given that the route is travelled relatively slowly. Medium to Medium-small scale effects would occur along a small geographic extent of the route. Effects will be of Low-negligible magnitude, Slight significance (**Not Significant**) and Neutral.

6.7.122. **A714** (3.5 km, west) – this road lies to the west of the site and within the ZVI runs broadly north-west from Braehead north of Kirkinner, passing the site, towards Girvan. The closest views of the Proposed Development from this route would be from the stretch of the road between Newton Stewart and the Wood of Cree at Castle Stewart. From this stretch of the route, when driving in either direction, views of the Proposed Development would be possible when looking out of the side of the vehicle rather than looking in the direction of travel. These views would be relatively open, across the valley of the River Cree, as shown by Viewpoint 26 (**Figure 6.40**), and of Large-medium scale. Further north of this stretch, views would become interrupted by the Wood of Cree and be more intermittent and occasional, but only when travelling southwards, and consequently of Negligible scale.

6.7.123. South of Newton Stewart, views from the A714 would be broadly towards the Proposed Development when travelling northwards. Roadside vegetation screens views from some stretches, with more open views from further stretches. Viewpoint 3 at **Figure 6.17** and Viewpoint 10 at **Figure 6.24** are broadly representative of views from the more open stretches of this length of the route. The scale of effect would vary from Medium to Small scale along this section of the route.

6.7.124. The A714 south of Newton Stewart is promoted as part of the 'South West Coastal 300' Scenic Driving Route and drivers using this stretch of the route are judged to be of Medium sensitivity. Drivers using the remainder of this route are also of Medium sensitivity, given that the route is travelled relatively slowly. Large-medium scale effects would occur across a Limited extent of the route, with Medium scale effects across a small geographic extent of the road. This would result in effects that are of Medium to Medium-low magnitude, Moderate (**Not Significant**) and Adverse.

6.7.125. **A75** (4.9 km, south) – which winds east to west through the study area, from west of Dumfries, along the eastern side of Wigtown Bay, along the southern edge of Newton Stewart and continuing to Stranraer. The ZTV studies indicate that the Proposed Development would be visible along the eastern edge of Wigtown Bay as far north of Palnure Burn (see Viewpoint 8 at **Figure 6.22**). Effects along this stretch of the road would be of Medium-small scale.

6.7.126. Visibility is then indicated south of Newton Stewart, before becoming intermittent across the drumlin landscape as far as Glenluce. Effects along this stretch of the road would be of Medium scale south of Newton Stewart, reducing to Small-negligible by Glenluce.

6.7.127. The A75 along the eastern side of Wigtown Bay and south of Newton Stewart is promoted as part of the 'South West Coastal 300' Scenic Driving Route and drivers using this stretch of the route are judged to be of Medium sensitivity. Drivers using the remainder of this route are also of Medium sensitivity, given that the route is travelled relatively slowly. Medium scale effects would occur along a very small geographic extent of the route, with Medium-small scale effects along a small geographic extent. This would result in effects that are of Medium-low to Low magnitude, Moderate-slight (**Not Significant**) and Adverse.

6.7.128. **A746** (17.4 km, south) – this route runs south from the junction with the B7085 at Braehead to Glasserton. Along with the A747 this forms the main route around the Machars peninsula. When travelling north on this route, views would be broadly in the direction of the Proposed Development. These views would be intermittent as a result of the landform and vegetation in the vicinity of the route (see Viewpoint 15 at **Figure 6.29**). The scale of these effects would be Small to Small-negligible.

6.7.129. The A746 is promoted as part of the 'South West Coastal 300' Scenic Driving Route and drivers using this stretch of the route are judged to be of Medium sensitivity. Small to Small-negligible scale effects would occur along around half of the route where it is located within the ZVI. This would result in effects that are of Low to Low-negligible magnitude, Slight (**Not Significant**) and Adverse.

Long Distance Recreational Routes – The Southern Upland Way

6.7.130. The Southern Upland Way (5 km, north) is a 344 km long distance footpath, which is the longest of Scotland's Great Trails and runs from coast to coast, connecting Portpatrick in the west and Cockburnspath in the east. Within the study area the route runs from Portpatrick, south of Stranraer, across the drumlins landscape via Glenvernoch Fell, south of Glentrool and the Rhinns of Kells and crossing Glenken before turning north. Viewpoints 4, 14 and 18 (**Figures 6.18, 6.28** and **6.32**) provide representative views from along the trail. Existing wind farms are a feature of views from the Southern Upland Way east of the Rhinns of Kells and west of Glenvernoch Fell, outside of the Galloway Forest.

6.7.131. The ZTVs show no potential visibility of the Proposed Development north or north east of the site. The scale of effect would be greatest to the west of the site where the route passes through Glenvernoch Fell within approximately 7.5 km of the Proposed Development; along this section of route the scale of effects would be Medium-small, where the full extent of the Proposed Development would be visible as a new wind farm on the local hills.

6.7.132. Beyond 7.5 km, there would be intermittent visibility of the Proposed Development from open areas away from woodland. The scale of effects would reduce to Small and Small-negligible, with existing wind farm developments forming part of the views.

6.7.133. Users of the Southern Upland Way are assessed to be High-Medium sensitivity. Effects on this route within 7.5 km of the Proposed Development would be of Medium-small scale and occur along a small geographic extent of the route. These effects will be of Medium-low magnitude, Moderate (not significant) and Adverse. Beyond 7.5 km, effects would be more intermittent, and Small and Small-negligible scale effects would occur along a small geographic extent of the route within the ZVI; on balance, effects along this section of the route would be of Low to Low-negligible magnitude, Slight (**Not Significant**) and Adverse.

National, Regional and Local Cycle Routes

6.7.134. **National Cycle Route (NCR) 7** (3.1 km, west) – NCR7 is an 860 km long route that travels from Sunderland to Inverness. Within the ZVI NCR7 runs from Carrick Forest in the north west of the study area, approximately 19.4 km from the Proposed Development, running along minor roads and passing Glentrool where the route splits to form a circuit. The northern part of this circuit passes north of Loch Trool towards Clatteringshaws Loch, before turning south past Loch Grannoch to rejoin the other half of the route at the B796. Almost all of this stretch of the route would have no visibility of the Proposed Development due to intervening landform. The southern section of the circuit follows the minor road along the eastern side of the River Cree, passing through Newton Stewart and following minor roads east of the A75. Kirroughtree visitor centre, which provides access to mountain biking trails promoted as a world class mountain biking venue, is located on one of these minor roads east of the A75 and accessible from NCR7, but would have no

visibility of the Proposed Development. Before it rejoins the northern section of the circuit, visibility of the Proposed Development would cease on the northern edge of Creetown, approximately 12.1 km from the Proposed Development, due to intervening landform.

6.7.135. Viewpoints 5 and 20 (**Figures 6.19** and **6.34**) are located on the route at some of the closest points to the site. As described at the start of this section on Operational Visual Effects, the scale of effects along this route would range from Medium at Viewpoint 20, where there would be relatively open views towards the site when looking east, to Negligible at the furthest extents of the potential visibility shown by the ZTVs. The stretch of the route between Newton Stewart and the Wood of Cree would experience Medium scale effects. Further north from this point, visibility would become more intermittent due to the presence of forestry and the intervening landform, reducing the scale of effects to Small around Viewpoint 5 and Negligible to the north or that area. South of Newton Stewart, visibility would again become more intermittent due to the presence of forestry and the intervening landform.

6.7.136. Cyclists along this route are assessed to be of Medium sensitivity. Medium scale effects would be experienced along a small geographic extent of the route, giving rise to effects of Medium magnitude, Moderate (**Not Significant**) and Adverse.

6.7.137. **National Cycle Route (NCR) 73** (4.8 km, south) – National Cycle Network Route 73 is broken into two distinct sections - north and south. Only the southern section falls within the study area, connecting Newton Stewart with Wigtown, Glenluce and Stranraer. Within the ZVI, NCR73 follows an offroad route parallel with the A714 south from Newton Stewart, before joining the minor road to Wigtown and passing through the Machars on the B7005. Visibility of the Proposed Development along the route would be intermittent and would cease approximately 22.7 km south west of the Proposed Development, to the north east of the A747.

6.7.138. Viewpoints 3 and 10 (**Figures 6.17** and **6.24**) are located on the route. As described at the start of this section on Operational Visual Effects, the scale of effects along this route would range from Medium at Viewpoint 3, where there would be relatively open views towards the site when looking across the valley of the River Cree, to Negligible at the furthest extents of the potential visibility shown by the ZTVs. The stretch of the route between Newton Stewart and the Moss of Cree would experience Medium scale effects. Further south from this point, where the forestry at Moss of Cree begins to influence views towards the Proposed Development, as demonstrated by Viewpoint 10. South of Wigtown, visibility across the Machars would become more intermittent due to the presence of forestry and the intervening landform, reducing the scale of effects to Small and becoming Negligible closer to the coast.

6.7.139. Cyclists along this route are assessed to be of Medium sensitivity. Medium scale effects would be experienced along a small geographic extent of the route, giving rise to effects of Medium magnitude, Moderate (**Not Significant**) and Adverse.

Specific Viewpoints

6.7.140. As set out in the Section 6.6, specific viewpoints are those chosen because they are key and sometimes promoted viewpoints within the landscape, including for example specific local visitor attractions, viewpoints in areas of particularly noteworthy visual and/or recreational amenity such as landscapes with statutory landscape designations, or viewpoints with particular cultural landscape associations. DGWLCS notes key views towards the host LCTs, which are considered to be specific viewpoints.

6.7.141. **Merrick** (11.3 km, north) – Merrick is identified as having key views within and towards a number of the LCTs described in the DGWLCS and is included as Viewpoint 7 (see **Figure 6.21**). Merrick is the highest summit in Southern Scotland and lies at the heart of

the Galloway ranges. As described in **Technical Appendix 6.3**, there are 360 degree panoramic views from the top of Merrick, across the surrounding hills and towards the lower lying plateau moorlands and drumlin landscapes to the west, as far as the coast. In views north east, west and north west particularly from Merrick, there are extensive views of existing wind turbine developments, with the closest operational wind farms being Mark Hill at approximately 16.6 km to the west of Merrick, Dersalloch 17.9 km to the north and South Kyle 20.3 km to the north east.

6.7.142. Viewpoint 7 demonstrates that the Proposed Development would be largely screened behind the lower hills between Merrick and the site. Recreational visitors to this viewpoint are assessed to be of High sensitivity. The scale of these effects would be Small-negligible, given the distance from the Proposed Development and the degree to which it would be screened. This scale of effects would be experienced across a very small extent of the panoramic view, giving rise to effects of Negligible magnitude, Minimal (**Not Significant**) and Adverse.

6.7.143. **Cairnsmore of Fleet** (8.6 km, south-east) – Cairnsmore of Fleet is also identified as having key views within and towards a number of the LCTs described in the DGWLCS and is included as Viewpoint 6 (see **Figure 6.20**). Cairnsmore of Fleet is the highest of the Solway Hills range and forms a landmark feature at the head of Wigtown Bay. As described in **Technical Appendix 6.3**, there are 360 degree panoramic views from the top of Cairnsmore of Fleet, across the surrounding hills and towards the lower lying plateau moorlands and drumlin landscapes to the west, and the Solway Firth to the south. In views north and north west from Cairnsmore of Fleet, there are extensive views of existing wind turbine developments, with closest operational wind farms being Aeries Fell at approximately 22.5 km to the west, Blackcraig 24.0 km to the north east.

6.7.144. Viewpoint 6 (**Figure 6.20**) demonstrates that the Proposed Development would be visible on the foothills to the north of Cairnsmore of Fleet. Recreational visitors to this viewpoint are assessed to be of High sensitivity. The scale of these effects would be Medium-small, given the distance from the Proposed Development and the backdrop of existing, although more distant, wind farm development. This scale of effects would be experienced across a small extent of the panoramic view, giving rise to effects of Medium-low magnitude, Moderate (**Not Significant**) and Adverse.

Operational Effects on Designated Landscapes and Mapped Interests

Dark Sky Parks

6.7.145. **Galloway Dark Sky Park** (150 m to Park Boundary and core area, north) – given that the Dark Sky Park is designated to protect the dark skies experienced within it, the effects of the Proposed Development are assessed in the Potential Operational Nighttime Effects and Lighting section below.

National Scenic Areas (NSA)

6.7.146. There would be no visibility of the Proposed Development from Fleet Valley NSA (15.6 km, south-east).

Regional Scenic Areas (RSA)

6.7.147. **Galloway Hills RSA** (includes site) – this designated area covers the site and a large part of the study area. Dumfries and Galloway Council's Regional Scenic Areas Technical Paper (2018) describes the character of this area and states that it is the *"largest Regional Scenic Area, a reflection both of the scale of the landscape of the Galloway Hills and the interesting juxtaposition of contrasting upland, valley and coastal landscapes. The relationship between the hills and the adjacent lowlands gives rise to sweeping and*

dramatic views of the hills, in particular from the western side of Wigtown Bay and certain sections of the perimeter valleys." Visibility of the Proposed Development would vary across the RSA, as shown by the ZTV studies.

6.7.148. Effects on this RSA have been previously described in the LCTs that it covers, primarily LCT158, 160, 161, 168, 172, 174, 176, 179, 180 and 181, and by the viewpoints that lie within the RSA (Viewpoints 1, 3, 5, 6, 7, 8, 10, 11, 20, 21, 22 and 23 shown on **Figures 6.15, 6.17, 6.18-6.22, 6.24-6.25** and **6.34-6.37**) as described in **Technical Appendix 6.3**. The scale of effects would range from Large scale across the site to Negligible scale at the edges of the RSA. From much of the RSA, the landform would prevent visibility of the Proposed Development.

6.7.149. As set out in the Baseline section, RSAs are assessed to be of High-medium sensitivity. Large scale effects on this RSA would occur across the site and its immediate context within the RSA and would give rise to High magnitude, Major-Moderate (**Significant**) and Adverse effects.

6.7.150. **Mochrum Lochs RSA** (16.4 km, south-west) - this designated area is located to the south west of the site, adjacent to Luce Bay. The Dumfries and Galloway Council's Regional Scenic Areas Technical Paper describes the character of this area and states that the *"combination of scattered lochs within gently undulating, rocky Plateau Moorland create a unique and distinctive landscape and coastline."* Visibility of the Proposed Development would vary across the RSA, as shown by the ZTV studies, as a result of forestry and landform.

6.7.151. The LCTs that cover the Mochrum Lochs RSA (LCT156, 167 and 174) were not considered in the detailed assessment of effects on landscape character due to the distance from the Proposed Development and the intermittent level of visibility. Viewpoint 12 (**Figure 6.26**) lies within the RSA, as described in **Technical Appendix 6.3**. The scale of effects across this RSA would range from Small scale at the northern end of the RSA to Negligible scale in the south.

6.7.152. As set out in the Baseline section, RSAs are assessed to be of High-medium sensitivity. Small scale effects on this RSA would occur across a small geographic extent of the RSA and would give rise to Low magnitude, Slight (**Not Significant**) and Adverse effects.

6.7.153. **Machars Coast RSA** (20.8 km, south) - this designated area is located to the south of the site, around the coastline of the Machars peninsula. The Dumfries and Galloway Council's Regional Scenic Areas Technical Paper describes the character of this area and states that the *"The landscape is an open one of smooth undulating hills and valleys and improved pastures, contrasting with rougher and more knolly areas invaded by gorse. The coastline comprises steep low grassy cliffs, raised beaches and rocky foreshores, indented by occasional sandy coves."* Visibility of the Proposed Development would vary across the RSA, as shown by the ZTV studies, predominantly due to the landform and the relationship of the RSA with the coast.

6.7.154. Of the LCTs that cover the Machars Coast RSA (LCT156, 157 and 158), only LCT158 has been considered in the detailed assessment of effects on landscape character, due to the distance from the Proposed Development and the relatively limited level of visibility. Viewpoint 24 (**Figure 6.38**) lies within the RSA, as described in **Technical Appendix 6.3**. The scale of effects across this RSA would range from Small scale at the northern end of the RSA to Negligible scale in the south.

6.7.155. As set out at paragraph 6.6.56, RSAs are assessed to be of High-medium sensitivity. Small scale effects on this RSA would occur across a very small geographic extent of the RSA and would give rise to effects of Negligible magnitude, Minimal (**Not Significant**) and Neutral effects.

Local Landscape Areas (LLA)

6.7.156. **High Carrick Hills** (12.8 km, north) - this designated area is located to the north of the site, immediately to the north of the Galloway Hills RSA. It is entirely within the boundary of the Galloway Dark Sky Park, with part of the Core Area of the Dark Sky Park covering the centre of the LLA, and the Merrick WLA extends into the south east of High Carrick Hills LLA. The LLA covers a combination of open high peaks and forestry on lower slopes. Visibility of the Proposed Development would be limited to the higher peaks such as Shalloch on Minnoch, Shalloch and Eldrick Hill, as shown by the ZTV studies, predominantly due to the landform.

6.7.157. Of the LCTs that cover the High Carrick Hills LLA (LCT72, 76, 78, 81, 82 and 83), none have been considered in the detailed assessment of effects on landscape character, due to the distance from the Proposed Development and the relatively limited level of visibility. The scale of effects across this RSA would range from Small-negligible scale on the taller peaks to Negligible scale across the rest of the LLA.

6.7.158. As set out in the Baseline section, LLAs are assessed to be of High-medium sensitivity. Small-negligible scale effects on this LLA would occur across a very small geographic extent of the RSA and would give rise to effects of Negligible magnitude, Minimal (**Not Significant**) and Neutral.

Wild Land Area

6.7.159. **Merrick WLA** (4.7 km, north east) – a full Wild Land Area Assessment is provided at **Technical Appendix 6.4** for this mapped interest. In summary, this concludes that the four attributes and qualities of Merrick WLA identified in the WLA description largely apply across the whole of Merrick WLA, given the relatively small area it covers. Effects as a result of the Proposed Development would occur across a very small geographic extent of the WLA, as demonstrated by **Technical Appendix 6.4, Figure 2**.

6.7.160. Given the Negligible magnitude of effect on the attributes and qualities of Merrick WLA, these effects are assessed to be Minimal (**Not Significant**) and Neutral (neither Adverse nor Beneficial). As a consequence, there would be relatively little impact on the wildness of Merrick WLA, either in localised areas or as a whole.

Potential Operational Nighttime Effects and Lighting

6.7.161. Onshore wind turbines of over 150 m in height require mandatory visible spectrum aviation lighting. A proposed lighting scheme has been discussed with the Civil Aviation Authority (CAA) and the agreed scheme will comprise:

- 1 no. medium intensity steady red (2000 candela) light mounted on the nacelles of turbines T01, T05, T06, T11, T12 and T15 (see also **Figure 15.1)** automatically dimmed to 10% of peak intensity (200 candela) when visibility is in excess of 5 km;
- a second 2000 candela light on the nacelles of the above turbines to act as alternates in the event of a failure of the main light (both lights should not be lit at the same time);
- no requirement for intermediate 32 candela steady red lights mounted around the tower.

6.7.162. The lights must be on "by night", which is defined in UK air legislation as 30 minutes after sunset until 30 minutes before sunrise. The switching of the lights on and off will be controlled by a timer, and not by photocells or similar that respond to light levels, thereby not giving rise to effects in the daytime. During periods of greater ambient light (e.g. twilight, dusk, dawn), there will be a reduced effect as the contrast of the aviation lighting against the background will be less. The hours of darkness vary considerably in Dumfries and Galloway throughout the year meaning that in summer, experience of the lighting whilst people are typically more active and likely to be outside is considerably

reduced. In winter, however, the lighting will be in use for greater periods of time and potentially active during peak activity times, i.e. morning and evening rush hours.

6.7.163. Due to the location of the lighting on the turbines relative to the rotating blades, this can result in a flashing or flickering effect caused by the screening effect of blades as they travel past the lights. These effects are dependent upon the rotation speed of the blades, direction of wind and the location of the receptor. Where a number of lit turbines are present in the view, such flashing is likely to be un-coordinated.

6.7.164. As described in **Section 6.5** and in further detail in **Technical Appendix 6.6** there are a range of factors that influence how bright the proposed lighting would appear to any observer. This is dependant primarily on distance from the light, angle at which it is viewed, how much ambient light is present, both local and in the view as a whole, and the weather. The report by Dr Stuart Lumsden at **Technical Appendix 6.6** summaries *"For the proposed Blair Hill Wind Farm, the lights will appear brightest from the viewpoint just north of Newton Stewart. Even there however they will have similar brightness to the bright stars in the sky. The other locations will essentially see rather faint red lights which would require at least a minimum amount of dark adaptation before they become visible to the eye for a typical person".*

6.7.165. As a worst case, this assessment makes reference to the brighter 2000 candela lighting, which is illustrated on the nighttime visualisations. However, **Technical Appendix 6.6** concludes that *"Overall then it seems likely that most of the time when the lights will operate at 2000 candela will be in conditions where they will not be seen much beyond 5km"*. **Technical Appendix 6.6** also concludes that *"Locations outside 5km see the lights attenuated rapidly"*, meaning that beyond 5km from the closest proposed wind turbine light, lighting intensity would rapidly reduce.

Nighttime Lighting Environment of the Study Area

6.7.166. The existing intensity of artificial lighting across the study area is illustrated on **Figure 6.12** using the latest satellite data (2023) from VIIRS. The figure illustrates that there are generally low levels of artificial light within the study area as a whole. Within 5 km of the Proposed Development, the exception to this is the settlement of Newton Stewart to the south of the site. Between 10-20 km from the Proposed Development, smaller settlements and clusters of houses are shown to emit light, predominantly to the south and south west, including Wigtown, Creetown and Kirkcowan.

6.7.167. There are other light sources beyond those generally associated with settlements and transport corridors, both within and beyond the study area, that can be seen from within the study area and vary in prominence depending on the context of the view. These include red aviation lighting on individual turbines located on higher ground to the south east of Creetown, assumed to be of the same intensity as required on the proposed wind turbines.

6.7.168. The majority of existing operational wind farms within the 45 km study area do not have red nacelle or tower lights as they are lower than the 150 m height threshold. However, a number of the consented schemes will require aviation lighting, which will introduce areas of turbine lighting into the landscape once construction is complete.

ZTV Studies

6.7.169. A ZTV study was prepared to inform this assessment based on the six turbines listed above being lit and at the highest nacelle height within the development parameters. This is shown on **Figure 6.13** and illustrates the number of turbines visible at hub height (to indicate the number of nacelle lights visible).

6.7.170. The ZTV study includes the screening effect of woodland and settlements to provide a more realistic illustration of potential visibility of proposed lighting compared to that of a

bare earth model. It is however acknowledged that lights may, in limited instances, be visible through areas of woodland where they are not particularly dense or when leaves are not present on trees. Where this may be the case for a particular receptor this is noted in the text. However, it will have little bearing on the overall pattern of visibility within the study area.

6.7.171. As can be seen from the ZTV study, the turbine lights will be most visible from the following areas:

- The site and the open areas of Moor of Barclye to the south;
- Hilltops to the north and north-east of the site;
- From Cairnsmore of Fleet to the south east;
- Intermittently from the open areas of the drumlin landscape to the south west;
- From Glenvernoch Fell to the west; and
- From some of the higher peaks to the north east and south east, with much reduced visibility from high points to the north.

6.7.172. A second ZTV study is shown on **Figure 6.14**, which indicates the light intensity of the proposed wind turbine lighting that would be visible, based on the vertical angle of the landform from the nacelle mounted aviation light. This demonstrates that within 5km of the Proposed Development, where light attenuation has been identified in **Technical Appendix 6.6** to be lowest, most areas with anticipated visibility of the proposed wind turbine lighting would be at such a vertical angle from the lighting to reduce the visible light intensity to below 80 candela when the lights are at 2000 candela. The exception to this is the higher ground to the north east of the site, where nighttime visitors are less likely to be visiting.

Effects on Visual Receptors

Visual Aids

6.7.173. Viewpoints 2, 8, 9 and 10 (**Figures 6.16** and **6.22** to **6.24**) at Newton Stewart, Creetown, Kirkcowan and Wigtown the B6318 north west of Claygate include night photomontages to help illustrate the effects at night. These viewpoints have been selected as locations where visual receptors are most likely to be significantly affected by lighting and numbers of nighttime receptors are likely to be highest.

6.7.174. For each of the selected viewpoints, the photographs were taken when the landform can still be seen half an hour after sunset, rather than in full darkness, in accordance with the guidance provided by NatureScot in 'Visual Representation of Wind Farms'. The proposed lighting is illustrated as the worst case 2000 candela lighting. Photomontages are calibrated with reference to photography of the built wind turbine at Methil, Fife which has a 2000 candela nacelle light. Further detail in respect of the production of night-time photomontages is included in **Technical Appendix 6.1**.

6.7.175. The viewpoint description, description of effects and scale of effects for each viewpoint (see **Figure 6.13** for viewpoint locations) is set out in **Technical Appendix 6.3**. The scale of effect at each viewpoint within the 20km study area for the nighttime assessment is summarised in **Table 6.11**.

Table 6.11: Summary of Scale of Nighttime Effects on Viewpoints

Viewpoint Reference & Location	Distance, Direction	Scale of Effect	Sensitivity	Magnitude	Significance	Positive / Neutral / Adverse
Viewpoint 1 - Drumwhirn Cairn, Moor of Barclye	2.6 km, south-west	Small	High-medium (recreational users of open access land)	Low	Slight and not significant	Adverse
Viewpoint 2 - Corsbie Road, Newton Stewart	4.5 km, south	Medium-small	Medium-low (residents, road users)	Medium-low	Slight and not significant	Adverse
Viewpoint 3 – Sustrans National Cycle Route 73/A714 south of Newton Stewart	6.4 km, south	Medium-small	Medium-low (cyclists, users of A714 as part of the 'South West Coastal 300')	Medium-low	Slight and not significant	Adverse
Viewpoint 4 - Glenvernoch Fell / Hill of Ochiltree	8.6 km, west	Small	High-medium (recreational users of open access land/ promoted route)	Low	Slight and not significant	Adverse
Viewpoint 5 - NCR7 on Minor Road North of Glentrool Village	8.0 km, north west	Small	High-medium (recreational users of surrounding countryside) Medium-low (cyclists, users of local road)	Low	Slight and not significant	Adverse
Viewpoint 6 - Cairnsmore of Fleet	8.6 km, south east	Medium-small	High-medium (recreational visitors to recognised viewpoint)	Medium-low	Moderate and not significant	Adverse

Viewpoint Reference & Location	Distance, Direction	Scale of Effect	Sensitivity	Magnitude	Significance	Positive / Neutral / Adverse
Viewpoint 7 - Merrick	11.3 km, north	Negligible	High-medium (recreational visitors to recognised viewpoint)	Negligible	Minimal and not significant	Neutral
Viewpoint 8 - A75 near Creetown	13.1 km, south east	Small	High-medium (recreational users of surrounding countryside) Medium-low (residents, users of A75 as part of the 'South West Coastal 300')	Low	Slight and not significant	Adverse
Viewpoint 9 – Kirkcowan	12.7 km, south-west	Small	High-medium (recreational users of surrounding countryside) Medium-low (residents, road users)	Low	Slight and not significant	Adverse
Viewpoint 10 - NCR73 on Minor Road North of Wigtown	14.0 km, south	Small	High-medium (recreational users of surrounding countryside) Medium-low (residents, cyclists, road users)	Low	Slight and not significant	Adverse
Viewpoint 11 - Benniguinea Lookout	14.1 km, east	Small	High-medium (recreational users of surrounding countryside)	Low	Slight and not significant	Adverse
Viewpoint 12 - Mochrum Lochs RSA, Moor of Drumwall	19.2 km, south-west	Negligible	High-medium (recreational users of surrounding countryside) Medium-low (road users)	Negligible	Minimal and not significant	Neutral

Viewpoint Reference & Location	Distance, Direction	Scale of Effect	Sensitivity	Magnitude	Significance	Positive / Neutral / Adverse
Viewpoint 13 - Minor Road near Barhill Station	20.5 km, north-west	Negligible	High-medium (recreational users of surrounding countryside) Medium-low (road users)	Negligible	Minimal and not significant	Neutral
Viewpoint 14 - Southern Upland Way near Artfield Fell	20.6 km, west	Negligible	High-medium (recreational users of open access land/ promoted route)	Negligible	Minimal and not significant	Neutral
Viewpoint 15 - A746 North of Whithorn	29.1 km, south	Negligible	High-medium (recreational users of surrounding countryside) Medium-low (residents, users of A746 as part of the 'South West Coastal 300')	Negligible	Minimal and not significant	Neutral
Viewpoint 16 - Byne Hill	31.9 km, north west	Negligible	High-medium (recreational users of surrounding countryside)	Negligible	Minimal and not significant	Neutral
Viewpoint 17 - A712 east of Corsock	36.2 km, east	Negligible	High-medium (recreational users of surrounding countryside) Medium-low (road users)	Negligible	Minimal and not significant	Neutral
Viewpoint 18 - Southern Upland Way near Stranraer	37.5 km, south west	Negligible	High-medium (recreational users of open access land/ promoted route) Medium-low (road users)	Negligible	Minimal and not significant	Neutral

Viewpoint Reference & Location	Distance, Direction	Scale of Effect	Sensitivity	Magnitude	Significance	Positive / Neutral / Adverse
Viewpoint 19 - Sandhead	37.8 km, south west	Negligible	High-medium (recreational users of surrounding countryside) Medium-low (residents, road users)	Negligible	Minimal and not significant	Neutral
Viewpoint 20 - Monigaff Parish Church	3.4 km, south	Small	High-medium (recreational users of surrounding countryside) Medium-low (residents, road users)	Low	Slight and not significant	Adverse
Viewpoint 21 - Lamachan Hill	3.0 km, north east	Medium	High-medium (recreational users of surrounding countryside)	Medium	Moderate and not significant	Adverse
Viewpoint 22 - Millfore	5.4 km, north east	Medium	High-medium (recreational users of surrounding countryside)	Medium	Moderate and not significant	Adverse
Viewpoint 23 - Meikle Millyea	12.3 km, north east	Small	High-medium (recreational users of surrounding countryside)	Low	Slight and not significant	Adverse
Viewpoint 24 - Innerwell Fishery approach	21.7 km, south	Negligible	High-medium (recreational users of surrounding countryside) Medium-low (road users)	Negligible	Minimal and not significant	Neutral
Viewpoint 25 - Penninghame Estate pond, Castle Stewart	4.2 km, west	Small	High-medium (recreational users of surrounding countryside)	Low	Slight and not significant	Adverse

Viewpoint Reference & Location	Distance, Direction	Scale of Effect	Sensitivity	Magnitude	Significance	Positive / Neutral / Adverse
Viewpoint 26 - Challoch Church	4.0 km, south west	Medium-small	High-medium (recreational users of surrounding countryside) Medium-low (road users)	Medium-low	Slight and not significant	Adverse

6.7.176. Each of the viewpoints is a 'sample' of the potential effects, representing a wide range of receptors – including not only those actually at the viewpoint, but also those nearby, at a similar distance and/or direction.

6.7.177. From these viewpoints it can be seen that:

- There are unlikely to be any locations where the proposed aviation lights will form a major new element in the view and result in Large scale visual effects due to the vertical angle at which the proposed wind turbine lights would be viewed within 5km of the Proposed Development (where light attenuation would be at its lowest);
- Medium or Medium-Small scale effects extends to approximately 6.5 km from the closest proposed turbines in locations where there are open views towards the Proposed Development. For locations where views are less open or that are not elevated above the site, or where there are existing nighttime lighting sources, the extent of this scale of effect would be less extensive.
- Beyond approximately 6.5 km from the site boundary, the scale of effects will reduce to Small or Small-Negligible due to light attenuation and the vertical angle at which the proposed wind turbine lights would be viewed, as well as greater sense of separation created by the landform and vegetation, or where there are existing nighttime lighting sources.
- Where the development will either be screened from visual receptors by changes in landform or vegetation within the landscape, or the development will form a very limited change in views due to distance and the resultant light attenuation, the scale of effect will be Negligible.

Visual Receptor Groups

6.7.178. As indicated within **Technical Appendix 6.1**, recreational visitors to the Dark Sky Park are assessed to be of High sensitivity; recreational visitors to other areas of the landscape where nighttime views are part of the experience are assessed to be of High-medium sensitivity; residents and visitors within settlements with lighting are assessed to be of Medium-low sensitivity; users of local roads at night are assumed to be driving and of Medium-Low sensitivity and main road users are considered to be of Low sensitivity. Effects on private residential visual amenity are considered in **Technical Appendix 6.5**.

Moor of Barclye between the Lamachan Hill/Curleywee group of hills, Penkiln Burn and the River Cree (up to 300 m north, 150 m east, 3.5 km south and 4 km west)

6.7.179. Viewpoint 1 (**Figure 6.15**) lies within this visual receptor group. Local residents and recreational visitors within the open countryside are assessed to be of High-medium sensitivity.

6.7.180. As described in **Technical Appendix 6.3**, from Viewpoint 1 at night, lighting on the nacelles of the six lit turbines would be visible. The settlement of Newton Stewart to the south forms the main existing light source within views from this vicinity, along with traffic passing along the A714 to the west. There is no existing turbine lighting within the

view, but many of the consented schemes will include lighting. Visitors are unlikely to go to this cairn, or the signposted footpath routes within the Wood of Cree, at night without the need for personal lighting, which would affect dark adaption due to the very close light source. **Figure 6.14** indicates that from this location the vertical angle of the viewpoint from the aviation lighting will be below -4° and light intensity would reduce to only 10 candela in conditions where visibility is less than 5km, which is fainter than the brightest stars.

6.7.181. It is less likely that there would be recreational users visiting this area, given more popular locations nearby for wild camping and observing the night sky, within the Dark Sky Park. However, should there be visitors to this visual receptor group at night, as set out above and within **Table 6.11** and the viewpoint descriptions in **Technical Appendix 6.3,** nighttime effects would be Small scale close to the site due to the angle at which the proposed wind turbine lights would be viewed. Further south in the visual receptor group, there would be some areas where the combination of landform and woodland would screen views of the lighting on the Proposed Development, as shown by the ZTV study. Small scale effects would arise across a wide geographic area of this High-medium sensitivity receptor group and would be of Low magnitude, Slight (**Significant**) and Adverse.

Lamachan Hill/Curleywee group of hills (up to 1.5 km north west, 3.5 km north east and 5.5 km east)

6.7.182. This visual receptor group covers the closest hills to the site, immediately to the north and east. Viewpoints 21 and 22 (**Figures 6.35** and **6.36**) lie within this visual receptor group. Local residents and recreational visitors within the open countryside are assessed to be of High-medium sensitivity.

6.7.183. As described in **Technical Appendix 6.3**, Viewpoints 21 and 22 are largely dark viewpoints, being located within the Core Area of the Galloway Dark Sky Park. Within this visual receptor group, Newton Stewart forms a source of light on the lower ground to the south and other lighting would be limited to distant settlements and isolated dwellings within the view, and vehicles passing along roads in the wider landscape. Whilst none of the currently operational wind farms have turbine lighting, many of the consented schemes to the north and west will introduce distant turbine lighting when commissioned. Visitors would not be able to climb Lamachan Hill, Millfore or any of the other hills in this visual receptor group at night without the need for personal lighting, which would affect dark adaption due to the very close light source. At night, lighting on the nacelles of the six lit turbines would be visible. The elevation of the hills in relation to the proposed wind turbine lights means that there would be no reduction in lighting intensity due to the angle at which the lights would be viewed.

6.7.184. As set out above and within **Table 6.11** and the viewpoint descriptions in **Technical Appendix 6.3,** effects would be Medium scale from the south and west facing slopes of these hills, as well as from the hill tops, with fewer light turbines likely to be visible from many of the slopes. From the north and east facing slopes, there would be no visibility of the lighting on the Proposed Development, as shown by the ZTV study. However, there are likely to be few recreational users visiting this area, despite the location within the Dark Sky Park. Medium scale effects would arise across areas in the immediate vicinity of the site within this High-medium sensitivity receptor group and would be of Medium magnitude, Moderate (**Not Significant**) due to the limited number of likely visitors and Adverse.

River Cree and Penkiln Burn valleys, including Newton Stewart and the road corridors of the A75 and A714 (up to 4.8 km south, 5.5 km south west and 4 km west)

6.7.185. Viewpoints 2, 20 and 26 (**Figures 6.16, 6.34** and **6.40**) lie within this visual receptor group. A night photomontage is provided for Viewpoint 2 (**Figure 6.16**). Recreational

visitors within the open areas of this visual receptor group are assessed to be of High-Medium sensitivity. People within Newton Stewart and users of local roads are assessed to be of Medium-low sensitivity.

6.7.186. As described in **Technical Appendix 6.3**, from locations within Newton Stewart where there would be views towards the Proposed Development, such as Viewpoint 2, lighting on the nacelles would be visible on all lit turbines (see **Figure 6.16**). The settlement of Newton Stewart would form the main existing light source within the foreground of this view. There are other occasional isolated light sources in the direction of the Site. However, there is no existing turbine lighting within the view. **Figure 6.14** indicates that from this location the vertical angle of the viewpoint from the aviation lighting will be between -3 and -4° and light intensity would reduce to between 40 and 10 candela in conditions where visibility is less than 5km, which is similar to the brightest stars.

6.7.187. From locations on the northern edge of Newton Stewart with potential visibility of the Proposed Development, such as Viewpoint 20 which is generally well lit by highways lighting, windows of existing dwellings and passing vehicles along Cumloden Road in the foreground of the view. Lighting on the nacelles would be visible on all of the lit turbines, with the tops of trees and the structures of pylons filtering views.

6.7.188. From open locations to the north of Newton Stewart, such as Viewpoint 26, traffic passing along the A714 forms the main existing light source within views, with some lighting from the settlement of Newton Stewart to the south visible and lighting from isolated properties in the landscape. There is no existing turbine lighting within the view. Dark adaption would be affected by car headlights travelling along the road and the need to use personal lighting for pedestrians and cyclists due to the unlit nature of the route. **Figure 6.14** indicates that from this location the vertical angle of the viewpoint from the aviation lighting will be between -3 and -4° and light intensity would reduce to between 40 and 10 candela in conditions where visibility is less than 5km, which is similar to the brightest stars. At night, lighting on the nacelles of the six lit turbines would be visible.

6.7.189. As set out above and within **Table 6.11** and the viewpoint descriptions in **Technical Appendix 6.3**, effects would be Medium-small to Small scale within this visual receptor group, in the areas where potential visibility of the Proposed Development is indicated. From the northern edge of Newton Stewart, Viewpoints 2 and 20 demonstrate that there would be relatively open views of the lighting on the Proposed Development, but existing lighting sources and the angle at which the proposed wind turbine lights would be viewed would reduce the lighting intensity. East of the town, along the Penkiln Burn valley, woodland and forestry mean that views of lighting on the Proposed Development would be intermittent. To the north west of the town, along the valley of the River Cree, there would be stretches of the valley with relatively open views towards the Proposed Development, with intervening landform screening parts of some of the turbine towers. Medium-small scale effects would arise in the immediate vicinity of the site within this predominantly Medium-low sensitivity visual receptor group, with Small scale effects across a slightly wider geographic extent, and would be of Medium-low to Low magnitude, Slight (**Not Significant**) and Adverse.

6.7.190. Elsewhere in Newton Stewart, the built form would prevent views towards the Proposed Development from most locations and there is already nighttime lighting. Along stretches of Penkiln Burn the landform and forestry would also prevent visibility of the proposed lighting. Effects would be Negligible magnitude, Minimal (**Not Significant**) and Neutral.

Merrick and the Rhinns of Kells (up to 11.3 km to the north and 16.5 km north east)

6.7.191. Viewpoints 5, 7 and 23 (**Figures 6.19, 6.21** and **6.37**) lie within this area. Recreational visitors to this visual receptor group within the Dark Sky Park are assessed to be of High sensitivity.

6.7.192. Within the Merrick area of this visual receptor group, the nighttime ZTV demonstrates that there would be no visibility of lighting on the Proposed Development. These effects would arise across a Wide extent of this High sensitivity visual receptor group and would be of Negligible magnitude, Minimal (**Not Significant**) and Neutral.

6.7.193. Within the Rhinns of Kells area of this visual receptor group, the nighttime ZTVs (**Figures 6.13** and **6.14**) demonstrates limited potential visibility on Meikle Millyea and one to two turbine lights from a small area of Corserine and Milldown. As described in **Technical Appendix 6.6**, this part of the visual receptor group is located within the Galloway Dark Sky Park. Newton Stewart forms a source of light on the lower ground and other lighting would be limited to distant settlements and isolated dwellings within the view, and vehicles passing along roads in the wider landscape. Whilst none of the currently operational wind farms have turbine lighting, many of the consented schemes to the will introduce turbine lighting when commissioned. Visitors would not be able to climb Meikle Millyea at night without the need for personal lighting, which would affect dark adaption due to the very close light source. The aviation lighting on the Proposed Development would be visible as a new feature along the top of the intervening landform. The elevation of the viewpoint means that there would be no reduction in lighting intensity due to the angle at which the lights would be viewed. However, there would be a reduction in intensity due to the distance and the small number of lights would form a relatively minor feature in views.

6.7.194. As set out above and within **Table 6.11** and the viewpoint descriptions in T**echnical Appendix 6.3,** effects would be Small from a very small geographic extent of this part of the High sensitivity visual receptor group. However, there are likely to be few recreational users visiting this area, despite the location within the Dark Sky Park. However, there are likely to be few recreational users visiting this area, despite the location within the Dark Sky Park. These effects would be of Low-negligible magnitude, Moderate-slight (**Not Significant**) and Adverse.

Cairnsmore of Fleet and highpoints east of the site (up to 9.5 km east and 8.8 km south east)

6.7.195. Viewpoint 6 (**Figure 6.20**) lies within this visual receptor group. Recreational visitors to this area are assessed to be of High-medium sensitivity.

6.7.196. From these high points, as represented by Viewpoint 6 which is a largely dark viewpoint, Newton Stewart forms a source of light on the lower ground and other lighting is limited to distant settlements and isolated dwellings within the view, and vehicles passing along roads in the wider landscape. Whilst none of the currently operational wind farms have turbine lighting, many of the consented schemes to the will introduce distant turbine lighting when commissioned. Visitors would not be able to climb Cairnsmore of Fleet at night without the need for personal lighting, which would affect dark adaption due to the very close light source. At night, lighting on the nacelles of the six lit turbines would be visible. The elevation of the viewpoint means that there would be no reduction in lighting intensity due to the angle at which the lights would be viewed. However, there would be a reduction in intensity due to the distance and the small number of lights would form a relatively minor feature in views.

6.7.197. As set out above and within **Table 6.11** and the viewpoint descriptions in **Technical Appendix 6.3,** effects would be Medium-small scale from this elevated location. However, there are likely to be relatively few nighttime visitors, despite the proximity to the Dark Sky Park. Within this visual receptor group, there would be relatively open views of lighting on the Proposed Development from north west facing slopes, outside of areas of forestry, in a similar pattern of visibility to the daytime visibility. Medium-small scale effects would arise across much of this higher ground on the north facing slopes of this

High-medium sensitivity receptor group and would be of Medium-low magnitude, Moderate (**Not Significant**) and Adverse.

River Cree Valley and Wigtown Bay from the A75 to 20km from the closest proposed wind turbine, including residents of Creetown

6.7.198. Viewpoints 3, 8 and 10 (**Figures 6.17, 6.22** and **6.24**) lie within this area. Night photomontages are provided for Viewpoints 8 and 10 (**Figures 6.22** and **6.24**). Recreational visitors within the open areas of this visual receptor group are assessed to be of High-medium sensitivity. People within settlements and users of local roads are assessed to be of Medium-low sensitivity.

6.7.199. As described in **Technical Appendix 6.3**, the settlement of Newton Stewart would form the main existing light source within the middle distance of views closer to the site, such as at Viewpoint 3, along with properties along the edge of the river valley to the west and cars travelling along both the A714 immediately to the west and the A75 to the east on the opposite side of the valley. There is no existing turbine lighting within the view. **Figure 6.14** indicates that from this part of the visual receptor group the vertical angle of the viewpoint from the aviation lighting will be between -2 and -3° and light intensity would reduce to between 80 and 40 candela in conditions where visibility is less than 5km. At night, lighting on the nacelles of the six lit turbines would be visible. However, the distance from the closest proposed turbine would reduce visibility to be roughly comparable to the brightest stars.

6.7.200. Further south within the visual receptor group, such as around Creetown and Wigtown (Viewpoints 8 and 10, see **Figures 6.22** and **6.24**) is mostly a result of vehicles passing along the roads, and further to the east from larger light sources at Creetown Service Station and Castle Cary Holiday Park. In the mid-ground, there is lighting at the base of Kirroughtree Forest, associated with isolated properties. Dark adaption would be affected by car headlights travelling along roads and the need to use personal lighting for pedestrians and cyclists due to the unlit nature of the route. The lighting on the nacelles of the six lit turbines would be visible. **Figure 6.14** indicates that from this part of the visual receptor group the vertical angle of the viewpoint from the aviation lighting will be between -1 and -2° and light intensity would reduce to between 750 and 80 candela in conditions where visibility is less than 5km. The distance from the Proposed Development would ensure that the proposed lighting would appear fainter than the brightest stars.

6.7.201. As set out above and within **Table 6.11** and the viewpoint descriptions in **Technical Appendix 6.3**, effects would range from Medium-small to Small, influenced by lighting attenuation due to distance and the angle at which the proposed wind turbine lights would be viewed, as well as the level of intervening vegetation and landform. Within this visual receptor group, those areas closer to Creetown or Wigtown, or located along the A75 corridor where there are higher volumes of nighttime traffic, would experience a reduced scale of effect due to existing light sources. Medium-small scale effects would arise across a small geographic extent of the Medium-low sensitivity areas of the visual receptor group, relating to locations south of Newton Stewart where nighttime views would be more open and located in darker areas, with Small scale effects likely to occur across a wider geographic extent of the visual receptor group. These effects would be of Medium-low to Low magnitude, Slight (**Not Significant**) and Adverse.

Roads, residents and recreational landscapes within the drumlin landscapes south west of the site between the A75 and the A714 to 20km from the closest proposed wind turbine, including residents of Wigtown and Kirkcowan

6.7.202. Viewpoints 9, 10 and 12 (**Figures 6.23, 6.24** and **6.26**) lie within this area. A night photomontage is provided for Viewpoint 10 (**Figure 6.24**). Recreational visitors within the open areas of this visual receptor group are assessed to be of High-medium sensitivity.

People within settlements and users of local roads are assessed to be of Medium-low sensitivity.

6.7.203. As described in **Technical Appendix 6.3**, around Kirkowan (Viewpoint 9) there are local light sources associated with nearby residential development along the B733 (see Figure 6.23). The wider landscape to the north-east is generally free from nighttime lighting. Current lighting within the environment is limited to that arising from nearby properties and vehicles passing along the B733. The B733 is does not have street lights. Dark adaption would be affected by car headlights travelling along the road and the need to use personal lighting for pedestrians and cyclists due to the unlit nature of the route. The lighting on the nacelles of the six lit turbines would be visible. **Figure 6.14** indicates that from this location the vertical angle of the viewpoint from the aviation lighting will be between -1 and -2° and light intensity would reduce to between 750 and 80 candela in conditions where visibility is less than 5km. The distance from the Proposed Development would ensure that the proposed lighting would appear fainter than the brightest stars.

6.7.204. Around Wigtown (Viewpoint 10) nighttime lighting within the proximity of this viewpoint (see **Figure 6.24**) is predominantly limited to vehicles passing along the minor road and nearby residential development. Lighting associated with isolated wind turbines further eastwards can be glimpse when looking east. Dark adaption would be affected by car headlights travelling along the road and the need to use personal lighting for pedestrians and cyclists due to the unlit nature of the route. The lighting on the nacelles of the six lit turbines would be visible. **Figure 6.14** indicates that from this location the vertical angle of the viewpoint from the aviation lighting will be between -1 and -2° and light intensity would reduce to between 750 and 80 candela in conditions where visibility is less than 5km. The distance from the Proposed Development would ensure that the proposed lighting would appear fainter than the brightest stars.

6.7.205. From more rural areas in the south of this visual receptor group, including the Mochrum Lochs Regional Scenic Area (Viewpoint 12), existing nighttime lighting is predominantly limited to vehicles passing along the minor roads and isolated residential development. Dark adaption would be affected by car headlights travelling along the road and the need to use personal lighting for pedestrians and cyclists due to the unlit nature of the route. **Figure 6.14** indicates that from this location the vertical angle of the viewpoint from the aviation lighting will be between -1 and -2° and light intensity would reduce to between 750 and 80 candela in conditions where visibility is less than 5km.

6.7.206. As set out above and within **Table 6.11** and the viewpoint descriptions in **Technical Appendix 6.3**, effects would range from Small scale to Negligible across this visual receptor group, varying both with distance and the influence of localised nighttime lighting, the drumlin landform and wooded areas. Small scale effects would occur closer to the site, in locations where the drumlins and large woodlands influence visibility less, across a moderate geographic extent of this Medium-high to Medium-low sensitivity receptor group. These effects would be of Low magnitude, Slight (**Not Significant**) and Adverse.

6.7.207. Negligible scale effects would generally occur further to the south west, in locations where the woodland and landform provide a greater screening effect and lighting attenuation would be greatly influenced by distance. In these areas, nighttime effects would be of Negligible magnitude, Minimal (**Not Significant**) and Neutral.

Roads, residents and recreational landscapes within the moorland landscapes west of the site from the A714 to 20 km from the closest proposed wind turbine

6.7.208. Viewpoints 4 and 14 (**Figures 6.18** and **6.28**) lie within this area. Recreational visitors within the open areas of this visual receptor group are assessed to be of High-medium sensitivity. People within settlements and users of local roads are assessed to be of Medium-low sensitivity.

6.7.209. As described in **Technical Appendix 6.3**, Viewpoint 4 is a largely dark viewpoint, with existing lighting limited to that at the isolated dwellings and distant settlements within the view and vehicles passing along roads in the wider landscape. It would be difficult to access the viewpoint without the need for personal lighting, which would affect dark adaption due to the very close light source. Whilst none of the currently operational wind farms have turbine lighting, many of the consented schemes to the west will introduce distant turbine lighting when operational. The lighting on the nacelles of the six lit turbines would be visible as a relatively minor feature on elevated landform. **Figure 6.14** indicates that from this location the vertical angle of the viewpoint from the aviation lighting would be between 0° and -1° and the light intensity at 2000 to 750 candela in conditions where visibility is less than 5km, and therefore close to full brightness.

6.7.210. From Viewpoint 14 on the Southern Upland Way and other more distant areas to the west, existing lighting is limited to that at isolated dwellings and distant settlements and vehicles passing along roads in the wider landscape. It would be difficult to access much of this area without the need for personal lighting, which would affect dark adaption due to the very close light source. Whilst none of the currently operational wind farms have turbine lighting, many of the consented schemes nearby will introduce turbine lighting when commissioned. This includes Artfield Forest and Kilgallioch Extension, which will be located close to the viewpoint and between the viewpoint and the Proposed Development.

6.7.211. As set out above and within **Table 6.11** and the viewpoint descriptions in **Technical Appendix 6.3**, effects would vary from Small to Negligible scale across this visual receptor group, varying with localised nighttime lighting, distance and the influence of wooded areas. Small scale effects would occur closer to the site, in locations where the moorlands are more open and there is less woodland to influence visibility. Negligible scale effects would generally occur further to the west, further from the site and in locations where the woodland and landform provide a greater screening effect or there are existing nighttime lighting sources. Small scale effects would arise across a small geographic extent of this Medium-high to Medium-low sensitivity receptor group, with Negligible effects also across a much larger geographic extent of the visual receptor group. These effects would be of Low to Negligible magnitude, Slight to Minimal (**Not Significant**) and Adverse to Neutral with distance from the site.

Road and Rail

6.7.212. No rail routes were identified that require detailed assessment.

6.7.213. **A712** (3.3 km, south) – the closest views of the lighting on the Proposed Development from this route would be from the stretch of the road south east of Newton Stewart. These views would be over intervening vegetation and landform. **Figure 6.13** indicates that there would be few locations along the route where all six proposed wind turbine lights would be visible. **Figure 6.14** indicates that from this location the vertical angle of the viewpoint from the aviation lighting would be between -3° to below -4° and the light intensity at below 40 candela in conditions where visibility is less than 5km, and therefore relatively faint. Effects from this stretch of the route would be Small scale.

6.7.214. Beyond these areas of visibility, the road is set down in the landform and would have no visibility of the Proposed Development. Effects from these more distant stretches of the route would be of Negligible scale.

6.7.215. Drivers using this route are of Medium-low sensitivity, given that the route is travelled relatively slowly like a local road but the focus of drivers would be on the road at night. Small scale effects would occur along a relatively short geographic extent of the route. Effects will be of Low-negligible magnitude, Slight significance (**Not Significant**) and Neutral.

6.7.216. **A714** (3.5 km, west) – the closest views of the lighting on the Proposed Development from this route would be from the stretch of the road between Newton Stewart and the Wood of Cree at Castle Stewart. As demonstrated by Viewpoint 26 (**Figure 6.40**), traffic passing along the A714 forms the main existing light source within views, with some lighting from the settlement of Newton Stewart to the south visible and lighting from isolated properties in the landscape. There is no existing turbine lighting within the view. Dark adaption would be affected by car headlights travelling along the road and the need to use personal lighting for pedestrians and cyclists due to the unlit nature of the route. From this stretch of the route, when driving in either direction, views of the Proposed Development would be possible when looking out of the side of the vehicle rather than looking in the direction of travel. Lighting on the nacelles of the six lit turbines would be visible, but **Figure 6.14** indicates that from this stretch of the A714 the vertical angle of the viewpoint from the aviation lighting will be between -3 and below -4° and light intensity would reduce to between 40 candela or less in conditions where visibility is less than 5km, which is similar to the brightest stars. These views would be relatively open, across the valley of the River Cree, but of Medium-small scale due to the reduction in visible light intensity.

6.7.217. Further north of this stretch, views would become interrupted by the Wood of Cree and be more intermittent and occasional, but only when travelling southwards, and consequently of Negligible scale.

6.7.218. South of Newton Stewart, views from the A714 would be broadly towards the Proposed Development when travelling northwards. Roadside vegetation screens views from some stretches, with more open views from further stretches. Viewpoint 3 at **Figure 6.17** and Viewpoint 10 at **Figure 6.24** are broadly representative of views from the more open stretches of this length of the route. The scale of effect would vary from Medium-small to Small scale along this section of the route with distance from the Proposed Development.

6.7.219. The A714 south of Newton Stewart is promoted as part of the 'South West Coastal 300' Scenic Driving Route, but the focus of drivers would be on the road at night and drivers using this stretch of the route are judged to be of Medium-low sensitivity. Drivers using the remainder of this route are also of Medium-low sensitivity. Medium-small scale effects would occur along the stretches of the route in closest proximity to the Proposed Development, with Small to Negligible scale effects along a longer stretch of the road. This would result in effects that are of Medium-low closer to the Proposed Development and Low-to Negligible magnitude further south and north of the Wood of Cree. Effects would be Slight to Minimal (**Not Significant**) and Adverse.

6.7.220. **A75** (4.9 km, south) – the nighttime ZTV study indicates that the lighting on the Proposed Development would be visible along the eastern edge of Wigtown Bay as far north as Palnure Burn (see Viewpoint 8 at **Figure 6.22**) to 15 km from the Proposed Development. Effects along this stretch of the road would be of Small scale, due to the distance from the proposed lighting, alongside the effects on dark adaptation due to car headlights/personal lighting.

6.7.221. Visibility is also indicated south of Newton Stewart, before becoming intermittent across the drumlin landscape as far as Glenluce. Effects along this stretch of the road would be of Medium-small scale south of Newton Stewart, reducing to Negligible by Glenluce.

6.7.222. The A75 along the eastern side of Wigtown Bay and south of Newton Stewart is promoted as part of the 'South West Coastal 300' Scenic Driving Route, but the focus of drivers would be on the road at night and drivers using this stretch of the route are judged to be of Medium-low sensitivity. Drivers using the remainder of this route are also of Medium-low sensitivity. Medium-small scale effects would occur along a relatively short stretch of the route, with Small scale effects along a slightly longer extent. This would result in effects that are of Medium-low to Low magnitude, Slight (**Not Significant**) and Adverse.

6.7.223. **A746** (17.4 km, south) – when travelling north on this route, views would be broadly in the direction of the lighting on the Proposed Development. These views would be intermittent as a result of the landform and vegetation in the vicinity of the route. Given the distance from the Proposed Development, the scale of these effects would be Negligible.

6.7.224. The A746 is promoted as part of the 'South West Coastal 300' Scenic Driving Route, but the focus of drivers would be on the road at night and drivers using this stretch of the route are judged to be of Medium-low sensitivity. Negligible scale effects would occur across the full extent of the route. This would result in effects that are of Negligible magnitude, Minimal (**Not Significant**) and Neutral.

Long Distance Recreational Routes – The Southern Upland Way

6.7.225. **Southern Upland Way** (5 km, north) - the nighttime ZTV shows no potential visibility of lighting on the Proposed Development north or north east of the site. The scale of effect would be greatest to the west of the site where the route passes through Glenvernoch Fell within approximately 7.5 km of the Proposed Development; along this section of route the scale of effects would be Small, as described in further detail for Viewpoint 4 in **Technical Appendix 6.3**, where the full extent of the lighting on the Proposed Development would be visible on the local hills but with rapid attenuation of the lighting intensity as the proposed wind turbine lights would be beyond 5km away.

6.7.226. Beyond 7.5 km, there would be very intermittent visibility of the Proposed Development from open areas away from woodland. The scale of effects would reduce to Small-negligible and Negligible.

6.7.227. Users of the Southern Upland Way with potential visibility of the lighting on the Proposed Development, should they be travelling along the route at night, are assessed to be High-medium sensitivity as they would be outside the Dark Sky Park. Effects on this route within 7.5 km of the Proposed Development would be of Small scale and occur along a small geographic extent of the route. These effects would be of Low magnitude, Slight (**Not Significant**) and Adverse. Beyond 7.5 km, effects would be more intermittent, and Small-negligible and Negligible scale effects would occur across a greater geographical extent of the route; on balance, effects along this section of the route would be of Low-negligible to Negligible magnitude, Slight to Minimal (**Not Significant**) and Adverse.

National, Regional and Local Cycle Routes

6.7.228. **National Cycle Route (NCR) 7** (3.1 km, west) – the nighttime ZTV (**Figure 6.13**) indicates that from almost all of the northern section of the route there would no visibility of the Proposed Development due to intervening landform. From the southern section of the circuit, the nighttime ZTV study indicates visibility in the immediate vicinity of Newton Stewart and between Creetown and Palanure Burn.

6.7.229. Viewpoints 5 and 20 (**Figures 6.19** and **6.34**) are located on the route at some of the closest points to the site. As described in further detail for Viewpoint 5 in **Technical Appendix 6.3**, lighting on the nacelles would be visible on five of the lit turbines, with the remaining screened behind the landform. There would be partial screening of the lit turbines by the woodland when travelling south along the road/NCR7. This is a largely dark area, with lighting limited to that at the isolated dwellings and distant settlements within the view and vehicles passing along roads in the wider landscape. There is no existing turbine lighting within the view. Dark adaption would be affected by car headlights travelling along the road and the need to use personal lighting for pedestrians and cyclists due to the unlit nature of the route. **Figure 6.14** indicates that from this location the vertical angle of the viewpoint from the aviation lighting will be between -1 and -2° and light intensity would reduce to between 750 and 80 candela in conditions where visibility is less than 5km.

6.7.230. Further south on the route, the northern edge of Newton Stewart as represented by Viewpoint 20, is generally well lit by highways lighting, windows of existing dwellings and passing vehicles along Cumloden Road, which are located in the foreground of the viewpoint. Lighting on the nacelles would be visible on all of the lit turbines, with the tops of trees and the structures of pylons filtering views.

6.7.231. As described above and within **Table 6.11**, the scale of effects along this route would range from Small on the northern edge of Newton Stewart (in the vicinity of Viewpoint 20), where there would be relatively open views towards the site when looking east, to Negligible at the furthest extents of the potential visibility shown by the ZTV. The stretch of the route between Newton Stewart and the Wood of Cree would intermittently experience Small scale effects. Further north from this point, visibility would become largely screened by the presence of forestry and the intervening landform, reducing the scale of effects to Negligible for much of the rest of the route. South of Newton Stewart, visibility would again become more intermittent due to the presence of forestry and the intervening landform.

6.7.232. Cyclists along this route are assessed to be of Medium-low sensitivity, as it largely follows along or close to local roads. Small scale effects would be experienced along a stretch of the route in relatively close proximity to the Proposed Development, giving rise to effects of Low magnitude, Slight (**Not Significant**) and Adverse.

6.7.233. **National Cycle Route** (NCR) 73 (4.8 km, south) – visibility of the lighting on the Proposed Development along the route would be intermittent and would cease approximately 22.7 km south west of the Proposed Development, to the north east of the A747.

6.7.234. As described above and within **Table 6.11**, the scale of effects along this route would range from Medium-small, where there would be relatively open views towards the site when looking across the valley of the River Cree, to Negligible at the furthest extents of the potential visibility shown by the ZTV. The stretch of the route between Newton Stewart and the Moss of Cree would experience Medium-small scale effects. Further south from this point, where the forestry at Moss of Cree begins to influence views towards the lighting on the Proposed Development, as demonstrated by Viewpoint 10 the scale of effect would be Small scale. South of Wigtown, visibility across the Machars would become more intermittent due to the presence of forestry and the intervening landform, reducing the scale of effects to Negligible.

6.7.235. Cyclists along this route are assessed to be of Medium-low sensitivity. Medium-small scale effects would be experienced along a short section of the route, giving rise to effects of Medium-low magnitude, Slight (**Not Significant**) and Adverse. Beyond this, effects would reduce to Low and the Negligible magnitude, Slight to Minimal (**Not Significant**) and Neutral.

Specific Viewpoints

6.7.236. As set out in the Section 6.6, specific viewpoints are those chosen because they are key and sometimes promoted viewpoints within the landscape, including for example specific local visitor attractions, viewpoints in areas of particularly noteworthy visual and/or recreational amenity such as landscapes with statutory landscape designations, or viewpoints with particular cultural landscape associations. DGWLCS notes key views towards the host LCTs, which are considered to be specific viewpoints.

6.7.237. **Merrick** (11.3 km, north) – as indicated by the ZTV study, there would be no visibility of the lighting on the Proposed Development from Merrick.

6.7.238. **Cairnsmore of Fleet** (8.6 km, south-east) – the lighting on the Proposed Development would be visible on the foothills to the north of Cairnsmore of Fleet. Recreational visitors to this viewpoint are assessed to be of High-medium sensitivity, as it is located outside the Dark Sky Park. Newton Stewart forms a source of light on the lower ground and other

lighting is limited to distant settlements and isolated dwellings within the view, and vehicles passing along roads in the wider landscape. Whilst none of the currently operational wind farms have turbine lighting, many of the consented schemes to the will introduce distant turbine lighting when commissioned. Visitors would not be able to climb Cairnsmore of Fleet at night without the need for personal lighting, which would affect dark adaption due to the very close light source. At night, lighting on the nacelles of the six lit turbines would be visible. The elevation of the viewpoint means that there would be no reduction in lighting intensity due to the angle at which the lights would be viewed. However, there would be a reduction in intensity due to the distance and the small number of lights would form a relatively minor feature in views.

6.7.239. However, there are likely to be relatively few nighttime visitors, despite the proximity to the Dark Sky Park. Within this visual receptor group, there would be relatively open views of lighting on the Proposed Development from north west facing slopes, outside of areas of forestry, in a similar pattern of visibility to the daytime visibility. Medium-small scale effects would arise across much of this higher ground on the north facing slopes of this High-medium sensitivity viewpoint and would be of Medium-low magnitude, Moderate (**Not Significant**) and Adverse.

Effects on Designated Landscapes and Mapped Interests

Dark Sky Parks

6.7.240. **Galloway Dark Sky Park** (150 m to park boundary and core area, north) – the Galloway Forest Park became one of the first Dark Sky Parks in 2009. Approximately 20 percent of the park has been set aside as a central "core" for preservation of dark skies and wildlife, with a policy of no permanent illumination. The management of the park recognizes the dark skies as a valuable resource and is committed to protecting and preserving them. Forestry Commission Scotland identifies the remoteness and sparse population of the area, combined with a lighting management plan, aims to ensure that Galloway Forest Park's skies will remain pristine.

6.7.241. The nighttime ZTV indicates potential visibility of the lighting on the Proposed Development from isolated high points within the Dark Sky Park. From the wider Dark Sky Park only the highest hills would have potential visibility, with the majority only having potential visibility of up to two proposed turbines. A higher level of visibility is only likely to be experienced from the closest hills to the Proposed Development, at the Lamachan Hill/Curleywee group of hills. From these hills, there would be visibility of all of the proposed turbine lights from the highest points and part of the south facing slopes, with the number of lights reducing lower down the slope and no visibility from north or east facing slopes.

6.7.242. As set out in relation to the visual receptor group covering the Lamachan Hill/Curleywee group of hills, there would be Medium scale effects from the south and west facing slopes of these hills, as well as from the hill tops. This would relate to the area in the immediate vicinity of the site within the Dark Sky Park. As indicated within **Technical Appendix 6.1**, Dark Sky Park's are assessed to be of High sensitivity. Effects would be Medium-low magnitude due to the small area of the Dark Sky Park affected, Moderate (**Not Significant**) and Adverse.

National Scenic Areas (NSA)

6.7.243. There would be no visibility of the lighting of the Proposed Development from Fleet Valley NSA (15.6 km, south-east).

Regional Scenic Areas (RSA)

6.7.244. **Galloway Hills RSA** (includes site) –nighttime visibility of the Proposed Development would vary across the RSA, as shown by the nighttime ZTV studies. Nighttime effects within this RSA have been previously described in relation to the viewpoints that lie within the RSA (Viewpoints 1, 3, 5, 6, 7, 8, 10, 11, 20, 21, 22 and 23 shown on **Figures 6.15, 6.17, 6.20-6.22, 6.24-6.25** and **6.34-6.37**) as described in **Technical Appendix 6.3**. The scale of effects would range from Medium-small scale across the site to Negligible scale across much of the RSA, where the landform would prevent visibility of the lighting on the Proposed Development or distance and angle of view towards the proposed wind turbine lights would minimise lighting intensity.

6.7.245. RSAs are assessed to be of High-medium sensitivity. Medium-small scale effects on this RSA would occur in the immediate vicinity of the Proposed Development within the RSA and would give rise to Medium-low magnitude, Moderate (**Not Significant**) and Adverse effects.

6.7.246. **Mochrum Lochs RSA** (16.4km, south-west) - Visibility of the Proposed Development would vary across the RSA, as shown by the nighttime ZTV study, as a result of forestry and landform.

6.7.247. Due to the distance from the Proposed Development and the intermittent level of visibility, the scale of nighttime effects across this RSA would be Negligible.

6.7.248. RSAs are assessed to be of High-medium sensitivity. Negligible scale effects on this RSA would give rise to Negligible magnitude, Minimal (**Not Significant**) and Neutral effects.

6.7.249. **Machars Coast RSA** (20.8 km, south) –visibility of the Proposed Development would vary across the RSA, as shown by the nighttime ZTV study, predominantly due to the landform and the relationship of the RSA with the coast.

6.7.250. Due to the distance from the Proposed Development and the intermittent level of visibility, the scale of nighttime effects across this RSA would be Negligible.

6.7.251. RSAs are assessed to be of High-medium sensitivity. Negligible scale effects on this RSA would give rise to Negligible magnitude, Minimal (**Not Significant**) and Neutral effects.

Local Landscape Areas (LLA)

6.7.252. **High Carrick Hills** (12.8 km, north) - visibility of the Proposed Development would be limited to one or two the higher peaks such as Shalloch on Minnoch, Shalloch and Eldrick Hill, as shown by the nighttime ZTV study, predominantly due to the landform.

6.7.253. Due to the distance from the Proposed Development and the intermittent level of visibility, the scale of nighttime effects across this LLA would be Negligible.

6.7.254. LLAs are assessed to be of High-medium sensitivity. Negligible scale effects on this LLA would give rise to Negligible magnitude, Minimal (**Not Significant**) and Neutral effects.

Wild Land Area

6.7.255. **Merrick WLA** (4.7 km, north east) – a full Wild Land Area Assessment is provided at **Technical Appendix 6.4.** The daytime assessment concludes that effects would be of Negligible magnitude on the attributes and qualities of Merrick WLA, these effects are assessed to be Neutral (neither Adverse nor Beneficial). The nighttime ZTV (**Figure 6.13**) indicates that there would only be very isolated locations within the WLA with any visibility of the lighting on the Proposed Development, with a maximum of two lights being visible at a distance of over 16 km from the closest proposed turbine. Consequently, nighttime effects on the attributes and qualities of Merrick WLA would remain of Negligible magnitude at night, Minimal (**Not Significant**) and Neutral.

6.8. Mitigation

6.8.1. Mitigation measures relevant to potential landscape and visual effects are embedded within the design of the Proposed Development. Landscape and visual impacts have been considered at each stage of the design process to create a layout that minimises effects.

6.8.2. Further detail of the design evolution can be found within **Chapter 3: Design Evolution and Alternatives**.

6.9. Assessment of Residual Effects

6.9.1. Embedded (primary) mitigation has been considered in the assessment of effects above. As there are no secondary or tertiary mitigation measures relevant to this assessment, residual effects will be the same as those identified above.

6.10. Assessment of Cumulative Effects

6.10.1. Cumulative effects are assessed on the same groups of landscape and visual receptors as the assessment for the main scheme. Landscape and visual receptors that are considered to receive effects of Low-Negligible or Negligible magnitude (both localised and overall) from the Proposed Development are not included in this assessment, as an effect of such low magnitude manifestly adds nothing or very little regardless of the effects of other developments. If significant cumulative effects arise on those receptors, they would be as a result of other developments and as such are not relevant for consideration as part of this application.

6.10.2. As indicated in the methodology section, the study area and scope for potential cumulative effects of the Development includes proposed wind turbine developments located within the same 45 km as the main LVIA. The scope for potential cumulative effects of the Proposed Development could arise from the wind farms identified in **Table 6.12**.

Table 6.12: Cumulative Sites

Wind farm	Distance, Direction	Number of turbines	Maximum tip height (m)	Status	Lighting required?
Glenvernoch	5.4 km west	13	200	Application	Yes
Airies	14.2 km west	14	137	Operational	No
Kilgallioch	15.4 km west	96	146.5	Operational	No
Kilgallioch Extension	16.7 km west	9	180	Consented	Yes
Artfield Forest	17.0 km west	12	180	Consented	Yes
Torrs Hill	17.9 m north east	2	100	Consented	No
Artfield Fell	18.6 km west	15	74	Operational	No
Glenchamber	19.3 km west	11	126.5	Operational	No
Balmurrie Fell (Artfield Fell Extension)	19.7 km west	7	80	Operational	No
Mark Hill	19.8 km north	28	110	Operational	No

Wind farm	Distance, Direction	Number of turbines	Maximum tip height (m)	Status	Lighting required?
	west				
Carscreugh	20.4 km south west	18	70	Operational	No
Chirmorie	21.7 km west	21	149.9	Consented	No
Arecleoch Extension	22.5 km west	13	200	Consented	Yes
Knockodhar	22.1 km north west	16	2 @ 149.9, 10 @ 180, 4 @ 200	Application	Yes
Garvilland	22.1 km south west	5	149.5	Application	No
Barlockhart Moor Extension	22.5 km south west	4	115	Consented	No
Barlockhart Moor	23.3 km south west	4	115	Operational	No
Carrick	23.6 km north	13	200	Application	Yes
Arecleoch	23.9 km west	60	118	Operational	No
Stranoch 2	24.3 km north east	20	2 @ 140, 2 @ 142.5, 7 @ 149.9, 9 @ 175	Consented – under construction	Yes
Quantans Hill	25.2 km north west	14	200	Application	Yes
Knockcronal	25.3 km north	9	3 @ 180, 6 @ 200	Application	Yes
Knockman Hill	26.1 km north east	5	81	Consented	No
Craiginmoddie	26.3 km north west	14	200	Application	Yes
Shepherd's Rig	26.7 km north east	17	2 @ 125, 15 @ 149.9	Consented	No
Hadyard Hill	26.7 km north west	51	100/110	Operational	No
Glenshimmeroch Variation	27.0 km north east	10	4 @ 180, 6 @ 200	Consented	Yes
Divot Hill	27.6 km north west	9	200	Consented	Yes
Blackcraig	27.7 km north east	23	110	Operational	No
Maclachrieston Farm	27.7 km north west	1	54	Operational	No
Benbrack	28.4 km north	15	1 @ 132,	Consented –	No

Wind farm	Distance, Direction	Number of turbines	Maximum tip height (m)	Status	Lighting required?
	east		1 @ 135, 16 @ 149.9	under construction	
Troston Loch	28.5 km north east	14	149.9	Consented	No
Margree	28.5 km north east	9	200	Consented	Yes
Dersalloch	29.1 km north	23	7 @ 115, 16 @ 125	Operational	No
Assel Valley	29.1 km north west	10	110	Operational	No
Windy Standard III	29.4 km north east	20	8 @ 125, 12 @ 177.5	Consented	Yes
South Kyle	30.3 km north east	50	149.5	Operational	No
Mid Moile	30.7 km west	15	8@200, 7@230	Application	Yes
Tralorg	30.6 km north west	8	100	Operational	No
Windy Standard II	31.4 km north east	30	12 @ 100, 9 @ 115, 9 @ 120	Operational	No
Windy Rig	31.5 km north east	12	125	Operational	No
Cornharrow Variation	31.6 km north east	7	200	Consented	Yes
Manquhill	31.6 km north east	8	200	Consented	Yes
Fell Variation	31.7 km north east	9	2 @ 180, 7 @ 200	Consented	Yes
Glen App	32.5 km west	11	126.5	Operational	No
Sclenteuch	32.5 km north	9	4 @ 180, 5 @ 200	Application	Yes
Windy Standard I	32.7 km north east	36	53.65	Operational	No
Wether Hill	32.7 km north east	14	91	Operational	No
Windy Standard I Repowering	33.0 km north east	8	200	Application	Yes
Lorg Revision	34.2 km north east	15	200	Application	Yes
Kirk Hill	34.4 km north west	8	115.5	Operational	No

Wind farm	Distance, Direction	Number of turbines	Maximum tip height (m)	Status	Lighting required?
Afton	34.8 km north east	25	5 @ 100, 20 @ 120	Operational	No
Enoch Hill Variation	34.9 km north east	16	149.9	Consented – under construction	No
Pencloe Variation	35.4 km north east	19	149.9	Consented	No
Knockkippen	35.5 km north	12	4 @ 150, 8 @ 180	Application	Yes
North Kyle	35.7 km north east	49	149.9	Consented – under construction	No
Euchanhead	36.7 km north east	21	230	Application	Yes
Sanquhar II	37.1 km north east	44	2 @ 149, 42 @ 200	Consented	Yes
Over Hill Variation	38.5 km north east	10	180	Consented	Yes
North Rhins	41.0 km south west	11	100	Operational	No
Hare Hill Extension	41.2 km north east	35	2 @ 70, 9 @ 75, 2@ 81, 5 @ 86, 17 @ 91	Operational	No
Hare Hill	41.7 km north east	20	64	Operational	No
Whiteside Hill	41.7 km north east	10	121.2	Operational	No
Sanquhar	42.5 km north east	9	130	Operational	No
Sandy Knowe	44.2 km north east	24	125	Operational	No

6.10.3. The locations and numbers of turbines within these developments are illustrated on **Figure 6.8** and the baseline panorama visualisations for each viewpoint.

Assessment Scenarios and Approach

6.10.4. As set out within the methodology, operational and consented wind farms are included as part of the baseline for the assessment and are considered within the main assessment of effects above. Potential cumulative effects with other applications in planning are considered below.

6.10.5. Applications in planning that are relevant to consider within this assessment are:

- Glenvernoch – a proposal for 13no. 200 m high turbines located approximately 5.2 km west of the Proposed Development;

- Knockodhar - a proposal for 16no. 149.9, 180 and 200 m high turbines located approximately 22.0 km west of the Proposed Development;
- Carrick - a proposal for 13no. 200 m high turbines located approximately 23.3 km north west of the Proposed Development;
- Knockcronal - a proposal for 9no. 180 and 200 m high turbines located approximately 25.3 km north west of the Proposed Development; and
- Craiginmoddie - a proposal for 14no. 200 m high turbines located approximately 26.3 km north of the Proposed Development.

6.10.6. Whilst there are other proposed wind farms that are currently in planning within the study area, as shown on **Figure 6.8**, these are all located amongst existing and consented wind farms and would continue the existing pattern of wind farm development. Effects of these proposals in combination with the Proposed Development are not therefore considered in detail.

6.10.7. **Figure 6.9** illustrates the theoretical visibility of operational and consented schemes, with the theoretical visibility of the Proposed Development shown in blue, theoretical visibility of the operational schemes shown in purple and theoretical visibility of the consented schemes shown in yellow. Locations with theoretical visibility of the Proposed Development with other operational schemes are shown in a combined lilac colour or with consented schemes in a light green colour. Locations where the operational and consented wind farms would be seen together are shown in a light orange colour and locations where the Proposed Development would be seen with other operational and consented schemes in a blue/green colour. This demonstrates the scenario considered in Section 6.7, with the existing and consented wind farms forming part of the assessment baseline. It demonstrates the extensive visibility of existing and consented wind farms throughout the study area, and the limited areas where the Proposed Development would introduce new visibility of wind turbines where there are currently no wind farms visible, predominantly in a corridor south west to west of the site, through some of the open moorland areas and the drumlin landscape, where landform can influence visibility to the west and north west.

6.10.8. **Figure 6.10** illustrates the theoretical visibility of all schemes in planning, including those schemes that would infill the existing pattern of wind farm developments and broadly continue the pattern of visibility of wind farm developments within the study area. The theoretical visibility of the Proposed Development is shown in blue, theoretical visibility of the schemes in planning shown in yellow and locations with theoretical visibility of the Proposed Development with schemes in planning shown in a combined blue/green colour. This figure demonstrates that the pattern of visibility for the schemes in planning would be almost the same as the existing pattern of visibility shown on **Figure 6.9**.

6.10.9. **Figure 6.10** illustrates the theoretical visibility of those schemes in planning that would introduce wind turbine development into an existing gap in the spread of wind farm development within the study area, potentially resulting in new areas of visibility and new cumulative effects with the Proposed Development. Some of these have been grouped into clusters that are likely to result in similar landscape and visual effects due to similarities in their distance and orientation from the site. The groupings are:

- Glenvernoch;
- Knockodhar; and
- Carrick, Knockcronal and Craiginmoddie, which are located at a similar distance and direction from the Proposed Development and would result in a new cluster of wind farms if all were constructed.

6.10.10. **Figure 6.10** illustrates that to the north of the Proposed Development, the pattern of potential visibility would generally result from a combination of the Knockodhar, Carrick, Knockcronal and Craiginmoddie proposals, with limited visibility of the Proposed Development and some visibility of Glenvernoch.

6.10.11. To the east, the fragmented potential visibility of the Proposed Development would largely be unaffected by visibility of any of the schemes forming the basis of the cumulative assessment.

6.10.12. To the south and west, there would be theoretical visibility of the Proposed Development and Glenvernoch from fragmented locations, as well as visibility of the Proposed Development with all of the schemes forming the basis of the cumulative assessment from other fragmented locations.

Cumulative Effects on Landscape Character

6.10.13. All of the landscape character types assessed in the assessment of potential effects are judged to receive Low magnitude or greater effects (locally or overall) as a result of the proposed wind farm, and are therefore assessed for cumulative effects. LCTs are shown on **Figure 6.3**.

6.10.14. **LCT172 Upland Fringe - Dumfries and Galloway** (includes site) – Viewpoint 1 (**Figure 6.15**) lies within this character type. The LCT is judged to be of High-medium sensitivity.

6.10.15. As indicated by **Figure 6.11**, within the north-west of this LCT there would be potential visibility of the proposed wind farms at Glenvernoch and Knockodhar, along with views of the Proposed Development. Throughout the rest of the LCT, the Proposed Development would remain the most prominent visibility, with isolated areas having views of Glenvernoch.

6.10.16. Knockodhar would form a relatively minor element of views from within this LCT. Should it be consented, the cumulative effects with the Proposed Development would be no greater than those experienced as a result of the Proposed Development alone. Glenvernoch would form a new prominent wind farm in views north west from this LCT, in areas where the effect of the Proposed Development would reduce to Medium scale. As a result, it is assessed that within the north west of the LCT, in those locations where combined visibility of the Proposed Development and Glenvernoch are likely to be possible, the scale of effect would increase to Large-medium. Cumulative effects of Large to Large-medium scale within the LCT would extend beyond the immediate context of the Proposed Development within this LCT if the Proposed Development and Glenvernoch were constructed. These effects would be of High Magnitude, and remain Major-Moderate significance (**Significant**) and Adverse.

6.10.17. **LCT 181 - Rugged Uplands with Forest - Dumfries & Galloway** (includes site) – this LCT is judged to be of High to High-medium sensitivity.

6.10.18. **Figure 6.11** indicates that for much of the area where the Proposed Development would be visible in this LCT, Glenvernoch would also be visible. There would also be limited visibility of Knockodhar from within the LCT. Whilst there would be visibility of these two cumulative sites within the LCT, the Proposed Development would remain within the LCT and have the more direct impacts on landscape character. Effects would remain as for the Proposed Development on its own; High Magnitude, Major (**Significant**) and Adverse.

6.10.19. **LCT 180 - Rugged Uplands - Dumfries & Galloway** (Includes part of site) - Viewpoints 7, 21 and 22 (**Figures 6.21, 6.35** and **6.36**) lie within this character type. The LCT is judged to be of High sensitivity.

6.10.20. **Figure 6.11** indicates that in the far north of the LCT there would be areas where the Carrick, Knockcronal and Craiginmoddie group would be visible and areas where Knockodhar would be visible, as well as small areas where all of these proposed wind

farms would be visible together. In the majority of these locations, the Proposed Development would not be visible. More centrally to the LCT, south of Merrick, there would be an area where Glenvernoch would be visible with no other proposed wind farms. In the south of the LCT, the Proposed Development would remain the more prominent development, with intermittent visibility of Glenvernoch. On the north side of Lamachan Hill and Larg there would also be potential visibility of the Carrick, Knockcronal and Craiginmoddie group, with intermittent visibility of Knockodhar and/or Glenvernoch in areas where there would be no visibility of the Proposed Development.

6.10.21. In the majority of areas of additional visibility indicated on **Figure 6.11**, there is existing visibility of operational wind farms and the schemes in planning would be sufficiently distance from the LCT to avoid an additional cumulative effect on the character of the LCT. For those areas further south that are beyond the visibility of the Proposed Development, Carrick, Knockcronal and Craiginmoddie, Knockodhar would again be sufficiently distance from the LCT to have limited additional cumulative effect. For the remaining areas of the LCT, effects would remain as for the Proposed Development on its own; High-medium to Medium Magnitude, Major (**Significant**) and Adverse.

6.10.22. **LCT 176 - Foothills with Forest - Dumfries & Galloway** (Includes site access track) - this LCT is judged to be of High-medium to Medium sensitivity.

6.10.23. **Figure 6.11** indicates that within this LCT, there would be very intermittent visibility of Glenvernoch, and an area in the south of the LCT, from the high point at Blairs Hill that would also have visibility of Knockodhar. From all of these areas, the Proposed Development would remain the closest wind farm development. Effects would remain as for the Proposed Development on its own; Medium-low to Low Magnitude, Moderate to Moderate-slight (**Not Significant**) and Adverse.

6.10.24. **LCT 174 - Plateau Moorland with Forest - Dumfries & Galloway** (1.5 km, west) – Viewpoints 4, 5 and 25 (**Figures 6.18, 6.19** and **6.39**) lie within this character type. The LCT is judged to be of Medium sensitivity, increasing to High in the east of the LCT.

6.10.25. Glenvernoch would be located within LCT174. As shown on **Figure 6.11**, there would be locations throughout the LCT where there would be combined visibility of the Proposed Development with Glenvernoch. Within the west of the LCT and small areas to the north west of Glenvernoch there would also be visibility of Carrick, Knockcronal and Craiginmoddie, and Knockodhar, in varying combinations. The presence of Glenvernoch would become the prominent influence on the character of the LCT. Effects would become Large scale in the immediate vicinity of Glenvernoch, covering much of Glenvernoch Fell. These effects are assessed to be of High Magnitude, Major-moderate (significant) and Adverse.

6.10.26. **LCT 160 - Narrow Wooded River Valley – Dumfries & Galloway** (1.6 km, south) – Viewpoints 20 and 26 (**Figures 6.34** and **6.40**) lie within this character type. The LCT is judged to be Medium sensitivity with a small area of High-medium.

6.10.27. **Figure 6.11** indicates that within the valley of Penkiln Burn, there would be no cumulative visibility of wind farms. Only the Proposed Development would be visible from this area. Within the valley of the River Cree, there would be more varied visibility of Glenvernoch and Knockodhar. Glenvernoch would be located approximately 620m to the west of this part of the LCT and would become prominent in views from within the valley, meaning that the other potential cumulative schemes would have a limited influence on LCT160. This would result in Large scale effects in the immediate vicinity of Glenvernoch and the Proposed Development. These effects are assessed to be of High magnitude, Major (significant) and Adverse.

6.10.28. **LCT 168 - Drumlin Pasture in Moss and Moor Lowland** (3.3km, south-west) – Viewpoints 2 and 9 (**Figures 6.16** and **6.23**) lie within this character type. Sensitivity is judged to be Medium-low, increasing to Medium along the eastern boundary of the LCT.

6.10.29. The undulating landform results in a pattern of intermittent visibility of predominantly the Proposed Development and Glenvernoch across LCT168, as shown on **Figure 6.11**. In the east of the LCT and along the north west boundary there would also be potential visibility of Carrick, Knockcronal and Craiginmoddie, and Knockodhar, in varying combinations. However, these additional cumulative schemes would be located further north than Glenvernoch. The combined effect of the Proposed Development with Glenvernoch would result in Small scale effects continuing to occur in the vicinity of the two proposed developments within LCT168. These effects would continue to be of Low Magnitude, Slight (**Not Significant)** and Adverse.

6.10.30. **LCT 158 - Coastal Flats - Dumfries & Galloway** (4.4 km, south) – Viewpoints 3, 8 and 10 (**Figures 6.17, 6.22** and **6.24**) lie within this character type. The LCT is judged to be of High to Medium sensitivity.

6.10.31. **Figure 6.11** indicates that from the majority of the LCT there would be combined visibility of the Proposed Development with Glenvernoch. Through the centre of the LCT, along the valley of the River Cree, there would also be visibility of Knockodhar, at a greater distance from the LCT than the Proposed Development and Glenvernoch. The combined effect of the Proposed Development with Glenvernoch would result in Small scale effects continuing to occur in the north of LCT158. These effects would continue to be of Low Magnitude, Moderate to Slight (**Not Significant**) and Adverse.

6.10.32. **LCT 160 - Narrow Wooded River Valley - Dumfries & Galloway** (4.5 km, south-east) – The LCT is judged to be of Medium sensitivity.

6.10.33. **Figure 6.11** indicates that from the valley of Palnure Burn there would be no visibility of the proposed cumulative developments. Effects would remain as for the Proposed Development on its own; Low Magnitude, Slight (**Not Significant**) and Adverse.

6.10.34. **LCT 179 - Coastal Uplands** (6.7 km, east) – Viewpoint 6 (**Figure 6.20**) is located within this LCT. The LCT is judged to be of High-medium sensitivity.

6.10.35. **Figure 6.11** indicates that from almost all areas of LCT179 with visibility of the Proposed Development there would also be visibility of Glenvernoch. From small areas of the LCT, predominantly on the west facing slopes of Cairnsmore of Fleet, there would also be visibility of Knockodhar. However, Knockodhar would be more distant than the Proposed Development and Glenvernoch, and located behind the Proposed Development. The combined effect of the Proposed Development and Glenvernoch would continue to be Small scale across a small proportion of the LCT. These effects are assessed to remain of Low Magnitude, Moderate to Slight (**Not Significant**) and Adverse.

6.10.36. **LCT 181 - Rugged Uplands with Forest - Dumfries & Galloway** (7.8 km, east) – Viewpoint 11 (**Figure 6.25**) is located within this LCT. Sensitivity is judged to be High-medium to Medium.

6.10.37. **Figure 6.11** indicates that from almost all locations within LCT181 there would be no visibility of the proposed cumulative developments. Effects would remain as for the Proposed Development on its own; Low Magnitude, Slight (**Not Significant**) and Adverse.

6.10.38. **LCT 172 - Upland Fringe - Dumfries & Galloway** (8.7 km, south-east) – The LCT is judged to be of High-medium to Medium sensitivity.

6.10.39. **Figure 6.11** indicates that from most areas of LCT172 with visibility of the Proposed Development there would also be visibility of Glenvernoch. From small areas of the LCT, predominantly high points and west facing slopes, there would also be visibility of Knockodhar. However, Knockodhar would be more distant than the Proposed

Development and Glenvernoch. The combined effect of the Proposed Development and Glenvernoch would continue to be Medium-small to Small scale across a small proportion of the LCT. Effects would remain Medium-Low to Low magnitude, Moderate (**Not Significant**) and Neutral.

6.10.40. **LCT 180 - Rugged Uplands - Dumfries & Galloway** (9.4km, north-east) - Viewpoint 23 (**Figure 6.37**) is located within this LCT. Sensitivity is judged to be High-medium.

6.10.41. **Figure 6.11** indicates that in the far north of the LCT there would be areas where the Carrick, Knockcronal and Craiginmoddie group would be visible, as well as small areas at the centre of the western boundary where all of the proposed wind farms would be visible. In the north of the LCT, the Proposed Development would not be visible. In the majority of areas of additional visibility indicated on Figure 6.11, there is existing visibility of operational wind farms and the schemes in planning would be sufficiently distance from the LCT to avoid an additional cumulative effect on the character of the LCT. Effects would remain as for the Proposed Development on its own; High-medium to Medium Magnitude, Major (significant) and Adverse.

6.10.42. **LCT 175 - Foothills - Dumfries & Galloway** (13.2 km, south-east) – The LCT is judged to be of High-medium sensitivity.

6.10.43. **Figure 6.11** indicates that from almost all areas of LCT175 with visibility of the Proposed Development there would also be visibility of Glenvernoch and Knockodhar. Knockodhar would be more distant than the Proposed Development and Glenvernoch. The combined effect of the Proposed Development and Glenvernoch would continue to be Small scale closer to the two proposed developments within this LCT. These effects are assessed to remain of Low Magnitude, Slight (**Not Significant**) and Adverse.

6.10.44. **LCT 169 - Drumlin Pastures** (10.0 km, south) – The LCT is judged to be of Medium-low sensitivity.

6.10.45. The undulating landform results in a pattern of intermittent visibility of the Proposed Development and all of the potential cumulative schemes across LCT169, as shown on **Figure 6.11**. The Proposed Development would remain visible across a greater extent of the LCT than the potential cumulative schemes. However, these additional cumulative schemes would be located further north than the Proposed Development and Glenvernoch. The combined effect of the Proposed Development with Glenvernoch would result in Small scale effects continuing to occur closer to the two proposed developments within this LCT. These effects would continue to be of Low Magnitude, Slight (**Not Significant**) and Adverse.

Cumulative Visual Effects

6.10.46. The assessment considers two types of cumulative visual effect, namely effects arising from combined and sequential views. This is in accordance with the NatureScot Guidance 'Assessing the Cumulative Impact of Onshore Wind Energy Developments' (March 2021). These comprise:

- Combined views which 'occur where the observer is able to see two or more developments from one viewpoint. Combined visibility may either be in combination (where several wind farms are within the observer's arc of vision at the same time) or in succession (where the observer has to turn to see the various wind farms)'; and
- Sequential views which 'occur when the observer has to move to another viewpoint to see different developments.'

6.10.47. This section assesses the anticipated cumulative visual effects arising from the proposal in combination with the existing and approved wind developments, and the proposed wind developments. The main linear routes that share combined intervisibility in the study area are then summarised to anticipate the likely sequential views.

Visual Aids

6.10.48. The baseline panoramas and wirelines shown on **Figures 6.15-6.40** supporting this LVIA include cumulative schemes. A detailed description of the methods by which the wirelines and photomontages are prepared is included in **Technical Appendix 6.1**. The visualisations are numbered according to the viewpoint that they show (e.g. VP_01 for Viewpoint 1), with a suffix indicating the type of visualisation (BP – baseline panorama and wireline (including cumulative schemes), WL – wireline, PM – photomontage, NP – night photomontage.

6.10.49. The viewpoint description, description of effects and scale of effect for each viewpoint, including cumulatively (refer to **Figures 6.6** and **6.7** for locations) is set out within **Technical Appendix 6.3**.

6.10.50. Each of the viewpoints is a 'sample' of the potential effects, representing a wide range of receptors – including not only those actually at the viewpoint, but also those nearby, at a similar distance and/or direction.

6.10.51. From these viewpoints the Proposed Development would generally be seen as a separate wind farm from other existing and proposed wind farm developments, with an existing backdrop of existing, distant wind farms at a distance.

Visual Receptor Groups

6.10.52. All of the identified visual receptor groups are judged to receive Low magnitude or greater effects (locally or overall) as a result of the Proposed Development, and are therefore assessed for cumulative effects.

Moor of Barclye between the Lamachan Hill/Curleywee group of hills, Penkiln Burn and the River Cree (up to 300 m north, 150 m east, 3.5km south and 4 km west)

6.10.53. Viewpoint 1 (**Figure 6.15**) lies within this visual receptor group. These local residents and recreational visitors are assessed to be of High-medium sensitivity.

6.10.54. As set out in the viewpoint description for Viewpoint 1 in **Technical Appendix 6.3**, in the west of this visual receptor group there would be visibility of Glenvernoch, which would form a new feature within the mid-ground in views to the north-west, in front of the more distant operational and consented wind farms to the west and north west. Cumulative effects would arise in combination with Glenvernoch Wind Farm, which would be visible as a separate scheme in a different area of views to the Proposed Development. However, given the location of the Proposed Development within the visual receptor group, effects would remain unchanged from the assessment of the Proposed Development alone and would remain of High magnitude, Major (**Significant**) and Adverse.

Lamachan Hill/Curleywee group of hills (up to 1.5 km north west, 3.5 km north east and 5.5 km east)

6.10.55. Viewpoints 21 and 22 (**Figure 6.35** and **6.36**) lie within this visual receptor group. These recreational visitors are assessed to be of High-medium sensitivity.

6.10.56. As set out in the viewpoint descriptions for Viewpoints 21 and 22 in **Technical Appendix 6.3**, Glenvernoch would be largely screened from view within this visual receptor group, with only partial visibility of Glenvernoch from some of the west facing slopes. There would be a minor addition to some views as a result of Glenvernoch Wind Farm behind the Proposed Development. However, given the location of the Proposed Development closer to the visual receptor group, effects would remain unchanged from the assessment of the Proposed Development alone; High-medium magnitude, Major-moderate (**Significant**) and Adverse.

River Cree and Penkiln Burn valleys, including Newton Stewart and the road corridors of the A75 and A714 (up to 4.8 km south, 5.5 km south west and 4 km west)

6.10.57. Viewpoints 2, 20 and 26 (**Figures 6.16, 6.34** and **6.40**) lie within this visual receptor group. These local residents and recreational visitors are assessed to be of High-Medium sensitivity. Users of local roads, none of which are identified as scenic routes, are assessed to be of Medium sensitivity.

6.10.58. As set out in the viewpoint descriptions for Viewpoints 2, 20 and 26 in **Technical Appendix 6.3**, for large areas of this visual receptor group there would be no visibility of the potential cumulative schemes. From the north western area of the visual receptor group, along the River Cree valley, there would be some visibility of Glenvernoch, often with partial screening provided by intervening vegetation. Generally, from within the Cree valley area of this visual receptor group, the Proposed Development would remain more prominent in views. On balance, effects would remain unchanged from the assessment of the Proposed Development alone; High-medium to Medium magnitude, Major-moderate (**Significant**) and Adverse.

Merrick and the Rhinns of Kells (up to 11.3 km to the north and 16.5km north east)

6.10.59. Viewpoints 5, 7 and 23 (**Figures 6.19, 6.21** and **6.37**) lie within this visual receptor group. These recreational visitors are assessed to be of High-Medium sensitivity.

6.10.60. The assessment of visual effects for recreational visitors to the Merrick area of the visual receptor group as a result of the Proposed Development found that effects would be Low-negligible magnitude, Slight (**Not Significant**) and Adverse. Consequently, where there is potential for visibility of any proposed cumulative scheme, if significant cumulative visual effects arise, they would be as a result of other developments and as such are not relevant for consideration as part of this application.

6.10.61. From the Rhinns of Kells, visibility of Glenvernoch would be limited, and views towards the other proposed cumulative schemes would either be from areas with no visibility of the Proposed Development or more distant than the Proposed Development. It is judged that effects would remain unchanged from the assessment of the Proposed Development alone; Medium-low magnitude, Moderate (**Not Significant)** and Adverse.

Cairnsmore of Fleet and highpoints east of the site (up to 9.5 km east and 8.8 km south east)

6.10.62. Viewpoint 6 (**Figure 6.20**) lies within this visual receptor group. These recreational visitors are assessed to be of High-medium sensitivity.

6.10.63. As shown by **Figure 6.11**, from the majority of this visual receptor group, Glenvernoch would be visible wherever the Proposed Development would be visible. In addition, Knockodhar would be visible at a distance from a small part of this visual receptor group. In combination cumulative effects would arise with Glenvernoch. However, Glenvernoch would be more distant than the Proposed Development and would not add notably to the visual effects of the Proposed Development. It is judged that effects would remain unchanged from the assessment of the Proposed Development alone; Medium-low magnitude, Moderate (**Not Significant**) and Adverse.

River Cree Valley and Wigtown Bay from the A75 to 20 km from the closest proposed wind turbine, including residents of Creetown

6.10.64. Viewpoints 3, 8 and 10 (**Figures 6.17, 6.22** and **6.24**) lie within this area. These local residents and recreational visitors are assessed to be of High-Medium sensitivity. Users of local roads, none of which are identified as scenic routes, are assessed to be of Medium sensitivity.

6.10.65. As set out in the viewpoint descriptions for Viewpoints 3, 8 and 10 in **Technical Appendix 6.3**, potential cumulative visibility would vary across the visual receptor group. For much

of the area, there would be some visibility of Glenvernoch, which would be seen as a separate wind farm to the Proposed Development and slightly more distant. Other wind farms in planning would be much more distant than the Proposed Development or Glenvernoch. In combination visual effects as a result of the Proposed Development and Glenvernoch would increase the extent of Medium scale effects. These effects would be of Medium magnitude, Moderate (**Not Significant**) and Adverse.

Roads, residents and recreational landscapes within the drumlin landscapes south west of the site between the A75 and the A714 to 20 km from the closest proposed wind turbine, including residents of Wigtown and Kirkcowan

6.10.66. Viewpoints 9, 10 and 12 (**Figures 6.23**, **6.24** and **6.26**) lie within this area. These local residents and recreational visitors are assessed to be of High-Medium sensitivity. Users of local roads, none of which are identified as scenic routes, are assessed to be of Medium sensitivity.

6.10.67. As shown on **Figure 6.11**, the undulating landform results in a pattern of intermittent visibility of the Proposed Development and all of the potential cumulative schemes. From most locations, Glenvernoch would only be partially visible due to landform and vegetation, would not be seen in the same area of the view as the Proposed Development and the presence of the blades would have little additional effect on views. On balance, effects would remain as assessed for the Proposed Development on its own; Medium-low to Low-negligible magnitude, Moderate to Slight (**Not Significant**) and Adverse.

Roads, residents and recreational landscapes within the moorland landscapes west of the site from the A714 to 20 km from the closest proposed wind turbine

6.10.68. Viewpoints 4 and 14 (**Figures 6.18** and **6.28**) lie within this area. These local residents and recreational visitors are assessed to be of High-Medium sensitivity. Users of local roads, none of which are identified as scenic routes, are assessed to be of Medium sensitivity.

6.10.69. As set out in the viewpoint descriptions for Viewpoints 4 and 14 in Technical Appendix 6.3, in combination cumulative effects would arise between the Proposed Development and Glenvernoch, because Glenvernoch is located towards the east of the visual receptor group, closer to visual receptors than the Proposed Development. In combination effects would increase to Large scale and Adverse in the east of the visual receptor group. These cumulative effects would be of High magnitude, Major-moderate (**Significant**) and Adverse.

Road and Rail

6.10.70. No rail routes were identified that require detailed assessment.

6.10.71. **A712** (3.3 km, south) – users of this route are assessed to be of Medium sensitivity. **Figure 6.11** indicates that none of the potential cumulative schemes would be visible from this route. Consequently, effects remain as assessed for the Proposed Development alone.

6.10.72. **A714** (3.5 km, west) – users of this route are assessed to be of Medium sensitivity. From the stretch of the road between Newton Stewart and the Wood of Cree at Castle Stewart **Figure 6.11** indicates that when driving northwards, views of Glenvernoch would be possible from much of the stretch, at relatively close proximity and on the opposite side of the road to the Proposed Development. Very distant visibility of Knockodhar would also be possible on occasions, but would have limited visual influence. when looking out of the side of the vehicle rather than looking in the direction of travel. However, Glenvernoch would be at a similar distance from the road to the Proposed Development and with some vegetation between the road and Glenvernoch to provide some filtering of

views. Effects for road users on this stretch of the route would remain of Large-medium scale.

6.10.73. South of Newton Stewart, views from the A714 would remain broadly towards the Proposed Development when travelling northwards, with occasional visibility of Glenvernoch and less frequently of Knockodhar in the distance. The scale of effect for road users on this stretch of the A714 would remain Medium to Small scale.

6.10.74. Combined cumulative effects for road users on the A714 would remain effects that are of Medium to Medium-low magnitude, Moderate (**Not Significant**) and Adverse.

6.10.75. **A75** (4.9 km, south) – users of this route are assessed to be of Medium sensitivity. **Figure 6.11** indicates that from the stretch of the A75 along the eastern edge of Wigtown Bay as far north as Palnure Burn, there would be visibility of both the Proposed Development and Glenvernoch, with Knockodhar visible in the distance from around two thirds of this stretch. Glenvernoch would appear slightly more distant than the Proposed Development, but located on the flatter landscape to the west of the site and therefore visual effects for road users along this stretch of the road would increase to Medium scale.

6.10.76. Visibility from the stretch of the A75 south of Newton Stewart would predominantly remain of the Proposed Development, with blades of Glenvernoch visible along some stretches. Across the drumlin landscape as far as Glenluce there would be intermittent visibility of Glenvernoch, and occasionally the other proposed cumulative wind farms in the distance, less frequently than there would be visibility of the Proposed Development. Effects along this stretch of the road would remain of Medium scale south of Newton Stewart, reducing to Small-negligible by Glenluce.

6.10.77. Combined cumulative effects for road users on the A75 would mean that the extent of Medium scale effects extends along a slightly longer stretch of the route. This would result in effects that are of Medium to Low magnitude, Moderate to Moderate-slight (**Not Significant**) and Adverse.

6.10.78. **A746** (17.4 km, south) – users of this route are assessed to be of Medium sensitivity. When travelling north on this route, views would be broadly in the direction of the Proposed Development. Views of all of the potential cumulative developments would be possible intermittently when travelling along the A746, as a result of the landform and vegetation in the vicinity of the route. The Proposed Development would remain visible for a greater extent of the road, but Glenvernoch would be visible at a similar distance for those stretches of the road where potential visibility is indicated. However, the scale of these effects would remain Small to Small-negligible. Combined cumulative effects for road users on the A746 would remain of Low to Low-negligible magnitude, Slight (**Not Significant**) and Adverse.

Long Distance Recreational Routes – The Southern Upland Way

6.10.79. **Southern Upland Way** (5 km, north) – Viewpoints 4, 14 and 18 (**Figures 6.18, 6.28** and **6.32**) provide representative views from along the Southern Uplands Way. Users of the Southern Upland Way are assessed to be High-Medium sensitivity.

6.10.80. **Figure 6.11** indicates that there would be some stretches of the Southern Upland Way where there would be no visibility of the Proposed Development but other potential cumulative schemes would be visible. Effects on those stretches of the route are not considered as part of this assessment because if significant cumulative effects arise on those stretches of the Southern Upland Way, they would be as a result of other Proposed Developments and as such are not relevant for consideration as part of this application.

6.10.81. Where the route passes through Glenvernoch Fell, within approximately 7.5 km of the Proposed Development, Glenvernoch would become the prominent wind farm in views as the route would pass within approximately 920 m of the closest proposed Glenvernoch

turbine. Along this section of route the scale of effects would increase to Large to Large-medium scale, where the full extent of Glenvernoch would be visible as a new wind farm in relatively close proximity to the route.

6.10.82. Beyond 7.5 km from the Proposed Development, there would be intermittent visibility of all of the potential cumulative schemes from open areas away from woodland. Glenvernoch would continue to be the more prominent of the potential cumulative schemes and be located closer to the Southern Uplands Way than the Proposed Development. The scale of effects would increase to Medium-small and Small, with existing wind farm developments forming part of the views.

6.10.83. Effects on this route within 7.5 km of the Proposed Development would be of Large to Large-medium scale, as a result of the proximity of Glenvernoch. These effects would be of High-medium to Medium magnitude, Major (**Significant**) and Adverse. Beyond 7.5 km, effects would be more intermittent, and of Medium-small and Small scale. On balance, effects along this section of the route would be of Medium-low to Low magnitude, Moderate-slight (**Not Significant**) and Adverse.

National, Regional and Local Cycle Routes

6.10.84. **National Cycle Route (NCR) 7** (3.1 km, west) – Viewpoints 5 and 20 (**Figures 6.19** and **6.34**) are located on the route at some of the closest points to the site. Cyclists along this route are assessed to be of Medium sensitivity.

6.10.85. **Figure 6.11** indicates that from the southern section of the NCR7 circuit, along the eastern side of the River Cree, through Newton Stewart and along minor roads east of the A75, there would be intermittent visibility of Glenvernoch on the opposite side of the route to the Proposed Development. Occasional distant visibility of Knockodhar in the distance would also be possible from short stretches of the route. On the stretch of the route between Newton Stewart and the Wood of Cree, cyclists would experience increased visual effects of Large-medium scale as a result of visibility of Glenvernoch to the west of the route. Large-medium scale effects would be experienced along this stretch of the route, giving rise to effects of High-medium magnitude, Moderate (**Not Significant**) and Adverse.

6.10.86. **National Cycle Route (NCR) 73** (4.8km, south) – Viewpoints 3 and 10 (**Figures 6.17** and **6.24**) are located on the route. Cyclists along this route are assessed to be of Medium sensitivity.

6.10.87. **Figure 6.11** indicates that along much of the stretch of NCR73 between Newton Stewart and Wigtown, there would be visibility of the Proposed Development in combination with Glenvernoch, and Knockodhar in the distance, when travelling northwards. The Proposed Development would remain the more prominent wind farm in views from this stretch of the route. From Wigtown across the Machars, views of all of the potential cumulative developments would be possible intermittently, as a result of the landform and vegetation in the vicinity of the route. The Proposed Development would remain visible for a greater extent of the route, but Glenvernoch would be visible at a similar distance for those stretches of the road where potential visibility is indicated. However, the scale of these effects would remain Small to Negligible.

6.10.88. Combined cumulative effects for cyclists on the NCR73 would remain of Medium magnitude, Moderate (**Not Significant**) and Adverse.

Specific Viewpoints

6.10.89. **Merrick** – Viewpoint 7 demonstrates that the Proposed Development would be largely screened behind the lower hills between Merrick and the site. Consequently, where there is potential for visibility of any proposed cumulative scheme, if significant cumulative

visual effects arise, they would be as a result of other developments and as such are not relevant for consideration as part of this application.

6.10.90. **Cairnsmore of Fleet** (8.6 km, south-east) – this viewpoint is represented by Viewpoint 6 (**Figure 6.20**). As set out in **Technical Appendix 6.3**, Glenvernoch, would form a new feature in this view, beyond the Proposed Development. It would be seen as a more distant element of the view, whilst closer to Cairnsmore of Fleet than other existing and consented wind farms. Knockodhar would appear to continue the existing pattern of wind turbines on the moorland plateau to the west.

6.10.91. In combination cumulative effects would arise with Glenvernoch, which would be more distant than the Proposed Development, but closer than any of the existing turbines. Seen together, Glenvernoch would not add notably to the visual effects of the Proposed Development. In combination effects remain of Medium-low magnitude, Moderate (**Not Significant**) and Adverse.

Cumulative Effects on Designated Landscapes

6.10.92. Only the Galloway Hills RSA and Mochrum Lochs RSA are judged to receive Low magnitude or greater effects (locally or overall) as a result of the proposal and therefore assessed for cumulative effects.

Regional Scenic Areas (RSA)

6.10.93. **Galloway Hills RSA** (includes site) – this designated area is assessed to be of High-medium sensitivity.

6.10.94. Effects on this RSA have been previously described in the LCTs that it covers, primarily LCT158, 160, 161, 168, 172, 174, 176, 179, 180 and 181, and by the viewpoints that lie within the RSA (Viewpoints 1, 3, 5, 6, 7, 8, 10, 11, 20, 21, 22 and 23 shown on **Figures 6.15, 6.17, 6.20-6.22, 6.24-6.25** and **6.34-6.37**) as described in **Technical Appendix 6.3**. **Figure 6.11** indicates areas within the north of this RSA where there would be visibility of potential cumulative schemes from areas without visibility of the Proposed Development. Effects on those areas of the RSA are not considered as part of this assessment because if significant cumulative effects arise on those areas, they would be as a result of other Proposed Developments and as such are not relevant for consideration as part of this application.

6.10.95. Elsewhere within the RSA, there would be visibility of Glenvernoch from the high points in the vicinity of the Proposed Development, with occasional visibility of Knockodhar in the distance. From the majority of locations within the RSA with cumulative visibility of the Proposed Development and Glenvernoch, the Proposed Development would remain more prominent in views. It is therefore judged that effects on Galloway Hills RSA would remain of High magnitude, Major-Moderate (**Significant**) and Adverse.

6.10.96. **Mochrum Lochs RSA** (16.4km, south-west) - – this designated area is assessed to be of High-medium sensitivity.

6.10.97. The LCTs that cover the Mochrum Lochs RSA (LCT156, 167 and 174) were not considered in the detailed assessment of cumulative effects on landscape character due to the distance from the Proposed Development and the intermittent level of visibility. Viewpoint 12 (**Figure 6.26**) lies within the RSA, as described in **Technical Appendix 6.3**. **Figure 6.11** indicates that from within the RSA there would be intermittent visibility of all of the potential cumulative schemes in areas where there would be visibility of the Proposed Development. The Proposed Development would remain visible across a slightly greater extent of the RSA than other potential cumulative schemes, with Glenvernoch located a similar distance from the RSA to the Proposed Development. Given that existing operational and consented wind farms already influence this RSA, cumulative effects on this RSA are assessed to remain of Low magnitude, Slight (**Not Significant**) and Adverse.

Cumulative Night-Time Effects

6.10.98. As set out at in the assessment of night-time effects above, medium intensity steady red (2000 candela) lights will be mounted on the nacelles of wind turbines T01, T05, T06, T11, T12 and T15. The majority of existing operational wind farms within the 45 km study area do not have red nacelle or tower lights as they are lower than the 150 m height threshold. However, a number of the consented schemes will require aviation lighting, which will introduce areas of turbine lighting into the landscape once construction is complete.

6.10.99. All of the cumulative schemes that form part of this assessment of cumulative effects would include turbines over 150 m high and would therefore require aviation lighting. The study area for the assessment of effects at night-time remains 20 km.

Cumulative Night-time Effects on Visual Receptors

6.10.100. As detailed in the assessment of cumulative visual effects above, the greatest cumulative visual effects would be on visual receptor groups to the south and west of the site, where the spread of turbines in views would increase as a result of the addition of cumulative schemes in combination with the Proposed Development. Combined with the description of cumulative night-time effects provided in **Technical Appendix 6.3**, the visual receptor groups within the 20 km study area that would experience increased visual effects at night as a result of the Proposed Development in combination with cumulative schemes are:

- River Cree Valley and Wigtown Bay from the A75 to 20 km from the closest proposed wind turbine, including residents of Creetown; and
- Roads, residents and recreational landscapes within the moorland landscapes west of the site from the A714 to 20 km from the closest proposed wind turbine.

6.10.101. **River Cree Valley and Wigtown Bay from the A75 to 20 km from the closest proposed wind turbine, including residents of Creetown** – Viewpoints 3, 8 and 10 (**Figures 6.18, 6.23** and **6.25**) lie within this area.

6.10.102. For much of the visual receptor group there would be some visibility of the lighting on Glenvernoch, which would be seen as a separate cluster of wind farm lighting to the Proposed Development and slightly more distant. Other wind farms in planning would be much more distant than the Proposed Development or Glenvernoch. In combination nighttime visual effects as a result of the lighting on the Proposed Development and Glenvernoch would increase the extent of Medium-small scale effects, all of which would be beyond 5km. These effects would be of Medium-low to Low magnitude, Slight (**Not Significant**) and Adverse.

6.10.103. **Roads, residents and recreational landscapes within the moorland landscapes west of the site from the A714 to 20 km from the closest proposed wind turbine** – Viewpoints 4 and 14 (**Figures 6.18** and **6.28**) lie within this area.

6.10.104. In combination nighttime cumulative effects would arise between the Proposed Development and Glenvernoch, because Glenvernoch is located towards the east of the visual receptor group, closer to visual receptors than the Proposed Development. In combination nighttime effects would increase to Medium scale and Adverse in the east of the visual receptor group. These cumulative effects would be of Medium magnitude, Moderate-slight (**Not Significant**) and Adverse.

Road and Rail

6.10.105. The A75 is the only road that would experience increased visual effects as a result of the Proposed Development in combination with cumulative schemes at night. From the stretch of the A75 along the eastern edge of Wigtown Bay as far north as Palnure Burn,

there would be visibility of lighting on both the Proposed Development and Glenvernoch. The lighting on Glenvernoch would appear slightly more distant than the Proposed Development, but would be located on the flatter landscape to the west of the site and therefore visual effects for road users along this stretch of the road would increase to Medium-small scale due to the increased spread of turbine lighting in the view.

6.10.106. Visibility from the stretch of the A75 south of Newton Stewart would predominantly remain of lighting on the Proposed Development. Across the drumlin landscape as far as Glenluce there would be intermittent visibility of lighting on Glenvernoch, and occasionally the other proposed cumulative wind farms in the distance, less frequently than there would be visibility of the Proposed Development. Effects along this stretch of the road would remain of Medium-small scale south of Newton Stewart, reducing to Negligible by Glenluce.

6.10.107. Combined cumulative nighttime effects for road users on the A75 would mean that the extent of Medium-small scale effects would expand to cover a slightly greater extent of the route. This would result in effects that remain of Medium-low to Low magnitude, Slight (**Not Significant**) and Adverse.

Long Distance Recreational Routes – The Southern Upland Way

6.10.108. **Southern Upland Way** (5 km, north) – Viewpoints 4, 14 and 18 (**Figures 6.18, 6.28** and **6.32**) provide representative views from along the Southern Uplands Way. Users of the Southern Upland Way are assessed to be High-Medium sensitivity.

6.10.109. Where the route passes through Glenvernoch Fell, within approximately 7.5 km of the Proposed Development, Glenvernoch would become the prominent wind farm lighting in views as the route would pass within approximately 920 m of the closest proposed Glenvernoch turbine. Along this section of route the scale of effects would increase to Medium scale, where the full extent of Glenvernoch would be visible as a cluster of new wind farm lighting in relatively close proximity to the route.

6.10.110. Beyond 7.5 km from the Proposed Development, there would be intermittent visibility of all of the potential cumulative schemes from open areas away from woodland. Glenvernoch would continue to be the more prominent source of lighting from the potential cumulative schemes and be located closer to the Southern Uplands Way than the Proposed Development. The scale of nighttime effects would increase to Medium-small and Small.

6.10.111. Nighttime effects on this route within 7.5 km of the Proposed Development would be of Medium scale as a result of the proximity of lighting at Glenvernoch. These effects would be of Medium magnitude, Moderate (**Not Significant**) and Adverse. Beyond 7.5 km, nighttime effects would be more intermittent. On balance, effects along this section of the route would be of Medium-low to Low magnitude, Moderate-slight to Slight (**Not Significant**) and Adverse.

National, Regional and Local Cycle Routes

6.10.112. **National Cycle Route** (NCR) 7 (3.1 km, west) – Viewpoints 5 and 20 (**Figures 6.19** and **6.34**) are located on the route at some of the closest points to the site. Cyclists along this route are assessed to be of Medium sensitivity.

6.10.113. Lighting on the Proposed Development would be visible in the immediate vicinity of Newton Stewart and between Creetown and Palanure Burn. There would be intermittent visibility of lighting on Glenvernoch between Creetown and Palanure Burn. Occasional distant visibility of Knockodhar in the distance would also be possible from short stretches of the route. From this stretch of the route, the lighting on Glenvernoch would appear as a separate cluster of lighting to that on the Proposed Development, but would

be further from NCR7 than the Proposed Development. Nighttime effects on cyclists using NCR 7 would remain of Low magnitude, Slight (**Not Significant**) and Adverse.

Cumulative Night-time Effects on Designated Landscapes

6.10.114. Of the designated landscapes within the study area for the night-time assessment, other than the Dark Sky Park, none are judged to experience increased effects as a result of the Proposed Development in combination with cumulative schemes.

Dark Sky Parks

6.10.115. **Galloway Dark Sky Park** (150 m to park boundary and core area, north) – in those areas where the nighttime ZTV indicates potential visibility of the lighting on the Proposed Development, generally isolated high points within the Dark Sky Park, the cumulative ZTV indicates limited potential visibility of the other potential cumulative schemes. There is likely to be visibility of turbine lighting from the other potential cumulative schemes. Effects on those areas of the Dark Sky Park are not considered as part of this assessment because if significant cumulative effects arise on those areas, they would be as a result of other Proposed Developments and as such are not relevant for consideration as part of this application.

6.10.116. From those areas of the Dark Sky Park that would have visibility of lighting on the Proposed Development, nighttime effects would continue to be Large-medium scale from the south and west facing slopes of the closest hills, as well as from the hill tops. This would relate to a Limited extent of the Dark Sky Park. As indicated within **Technical Appendix 6.1**, Dark Sky Park's are assessed to be of High sensitivity. Nighttime effects would remain Medium-low magnitude, Moderate (**Not Significant)** and Adverse.

Regional Scenic Areas (RSA)

6.10.117. **Galloway Hills RSA** (includes site) – in those areas where the nighttime ZTV indicates potential visibility of the lighting on the Proposed Development, generally isolated high points within the RSA, the cumulative ZTV indicates limited potential visibility of the other potential cumulative schemes. There is likely to be visibility of turbine lighting from the other potential cumulative schemes. Effects on those areas of the RSA are not considered as part of this assessment because if significant cumulative effects arise on those areas, they would be as a result of other Proposed Developments and as such are not relevant for consideration as part of this application.

6.10.118. From those areas of the RSA that would have visibility of lighting on the Proposed Development, nighttime effects would continue to be Medium-small scale effects and would remain Medium-low magnitude, Moderate (**Not Significant**) and Adverse effects.

6.11. Summary

Methodology

6.11.1. The assessment method for this LVIA draws upon the established Landscape Character Assessment Guidance for England and Scotland (Scottish Natural Heritage and The Countryside Agency, 2002); LI Technical Guidance Note 02/2019 Residential Visual amenity assessment (RVAA); Landscape Institute's Technical Guidance Note 02/21: Assessing landscape value outside national designations; LI Technical Guidance Note 06/19 Visual Representation of development proposals; NatureScot Guidance on Aviation Lighting Impact Assessment; Visual Representation of Wind Farms; NatureScot Assessing the Cumulative Landscape and Visual Impact of Onshore Wind Energy Development; sand other recognised guidelines.

Baseline

6.11.2. 24 landscape character types are located within 15 km of the proposed development, within the Zone of Theoretical Visibility (ZTV) study and Zone of Visual Influence (ZVI). Of these, 15 have been identified that require detailed assessment, with the remainder excluded because the Zone of Theoretical Visibility (ZTV) study and site work indicates limited or no visibility.

6.11.3. The different types of groups assessed within this report encompass local residents; people using key routes such as roads; cycle ways, people within accessible or recreational landscapes; people using Public Rights of Way and Core Paths; or people visiting key viewpoints. In dealing with areas of settlement, Public Rights of Way and local roads, receptors are grouped into areas where effects might be expected to be broadly similar, or areas which share particular factors in common.

6.11.4. 26 representative viewpoints have been selected to inform the assessment of effects on visual receptors.

Effects on Landscape Character

6.11.5. The findings of the assessment indicate that landscape sensitivity within the study area is variable, ranging from High to Medium. This is in part due to the presence of landscape designations including Galloway Dark Sky Park, and Fleet Valley National Scenic Area, as well as Regional Scenic Areas, Local Landscape Areas and the Merrick Wild Land Area.

6.11.6. The Proposed Development is likely to become the dominant characteristic of the landscape within the site, and for an area extending north and east approximately 1.5km to the top of Larg Hill and Benera, south approximately 1.8 km to the minor road between Cumloden and Garlies Castle, and west between 1 km and 1.4 km to the low hills at The Thieves Standing Stones and Cumloden Deer Parks. Beyond these areas and up to approximately 4.6 km from the Proposed Development, it would become one of the key characteristics, giving the sense of being near a wind farm. As a result, there would be there will be Large scale effects on parts of the host Landscape Character Types, LCT172 Upland Fringe – Dumfries and Galloway and LCT 181 – Rugged Uplands with Forest – Dumfries & Galloway, as well as the nearby LCT 180 – Rugged Uplands - Dumfries & Galloway, resulting in significant effects on landscape character.

6.11.7. Overall effects on landscape character within the study area will range between High to Negligible magnitude and Major to Minimal significance and are set out in Table 6.13 below.

Visual Effects

6.11.8. Effects on views will be generally of Large scale within close proximity to the site, up to approximately 5 km, and Medium to Medium-small scale up to around 13km from the proposed wind farm, and will decrease to Small and Negligible scale beyond these distances from the proposed turbines. These are summarised for each representative viewpoint in Table 6.10 above.

Effects on Visual Receptor Groups

6.11.9. The Proposed Development would be prominently visible from much of the visual receptor group covering the site: Moor of Barclye between the Lamachan Hill/Curleywee group of hills, Penkiln Burn and the River Cree. This will give rise to significant visual effects in EIA terms. The south and west facing slopes of the Lamachan Hill/Curleywee group of hills, and the River Cree and Penkiln Burn valleys, including Newton Stewart and the road corridors of the A75 and A714 would also experience significant visual effects in EIA terms. Other visual receptor groups within the study area would tend to have fewer

and more distant views resulting in effects of no greater than Moderate significance, which are not significant.

Effects on Roads and Rail

6.11.10. Views of the Proposed Development from key road and rail routes through the study area would generally be intermittent. There would be no significant visual effects for rail users. Effects would be of Medium to Medium-low magnitude and Moderate for users of the A714; Medium-low to Low magnitude and Moderate-slight for users of the A75; Low to Low-negligible magnitude and Slight significance for users of the A712 and A746; and Negligible effects for users of other main road routes through the study area. None of these effects would be significant in EIA terms.

Effects on Long Distance Recreational Routes – the Southern Upland Way

6.11.11. Views of the Proposed Development for walkers on the Southern Uplands Way would be of Low to Low-negligible magnitude and Slight.

Effects on National, Regional and Local Cycle Routes

6.11.12. Views of the Proposed Development for cyclists on National Cycle Route (NCR) 7 and NCR73 would be of Medium magnitude and Moderate. These effects would not be significant in EIA terms.

Effects on Specific Viewpoints

6.11.13. Specific viewpoints are those chosen because they are key and sometimes promoted viewpoints within the landscape, including for example specific local visitor attractions, viewpoints in areas of particularly noteworthy visual and/or recreational amenity such as landscapes with statutory landscape designations, or viewpoints with particular cultural landscape associations. DGWLCS notes key views towards the host LCTs, which are considered to be specific viewpoints. Effects on the view from Merrick would be of Negligible magnitude and Minimal. Effects on the view from Cairnsmore of Fleet would be of Medium-low magnitude and Moderate. Moderate. These effects would not be significant in EIA terms.

Effects on Designated Landscapes and Mapped Interests

6.11.14. There would be no effects on the Fleet Valley National Scenic Area.

6.11.15. There would be significant effects on parts of the Galloway Hills Regional Scenic Areas (RSA), within which the site is located, due to direct effect of the Proposed Development on the RSA and its visibility from much of the designated area. However, the proposed development would not compromise the overall integrity of this RSA. There would also be effects of Low magnitude and Slight on Mochrum Lochs RSA, and Negligible magnitude and Minimal on Machars Coast RSA and High Carrick Hills Local Landscape Area (LLA). These effects would not be significant in EIA terms

6.11.16. Effects on the attributes and qualities of Merrick Wild Land Area, would be of Negligible magnitude and are assessed to be Neutral (neither Adverse nor Beneficial). These would not be significant.

6.11.17. There will be no effects on any Gardens and Designed Landscapes within the study area.

Night-time Effects

6.11.18. The night-time effects of the proposed development are assessed within a study area of 20 km.

6.11.19. None of the existing wind farms within the study area are currently lit. However, several of the consented schemes will include wind turbine lighting once construction is complete.

Visual Effects

6.11.20. Of the visual receptors within the 20 km study area for night-time effects, many already experience some level of lighting at night due to the presence of roads, settlement and individual residential properties. However, the Proposed Development would introduce clusters or red aviation lighting that would introduce significant nighttime visual effects for the following visual receptor groups:

- Moor of Barclye between the Lamachan Hill/Curleywee group of hills, Penkiln Burn and the River Cree; and
- Lamachan Hill/Curleywee group of hills.

Designated Landscapes

6.11.21. There would be significant nighttime effects on parts of the Galloway Hills Regional Scenic Area due to the introduction of new light sources.

Effects on Residential Properties

6.11.22. The baseline assessment identified a total of 10 residential properties within the 2.5 km study area for the residential visual amenity assessment (RVAA). Of these properties, all but one have potential visibility of the proposed development and have been assessed in detail in the RVAA.

6.11.23. Operational effects would vary notably between residential properties due to the range of locations of properties within the study area. The property with the highest magnitude of change would remain P10. Detailed assessment of P10 reached the conclusion that physical separation, combined with the landform, localised mature trees and forestry to the north creates sufficient visual separation between the property and the Proposed Development such that effects would not be perceived to be imposing or overbearing, and it is deemed that effects on these properties would not meet the Residential Visual Amenity threshold.

6.11.24. The assessment concludes that for all of the properties within the RVAA study area the Residential Visual Amenity threshold will not be reached, and the effects will not be sufficiently “oppressive” or “overbearing” that any property will be rendered an unattractive place in which to live.

Cumulative Effects

6.11.25. The majority of schemes that are currently in planning are located amongst existing and consented wind farms and would continue the existing pattern of wind farm development. Of the schemes considered in detail in the cumulative assessment, only Glenvernoch, a proposal in scoping for 13no. 200 m high turbines located approximately 5.2km west of the Proposed Development, would result in effects that would alter effects assessed for the Proposed Development alone. Greater effects than for the Proposed Development alone would arise on the following receptors if Glenvernoch and the Proposed Development were consented, generally due to closer proximity to Glenvernoch:

- LCT 174 - Plateau Moorland with Forest - Dumfries & Galloway;
- LCT 160 - Narrow Wooded River Valley – Dumfries & Galloway;
- LCT 180 - Rugged Uplands - Dumfries & Galloway - 9.4km, north east;

- Visual receptor group - Roads, residents and recreational landscapes within the moorland landscapes west of the site from the A714 to 20 km from the closest proposed wind turbine; and
- Southern Upland Way within 7.5 km of the Proposed Development.

Cumulative Nighttime Effects

6.11.26. Greater effects than for the Proposed Development alone would arise at night on the following receptors if Glenvernoch and the Proposed Development were consented, generally due to closer proximity to Glenvernoch:

- Visual receptor group - Roads, residents and recreational landscapes within the moorland landscapes west of the site from the A714 to 20 km from the closest proposed wind turbine; and
- Southern Upland Way within 7.5 km of the Proposed Development.

Summary of Effects

6.11.27. Effects on the receptors assessed above are summarised in Table 6.13 below.

Table 6.13: Summary of Residual Effects

Likely Significant Effect	Mitigation	Means of Implementation	Residual Effect
Daytime effects on landscape character: LCT172 Upland Fringe – Dumfries and Galloway	N/A	N/A	Major-Moderate (significant), Adverse
Daytime effects on landscape character: LCT 181 – Rugged Uplands with Forest – Dumfries & Galloway	N/A	N/A	Major (significant), Adverse
Daytime effects on landscape character: LCT 180 – Rugged Uplands - Dumfries & Galloway	N/A	N/A	Major (significant), Adverse
Daytime effects on landscape character: LCT 176 - Foothills with Forest - Dumfries & Galloway	N/A	N/A	Moderate to Moderate-slight (Not Significant) and Adverse
Daytime effects on landscape character: LCT 174 - Plateau Moorland with Forest - Dumfries & Galloway	N/A	N/A	Moderate (Not Significant) and Adverse
Daytime effects on landscape character: LCT 160 - Narrow Wooded River Valley – Dumfries & Galloway	N/A	N/A	Moderate to Slight (Not Significant) and Adverse

Likely Significant Effect	Mitigation	Means of Implementation	Residual Effect
Daytime effects on landscape character: LCT 168 – Drumlin Pasture in Moss and Moor Lowland	N/A	N/A	Slight (Not Significant) and Adverse
Daytime effects on landscape character: LCT 158 - Coastal Flats - Dumfries & Galloway	N/A	N/A	Moderate to Slight (Not Significant) and Adverse
Daytime effects on landscape character: LCT 160 – Narrow Wooded River Valley – Dumfries & Galloway	N/A	N/A	Slight (Not Significant) and Adverse
Daytime effects on landscape character: LCT 179 - Coastal Uplands	N/A	N/A	Moderate to Slight (Not Significant) and Adverse
Daytime effects on landscape character: LCT 181 - Rugged Uplands with Forest - Dumfries & Galloway	N/A	N/A	Slight (Not Significant) and Adverse
Daytime effects on landscape character: LCT 172 – Upland Fringe – Dumfries & Galloway	N/A	N/A	Moderate to Slight (Not Significant) and Adverse
Daytime effects on landscape character: LCT 180 - Rugged Uplands - Dumfries & Galloway	N/A	N/A	Slight (Not Significant) and Adverse
Daytime effects on landscape character: LCT 175 - Foothills - Dumfries & Galloway	N/A	N/A	Slight (Not Significant) and Adverse
Daytime effects on landscape character: LCT 169 - Drumlin Pastures	N/A	N/A	Slight (Not Significant) and Adverse
Daytime visual effects: Viewpoint 1 - Drumwhirn Cairn, Moor of Barclye	N/A	N/A	Major (Significant) and Adverse
Daytime visual effects: Viewpoint 2 - Corsbie Road, Newton Stewart	N/A	N/A	Major to Major-moderate (Significant) and Adverse

Likely Significant Effect	Mitigation	Means of Implementation	Residual Effect
Daytime visual effects: Viewpoint 3 – Sustrans National Cycle Route 73/A714 south of Newton Stewart	N/A	N/A	Moderate (Not significant) and Adverse
Daytime visual effects: Viewpoint 4 - Glenvernoch Fell / Hill of Ochiltree	N/A	N/A	Moderate (Not significant) and Adverse
Daytime visual effects: Viewpoint 5 - NCR7 on Minor Road North of Glentrool Village	N/A	N/A	Slight (Not significant) and Adverse
Daytime visual effects: Viewpoint 6 - Cairnsmore of Fleet	N/A	N/A	Moderate (Not significant) and Adverse
Daytime visual effects: Viewpoint 7 – Merrick	N/A	N/A	Minimal (Not significant) and Adverse
Daytime visual effects: Viewpoint 8 - A75 near Creetown	N/A	N/A	Moderate (Not significant) and Adverse
Daytime visual effects: Viewpoint 9 – Kirkcowan	N/A	N/A	Moderate (Not significant) and Adverse
Daytime visual effects: Viewpoint 10 - NCR73 on Minor Road North of Wigtown	N/A	N/A	Slight (Not significant) and Adverse
Daytime visual effects: Viewpoint 11 - Benniguinea Lookout	N/A	N/A	Slight (Not significant) and Adverse
Daytime visual effects: Viewpoint 12 - Mochrum Lochs RSA, Moor of Drumwall	N/A	N/A	Minimal (Not significant) and Adverse
Daytime visual effects: Viewpoint 13 - Minor Road near Barhill Station	N/A	N/A	Minimal (Not significant) and Adverse
Daytime visual effects: Viewpoint 14 - Southern Upland Way near Artfield Fell	N/A	N/A	Minimal (Not significant) and Adverse
Daytime visual effects: Viewpoint 15	N/A	N/A	Minimal (Not significant) and

Likely Significant Effect	Mitigation	Means of Implementation	Residual Effect
- A746 North of Whithorn			Adverse
Daytime visual effects: Viewpoint 16 - Byne Hill	N/A	N/A	Minimal (Not significant) and Neutral
Daytime visual effects: Viewpoint 17 - A712 east of Corsock	N/A	N/A	Minimal (Not significant) and Neutral
Daytime visual effects: Viewpoint 18 - Southern Upland Way near Stranraer	N/A	N/A	Minimal (Not significant) and Neutral
Daytime visual effects: Viewpoint 19 - Sandhead	N/A	N/A	Minimal (Not significant) and Neutral
Daytime visual effects: Viewpoint 20 - Monigaff Parish Church	N/A	N/A	Major-moderate (Significant) to Moderate (Not significant) and Adverse
Daytime visual effects: Viewpoint 21 - Lamachan Hill	N/A	N/A	Major-moderate (Significant) and Adverse
Daytime visual effects: Viewpoint 22 - Millfore	N/A	N/A	Major-moderate (Significant) and Adverse
Daytime visual effects: Viewpoint 23 - Meikle Millyea	N/A	N/A	Moderate (Not significant) and Adverse
Daytime visual effects: Viewpoint 24 - Innerwell Fishery approach	N/A	N/A	Slight (Not significant) and Adverse
Daytime visual effects: Viewpoint 25 - Penninghame Estate pond, Castle Stewart	N/A	N/A	Moderate (Not significant) and Adverse
Daytime visual effects: Viewpoint 26 - Challoch Church	N/A	N/A	Major-moderate (Significant) and Adverse
Daytime visual effects: Moor of Barclye between the Lamachan Hill/Curleywee group of hills, Penkiln Burn and the River Cree	N/A	N/A	Major (significant), Adverse In south of visual receptor group: Negligible (Not Significant) and Neutral
Daytime visual effects: Lamachan	N/A	N/A	Major-Moderate (significant), Adverse

Likely Significant Effect	Mitigation	Means of Implementation	Residual Effect
Hill/Curleywee group of hills			From the north and east facing slopes: Negligible (Not Significant) and Neutral
Daytime visual effects: River Cree and Penkiln Burn valleys, including Newton Stewart and the road corridors of the A75 and A714	N/A	N/A	Major-Moderate (significant), Adverse Within the centre of Newton Stewart: Negligible (Not Significant) and Neutral
Daytime visual effects: Merrick and the Rhinns of Kells	N/A	N/A	Merrick and approaches: Slight (Not Significant) and Adverse Rhinns of Kells: Moderate (Not Significant) and Adverse
Daytime visual effects: Cairnsmore of Fleet and highpoints east of the site	N/A	N/A	Moderate (Not Significant) and Adverse
Daytime visual effects: River Cree Valley and Wigtown Bay from the A75 to 20 km from the closest proposed wind turbine, including residents of Creetown	N/A	N/A	Moderate (Not Significant) and Adverse Beyond Creetown and Wigtown: Negligible (Not Significant) and Neutral
Daytime visual effects: Roads, residents and recreational landscapes within the drumlin landscapes south west of the site between the A75 and the A714 to 20 km from the closest proposed wind turbine, including residents of Wigtown and Kirkcowan	N/A	N/A	Moderate (Not Significant) and Adverse South of visual receptor group: Negligible (Not Significant) and Neutral
Daytime visual effects: Roads, residents and recreational landscapes within the moorland landscapes	N/A	N/A	Moderate (Not Significant) and Adverse West of visual receptor group: Negligible (Not

Likely Significant Effect	Mitigation	Means of Implementation	Residual Effect
west of the site from the A714 to 20km from the closest proposed wind turbine			Significant) and Neutral
Daytime visual effects: A712	N/A	N/A	Slight (Not Significant) and Neutral
Daytime visual effects: A714	N/A	N/A	Moderate (Not Significant) and Adverse
Daytime visual effects: A75	N/A	N/A	Moderate (Not Significant) and Adverse
Daytime visual effects: A746	N/A	N/A	Slight (Not Significant) and Adverse
Daytime visual effects: Southern Upland Way	N/A	N/A	Slight (Not Significant) and Adverse
Daytime visual effects: National Cycle Route 7	N/A	N/A	Moderate (Not Significant) and Adverse
Daytime visual effects: National Cycle Route 73	N/A	N/A	Moderate (Not Significant) and Adverse
Daytime visual effects: Merrick Specific Viewpoint	N/A	N/A	Minimal (Not Significant) and Adverse
Daytime visual effects: Cairnsmore of Fleet Specific Viewpoint	N/A	N/A	Moderate (Not Significant) and Adverse
Daytime effects on Galloway Hills Regional Scenic Area	N/A	N/A	Major-Moderate (significant) and Adverse
Daytime effects on Mochrum Lochs Regional Scenic Area	N/A	N/A	Slight (Not Significant) and Adverse
Daytime effects on Machars Coast Regional Scenic Area	N/A	N/A	Minimal (Not Significant) and Adverse
Daytime effects on High Carrick Hills Local Landscape Area	N/A	N/A	Minimal (Not Significant) and Adverse
Merrick Wild Land Area	N/A	N/A	Minimal (Not Significant) and Adverse
Nighttime visual effects: Viewpoint 1 -	N/A	N/A	Slight (Not Significant) and Adverse

Likely Significant Effect	Mitigation	Means of Implementation	Residual Effect
Drumwhirn Cairn, Moor of Barclye			
Nighttime visual effects: Viewpoint 2 - Corsbie Road, Newton Stewart	N/A	N/A	Slight (Not Significant) and Adverse
Nighttime visual effects: Viewpoint 3 – Sustrans National Cycle Route 73/A714 south of Newton Stewart	N/A	N/A	Slight (Not Significant) and Adverse
Nighttime visual effects: Viewpoint 4 - Glenvernoch Fell / Hill of Ochiltree	N/A	N/A	Slight (Not Significant) and Adverse
Nighttime visual effects: Viewpoint 5 - NCR7 on Minor Road North of Glentrool Village	N/A	N/A	Slight (Not Significant) and Adverse
Nighttime visual effects: Viewpoint 6 - Cairnsmore of Fleet	N/A	N/A	Moderate (Not Significant) and Adverse
Nighttime visual effects: Viewpoint 7 - Merrick	N/A	N/A	Minimal (Not Significant) and Adverse
Nighttime visual effects: Viewpoint 8 - A75 near Creetown	N/A	N/A	Slight (Not Significant) and Adverse
Nighttime visual effects: Viewpoint 9 – Kirkcowan	N/A	N/A	Slight (Not Significant) and Adverse
Nighttime visual effects: Viewpoint 10 - NCR73 on Minor Road North of Wigtown	N/A	N/A	Slight (Not Significant) and Adverse
Nighttime visual effects: Viewpoint 11 - Benniguinea Lookout	N/A	N/A	Slight (Not Significant) and Adverse
Nighttime visual effects: Viewpoint 12 - Mochrum Lochs RSA, Moor of Drumwall	N/A	N/A	Minimal (Not Significant) and Adverse
Nighttime visual effects: Viewpoint 13 - Minor Road near Barhill Station	N/A	N/A	Minimal (Not Significant) and Adverse

Likely Significant Effect	Mitigation	Means of Implementation	Residual Effect
Nighttime visual effects: Viewpoint 14 - Southern Upland Way near Artfield Fell	N/A	N/A	Minimal (Not Significant) and Adverse
Nighttime visual effects: Viewpoint 15 - A746 North of Whithorn	N/A	N/A	Minimal (Not Significant) and Adverse
Nighttime visual effects: Viewpoint 16 - Byne Hill	N/A	N/A	Minimal (Not Significant) and Adverse
Nighttime visual effects: Viewpoint 17 - A712 east of Corsock	N/A	N/A	Minimal (Not Significant) and Adverse
Nighttime visual effects: Viewpoint 18 - Southern Upland Way near Stranraer	N/A	N/A	Minimal (Not Significant) and Adverse
Nighttime visual effects: Viewpoint 19 - Sandhead	N/A	N/A	Minimal (Not Significant) and Adverse
Nighttime visual effects: Viewpoint 20 - Monigaff Parish Church	N/A	N/A	Slight (Not Significant) and Adverse
Nighttime visual effects: Viewpoint 21 - Lamachan Hill	N/A	N/A	Moderate (Not Significant) and Adverse
Nighttime visual effects: Viewpoint 22 - Millfore	N/A	N/A	Moderate (Not Significant) and Adverse
Nighttime visual effects: Viewpoint 23 - Meikle Millyea	N/A	N/A	Slight (Not Significant) and Adverse
Nighttime visual effects: Viewpoint 24 - Innerwell Fishery approach	N/A	N/A	Minimal (Not Significant) and Adverse
Nighttime visual effects: Viewpoint 25 - Penninghame Estate pond, Castle Stewart	N/A	N/A	Slight (Not Significant) and Adverse
Nighttime visual effects: Viewpoint 26 - Challoch Church	N/A	N/A	Slight (Not Significant) and Adverse
Nighttime visual effects: Moor of Barclye between the Lamachan	N/A	N/A	Slight (Not significant) and Adverse

Likely Significant Effect	Mitigation	Means of Implementation	Residual Effect
Hill/Curleywee group of hills, Penkiln Burn and the River Cree			
Nighttime visual effects: Lamachan Hill/Curleywee group of hills	N/A	N/A	Moderate (Not significant), Adverse
Nighttime visual effects: River Cree and Penkiln Burn valleys, including Newton Stewart and the road corridors of the A75 and A714	N/A	N/A	Slight (Not significant) and Adverse
Nighttime visual effects: Merrick and the Rhinns of Kells	N/A	N/A	Merrick and approaches: Slight (Not Significant) and Adverse Rhinns of Kells: Moderate-slight (Not Significant) and Adverse
Nighttime visual effects: Cairnsmore of Fleet and highpoints east of the site	N/A	N/A	Moderate (Not Significant) and Adverse
Nighttime visual effects: River Cree Valley and Wigtown Bay from the A75 to 20km from the closest proposed wind turbine, including residents of Creetown	N/A	N/A	Slight (Not Significant) and Adverse
Nighttime visual effects: Roads, residents and recreational landscapes within the drumlin landscapes south west of the site between the A75 and the A714 to 20km from the closest proposed wind turbine, including residents of Wigtown and Kirkcowan	N/A	N/A	Slight (Not Significant) and Adverse South of visual receptor group: Negligible (Not Significant) and Neutral
Nighttime visual effects: Roads, residents and	N/A	N/A	Slight to Minimal (Not Significant) and Adverse to Neutral

Likely Significant Effect	Mitigation	Means of Implementation	Residual Effect
recreational landscapes within the moorland landscapes west of the site from the A714 to 20 km from the closest proposed wind turbine			with distance from the site
Nighttime visual effects: A712	N/A	N/A	Slight (Not Significant) and Neutral
Nighttime visual effects: A714	N/A	N/A	Slight to Minimal (Not Significant) and Adverse
Nighttime visual effects: A75	N/A	N/A	Slight (Not Significant) and Adverse
Nighttime visual effects: A746	N/A	N/A	Minimal (Not Significant) and Neutral
Nighttime visual effects: Southern Upland Way	N/A	N/A	Slight to Minimal (Not Significant) and Adverse
Nighttime visual effects: National Cycle Route 7	N/A	N/A	Slight (Not Significant) and Adverse
Nighttime visual effects: National Cycle Route 73	N/A	N/A	Slight to Minimal (Not Significant) and Neutral
Nighttime visual effects: Merrick Specific Viewpoint	N/A	N/A	Minimal (Not Significant) and Neutral
Nighttime visual effects: Cairnsmore of Fleet Specific Viewpoint	N/A	N/A	Moderate (Not Significant) and Adverse
Nighttime effects on Galloway Dark Sky Park	N/A	N/A	Moderate (Not Significant) and Adverse
Nighttime effects on Galloway Hills Regional Scenic Area	N/A	N/A	Moderate (Not significant), Adverse
Nighttime effects on Mochrum Lochs Regional Scenic Area	N/A	N/A	Minimal (Not Significant) and Neutral
Nighttime effects on Machars Coast Regional Scenic Area	N/A	N/A	Minimal (Not Significant) and Neutral
Nighttime effects on High Carrick Hills	N/A	N/A	Minimal (Not Significant) and

Likely Significant Effect	Mitigation	Means of Implementation	Residual Effect
Local Landscape Area			Neutral
Nighttime effects on Merrick Wild Land Area	N/A	N/A	Minimal (Not Significant) and Neutral
Daytime cumulative effects on landscape character: LCT172 Upland Fringe – Dumfries and Galloway	N/A	N/A	Major-Moderate (significant), Adverse
Daytime cumulative effects on landscape character: LCT 181 – Rugged Uplands with Forest – Dumfries & Galloway	N/A	N/A	Major (significant), Adverse
Daytime cumulative effects on landscape character: LCT 180 – Rugged Uplands - Dumfries & Galloway	N/A	N/A	Major (significant), Adverse
Daytime cumulative effects on landscape character: LCT 176 - Foothills with Forest - Dumfries & Galloway (	N/A	N/A	Moderate to Moderate-slight (Not Significant) and Adverse
Daytime cumulative effects on landscape character: LCT 174 - Plateau Moorland with Forest - Dumfries & Galloway	N/A	N/A	Major-Moderate (significant), Adverse
Daytime cumulative effects on landscape character: LCT 160 - Narrow Wooded River Valley – Dumfries & Galloway	N/A	N/A	Major (significant), Adverse
Daytime cumulative effects on landscape character: LCT 168 – Drumlin Pasture in Moss and Moor Lowland	N/A	N/A	Slight (Not Significant) and Adverse
Daytime cumulative effects on landscape character: LCT 158 - Coastal Flats - Dumfries & Galloway	N/A	N/A	Moderate to Slight (Not Significant) and Adverse
Daytime cumulative	N/A	N/A	Slight (Not Significant)

Likely Significant Effect	Mitigation	Means of Implementation	Residual Effect
effects on landscape character: LCT 160 – Narrow Wooded River Valley – Dumfries & Galloway			and Adverse
Daytime cumulative effects on landscape character: LCT 179 - Coastal Uplands	N/A	N/A	Slight (Not Significant) and Adverse
Daytime cumulative effects on landscape character: LCT 181 - Rugged Uplands with Forest - Dumfries & Galloway	N/A	N/A	Slight (Not Significant) and Adverse
Daytime cumulative effects on landscape character: LCT 172 – Upland Fringe – Dumfries & Galloway	N/A	N/A	Moderate (Not Significant) and Neutral
Daytime cumulative effects on landscape character: LCT 180 - Rugged Uplands - Dumfries & Galloway - 9.4km, north east	N/A	N/A	Major (significant), Adverse
Daytime cumulative effects on landscape character: LCT 175 - Foothills - Dumfries & Galloway	N/A	N/A	Slight (Not Significant) and Adverse
Daytime cumulative effects on landscape character: LCT 169 - Drumlin Pastures	N/A	N/A	Slight (Not Significant) and Adverse
Daytime cumulative visual effects: Moor of Barclye between the Lamachan Hill/Curleywee group of hills, Penkiln Burn and the River Cree	N/A	N/A	Major (significant), Adverse
Daytime cumulative visual effects: Lamachan Hill/Curleywee group of hills	N/A	N/A	Major-Moderate (significant), Adverse
Daytime cumulative visual effects: River Cree and Penkiln Burn valleys, including	N/A	N/A	Major-Moderate (significant), Adverse

Likely Significant Effect	Mitigation	Means of Implementation	Residual Effect
Newton Stewart and the road corridors of the A75 and A714			
Daytime cumulative visual effects: Merrick and the Rhinns of Kells	N/A	N/A	Merrick and approaches: Slight (Not Significant) and Adverse Rhinns of Kells: Moderate (Not Significant) and Adverse
Daytime cumulative visual effects: Cairnsmore of Fleet and highpoints east of the site	N/A	N/A	Moderate (Not Significant) and Adverse
Daytime cumulative visual effects: River Cree Valley and Wigtown Bay from the A75 to 20 km from the closest proposed wind turbine, including residents of Creetown	N/A	N/A	Moderate (Not Significant) and Adverse
Daytime cumulative visual effects: Roads, residents and recreational landscapes within the drumlin landscapes south west of the site between the A75 and the A714 to 20 km from the closest proposed wind turbine, including residents of Wigtown and Kirkcowan	N/A	N/A	Moderate to Slight (Not Significant) and Adverse
Daytime cumulative visual effects: Roads, residents and recreational landscapes within the moorland landscapes west of the site from the A714 to 20km from the closest proposed wind turbine	N/A	N/A	Major-Moderate (significant), Adverse
Daytime cumulative visual effects: A712	N/A	N/A	Slight (Not Significant) and Neutral

Likely Significant Effect	Mitigation	Means of Implementation	Residual Effect
Daytime cumulative visual effects: A714	N/A	N/A	Moderate (Not Significant) and Adverse
Daytime cumulative visual effects: A75	N/A	N/A	Moderate to Moderate-slight (Not Significant) and Adverse
Daytime cumulative visual effects: A746	N/A	N/A	Slight (Not Significant) and Adverse
Daytime cumulative visual effects: Southern Upland Way	N/A	N/A	Within 7.5km of the Proposed Development: Major (significant), Adverse Beyond 7.5km of the Proposed Development: Moderate-slight (Not Significant) and Adverse
Daytime cumulative visual effects: National Cycle Route 7	N/A	N/A	Moderate (Not Significant) and Adverse
Daytime cumulative visual effects: National Cycle Route 73	N/A	N/A	Moderate (Not Significant) and Adverse
Daytime cumulative visual effects: Merrick Specific Viewpoint	N/A	N/A	Minimal (Not Significant) and Adverse
Daytime cumulative visual effects: Cairnsmore of Fleet Specific Viewpoint	N/A	N/A	Moderate (Not Significant) and Adverse
Daytime cumulative effects on Galloway Hills Regional Scenic Area	N/A	N/A	Major-Moderate (significant), Adverse
Daytime cumulative effects on Mochrum Hills Regional Scenic Area	N/A	N/A	Slight (Not Significant) and Adverse
Nighttime cumulative visual effects: River Cree Valley and Wigtown Bay from the A75 to 20 km from the closest proposed wind turbine, including residents of	N/A	N/A	Slight (Not Significant) and Adverse

Likely Significant Effect	Mitigation	Means of Implementation	Residual Effect
Creetown			
Nighttime cumulative visual effects: Roads, residents and recreational landscapes within the moorland landscapes west of the site from the A714 to 20km from the closest proposed wind turbine	N/A	N/A	Moderate-slight (Not Significant) and Adverse
Nighttime cumulative visual effects: A75	N/A	N/A	Slight (Not Significant) and Adverse
Nighttime cumulative visual effects: Southern Upland Way	N/A	N/A	Within 7.5km of the Proposed Development: Moderate (Not significant), Adverse Beyond 7.5km of the Proposed Development: Slight (Not Significant) and Adverse
Nighttime cumulative visual effects: National Cycle Route 7	N/A	N/A	Slight (Not Significant) and Adverse
Nighttime cumulative effects on Galloway Dark Sky Park	N/A	N/A	Moderate (Not Significant) and Adverse
Nighttime cumulative effects on Galloway Hills Regional Scenic Area	N/A	N/A	Moderate (Not Significant) and Adverse
Residential property: P1 - Cordorcan	N/A	N/A	Minimal (Not Significant) and Neutral
Residential property: P2 - Drannandow Farm	N/A	N/A	Major-moderate (Significant), Adverse
Residential property: P3 - Drannandow Cottage	N/A	N/A	Major-moderate (Significant), Adverse
Residential property: P4 - Barclye	N/A	N/A	Minimal (Not Significant) and Neutral
Residential property: P5 - Claughrie Lodge	N/A	N/A	Major-moderate (Significant), Adverse

Likely Significant Effect	Mitigation	Means of Implementation	Residual Effect
Residential property: P6 - Cumloden House	N/A	N/A	Major-moderate (Significant), Adverse
Residential property: P7 - Cumloden Stable Cottage	N/A	N/A	Major-moderate (Significant), Adverse
Residential property: P8 - Cumloden Stables	N/A	N/A	Major-moderate (Significant), Adverse
Residential property: P9 - New Galloway Lodge	N/A	N/A	Minimal (Not Significant) and Neutral
Residential property: P10 - Garden Cottage	N/A	N/A	Major-moderate (Significant), Adverse
Residential property: P11 - Glenmalloch Lodge	N/A	N/A	Major-moderate (Significant), Adverse
Residential property: P12 - Glenhoise Cottage	N/A	N/A	Major-moderate (Significant), Adverse
Residential property: P13 - Risk Cottage	N/A	N/A	Major-moderate (Significant), Adverse
Residential property: P14 - Risk Farm	N/A	N/A	Major-moderate (Significant), Adverse
Residential property: P15 - Auchenleck Lodge	N/A	N/A	Major-moderate (Significant), Adverse
Residential property: P16 - Glenshalloch	N/A	N/A	Major-moderate (Significant), Adverse
Residential property: P17 - Auchenleck	N/A	N/A	Major-moderate (Significant), Adverse
Residential property: P18 - The Cottage	N/A	N/A	Major-moderate (Significant), Adverse

6.12. References

Dumfries and Galloway Council. (February 2020). Wind Energy Development: Development Management Considerations Supplementary Guidance. Available at: https://www.dumgal.gov.uk/article/17034/LDP2-Supplementary-Guidance

Dumfries and Galloway Council. (February 2020). Part 1 Wind Energy Development: Development Management Considerations Appendix ‘c’ Dumfries and Galloway Wind Farm Landscape Capacity Study (June 2017). Available at: https://www.dumgal.gov.uk/article/17034/LDP2-Supplementary-Guidance

Dumfries and Galloway Council. (February 2020). Dark Skies Friendly Lighting Supplementary Guidance. Available at: https://www.dumgal.gov.uk/article/17034/LDP2-Supplementary-Guidance

Dumfries and Galloway Council. (October 2019). Local Development Plan 2. Available at: https://www.dumgal.gov.uk/ldp2

Dumfries and Galloway Council. (January 2018). Regional Scenic Areas Technical Paper. Available at: https://www.dumgal.gov.uk/article/15343/Technical-Papers-Land-Use-Audits-and-Supporting-Documentss

East Ayrshire Council. (April 2024). Local Development Plan 2. Available at:https://www.east-ayrshire.gov.uk/PlanningAndTheEnvironment/development-plans-and-policies/ldp2/ldp2-information.aspx

East Ayrshire Council. (July 2017). Supplementary Guidance: Dark Sky Park lighting. Available at: https://www.east-ayrshire.gov.uk/PlanningAndTheEnvironment/development-plans-and-policies/supplementary-planning-guidance.aspx

Landscape Institute. (2021). Assessing Landscape Value Outside National Designations Technical Guidance Note 02/21. Available at: https://www.landscapeinstitute.org/news/new-guidance-assessing-landscape-value-outside-national-designations/#:~:text=TGN%2002%2D21%3A%20Assessing%20landscape,What%20is%20a%20valued%20landscape%3F

Landscape Institute. (2019). Visual Representation of Development Proposals Technical Guidance Note 06/19. Available at: https://landscapewpstorage01.blob.core.windows.net/www-landscapeinstitute-org/2019/09/LI_TGN-06-19_Visual_Representation.pdf

Landscape Institute. (March 2019). Residential Visual Amenity Assessment (RVAA) Technical Guidance Note 2/19. Available at: https://www.landscapeinstitute.org/technical-resource/rvaa/

Landscape Institute with the Institute of Environmental Management and Assessment (2013). The Guidelines for Landscape and Visual Impact Assessment, 3rd Edition. Routledge, Oxon.

Natural England. (2002). Landscape Character Assessment Guidance for England and Scotland. Available at: https://digital.nls.uk/pubs/e-monographs/2020/216649977.23.pdf

NatureScot. (September 2023). NatureScot pre-application guidance for onshore wind farms. Available at: https://www.nature.scot/doc/naturescot-pre-application-guidance-onshore-wind-farms

NatureScot. (March 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

NatureScot. (2019). Scottish Landscape Character Assessment. Available at: https://www.nature.scot/professional-advice/landscape/landscape-character-assessment/scottish-landscape-character-types-map-and-descriptions

NatureScot. (February 2017). Visual Representation of Wind Farms. Available at: https://www.nature.scot/doc/visual-representation-wind-farms-guidance

Scottish Government. (February 2023). National Planning Framework 4. Available at: https://www.gov.scot/publications/national-planning-framework-4/

Scottish Government. (December 2022). Onshore wind: policy statement 2022. Available at: https://www.gov.scot/publications/onshore-wind-policy-statement-2022/

South Ayrshire Council. (August 2022). Local Development Plan 2. Available at: https://www.south-ayrshire.gov.uk/article/28782/Local-development-plan-2

South Ayrshire Council. (August 2018). Landscape Wind Capacity Study. Available at: https://www.south-ayrshire.gov.uk/article/28780/Supplementary-planning-guidance

South Ayrshire Council. (August 2016). Supplementary Guidance: Dark Sky Lighting. Available at: https://www.south-ayrshire.gov.uk/article/28780/Supplementary-planning-guidance

7 Cultural Heritage Assessment

7.1 Introduction

7.1.1 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.

7.1.2 The cultural heritage impact assessment will: identify cultural heritage assets that may be subject to significant effects, both within the limits of the Proposed Development and within a surrounding radius of 10 km; establish the potential for currently unknown archaeological assets to survive buried within the Site; assess the predicted effects on these assets; and propose a programme of mitigation where appropriate. It will consider direct effects (such as physical disturbance 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 related development proposals).

7.2 Legislation, Policy and Guidance

Legislation

7.2.1 The assessment will be undertaken having regard to the following principal relevant legislation:

- The Ancient Monuments and Archaeological Areas Act 1979;
- The Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997;
- The Historic Environment (Amendment) (Scotland) Act 2011; and
- Scottish Statutory Instrument No. 101 The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017.

Policy

7.2.2 The Scottish Government, HES and Dumfries & Galloway Council have issued a number of statements of policy with respect to dealing with the historic environment in the planning system:

- National Planning Framework 4 (NPF4; 2023);
- Historic Environment Policy for Scotland (HEPS 2019);
- Dumfries and Galloway Local Development Plan (2019); and
- Onshore Wind Policy Statement (2022).

Guidance

7.2.3 Relevant guidance and technical standard documents comprise:

- Historic Environment Scotland Guidance on Managing Change in the Historic Environment: Setting (2020);
- Planning Advice Note 2/2011: Planning and Archaeology;
- A Guide to Climate Change Impact: On Scotland's Historic Environment (2019);
- Our Past, Our Future (2023)[1];
- Dumfries and Galloway Technical Note: Archaeological Sensitive Area's (2018);

[1] Supersedes *Our Place in Time* (2014), Historic Environment Scotland.

- NatureScot and Historic Environment Scotland Environmental Impact Assessment Handbook: Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment Process in Scotland (2019); and
- Chartered Institute for Archaeologists Standard and Guidance for Historic Environment Desk Based Assessment (2014, updated 2020).

7.3 Consultation

7.3.1 In undertaking the assessment, consideration has been given to the scoping responses and other consultation undertaken as detailed in Table 7.1. Refer also to **Technical Appendix 7.4**.

Table 7.1 Consultation

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action
HES (17th March 2023)	Pre-Application Design Iteration A	HES raised concern that there is potential for a significant impact upon the integrity of setting of scheduled monuments within the Proposed Development area. HES indicated that it may be possible to accommodate turbines in the north-west and north east areas of the Site.	Mitigation through design was undertaken following feedback from SLR and HES which the Applicant took forward, moving the turbines outwith the Archaeological Sensitive Area (ASA) and further away from the scheduled assets of concern. Refer also to the discussion of design iteration Layouts B and C in **Chapter 3: Design Evolution and Alternatives**.
HES (6th October 2023)	Scoping Design Iteration C (Scoping Layout)	HES reiterated their concern for potentially significant effects upon the setting of the assets set out below. There was concern on any micrositing distance of 75 m which when subtracted from the suggested 250 m would bring monuments into the topple zone of the turbines. HES raised concern with direct and setting impact upon: - The Thieves Standing stones (SM1044); - Drumfern, Cairn and stone circles (SM1019); - Nappers Cottage, Chambered Cairn (SM5676); and - Dalvaird, Cairn (SM1015). They also raised concern with the setting effect upon: - Cordorcan, Cairn (SM10385); - Garlies Castle (SM7916); - Challoch Church (LB19190); and - Cumloden House (LB17052). HES are content with assets scoped out of assessment and that for the EIAR a similar method applied with justification. HES refer to indirect as being incorrect terminology in respect to setting impacts and request it be referred to as a setting impact specifically.	Any micrositing would respect buffers of 250 m from monuments, such that the monuments would not be within any topple zones. A revised Site boundary and the implementation of a 250 m buffer from all monuments has removed scheduled monuments from the risk of physical impact. The assets highlighted by HES have been assessed for setting impacts (non-physical impacts) as part of the EIA. A method similar to that within the EIA Scoping Report has been applied within this report as set out in **Technical Appendix 7.2**. A revised methodology has also been submitted in line with HES's comments.
HES (16th November 2023)	On-site Meeting	An on-site visit between SLR and HES was carried out where assets were visited and setting discussed. Due to access issues, Garlies Castle was not visited.	Discussions have informed the impact assessment undertaken.
HES (29th November (2023)	Design Meeting Design Iteration C (Scoping Layout)	SLR, HES and the Applicant conducted a meeting to discuss the findings of the site visit. Concern was raised over being unable to access Garlies Castle, which was rectified for HES's individual site visit at a later date. HES raised concern over the proximity of some of the turbines in relation to assets. Dalvaird Cairn - HES stated that the setting of the cairn largely comprises the valley it sits within. HES consider that the impact would arise from the presence of the turbines disrupting the experience of the cairn and views across the cairn. SLR made note but ultimately it is for the assessment to determine whether this is a key contributing factor. HES requested a photomontage to utilise on a site visit. Drumfern Cairn and Stone Circle - HES suggested that the cairn and stone circle, as well as The Thieves (SM1044) and Napper's Cottage (SM5676), were not necessarily placed to be prominent within the landscape in views towards the assets but appear to be placed primarily for views out to the southwest. HES raised T12 as a concern in views looking towards The Thieves. Napper's Cottage - HES highlighted T16 as a wind turbine that is a significant issue as it is close to the east of the asset, potentially less than 500m in distance. HES raised that T13 and T15 may sit along the axis of the cairn, to the east-northeast. HES would like to see visualisations looking to the east-northeast along the axis of the cairn, from a viewpoint just west of the cairn.	SLR conducted a setting assessment upon Garlies Castle on the 06/08/2024. Photomontages were supplied to HES on the 20/08/2024 ahead of their planned site visit. Access to Garlies Castle was also arranged for HES ahead of their planned site visit. Mitigation through design has occurred following this meeting with HES, see discussion of design iteration Layouts D, E and F in **Chapter 3: Design Evolution and Alternatives**.

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action
		General Comments - In general, HES have concerns regarding the turbines on the west of the Site and fewer issues regarding turbines on the east/within the forested area of the Site. Discussion followed that was between SLR and HES and concluded that reduction in the height of 'problem' turbines is unlikely to provide effective mitigation in this instance. HES are not seeking to have all visibility of turbines completely removed, but to achieve reduced impact. HES also discussed that enhancement is always encouraged.	
HES (30th April 2024)	Design Iteration G	HES reviewed the updated layout and stated that despite positive design changes, there were still potential for significant impact that would be in the national interest to object; regarding Dalvaird and Nappers Cottage chambered cairn. HES raised issue with T5 and T6 in relation to Dalvaird and continued to emphasise the importance of the axis on which Nappers Cottage sits. HES outlined that the removal of T9, T13 and T18 reduced the level of impact to be sufficient to not raise issues of the national interest for The Thieves Standing Stones and Drumfern Cairn.	SLR identified the Nappers Cottage cairn sits on an 85° axis and that this is a key focus of the monument's setting which is discussed in the Section 7.8. Further changes were made to the layout of the Proposed Development to minimise potential impacts on scheduled monuments following a review of design iteration Layout G. Refer to the discussion of design iteration Layout H in **Chapter 3: Design Evolution and Alternatives.**
HES (20th May 2024)	Design Iteration H (Design chill)	HES welcomed the updated visuals and noted they were largely content with the location and direction of the draft visuals provided to them on the 13th of May 2024. Concern was raised that T10 and T11 should be located away from the axis of the Nappers Cottage cairn monument as the scale and proximity would have the potential to cause a distraction so much that it would dominate the experience of the monument.	T10 and T11 were moved, as far as reasonably possible given other Site constraints, to reduce potential impacts – refer to the discussion of design iteration Layout I (Design Freeze) in **Chapter 3: Design Evolution and Alternatives**.
HES (25th July 2024)	Gatecheck Design Iteration I (Design Freeze)	HES made note that the summary provided in the Gatecheck Report is a fair assessment of their involvement to date and said they felt it would be difficult to design a wind farm in this location without raising issues of national interest which fall within their remit, particularly upon Dalvaird Cairn and Nappers Cottage, Cairn. HES reiterated their comments on T4 and T5 with regard to impacts on Dalvaird and that they recommend measures such as deletion or relocation to ensure there is no significant adverse impact on the integrity of the monument. Re Nappers Cottage, HES stated that they welcome the relocation of T10 and that it has been moved to avoid the axis of Nappers Cottage Cairn. They confirmed that a photomontage was required to ascertain this has reduced the potential impact on the monument. HES welcomed that the applicant has been very engaged regarding the Proposed Development and that mitigation by design has been a key part of the engagement process for HES.	Draft visuals were issued to HES on the 20/08/2024 to aid in their site visit to assess impacts of the Proposed Development on assets in their remit.
DGC (15th of February 2023)	Pre-application consultation	A request for pre-application consultation with DGC was submitted but no formal response was received.	

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action
DGC (6th of February 2024)	EIA Scoping	A draft response was received outlining concerns for the potential for significant adverse impact on cultural heritage assets. The response confirmed that information on the extent of and results from the walkover must be logged by the chosen archaeological contractor as an archaeological event via the online OASIS recording system. It stated that it would be helpful if the Council's Historic Environment Record could be provided with the final gazetteer of sites in digital format, along with corresponding GIS datasets for the location and extent of any identified assets, as well as the extent of the walkover. Examination of the Scoping Report appendices indicated that the walkover was not confined to known sites, but it is important to know spatially which areas have been surveyed and which not. Concerns over monuments within the Site and their setting was raised including that of post medieval farmsteads within the ASA. DGC requested that the Category A listed Cumloden House be scoped into assessment and viewpoints taken from the drive of the house as a photomontage.	SLR conducted a blanket walkover of the Site. This is documented in **Technical Appendix 7.1**. Data of the assets uncovered during the walkover of the site can be made available to the council upon submission of the application. A letter summarising the design work was provided in response to DGC on 17th of April 2024. No response was received. SLR will provide GIS data to the council upon submission of the application. Clarifications were issued upon receipt of the scoping response outlining the applicant's position to assessments being taken forward. Cumloden House was taken forward to assessment. However, a wireline rather than a photomontage was felt to be more prudent in line with a proportionate assessment.
DGC (8th of August 2024)	Gatecheck response	DGC largely reiterated notes made within the scoping response on the 06/02/2024 but did not make reference to the letter sent on the 17th of April 2024. These are outlined above.	The DGC archaeologist's response to Gatecheck did not acknowledge any of the points made in the letter dated 17th April 2024. The said letter addressed some of the comments made in the response to Gatecheck. Any remaining points raised have been addressed in this chapter, where possible.

7.4 Assessment Methodology

Study Area

7.4.1 A 1 km radius to ascertain the predictability of unknown buried remains was applied to the Site boundary of the Proposed Development. See **Figure 7.1**.

7.4.2 For purposes of the assessment of effects on the settings of assets a Study Area was defined extending 10 km from the wind turbines of the Proposed Development[2] – see **Figure 7.2**.

Scope

Assets within the Site

7.4.3 Non-designated assets within the Site were assessed in order to determine any direct (physical) and indirect (non-physical) impacts. The ASA within the Site was subject to assessment as set out above. Impacts upon setting and any cumulative impacts have also been included where the criteria set out below have been met.

Assets outwith the Site

7.4.4 Nationally significant designated assets (**Technical Appendix 7.1**) outwith the Site but within the Study Area have been subject to setting assessments in accordance with stakeholder responses in order to determine any setting impacts.

Consultation

7.4.5 Based on the results of the baseline study, constraint mapping has been generated using GIS software to show mapped heritage assets in relation to a Zone of Theoretical Visibility (ZTV). This has filtered out those assets that do not require further assessment. It has also been used to identify and agree the most potentially sensitive assets; these may then require computer-generated visualisations to be produced as part of their assessment, in liaison with consultees. Third points of appreciation have been considered during consultation however only one was identified with DGC.

7.4.6 Consultation has been undertaken with HES in relation to the method of assessment employed in assessing those heritage assets within their remit; these include: Scheduled Monuments, Category A Listed Buildings, Inventoried Gardens and Designed Landscapes (GDLs), and Inventoried Battlefields. DGC was consulted in relation to designated heritage assets of regional and local significance, and any non-designated assets they consider to be of higher significance.

7.4.7 Section 7.3, above, sets out the consultation that has been undertaken to date.

Field Surveys

7.4.8 A blanket Site inspection was carried out in relation to all recorded assets within the Site boundary of the Proposed Development. The aim of this was to establish the condition of any recorded assets and identify the potential for any additional presently unrecorded assets.

7.4.9 The blanket walkover was carried out between 11th and 16th September 2023.

7.4.10 The results of this inspection are summarised in the 'Undated' section of the current archaeological baseline in Section 7.5, below.

[2] There is no guidance defining what the extent of an appropriate 'study area' should be for the archaeological and cultural heritage assessment of wind farms. Any given study area will therefore represent an exercise in professional judgment, refined to point of agreement between stakeholders during consultation.

7.4.11 Assessment of setting was carried out on 31st July 2024, following design freeze. All assets taken forward to detailed assessment were visited. A request for photography from Cumloden House (LB17052) was declined by the homeowner.

Assessment of Impact

7.4.12 The Proposed Development has the potential to result in impacts upon the significance of heritage assets where it changes their baseline condition and/or their setting.

7.4.13 In accordance with the EIA Regulations, this assessment has identified any development effects as either direct or indirect, adverse or beneficial, and short-term, long-term or permanent.

7.4.14 Assessment was undertaken separately for direct impact and indirect impact. Direct impacts are those which would change the heritage significance of an asset through physical alteration or changes to their setting; indirect impacts are those which would affect the heritage significance of an asset by causing change to its fabric indirectly, such as dewatering.

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

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

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

Zone of Theoretical Visibility (ZTV)

7.4.17 The settings assessments have been assisted by a ZTV calculation, presented in **Figure 7.2**. A ZTV calculation maps the predicted degree of visibility of a Proposed Development from all points within a proportionate, defined study area around the Site, as would be seen from an average observer's eye level (two metres above ground level). The ZTV model presented in **Figure 7.2** is based upon the maximum level of theoretical visibility, i.e., the maximum height of the wind turbine blade tips (refer to Table 2.1 in **Chapter 2: Proposed Development** for maximum wind turbine heights).

Cultural Heritage Significance

7.4.18 The categories of cultural heritage significance to be referred to are presented in **Table 7.2**, which will act as an aid to consistency in the exercise of professional judgement and provide a degree of transparency for others in evaluating the conclusions drawn.

7.4.19 The significance categories take into account factors such as: designation, status and grading. For non-designated assets, consideration has been given to their inherent heritage interests, intrinsic, contextual, and associative characteristics as defined in Annex 1 of HEPS (2019b). In relation to these assets, the assessment focusses upon an assessment of the assets' inherent capability to contribute to our understanding of the

past; the character of their structural, decorative and field characteristics as informed by the HER and Canmore records and/or Site visit observations; the contribution of an asset to their class of monument, or the diminution of that class should an asset be lost; and how a site relates to people, practices, events, and/or historical or social movements. Assessments of the cultural significance of specific assets, where recorded within the HER, have been taken into account where appropriate.

Table 7.2: Cultural Heritage Significance

Cultural Heritage Significance	Criteria
Highest	Sites of international importance, including: • World Heritage Sites.
High	Site of National importance, including: • Scheduled Monuments; • Category A Listed Buildings; • Gardens and Designed Landscapes included on the national inventory; • Designated Battlefields; and • Non-designated assets of equivalent significance.
Medium	Sites of Regional/local importance, including: • Category B and C Listed Buildings; • Some Conservation Areas; and • Non-designated assets of equivalent significance.
Low	Sites of minor importance or with little of the asset remaining to justify a higher importance.
None	Sites that are of no heritage significance
Unknown	Further information is required to assess the significance of these assets.

Sensitivity of Impact

7.4.20 In addition to identifying the significance of a heritage asset, it is essential, where changes to setting are being assessed, to understand the contribution that setting makes towards the significance of an asset. Elements of setting may make a positive, neutral or negative contribution to the significance of an asset. Thus, in determining the nature and level of effect upon an asset and their setting by the development, the contribution that setting makes to an asset's significance, and thus its sensitivity to changes to its setting need to be considered.

7.4.21 This approach recognises the importance of avoiding significant adverse impacts on the integrity of the setting of an asset in the context of the contribution that setting makes to the understanding, appreciation and experience of an asset. It recognises that setting may be key in characterising, understanding and appreciating some, but not necessarily all, assets. Indeed, assets of high or very high significance do not necessarily have high sensitivity to changes to their settings.

7.4.22 An asset's relative sensitivity to alterations to its setting refers to its capacity to retain its ability to contribute to an understanding and appreciation of the past in the face of changes to its setting. The ability of an asset's setting to contribute to an understanding, appreciation and experience of it and its significance also has a bearing on the sensitivity of that asset to changes to its setting.

7.4.23 While certain cultural heritage assets of high or very high importance are likely to be sensitive to direct impacts, not all will have a similar sensitivity to impacts on their setting; this would be true where setting does not appreciably contribute to their

significance. HES' guidance on setting makes clear that the level of effect may relate to "the ability of the setting of an asset to absorb new development without eroding its key characteristics" (2020). Assets with Very High or High relative sensitivity to setting impacts may be vulnerable to any changes that effect their settings and even slight changes may erode their key characteristics or the ability of their settings to contribute to the understanding, appreciation or experience of them. Assets where relative sensitivity to changes to their setting is lower may be able to accommodate greater changes to their settings without key characteristics being eroded.

7.4.24 The key criteria used for establishing an asset's relative sensitivity to changes to its setting are detailed in **Table 7.3**. This table has been developed based on SLR's professional judgement and experience of setting effects. It has been developed in line with relevant policy and guidance throughout this chapter.

Table 7.3: Sensitivity of Setting

Relative Sensitivity	Explanatory Criteria
Very High	An asset, the setting of which is crucial to an understanding, appreciation and experience of it, should be regarded as having very high sensitivity to changes to its setting. This is particularly relevant where setting, or elements of, make a crucial and essential direct contribution to significance.
High	An asset, the setting of which is major to an understanding, appreciation and experience of it, should be regarded as having high sensitivity to changes to its setting. This is particularly relevant where setting, or elements of, contribute substantially to their cultural significance.
Medium	An asset, the setting of which makes a moderate contribution to the understanding, appreciation and experience of it, should be regarded as having medium sensitivity to changes to its setting. This could be an asset for which setting makes a contribution to significance but whereby its value is derived equally from its other characteristics.
Low	An asset, the setting of which makes some contribution to the understanding, appreciation and experience of it, should be regarded as having low sensitivity to changes to its setting. This could be an asset where its significance is derived mainly from other characteristics.
Negligible	An asset where setting makes a minimal contribution to the understanding, appreciation and experience of the asset and it should be thought of having a negligible sensitivity to changes to its setting.

7.4.25 The determination of an asset's relative sensitivity to changes to its setting is first and foremost reliant upon the determination of its setting and how setting aligns with other key characteristics which contribute to cultural significance. The criteria set out in **Table 7.3** is a guide and assessment of individual assets is informed by knowledge of the asset itself, its type and by a site visit conducted by the author of this report to establish the current setting of an asset. This allows for use of professional judgement on an individual basis.

Magnitude of Impact

7.4.26 Determining the magnitude of any likely impacts includes consideration of the nature of the activities proposed during the construction and operational phases of the Proposed Development.

7.4.27 Changes could potentially include ground disturbance and changes to setting. The latter might include visual change, as well as noise, vibration, smell, dust, traffic movements etc. Effects may be beneficial or adverse, and may be short term, long term or permanent.

7.4.28 Where adverse effects on cultural heritage assets are possible, the magnitude of impact can be reduced through measures to prevent, reduce and/or, where possible, offset these effects.

7.4.29 Suitable measures for minimising impacts through ground disturbance might include:

- the micrositing 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.

7.4.30 Suitable measures for mitigating any setting impacts might include:

- alteration of the proposed wind turbine layout; and/or
- reduction of proposed wind turbine heights.

Taking into account all embedded mitigation measures, the magnitude of any effects has been assessed using professional judgment, with reference to the criteria set out in **Table 7.4**.

Table 7.4: Magnitude of Impact

Magnitude of Impact	Explanatory Criteria
High Beneficial	The Proposed Development would considerably enhance the cultural heritage significance of the affected asset, or the ability to understand, appreciate and experience it.
Medium Beneficial	The Proposed Development would enhance, to a clearly discernible extent, the cultural heritage significance of the affected asset, or the ability to understand, appreciate and experience it.
Low Beneficial	The Proposed Development would enhance, to a minor extent, the cultural heritage significance of the affected asset, or the ability to understand, appreciate and experience it.
Very Low Beneficial	The Proposed Development would enhance, to a very minor extent, the cultural heritage significance of the affected asset, or the ability understand, appreciate and experience it.
Neutral/None	The Proposed Development would not affect the cultural heritage significance of the affected asset, or the ability to understand, appreciate and experience it.
Very Low Adverse	The Proposed Development would erode, to a very minor extent, the cultural heritage significance of the affected asset, or the ability to understand, appreciate and experience it. This level of indirect effect would not be considered to affect the integrity of the asset's setting.
Low Adverse	The Proposed Development would erode, to a minor extent, the cultural heritage significance of the affected asset, or the ability to understand, appreciate and experience it. This level of indirect effect would rarely be considered to affect the integrity of the asset's setting.
Medium Adverse	The Proposed Development would erode, to a clearly discernible extent, the cultural heritage significance of the affected asset, or the ability to

Magnitude of Impact	Explanatory Criteria
	understand, appreciate and experience it. This level of indirect effect might not be considered to affect the integrity of the asset's setting.
High Adverse	The Proposed Development would considerably erode the cultural heritage significance of the affected asset, or the ability to understand, appreciate and experience it. This level of indirect effect would probably be considered to affect the integrity of the asset's setting.

Significance of Effect

7.4.31 **Table 7.5** provides a matrix that relates the cultural heritage significance of the asset to the magnitude of impact on its significance, to produce an overall anticipated level of impact ('significance of effect').

Table 7.5: Significance of Effect

Magnitude of Impact	Cultural Significance (Excluding Unknown)			
	Highest	High	Medium	Low
High beneficial	Major	Major	Moderate	Minor
Medium beneficial	Major	Moderate	Minor	Very Minor
Low beneficial	Moderate	Minor	Very Minor	Very Minor
Very low beneficial	Minor	Very Minor	Negligible	Negligible
Neutral/None	Neutral/Nil	Neutral/Nil	Neutral/Nil	Neutral/Nil
Very low adverse	Minor	Very Minor	Negligible	Negligible
Low adverse	Moderate	Minor	Very Minor	Very Minor
Medium adverse	Major	Moderate	Minor	Very Minor
High adverse	Major	Major	Moderate	Minor

Cumulative Impact

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

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

7.4.33 Consideration of other developments has been limited to:

- wind farm planning applications that have been submitted and have a decision pending; and
- wind farm planning applications that have been granted permission but not yet constructed.

7.4.34 Any impact resulting from operational wind farms has been considered as part of the baseline impact assessment.

7.4.35 Cumulative impact has been considered in two stages:

- assessment of the combined impact of the developments, including the Proposed Development; and

- assessment of the extent to which the Proposed Development contributes to the combined impact.

Significance and Integrity

Significance

7.4.36 Once the anticipated effects of the Proposed Development upon cultural heritage assets are defined, professional judgment is used to determine whether those impacts would be either 'Significant' or 'Not Significant' in terms of the EIA Regulations. As part of this determination process, regard was given to any relevant guidance.

7.4.37 With reference to the matrix presented in Table 7.5:

- any impacts identified as 'Major' would most probably be considered 'Significant';
- any impacts identified as 'Moderate' might also be considered 'Significant', though professional judgment may determine otherwise on the basis of the associated site-/asset-specific detail; and
- any impacts identified as 'Minor' or less are unlikely to be considered 'Significant', though again, professional judgment has been exercised.

7.4.38 A clear statement has been made in relation to all affected assets as to whether the identified impacts upon them are 'Significant' or 'Not Significant' for purposes of EIA.

Integrity

7.4.39 NPF4 indicates that development proposals affecting scheduled monuments will only be supported where;

7.4.40 *"i, Direct impacts on the scheduled monument are avoided;*

7.4.41 *ii, significant adverse impacts on the integrity of the setting of a scheduled monument are avoided; or*

7.4.42 *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.".*

7.4.43 A significant effect in EIA terms does not necessarily equate to a significant impact upon the integrity of setting. Where EIA significant effects are found, a detailed assessment of adverse impacts upon the integrity of the setting is made. Whilst non-significant effects are unlikely to significantly impact the integrity of the setting, the reverse is not always true. That is, the assessment of an effect as being Significant in EIA terms does not necessarily mean that the adverse effect on the setting of the asset will significantly impact its integrity, which is an approach followed by HES. The assessment of adverse impact upon the integrity of an asset's setting, where required, is a qualitative one and largely dependent upon whether the impact predicted would result in a major impediment to the ability to understand, appreciate or experience a cultural heritage asset. This is most likely to occur where the sensitivity of setting as set out in **Table 7.3** is high or very high. It should also be noted that the NPF4 test specifies setting and not the cultural significance of an asset. While the policy test must be addressed it must be borne in mind that, in cases where setting makes little contribution to cultural significance, failing the policy test may well not mean that the integrity of the cultural significance of the asset has been compromised.

7.4.44 It is considered that a Significant impact upon the integrity of the setting of an asset will only occur where the degree of change that will be represented by the Proposed Development would adversely alter those factors of the monument's setting that contribute to cultural significance such that the understanding, appreciation and experience of an asset are not adequately retained only in relation to its setting where this contributes to the overall cultural significance of the asset.

Presentation of Assessment of Effects

7.4.45 The presentation of the assessment of effects in this chapter differs from other chapters in this EIA Report. Due to the large number of individual receptors to be assessed and to avoid fragmentation of the assessment of each receptor, each receptor is considered in turn in terms of potential effects, proposed mitigation measures and resultant residual effects. For the assessment of effects to cultural heritage and archaeology, this is a more efficient and appropriate chapter structure compared to the 'standard' structure adopted for most other technical chapters in this EIA Report.

Limitations of Assessment

7.4.46 The assessment is based on the sources outlined in Section 7.11 and, therefore, shares the same range of limitations in terms of comprehensiveness and completeness of those sources.

Residual Impact

7.4.47 Further (secondary) mitigation, not referenced above, such as archaeological fieldwork undertaken as a condition of consent or other post-consent measures associated with public benefits, do not inform on the identification of Significant or Not Significant impacts but are presented in order to demonstrate how additional mitigation could offset Significant impacts.

7.5 Baseline

7.5.1 A full description of the Site and environs is given in **Chapter 2: Proposed Development.** All heritage assets within the Site and 1 km of this area are shown on **Figure 7.1.1**. Nationally designated assets within the study areas are shown in relation to the ZTV on **Figure 7.2**.

7.5.2 All recorded non-designated heritage assets within the Site and 1 km of the Site are listed in the gazetteer that is contained within **Technical Appendix 7.1: Site Gazetteer**. For ease of reference these have been provided with an SLR identifier. 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.

Current Baseline

Nationally Important Designated Heritage Assets

7.5.3 There are no designed heritage assets including World Heritage Sites located within the Site boundary.

7.5.4 There are 29 heritage assets of national importance within 10 km of the Site boundary, comprising 22 Scheduled Monuments and seven Category A Listed Buildings. There are 76 assets of Regional Importance within 5 km, all comprising Category B Listed Buildings, and one Conservation Area of national/regional importance is located within 10 km of the Site boundary.

7.5.5 As per correspondence with HES and DGC, it was agreed that the designated assets to be assessed are as listed in Table 7.6. See also **Section 7.3: Consultation**.

Table 7.6: Designated Heritage Assets to be assessed in agreement with HES.

Reference	Name	Type
(SM1044)	The Thieves Standing Stone, Blair Hill	Scheduled Monument
(SM1019)	Drumfern, cairn and remains of stone circle	Scheduled Monument
(SM5676)	Napper's Cottage, Chambered Cairn	Scheduled Monument
(SM1015)	Dalvaird, cairn 320 m NNE of	Scheduled Monument
(SM10385)	Cordocan, cairn 750 m NE of	Scheduled Monument
(SM7916)	Garlies Castle	Scheduled Monument
(LB19190)	Challoch, All Saints Episcopal Church	Category A Listed Building
(LB17052)	Cumloden House	Category A Listed Building

7.5.6 All other assets in the appraisal in **Technical Appendix 7.2** were considered for assessment but were excluded due to either the asset and its approach falling outwith the ZTV, or the setting which contributed to its significance would not be impacted by the Proposed Development.

Archaeological Baseline

Prehistoric and Roman

7.5.7 The northern element of Coldstream Archaeologically Sensitive Area falls within the Site, **Figure 7.1.3**. Whilst the northern boundary falls within the Site there are no known assets identified within the northern area that have been identified.

7.5.8 There are six recorded prehistoric heritage assets within 1 km of the Site boundary. The assets comprise four cairns, two of which are Scheduled (**SM1015/SLR62** and **SM5676/SLR59**) and two of which are non-designated (**SLR61** and **SLR63**). A pair of Scheduled standing stones are also present (**SM1044/SLR60**) and the remains of a hut or enclosure (**SLR64**).

7.5.9 Four of these monuments form a loose cluster located c.0.3-0.7km to the west of the Site. The include the Scheduled chambered cairn of Napper's Cottage (**SM5676/SLR59**) which is located *c.*0.34 km to the west of the Site boundary. The monument, comprising a cairn with five chambers, is located within a field of rough grazing. There are two further cairns within the same field to the south of the Scheduled Monument; located *c.*0.38 km (**SLR63**) and *c.*0.48 km (**SLR61**) to the west of the Site boundary. The pair of standing stones, known as The Thieves (**SM1044/SLR60**), is located close to these three cairns to their north, *c.*0.8 km to the west of the Site boundary.

7.5.10 The fourth cairn within the study area, Dalvaird Cairn (**SM1015/SLR62),** is located outwith the cluster along the Cordorcan Burn, *c.*0.17 km to the west of the Site boundary and *c.*1.5 km to the north of the aforementioned stone monuments. A small number of other prehistoric cairns just outside of the 1 km study area to the west (out of frame in **Figure 7.1.1**) may form part of the same group.

7.5.11 One potential prehistoric asset, comprising traces of huts or small enclosures, is located to the east of the Site boundary, *c.*0.24 km to the east of the proposed access track (**SLR64**).

7.5.12 There are no Romano-British heritage assets within the Site or 1 km of the Site.

Medieval

7.5.13 One potential medieval asset is located within the Site, comprising a section of Deil's Dyke (**SLR66**). This irregular linear feature crosses the western boundary of the Site, ending *c*.0.2 km to the northeast of T10 (**Figure 7.1.4**). Medieval mapping shows the Dyke continuing westwards outwith the Site boundary (not reproduced). The precise use of Deil's Dyke is debated, with the most accepted theory placing it as an agricultural feature. The section of the Dyke that is within the Site was visible during the Site visit, however outside of the Site, to the west, the Dyke becomes more ephemeral, likely eroded due to agricultural use of the land. The trajectory of Deil's Dyke also extends outwith the Site to the east, with the full Dyke stretching from the east of Afton Water near New Cumnock to Burnmouth in the parish of Durisdeer.

7.5.14 There are three other assets recorded as 'medieval to post-medieval' in date within 1 km of the Site boundary (**SM7916/SLR57**, **SLR11** and **SLR65**). This assigned, wide-ranging time bracket potentially indicates that the assets were constructed in the medieval period and continued in use throughout the post-medieval period.

7.5.15 The Scheduled Monument of Garlies Castle (**SM7916/ SLR57**) is located *c*.0.12 km south of the Site boundary and *c*.0.9 km southeast of T14. Garlies Castle is a tower house, thought to have been constructed in the late 15th century.

7.5.16 Murdoch's Cave (**SLR65**) is an excavated cave system, thought to have been the hideout of a 14th century robber, located c.0.84 km to the east of the main Site boundary and 0.11 km to the north of the proposed access track.

7.5.17 A former ruined building and field system referred to as 'Peat Rig Knowe' (**SLR11**) are recorded on OS mapping until the late 20th century, located c.0.58 km to the southeast of the Site boundary.

7.5.18 A group of assets recorded as potentially being of 'medieval to postmedieval date' are located just outside of the 1 km study area to the west, largely comprising agricultural remains including a bothy, sheepfolds, clearance cairns and field systems (out of frame in **Figure 7.1.1**)

Post-medieval

7.5.19 There are 16 assets recorded as being of post-medieval date within the Site boundary. All except one asset is of an agricultural nature, the exception being a Category C Listed bridge located within the area of the proposed Site access track, namely Auchinleck Bridge (**LB10738**). The other agricultural assets within the Site are outlined in more detail below.

7.5.20 Two agricultural assets, comprising a boundary (**SLR55**) and a sheep fold (**SLR49**), are located along the Black Burn which runs through the north of the Site, located approximately 0.23 km south of T4 and 0.38 km northeast of T6, respectively. Around 0.7 km to the south east of these assets is another sheepfold which is located just within the western Site boundary (**SLR37**).

7.5.21 Two further sheepfolds are located along the eastern boundary of the Site; **SLR31** is located *c*.0.37 km to the northeast of T12 and **SLR32** is located *c*.0.12 km southwest of T7.

7.5.22 A small structure and an enclosure are located within the southwest of the Site (**SLR16** and **SLR17**) which were likely agricultural in nature and associated with the farmsteads of Napper's Cottage or Coldstream Burn/Threave, located just outside of the western boundary of the Site (**SLR23** and **SLR22;** respectively). Both the structure and enclosure are located *c*.0.25 km to the west of T10.

7.5.23 There are a loose cluster of enclosures and small structures located to the north of the former Cumloden Deer Park, within the southeast portion of the Site in the Glenmalloch Hill Area (**SLR15, SLR35, SLR41, SLR42** and **SLR51**). **SLR15** (enclosure) is located

*c.*0.18 km to the southeast of T14, with **SLR35** (structure) located *c.*0.32 km to its east. **SLR51** (boundary bank) is located 0.4 km north of the same wind turbine. **SLR41** (enclosure) is located c.0.25 km northeast of T13, with **SLR42** (enclosure) located c.0.33 km southeast of the same wind turbine. These features may relate to the former farmstead associated with Cumloden Deer Park (**SLR7**)

7.5.24 No farmhouses are recorded within the Site during the post-medieval period and only one farmstead within the immediate proximity (*c.*0.5 km) of the Site was, ostensibly, operational through into the modern (19th century onwards) period, comprising Glenshalloch, located c.170 m to the south of the access track (**SLR67**, non-designated). The majority of other recorded farmsteads within the study area are recorded as being 'in ruins' by the 1st edition OS mapping during the 1850s (outlined further in Section 7.6), including Coldstream Burn farmstead, located *c.*0.06 km to the west of the Site boundary and *c.*0.55 km to the southwest of T10 (**SLR22**) and Dalvaird, located 0.23 km to the west of the Site boundary and 1 km to the west of T4 (**SLR28**).

7.5.25 An area of former deer parks, named as Cumloden Deer Park (**SLR2**) is located within the southeast of the Site, *c.*0.35 km south of proposed T14 extending outwith the Site boundary to the west and south. The ruins of up to possibly three distinct farmsteads are recorded within the former deer park area, comprising Knockbracks (**SLR8**), Cumloden (**SLR6**) and Knockman Wood (**SLR4**) (all depicted on **Figure 7.1.4**).

7.5.26 There are *c.*30 other post-medieval heritage assets within 1 km of the Site boundary (itemised in **Technical Appendix 7.1**). The majority of these assets are agricultural in nature, comprising ruined farmsteads, sheepfolds, field systems and field boundaries.

Undated

7.5.27 There are 17 undated heritage assets recorded within the Site. These assets are mostly agricultural in nature, likely related to the aforementioned farmsteads in and around the Site, and were largely identified as part of the walkover survey.

7.5.28 A potential isolated clearance cairn, **SLR97**, was identified to the immediate northeast (c.40 m) from T3.

7.5.29 A sheep ree, labelled on 1st edition OS mapping, is located c.0.46 km north of T4 (**SLR92**).

7.5.30 Within the Site boundary to the northwest a sheepfold is located, c.1km west of T6 (**SLR105**).

7.5.31 A small cluster of enclosures and sheepfolds/sheep rees are recorded along the eastern border of the Site to the south of T7 (**SLR68, SLR69, SLR70, SLR71, SLR72, SLR85, SLR86** and **SLR87**) and *c.*0.3 km east of T9 (**SLR73**).

7.5.32 **SLR88** and **SLR106**, both potential shepherd's cairns, are located c.0.3 km to the southwest of proposed T13. The cairns are identified on historic mapping. A potential clearance cairn (**SLR97**) was identified c.43 m to the northwest of T3.

7.5.33 There are a further 50 recorded undated heritage assets within 1 km of the Site boundary. The majority of these assets are agricultural in nature, comprising sheep rees, enclosures and shepherd's cairns associated with surrounding farmsteads. A full list of the undated assets found within 1 km of the Site boundary can be found in **Technical Appendix 7.2**.

7.6 Historic Mapping and Historic Land-Use Assessment

7.6.1 Analysis of the Historic Land Use Assessment (HLA) map indicates that the land within the Site boundary and within 1 km has had multiple uses over time, with areas recorded as consisting of a mixture of Sub-rectangular Field and Farms, Rectilinear Fields and Farms, Rough moorland and Grazing, and Plantations. Some areas of modern commercial forestry were previously recorded as containing rectilinear farms and fields, though most physical

evidence of this will have been destroyed due to the plantation forestry. A large section of the Site's central area comprises modern commercial forestry plantations and the rest is recorded as rough moorland and grazing. The historical agricultural improvements to the land within and surrounding the Site are strongly reflected in the HER, which largely consists of agricultural assets such as farmsteads and enclosures.

7.6.2 A review of the online historic mapping available from the National Library of Scotland was undertaken.

7.6.3 The Site first appears on Robert Gordon's 1640 '*A map of the coast from Loch Ryan nearly to the head of Solway*', which shows the settlements of 'Kree' (Cree), 'Drongandow' (possibly Drannandow), 'Monigaff' (Minnigaff), Peningham (Penninghame), and Garlies. The land to the north of Garlies' Castle is marked as 'Boirland' which may refer to land that lords used to keep their tables full or land on which 'bere' or barley was grown[3].

7.6.4 The Site can also be found on Pont's 1654 map of '*Gallovidia, vernacule Galloway*', which shows many of the same settlements as Gordon's map, though it notes 'Boirlant' to the south of 'Gairleyis' (Garlies), as well as a settlement named 'Knokbrek', likely relating to Knockbracks farmstead. John Adair's 1685 '*A mape of the west of Scotland containing Clydsdail, Nithsdail, Ranfrew, Shyre of Ayre, & Galloway*' also shows the area, but notes only Garlies, 'Monygafe' (Minnigaff) and Loch 'Krea' (Cree), with few other details shown.

7.6.5 John Thomson's map of Kirkcudbrightshire, published in 1821, shows more detail than previous maps, including some of the farmsteads to the west of the Site (Drannadow, 'Torthoggan' (Terregan), and Knockbracks to the south. Sheet 28 of the 1852 1st edition Ordnance Survey map provides a detailed insight into the area within and in the immediate surroundings of the Site, including Deil's Dyke, the Thieves Standing stones, Drumfern Cairn, Cordorkan, Drannadow, and many sheep rees. Sheet 56 (Galloway) of Gall & Inglis' Graded road maps of Scotland, published between 1906 and 1913, also shows a number of heritage assets referred to in this report, including Deil's Dyke and a cairn marked as being located just to the east of Terregan farmstead, likely to be Drumfern Cairn. No further heritage assets were identified through the review of historic mapping.

7.7 Aerial Photography and LiDAR

7.7.1 The online aerial imagery of National Collection of Aerial Photography (NCAP) was examined for evidence of archaeological sites. No oblique aerial imagery in the HES archives on Canmore was found. No further archaeological sites were identified.

7.7.2 Available LiDAR imaging of the Site was limited to a very small part of the eastern extents largely comprising the area of the proposed access road, with no further archaeological sites identified in this area beyond those already discussed.

Discussion of the Site

7.7.3 There is evidence of prehistoric ceremonial activity within 1 km west of the Site, characterised by a number of cairns, as well as standing stones and the remains of a stone circle (**SM1015/SLR62**, **SM5676/SLR59**, **SLR61, SLR63** and **SM1044/SLR60**). No prehistoric heritage assets are recoded within the Site however, with the closest asset located c.0.13 km west of the Site boundary. As such, although assets cannot be entirely discounted, there is considered to be a low potential for unknown prehistoric assets within the Site. Certainly, there is no potential for earthwork or other upstanding remains which would have been identified from mapping and the walkover survey.

3 Maxwell, H., "Studies in the topography of Galloway; being a list of nearly 4000 names of places, with remarks on their origin and meaning, and an introductory essay", pub. 1887, Accessible at https://deriv.nls.uk/dcn23/8208/82082223.23.pdf (Accessed 25/04/2024)

7.7.4 No medieval heritage assets are recorded within the Site, however a section of Deil's Dyke is recorded on both sides of the Site boundary (within and outside) which may extrapolate across the whole Site. Upstanding remains were observed within the western part of the Site during the Site visit in accordance with a section recorded on the HER. A number of other assets within the study area are recorded as being medieval to post-medieval in date, which are primarily of an agricultural nature. Due to the uncertainty in dates for those assets recorded, and the evidence to suggest that the area in and around the Site was in use from the prehistoric period to the post-medieval, there is considered to be a moderate potential for unknown medieval remains to be present within the Site, possibly associated with Deil's Dyke or other agricultural activity.

7.7.5 There is a relatively high level of evidence for post-medieval activity within the Site, given the number of surrounding farmsteads within the study area and their associated features – some of which are inside the Site – are recorded on historic maps and are still extant (sheepfolds, clearance cairns, field boundaries, corn drying kilns and field systems). There is also evidence of other activity from this period, including a deer park to the south of the Site. As this period is relatively well represented however, both in the HER and historic mapping, there is considered a low potential for unknown post-medieval heritage assets within the Site. If present, such assets would be anticipated to relate to agricultural activity only.

7.7.6 Undated assets within the Site are likely to reflect medieval to post-medieval agricultural activity, as the undated assets reflected in the HER mainly consist of sheep rees/folds, shepherds cairns and rigs/field systems located within the wider environs of the post-medieval farmsteads. The new assets identified during the archaeological walkover survey are largely thought to be of an agricultural nature and are likely related to the aforementioned farmsteads.

Future Baseline

Implications of Climate Change

7.7.7 As per 'A Guide to Climate Change Impacts On Scotland's Historic Environment' (October 2019), peat is classed as a cultural heritage resource due to its formation during the Bronze Age as mass deforestation occurred. Due to the anaerobic conditions under which peat is formed, it is often seen as a 'window' onto the palaeo-environment. The presence of peat across the Site, as detailed in **Chapter 10: Geology, Hydrology and Peat**, means there is a potential for environmental or organic deposits to survive. 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.

7.7.8 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.

7.7.9 Notwithstanding the above, it is considered that the description of the baseline conditions remains robust for purposes of this assessment, and that it allows for a robust assessment of the impacts of the Proposed Development on cultural heritage.

7.8 Assessment of Potential Effects

Construction Effects

Embedded Mitigation

7.8.1 The assessment of potential direct impacts on heritage assets is based on the maximum likely impact that could be caused by the Proposed Development. The layout design of the Proposed Development has undergone a number of revisions to avoid impacts. Impacts are considered with due regard to embedded mitigation measures.

7.8.2 Direct 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 and cable trenches. This will also include the construction and maintenance of access tracks, laydown areas and working compounds. Refer to **Chapter 2: Proposed Development** for a more detailed description of the proposed construction activities.

7.8.3 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. Throughout the design process the Scheduled Monuments in close proximity to the Site have had a 250 m avoidance buffer placed around them to embed the mitigation through design and to ensure no direct physical impacts would occur to these assets. Refer also to **Chapter 3: Design Evolution and Alternatives** for a discussion of avoidance measures implemented and changes made to the design and layout of the Proposed Development to eliminate, minimise or otherwise reduce the potential effects of the Proposed Development on the identified sensitive cultural heritage receptors.

Potential Effects and Secondary Mitigation

7.8.4 Taking into account the embedded design mitigation measures, the following effects are predicted. With reference to **Figure 7.1**, the Proposed Development, potential direct impacts on cultural heritage assets are outlined in **Table 7.7**, below.

Table 7.7: Potential Direct Impacts

Asset	Infrastructure	Cultural Heritage Significance	Magnitude of Impact	Significance of Effect	Proposed Mitigation
Clearence Cairn (SLR97)	Turbine 3	Very Low	Medium Adverse	Very Minor	Watching Brief
Sheep Fold (SLR49)	Access Track	Low	Low Adverse	Minor	Fencing Off
'Threave Cairn' Structure (SLR16)	Access Track	Low	Low Adverse	Minor	Fencing Off
Named Cairn (SLR78)	Turbine 10	Low	Low Adverse	Minor	Fencing Off
Boundary Bank (SLR52)	Access Track	Low	Low Adverse	Minor	Photographic Record

Asset	Infrastructure	Cultural Heritage Significance	Magnitude of Impact	Significance of Effect	Proposed Mitigation
Glenmalloch Hill Enclosure ('old fence') (SLR41)	Access Track	Very Low	Very Low Adverse	Very Minor	N/A
Unknown buried remains	All	Low	Medium	Low	Watching brief on all ground breaking works outwith forested areas.

Residual Construction Effects

7.8.5 The completion of the archaeological mitigation programme outlined above would acknowledge direct adverse impact upon archaeological remains. Any adverse effect caused to buried remains as a result of ground disturbance during construction would be offset to some degree by the benefits provided through the information gained during the archaeological investigation and reporting process. Any significant impacts identified in relation to buried archaeological remains should be considered in this context.

Operational Effects

7.8.6 With regard to setting (operational) effects, as detailed in **Chapter 3: Design Evolution and Alternatives**, mitigation through design has been implemented. This has included wind turbine deletion and relocation to limit wind turbine proximity and infringement on the relationships between cultural heritage assets.

Prehistoric Assets

Dalvaird Cairn (SM1015)

Description

7.8.7 The burial cairn measures approximately 14 m north to south and 11 m east to west. The cairn is up to 1 m high, however some of this appears to reference modern disturbance caused by walkers moving stones to the height of the monument. The oval cairn sits on a grassy mound above the boggy land (220 m AOD) which occupies the lower levels of the valley. The cairn may have once been significantly larger however, given the proximity of medieval and postmedieval assets to the monument it is likely that an element of reuse of the stones that made up the cairn were used for these assets. The cairn is predicted to date to the late Neolithic, early Bronze Age, like many of the designated assets in the area.

7.8.8 The asset is located in an area of high prehistoric activity with a number of cairns located to the south east. SLR98 is the closest asset to the monument being less that 20 m from the edge of the scheduled area, however it is noted this cairn is situated in a large area of farming regeneration so may be a non contemporary clearance cairn. Dalvaird Cairn is the most easterly scheduled cairn out of the Cree Valley assets.

Plate 7.1: North facing view of SM1015

Significance

7.8.9 As a Scheduled Monument, the asset is of high significance. This is rooted in its archaeological value as well as its group value with monuments in the area such as SM10385, SM1019 and SM5676, which are all cairns of similar date and classification. The monument also sits within the Coldstream Burn ASA.

Setting

7.8.10 The monument is situated on a raised knoll above wet marsh land, flanked by Black Burn and Cordorcan Burn. Black Burn is located 0.13 km to the south east of the asset. This is a tributary of Cordorcan Burn located 57 m to the north west.

7.8.11 The asset is bracketed by a bowl-like landscape to the north and east. This comprises Larg Hill at 676 m AOD, Sheuchan Craig (410 m AOD), Sheichanower (410 m AOD) and Benailsa (404 m AOD) forming part of this bowl-like feature. The hills and undulating topography that descends from Benailsa to the east of the asset creates a sense of enclosure to the north of the asset.

7.8.12 The sense of enclosure to the north and east, encourages the viewer to look south west out to the flatter landscape and onto the Cree Valley below along the Cordorcan Burn and onto the River Cree. This placement and drawing of the eye of the viewer to the south-west provides for an appreciable connectivity with Cordorcan Cairn (SM10385). Despite the high number of prehistoric assets within 1 km of the monument, SM10385 is the only monument that shares intervisibility in a bare-earth scenario due to topography and placement of the monument in the lower levels of the valley. However, due to intervening conifer plantation this cairn could not be seen from the monument.

7.8.13 Subsequently, views outward to the south west also direct the viewer over the Cree Valley and out to the summit of Culvennan Fell (213 m AOD) located 12 km to the south west.

Whilst the Ordnance Survey mapping indicated that there is a cairn on the hill, this appears to be a historical trigonometry point installed in the late 19th century.

7.8.14 The landscape has been heavily altered since the monument's inception, with the addition of post medieval farmsteads in the area of the monument itself. These have since been abandoned and grown over (SLR28), it is possible that the robbing and disturbance shown on the cairn that stone was used for the farmstead. Modern conifer plantation has been added to the surrounding landscape, notably to the north covering large portions of the slopes of Craigmurchie forming part of the Wood of Cree.

7.8.15 Located approximately 15 km to the west of the asset are Kilgallioch and Airies Fell Wind Farms which could be viewed from the asset at the time of the first site visit (Figure 7.5).

Contributions of Setting to Significance

7.8.16 Not all aspects of an asset's setting can contribute to its cultural significance. As such some aspects may be neutral where others detract and in other cases positively contribute to significance.

7.8.17 The following aspects are considered to contribute to the setting of Dalvaird Cairn and as such contribute to its cultural significance:

- Intervisibility with Cordorcan Cairn (SM10385) to the south west of the monument. A potential contemporary monument which may have been visible from the asset when it was established and which may have shared a common funerary representation in the prehistoric landscape.
- The isolating bowl-shaped landscape which rises to the assets north. This topography naturally directs the viewer to focus on more open views to the south west across the Cree Valley and out to Culvennan Fell.
- The relationship with Cordorcan Burn and Black Burn, which may have provided transport to the monument or which may have been markers for movements across the landscape and the experience of funerary rituals in the prehistoric period.
- The termination provided by rising land to the north and the east which may represent a change in landscape which the cairn builders stood off from/respected as a wider backdrop to the cairns in this vicinity.

7.8.18 Based on the contributing factors of significance as set out above, it is considered that the sensitivity of setting is Medium. This is due to the intrinsic and contextual characteristics contributing equally to the monument's significance.

7.8.19 As outlined in the baseline of the setting above, there are a number of established operational windfarms occupying the outward views from the asset as per Figure 7.5. Within the landscape there are also significant plantations of commercial conifers occupying the views over the River Cree and obscuring views of Cordorcan Cairn (SM10385).

Development Effects

7.8.20 From the monument, eight of the proposed 14 wind turbines would be visible, the closest being T4 located 0.9 km to the east situated upon the outcrop below Benailsa. As per **Figure 7.5**, two wind turbine tips of T11 and T13 would be visible.

7.8.21 With reference to the section above, the primary contributing factors to setting which contribute to the cultural significance of this asset and which have the potential to be impacted by the Proposed Development comprise landscape features and other prehistoric assets associated with the Cree Valley to the south-west but also the rising land to the north and east which may have influenced the prehistoric use of the area.

7.8.22 Whilst HES specifically identify the rising land to the north and east as a noteworthy factor which contributes to significance throughout their consultation, it is emphasised here that this is only one aspect of setting and that other aspects of setting are equally if not more

important with regards to understanding the monument. It is not felt that this is a sole source of the integrity of setting of the asset but, as referenced above, just one factor which contributes to the significance of the monument. The rising land to the north and east provides a sense of place and encourages the viewer to look to the south west over the Cree Valley. This sense of place would be distracted upon, but through embedded measures, this has been greatly reduced to a minor distraction behind the viewer. Views outward of the monument to the wider landscape over the Cree Valley and beyond will not be infringed upon by the proposed development. Nor will the relationship between the asset and Cordorcan Cairn (SM10385) be impacted.

7.8.23 As the sensitivity to change has been defined as Medium and with due regard to an understanding that the specific element of the sense of place identified to be adversely impacted only contributes to a proportion of the setting of the monument, it is considered that the magnitude of impact would be Medium resulting in a Significance of Effect of Moderate. Recognising that intrinsic and contextual characteristics contribute equally to the monument's significance and that this effect is due to setting change only, this is **Not Significant** in EIA terms, as such, it is considered that the integrity of setting would be conserved due to the retention of the majority of factors which contribute to the monument's setting.

Residual Effects

7.8.24 Significant mitigation through design has occurred in the surrounds of this asset, as discussed in Chapter 3. This mitigation has occurred through deletion and relocation of turbines. The residual impact upon the monument would marginally impact on the sense of place however all other elements of setting would be retained with a minor distraction behind the viewer. It is therefore not considered to breach the integrity of the asset's setting under NPF4 Policy 7 h (ii).

7.8.25 As well as this, under HEPS (2019) HEP3 and HEP4, the Applicant has looked to mitigate effects, reduce impact and enhance assets where possible (as set out below). While the impact may remain, the ability to understand, appreciate and experience the asset has been enhanced for current and future generations. Equally, these impacts have been minimised to a degree that is acceptable so that it would not compromise the integrity of setting as all of the contributing factors would be retained. This is in line with NPF4 Policy 7 h (ii) and HEP4 for HEPS (2019).

Enhancement

7.8.26 Throughout the design process (refer to **Chapter 3: Design Evolution and Alternatives**), in which HES has been significantly involved, wind turbines have been moved or deleted to address the potential impacts of the Proposed Development on this monument and have been a leading element of the design process. The Proposed Development has reduced from 29 wind turbines to 14, with the reduction of potential impacts on cultural heritage being one of the main drivers for change throughout the design process. The removal of fifteen turbines has allowed for a significant reduction in potential impacts, as shown in **Table 7.1**.

7.8.27 Significant mitigation through design has occurred, which is outlined in the Embedded Measures section. This has been utilised to reduce impact on the setting of the monument. Alongside these embedded measures it is also proposed to install a series of public enhancement measures as outlined in **Technical Appendix 7.3**.

7.8.28 One of these measures would be to install an information board to the east of the monument to raise its profile and enhance the public understanding of the prehistoric landscape in the area. It is proposed that a pedestrian track be installed as shown in **Figure 7.4** to enable visitors to access the monument.

7.8.29 It is acknowledged that this may be considered off-setting in line with the EIA Handbook (2019) however, under HEP4, of HEPS 2019, it is considered to be an enhancement opportunity as it does not offset the negative setting impacts. It is therefore considered that under policy that any additional works would be enhancement rather than off-setting as outlined under HEPS. It would also be consistent with the Scottish Government's ambitions for enhancing public access and appreciation of the historic environment, as set out within Our Past, Our Future (2023).

The Thieves, Standing Stones (SM1044)

Description

7.8.30 The monument comprises two upright stones approximately 2 m in height, situated 4 m apart. There is record of a third stone lying perpendicular to the stones. Sitting on a flat plateau of 210 m AOD on the south westerly slopes of Blair Hill, the stones sit within a slightly raised oval enclosure which has been recorded as modern within Canmore and this was confirmed during the Site inspection. It is unclear if the monument was once made up of more stones forming part of a stone circle similar to that at Drumfern (SM1019) 0.6 km to the south west or if it always comprised of three stones. The stones align to the north east – south west which is line with the most northerly point of the summer solstice, this is not uncommon for Neolithic monuments to align to such a degree. This can be seen in other monuments across Scotland such as Maeshowe (SM90209) and the standing stones on Lewis (SM90054).

7.8.31 The stones are located in close proximity to other prehistoric assets such as Nappers Cottage (SM5676) and Drumfern Stone Circle and Cairns (SM1019). Drumfern (SM1019) is visible located to the south west by 0.7 km. Drumwhirm Cairn (SM1021) is visible located to the south west by 2.9 km. Further distant is Cairnsmore of Fleet (SM2316) located 10.7 km to the south east. Non-designated assets are also visible to the southeast. These are, SLR63, SLR100, SLR101 and SLR102. All such cairns look back at the standing stones.

7.8.32 The monument is truncated by a modern post and wire fence although this does not appear to impact directly on the standing stones and only the footprint of the designated area.

Plate 7.2: South East facing view of SM1044

Significance

7.8.33 As a Scheduled Monument the asset is of high significance due to being protected at a national level. The asset is also located within the Archaeological Sensitive Area of Coldstream Burn, a regional designation.

7.8.34 The stones themselves can provide insight into the practices of Neolithic and Bronze Age people as well as the reuse of the Site during the post medieval period as an enclosure. The stones may provide key archaeological insight as well as a wider contextual and associative instruction from other assets that it is related to within the landscape.

Setting

7.8.35 The monument is situated on the south westerly slopes of Blair Hill, with the slopes rising to the north east, shielding views directly north east. With views to the north including Larg Hill and the crest of Blair Hill itself being restrictive in the northerly direction. To the distant east of the monument, the crests of Cairnsmore of Fleet and Meikle Multaggart can be seen above the commercial forestry.

7.8.36 Most notably, views outward from the monument are the key focus, with the aforementioned hills diverting the viewer to observe in the opposite direction to the south and south west in the direction of the assets as discussed in the section, *Group Value*. As well as views of these assets being a key element of the setting of the monument, long distance views to the south west over the Cree Valley out to the mouth of the River Cree are also notable.

7.8.37 The monument is bracketed by Straminnon Burn located 0.1 km to the east, and an unnamed burn (0.1 km to the west) which cumulates to the south west of the asset. Straminnon Burn is a tributary of Coldstream Burn, which leads into the River Cree. It is common of prehistoric assets to be associated with watercourses.

7.8.38 Within the landscape of The Thieves, there is a number of post medieval improvement farms occupying the area, the closest being the abandoned Sheepfold lying 0.3 km to the east and a post medieval farmstead located to the south west by 0.2 km, both of which are abandoned.

7.8.39 The monument survives on a moorland landscape with significant areas of modern commercial forestry in the near vicinity, 0.8 km to the east, 0.2 km to the south and 0.5 km to the west. Other modern developments in views predominantly to the North West and West of the asset include the operational Carscreugh, Glenchamber, North Rhins, Airies, Artfield Fell, Balmurrie Fell, Kilgallioch, Glen App and Arecleoch Wind Farms with the closest being Kilgallioch at 14.2 km to the north west. There are a number of consented schemes, including Artfield Forest, Kilgallioch Extension, Stranoch 2, Chirmorie and Arecleoch Extension (Figure 7.6). The A714 is also visible from the asset with road noise heard, despite being 2.4 km to the south west.

Contribution of Setting to Significance

7.8.40 Whilst not all aspects of an asset's setting are visual, many are, and whilst not all visual elements are positive, some may be neutral or even negative.

7.8.41 The following elements of setting are considered to be key contributors to the asset's cultural significance:

- The orientation to the north east-south west aligning to the celestial patterns of the summer solstice.
- The asset's shared visibility to and from the assets listed previously. This was likely to be a recognised 'design intention' at the time of their establishment, such that assets could be seen from each other or experienced as part of a group.
- The views and acknowledgement of nearby waterways such as Staminnon Burn and the unnamed burn to the east and west. These features likely being determining features in the location of the Site.
- Further outward views of waterways to the River Cree and Cree Valley and beyond, out to the mouth of the River Cree which likely provided a topographic understanding/context which may have determined the location of the Site.
- The physical backdrop provided by the crest of Blair Hill which directs open outward views to the south west onto the aforementioned River Cree, enforcing an understanding of topographic factors which likely determined the location of the asset.

7.8.42 Based on the contributing factors of significance as set out above, it is considered that the sensitivity of setting is Medium. This is due to the intrinsic and contextual characteristics contributing equally to the monument's significance.

7.8.43 The following infrastructure and / or land uses are considered to form a negative baseline upon the setting of the Thieves, Standing Stones, which would detract from its cultural significance:

- The presence of 14 established onshore wind developments visible from the asset, (Figure 7.6). The presence of these baseline wind farms are situated in outward views which are established as key elements of the assets setting, such as the wider views of the Cree Valley.
- The visibility and noise of the A714, as experienced at the monument.

7.8.44 The following land uses are considered to have a neutral effect upon the setting of the asset's significance:

- Conifer plantation; and
- the surrounding agricultural land, including the modern farmsteads, and the minor roads connecting them.

Development Effects

7.8.45 The Proposed Development would introduce 14 wind turbines to the north easterly slopes of Blair Hill. The closest wind turbine would be T10, 1.1 km to the east of the asset. Analysis of the ZTV and photomontage suggests that all 14 of the proposed turbines would be visible, with 14 hubs and only the tip of T2 (Figures 7.2 and 7.6) being visible from the Scheduled Monument.

7.8.46 With reference to the section above, the ability to understand, appreciate and experience the stones in this location would not be impeded by the presence of the turbines on Blair Hill.

7.8.47 The monument utilises the views outward over the Cree Valley and other watercourses which are utilised by other prehistoric monuments which the asset is associated with. Within such views towards contemporary assets, the wind turbines would be behind the viewer. The wind turbines would only be visible in views of contemporary monuments when looking to the distant south-east towards Cairnsmore of Fleet (SM2316). Within this particular view, T14 sits marginally to the south but would not impede views through to SM2316. However, it would cause a distraction in this intervisibility between the two assets.

7.8.48 A key contributor that would have the potential to be impacted would be that of the appreciation of the stones during the summer solstice. The stones appear perfectly aligned along this orientation, which HES agree with (20th of May 2024). T5 and T6 sit to the south of this view and should not impede the alignment of the appreciation or understanding of the contributing factors of the monument.

7.8.49 Throughout the design process (refer to **Chapter 3: Design Evolution and Alternatives**), which HES has been significantly involved in, wind turbines have been moved or deleted to address the potential impacts of the Proposed Development on this monument. The Proposed Development has reduced from 29 wind turbines to 14, with the reduction of potential impacts on cultural heritage being one of the main drivers for change throughout the design process. The removal of fourteen turbines has allowed for a significant reduction in potential impacts, as shown in **Table 7.1**.

7.8.50 The size and scale of the scheme means it is unlikely to remove all impacts from the Proposed Development entirely, and as such certain turbines still have the potential to distract from the relationship between the asset and the landscape around it. T14 sits on the periphery of views from the asset to SM2316, and T5 and T6 sit south of the views along the celestial alignment which would cause minor infringement upon these aspects of setting.

7.8.51 The slight erosion to the aspects such as the celestial alignment which contribute to the significance of the monument are minimal with most of the contributing factors of both views retained and other views towards contemporary assets unaffected. Although the ability to experience the relationship between the asset and these two elements of setting would potentially be minimally eroded with the introduction of the Proposed Development, the proposals would not significantly affect the overall ability to understand or appreciate the factors which contribute to the monument's overall significance. The ability to experience the relationship would still remain, however the Proposed Development would introduce a level of distraction to these elements.

7.8.52 The Proposed Development would result in a modest level of effect upon these elements of setting which contributes positively to understanding the asset.

7.8.53 A **Medium** adverse magnitude of impact would be anticipated in the worst instance due to a low sensitivity of change to it's setting, resulting in an overall **Moderate** significance of effect, which is considered **Significant** in EIA terms. The operation of the Proposed Development would not result in such a high level of impact that it would adversely affect the integrity of the asset's setting. This integrity is preserved in the intervisibility of many

of the other assets which surround the stones and the outward views to the south west along the Cree Valley and beyond.

Residual Effects

7.8.54 With the embedded measures, it is considered that the level of effect on the asset would remain a **Moderate** significance of effect. This is not considered to be so adverse that it would impact the integrity of the monument as outlined above. A substantial level of mitigation through design has occurred throughout the EIA process, and enhancement measures are proposed which will increase the public's ability to appreciate the monument.

Enhancement

7.8.55 Alongside the embedded measures, which have primarily focussed on reducing the impact upon setting as far as possible during the design of the Proposed Development, it is also proposed to install a series of public enhancement measures, refer to Figure 7.4 and Appendix 7.3.

7.8.56 It is acknowledged that this may be considered off-setting in line with the EIA Handbook (2019) however, under HEPS 2019, of HEP4, it is considered to be an enhancement opportunity as it does not offset the negative setting impacts. It would also be consistent with the Scottish Government's ambitions for enhancing public access and appreciation of the historic environment, as set out within Our Past, Our Future (2023).

Drumfern Cairn (SM1019)

Description

7.8.57 The monument comprises a large cairn, roughly 10 m in diameter and 0.4 m high, and the remains of a stone circle approximately 27 m to the north east of the cairn. HES records state that there are several surviving stones of which two are prostrate however, upon field inspection, the prostrate stones could not be found. The asset is situated in an area of dense prehistoric activity. A number of non-designated assets sit within close vicinity of the monument. MGD2675, a large prehistoric cairn, sits on the southern slope facing Drumfern Cairn. Equally, the monument shares intervisibility with a number of designated monuments. These include SM1044, SM1021 and SM2316. Non-designated assets that the monument also shares intervisibility with are MDG2675 and MDG23823.

Plate 7.3: South West facing view of SM1019

Significance

7.8.58 As a Scheduled Monument, the asset is of high significance due to its protection at a national level. The asset is also located within the Archaeological Sensitive Area of Coldstream Burn, a regional designation.

7.8.59 The cairn and stones themselves can provide insight into the practices of Neolithic and Bronze Age people, as well as holding archaeological value. The stones may provide key archaeological insight as well as a wider contextual and associative instruction from other assets that it is related to within the landscape.

Setting

7.8.60 Situated on the south westerly slopes of Blair Hill, at 160 m AOD, the monument is shielded from long distance views north. Views to the north include Larg Hill and the crest of Blair Hill itself being restrictive in the northerly direction. To the east of the monument, the crests of Cairnsmore of Fleet and Meikle Multaggart can be seen above the commercial forestry.

7.8.61 Most notably, views outward from the monument are the key focus, with the aforementioned hills directing the viewer to observe to the south and south west in the direction of the assets as discussed in section *Group Value*. As well as views of these assets being a key element of the setting of the monument, long distance views to the south west over the Cree Valley out to the mouth of the River Cree are also notable.

7.8.62 The monument is centred between by Straminnon Burn located 0.2 km to the east, and Washing Burn, 0.5 km to the west, which cumulates to the south west of the asset. Straminnon Burn is a tributary of Coldstream Burn, which leads into the River Cree. It is common of prehistoric assets to be associated with watercourses.

7.8.63 Abutting the designated area to the north is the access track utilised for pastural farming with a prominent drainage ditch to the north to a depth of 1 m. Visible to the south of the

monument is Drannandow Farm, located 1.3 km away. Many of the views to the south and north east up the River Cree and its valley are covered in a mix of deciduous and commercial forestry. Outward views beyond this form of arable field systems and views can be as far out as the mouth of the River Cree.

7.8.64 Views to the north west show a number of operational wind farms. With reference to **Figure 7.7**, these include 16t schemes, the closest being Airies Wind Farm at 12.8 km. Plate 7.4 below also shows such schemes are visible. As with other developments in the area, the A714 is also visible and traffic along this road can be heard from the monument.

Plate 7.4: West-facing shot overlooking Cree Valley from the Drumfern Cairn (SM1019)

Contribution of Setting to Significance

7.8.65 Many elements of setting can positively, neutrally and negatively contribute to a monument's setting.

7.8.66 As such the following aspects positively contribute to the monument's significance and make up its setting:

- Association with other assets in the immediate and wider landscape; the views both to and from the other assets in the area have the ability to enhance the understanding of Neolithic/Bronze Age funerary practices in the area.
- Views outward to the Cree Valley and the association of watercourses in the immediate area; the cairn likely positioned in respect to topographic features.

7.8.67 Based on the contributing factors of significance as set out above, it is considered that the sensitivity of setting is Medium. This is due to the intrinsic and contextual characteristics contributing equally to the monument's significance.

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7.8.68 Aspects that are considered to be a neutral effect on the monument's significance are:

- The post medieval and modern farmsteads in outward views from the monument.
- Noise of A714.

7.8.69 Finally, aspects of setting that are considered as baseline to negatively impact the monuments setting:

- The operational wind farms in views to the north and west which sit within key outward views from the monument creating modern intrusions on the asset.
- Large dense conifer plantation which restricts intervisibility to the north east and west.

Development Effects

7.8.70 The Proposed Development would introduce 14 wind turbines to the north east of the asset, with the closest wind turbine being 1.5 km to the north east. Analysis of the ZTV and photomontage suggests that all 14 of the proposed wind turbines would be visible, with all 14 hubs visible (Figures 7.2 and 7.7).

7.8.71 The key factor of the setting that may be detracted from by the Proposed Development is its intervisibility with other monuments in the landscape. Whilst these aren't visible to the naked eye, as shown at The Thieves (SM1044), it may draw the viewer's gaze to the Proposed Development rather than in the direction of the standing stones located 0.7 km to the north of the asset. The ability to appreciate this asset's relationship with other monuments may therefore be distracted from a key component of its setting.

7.8.72 Despite this, the other effects of the Proposed Development would not alter the ability to understand, appreciate or experience the monument. The ability to appreciate the relationships between the designated and non-designated assets in the wider Cree Valley would be retained with views to and from the monument still intact.

7.8.73 Throughout the design process (refer to **Chapter 3: Design Evolution and Alternatives**), in which HES has been significantly involved, wind turbines have been moved or deleted to address the potential impacts of the Proposed Development on this monument. The Proposed Development has reduced from 29 wind turbines to 14, with the reduction of potential impacts on cultural heritage assets, including Drumfern Cairn (SM1019), being one of the main drivers for change throughout the design process. The removal of fourteen turbines has allowed for a significant reduction in impacts, as shown in **Table 7.1**.

7.8.74 The size and scale of the scheme means it is unlikely to remove all impact from the Proposed Development entirely, and as such, certain turbines still have the potential to distract from the relationship between the asset and the landscape around it. The landscape can already be shown to have a significant intrusion of renewable energy developments in the valley. These intrusions sit on the edge of contributing factors to the asset's significance, which is the Cree Valley and the association of other monuments in close proximity.

7.8.75 With this in mind, as a monument of high significance, it is estimated that the magnitude of change would be **Medium**, resulting in a **Moderate** significance of effect. Whilst this is considered **Significant** in EIA terms, it is not considered to breach the test of adverse impact upon the integrity of setting under NPF4 Policy 7 h) ii. This is judged by there being a number of contributing factors to the asset's setting which contribute to its significance and as this would be only one element of setting impacted, while the ability to understand, appreciate and experience the monument and its setting would be retained, it is not anticipated to have such a great effect on the monument as to adversely affect the integrity of the monument.

Residual Effect

7.8.76 With the embedded, it is considered that the level of effect on the asset would remain a **Moderate** significance of effect, i.e. **Significant** in EIA terms. This is not considered to be

so adverse that it would impact the integrity of the monument as outlined above. Enhancement measures for the proposals are outlined in Appendix in 7.2.

Enhancement

7.8.77 Alongside the embedded measures which have primarily focussed on reducing the impact upon setting as far as possible Development during design, it is also proposed to install a series of public enhancement measures. Refer to **Figure 7.4** and **Appendix 7.2**.

7.8.78 It is acknowledged that this may be considered off-setting in line with the EIA Handbook (2019) however, under HEPS 2019, of HEP4, it is considered to be and enhancement opportunity as it does not offset the negative setting impacts. It would also be consistent with the Scottish Government's ambitions for enhancing public access and appreciation of the historic environment, as set out within Our Past, Our Future (2023).

Nappers Cottage, Chambered Cairn (SM5676)

Description

7.8.79 The monument is a chambered cairn belonging to a group of monuments known as Clyde Cairns. It is approximately 23 m by 15 m and comprises five chambers sitting at approximately 1 m high. Excavated in 1922 the cairn is now largely rubble but stone chambers, defined by large slabs can still be identified. Upon closer inspection, two cup marks were identified on a slab face to the south west side.

7.8.80 Orientated to the north east, south west, with the cairn aligned along an 80° axis, with an upstanding cist to the furthest north easterly point in plan, the cairn is aligned to the rising sun similar to, for example, Maes Howe in Orkney (SM90209). The association with the rising sun is an ongoing theme of Neolithic and Bronze Age monuments across the UK and Ireland. The alignment of astronomy has been a heavily debated topic amongst archaeologists for a long time. As outlined in ScARF it is deduced that:

"General alignments such as this, which could be easily planned without a great deal of accuracy or specialist knowledge, should be viewed as part of the experience of monuments, but not the only reason for their construction. Alignments on, and drawing attention to, phenomenon in the skies was but one aspect of the world view of people in the Neolithic."[4]

7.8.81 Situated on a raised knoll of 200 m AOD, located 0.1 km to the south east of the asset is MDG3211 and MDG3209. Rosie Gills Cairn (MDG3211) is located closest to the asset and is a traditional cairn type, whilst MDG3209 is a cairnfield which extends to the north of SM5676 and is comprised of a series of smaller cairns. These assets share intervisibility with Nappers Cottage Cairn. Beyond this, Drumwhirn Cairn (SM1021), shares intervisibility with the monument, as it does with many assets in the valley.

[4] Scottish Archaeological Research Framework, Neolithic Cosmology. https://scarf.scot/national/scarf-neolithic-panel-report/6-identity-society-belief-systems/6-3-2-neolithic-cosmology/6-2-2-neolithic-cosmology/

Plate 7.5: West facing view of SM5676

Significance

7.8.82 As a Scheduled Monument is of national importance it warrants that of high significance as per Table 7.1. Despite the monument being cleared of most of its funerary remains, it has the potential to give evidence in its construction and wider usage. Also, material may be sealed beneath the cairn which may give information of the Neolithic or earlier.

Setting

7.8.83 Situated on a raised knoll on the southern slopes of Blair Hill, the monument overlooks the source of two unnamed burns which feed into Coldstream Burn 0.5 km to the south of the monument. The source of these burns is amongst boggy ground within which MDG3211 is situated. This is not uncommon for prehistoric funerary assets.

7.8.84 Views directly north of the asset are shielded topographically by Blair Hill. Views eastward to Cairnsmore of Fleet and Meikle Multaggart are possible. Views to the south west and north west are, however, more prominent. Views across the Cree Valley and beyond to the south west out to the mouth are particularly notable. These include views of the River Cree and another chambered cairn; Drumwhirn Cairn (SM1021).

Plate 7.6: South westerly view from SM5676

7.8.85 Large parcels of conifer plantation are present in the wider landscape. These can be seen to the east, south and west, with the closest being to the east at 0.3 km. A modern track which accesses the forestry and pastural land that the cairn sits within abuts the designated area to the north of the monument with a modern farmstead building (SLR307) adjacent to the monument to the south.

7.8.86 Along the opposite axis of the cairn, at 260°, the operational wind farm of Kilgallioch sits 14.7 km to the north west. As shown in **Figure 7.7**, 11 of Kilgallioch Wind Farm's turbines including towers are fully visible. Within the wider landscape, there are ten further operational schemes with five additional schemes in construction, with the closest being Airies Wind Farm at 13.7 km to the south west.

Contribution of Setting to Significance

7.8.87 As outlined previously, setting can contribute in many ways both positive and negative.

7.8.88 The elements of setting considered to contribute to the significance of the monument are:

- Association of other monuments in the vicinity: The significance of the monument is informed by the association and contextual information the monuments in the area can give to Neolithic/Bronze Age practices. For example, the inter-visibility with Drumwhirn Cairn is notable to the south-west. Non-designated cairns are present in closer proximity to the south-east (MDG3211 and MDG3209) and a non designated cairnfield is present to the north (MDG3209).
- The axis of the cairn being 80°oriented along the rising sun allows for further understanding of funerary monuments of this period and the association of astronomical events.
- Outward views to the wider landscape across the Cree Valley and association with waterbodies in close vicinity to the monument, it being notable that the asset is located near to the source of two watercourses. This may have been an important locational pull for the siting of the monument at this site.

7.8.89 Based on the contributing factors of significance as set out above, it is considered that the sensitivity of setting is Medium. This is due to the intrinsic and contextual characteristics contributing equally to the monument's significance.

7.8.90 Elements of setting considered to be a baseline negative effect are:

- Close proximity of commercial forestry;
- Post-medieval farmstead abutting the monument;
- Modern access track which abuts the monument to the west; and
- The modern onshore wind farms that are substantially visible from the asset.

Development Effects

7.8.91 The Proposed Development would introduce visibility of twelve turbine hubs and towers. An additional tip of T1 and T2 would be visible. As shown on **Figures 7.2** and **7.8**, the closest wind turbine would be T10 at 0.7 km away.

7.8.92 With reference to the section above, the primary contributing factor that may be impacted would be the association of the cairn with solar movements. As set out above and by HES, the axis of the cairn is a contributing factor to the asset's significance and the understanding of astronomy in relation to the cairn is something which many prehistoric cairns share. Mitigation through design is outlined in **Chapter 3: Design Evolution and Alternatives** and **Table 7.1** through correspondence with HES. T10 has been moved to the south, to ensure that it does not fall on the 80 axis of the cairn which is, hypothetically, where the sun rise breaches the horizon. The ability to appreciate this event would still be possible with turbines sitting on the periphery of these views. However, there would still be a distraction through the turning blades on either side of the horizon event. Despite this, the association with other monuments and views to and from the monument would be retained, as well as the ability to appreciate the outward views that this monument commands. The outward views already feature a significant number of onshore renewable energy schemes which are operational.

7.8.93 Due to there being a discernible alteration to the monuments setting, which is of high significance, it is anticipated that the magnitude of impact would be **Medium** resulting in a **Moderate** Significance of Effect. Whilst this is considered **Significant** in EIA terms, it does not equate to a level of impact which would result on a significant adverse impact on the integrity of setting on the asset. As the setting is composed of many elements as outlined above, the Proposed Development would only impact the ability to appreciate the rising sun with the interlude of moving turbines on the periphery of the axis of the monument where the rising sun may be experienced.

7.8.94 Therefore, in line with NPF4 Policy 7, Paragraph h, ii "*significant adverse impacts on the integrity of the setting of a scheduled monument are avoided;*" it is not considered that the Proposed Development would be a significant adverse impact upon the integrity of setting which contributes to the overall cultural significance of the monument.

Residual Effect

7.8.95 With the embedded , it is considered that the level of effect on the asset would remain a **Moderate** significance of effect. This is not considered to be so adverse that it would impact the integrity of the monument as outlined above

Enhancement

7.8.96 Alongside the embedded measures which have primarily focussed on reducing the impact upon setting as far as possible which were incorporated into the design of the Proposed Development, it is also proposed to install a series of public enhancement measures. Refer to **Figure 7.4** and **Appendix 7.2**.

7.8.97 It is acknowledged that this may be considered off-setting in line with the EIA Handbook (2019) however under HEPS 2019, of HEP4, it is considered to be and enhancement opportunity as it does not offset the negative setting impacts. It would also be consistent with the Scottish Government's ambitions for enhancing public access and appreciation of the historic environment, as set out within Our Past, Our Future (2023).

Cordorcan Burn, Cairn (SM10385)

7.8.98 The monument comprises a substantial cairn which is categorised as a burial cairn. The cairn is large with it spanning 25 m in diameter with a total height of 2.5 m. It has been substantially robbed which may relate to its excavation in 1914, however no cist or chamber can be seen. Upon inspection during the field visit, there were elements of potential cup marks on the eastern side of some of the larger stones on the monument.

Plate 7.7: SM10385

7.8.99 The cairn's significance predominantly derives from its archaeological value, which upon excavation, could enhance the understanding of burial practices within cairns in the Cree Valley and the understanding of prehistory during this time period.

7.8.100 Situated upon a southern spur of Craigmurchie, the cairn's position on the ridge at 180 m AOD allows it substantial views over the confluence of Cordorcan Burn and the River Cree. Whilst associated with the watercourses, the cairn shares intervisibility with Dalvaird Cairn (SM1015) and many others in the valley including Drumwhirm (SM1021) and Cairnsmore of Fleet (SM2316), although the latter may not have been intentional. Views from the monument utilise the enclosed feeling that the slopes of Craigmurchie focus the viewer to appreciate the Cree Valley and the wider landscape to the south, however the views back to Dalvaird and the Cordorcan Burn are also a central focus of the monument. Views are impeded currently by commercial forestry which surrounds the monument in all directions. Whilst this can be felled and regrown, the modern intrusion is retained. Modern

forestry to the south of the monument restricts outward views to the wider Cree Valley as well as views inward to Dalvaird Cairn.

7.8.101 Based on **Figure 7.9**, Dalvaird Cairn is discernible to the north east, between upstanding forestry, situated on a small knoll between Cordorcan Burn and Black Burn. This important element of setting would be retained should the Proposed Development become operational. **Figures 7.2** and **7.9** indicate that 13 turbines would be visible with one additional tip (T8) visible from the monument. As outlined above, the key contributing factors to the setting of the monument would be its relationship with other monuments in the valley such as Dalvaird Cairn (SM1015) and Drumwhirm (SM1021). These views will be retained with no intervisibility being impacted between SM10385 and SM1021. Views to SM1015, would be retained with a minimal distraction on the ability to appreciate this relationship. The relationship between the cairn and outward views towards the watercourses would not be impacted.

7.8.102 Whilst the Proposed Development would be highly visible it is not considered to impact key contributing factors which contribute to the significance of the monument. As such it is considered that the monument would receive a **low** adverse magnitude of impact resulting in a **Minor** Significance of Effect. This is considered **Not Significant** in EIA terms.

Drumwhirn Cairn (SM1021)

7.8.103 Drumwhirn cairn is a prehistoric burial cairn, comprising a pile of stones approximately 3.6 m in height. The main visible portion of the cairn measures approximately 27 m by 25 m and is roughly circular. There appears to be a platform of stone projecting to the south of the cairn, which may have been part of the cairn originally, making the original cairn pear-shaped, and measuring an additional 20 m in length. The cairn appears to have been robbed, however, that does not negate the potential for below-surface archaeological remains.

7.8.104 The cairn predominantly derives its significance from its archaeological interest, with further investigation likely to further our understanding of prehistoric burial practices, cairns in the Cree Valley, prehistoric society and our understanding of the true form of the asset.

7.8.105 The cairn is located on gently westward-sloping agricultural land. The gentle hill starts at the River Cree which is located *c*.0.67 km west of the asset and runs north to south along the Cree Valley. The asset sits within an agricultural field, currently enclosed and used for rough grazing. Rough grazing fields encircle the asset to the north and east, and it is enclosed by sparse brush and trees to the south and west. Heavier commercial forestry (The Boreland Plantation) is located *c*.0.78 km to the east, with several farmsteads within the surrounding landscape, the closest being *c*.0.57 km to the north. The National Cycle Route 7 runs along the path of the River Cree *c*.0.54 km to the west. The nearest settlements are Minnigaff and Newton Stewart, c.2.6 km to the southeast.

7.8.106 The cairn is situated within a wider prehistoric landscape, with multiple other cairns and ritual monuments nearby. Boreland Chambered Cairn (SM1004) is located *c*.1 km to the east of the asset, however, any views between the assets are currently screened by intervening commercial forestry. A further set of cairns are located *c*.2.7 km to the northeast (SM5676, MDG3211, MDG3209) and there are multiple cairns located within the Proposed Development, along the River Cree to the north and further afield to the east (SM2316).

7.8.107 The asset derives part of its cultural heritage significance from its setting, which has multiple aspects that contribute to this significance. Burial cairns are often placed at elevated positions, potentially to provide a symbolic perspective of deceased ancestors watching over the land they once inhabited and for the living to feel like their ancestors are watching over them.

7.8.108 Drumwhirn Cairn is elevated above the River Cree valley, offering views along its length, and it would likely have been visible when approaching along the valley; it still is to some extent, due to its height. As such, views from the cairn down into the valley and views along the approaches are of significance. It is believed that cairns may have acted as land or boundary markers, and the height of Drumwhirn Cairn, suggests that it was meant to be seen when approaching through the landscape. Cairns are often placed along natural routeways, potentially acting as boundary or land markers, such as the River Cree in this case. As such, approaches along the Cree Valley are of importance.

7.8.109 The asset sits within a wider prehistoric landscape, with the aforementioned cairns having visibility of the asset within a bare earth scenario. With the changes to the landscape, including commercial forestry and agricultural improvements, this may not necessarily be the case with the current landscape. The cairn appears to have intervisibility with several nearby cairns. A majority of the cairns within the surrounding landscape appear to focus on the River Cree as a key part of their setting and due to the asset's proximity to the river it is proposed that the cairn was placed in its position to be viewed from the surrounding assets when looking towards the Cree Valley. As such, views towards the asset from these surrounding cairns are of importance. The views from Drumwhirn Cairn outwards towards the surrounding cairns are likely of some importance, but as it is one of the lowest assets within the study area in terms of elevation, it is proposed that views towards Drumwhirn are of more significance due to the high number of assets looking towards it. Further investigation of the relationship between these assets would enhance our understanding of prehistoric funerary practices and the chronology of the cairns themselves.

7.8.110 The ZTV (**Figure 7.2**) indicates that the full Proposed Development would be visible from Drumwhirn Cairn, located to the northeast, with the wirelines (**Figure 7.10,** VPCH6) confirming that all 14 wind turbine tips and hubs would be present within views to the northeast. The closest wind turbine is T14, located *c*.2.5 km to the northeast.

7.8.111 Due to its orientation behind the cairn, the Proposed Development would not be visible when looking from the asset towards the Cree Valley. The Proposed Development would be visible when travelling along the Cree Valley, particularly along the west bank of the River Cree. However, the ZTV presents a bare-earth scenario and the cairn is currently screened by intervening scrub and trees. Due to the orientation of the Proposed Development to the northeast of the asset, the cairn would not have turbines directly behind it when approaching from the north and the south along the valley. Thus, the Proposed Development would not be a distraction from any visual prominence that the cairn holds on approach. For both cases, the Proposed Development would not impact the ability to understand, appreciate or experience the asset and its connection to those aspects of its setting.

7.8.112 With regards to the relationship between the cairns in the surrounding landscape, there would be no proposed wind turbines obstructing views between cairns, as the cairns are concentrated outside of the northwestern field of view that the wind turbines would inhabit. Any views from the nearby cairns to Drumwhirn Cairn are unlikely to be impacted, with any wind turbine views being peripheral and a minor distraction to understanding their relationship. Views out from Drumwhirn to the cairns at the east and northwest are not anticipated to be impacted by the proposed turbines, however, turbines would be visible in views from Drumwhirn to the cluster of cairns to the north. Whilst, again, the modern additions to the landscape in the form of scrub and trees currently obscure views between the cairns it is likely that having prominent wind turbines in views slightly to the east of this cluster of cairns would have a minor impact on the ability to distinguish and understand the relationship between the cairns.

7.8.113 As such, a low adverse magnitude of impact would be anticipated as a result of the Proposed Development, resulting in an overall **Minor** level of effect. This is **Not Significant** in EIA terms.

White Cairn (SM1048)

7.8.114 The White Cairn is a circular kerbed cairn, measuring *c*.15 m in diameter and 4.6 m in height. The cairn appears to have been robbed, indicated by a 60 cm depression in the centre. There are intermittent traces of a kerb surrounding its base and no evidence of a central chamber. The asset has not been excavated, and despite the depression in the centre, it appears to be relatively well preserved. The cairn derives much of its cultural heritage significance from its archaeological interest, as it is an unexcavated example of a prehistoric funerary cairn. Further investigation of the asset may be able to identify a date of construction and further our understanding of prehistoric burial practices and society in the Cree Valley area.

7.8.115 The cairn is located on a south-facing slope, at approximately 140 m AOD. The Bargrennan Burn runs *c*.0.28 km to the west and the Fagan Burn runs *c*.0.6 km to the east, both running downslope to the south. The River Cree is located *c*.1.7 km south of the asset, with the Cree and the Cree Valley running roughly east to west through the landscape. The asset overlooks multiple confluences of burns to the south before they all eventually join the Cree. The cairn is currently situated within scrubland, with commercial forestry located between c.0.6 km and 1 km to the west, north, and east. The A714 is located *c*. 0.6 km to the south.

7.8.116 The asset also sits within a wider prehistoric landscape, with multiple prehistoric cairns nearby. The closest scheduled cairn is White Cairn (SM1049), located *c*.1.2 km to the southeast. The topography of the landscape between the two assets means that there is no visibility between them. The nearby cairns are also spread along the River Cree valley and, as with the White Cairn, likely share the Cree Valley as the main focus of their setting. Investigation of the visual or spatial connections between cairns along the Cree Valley would further our understanding of prehistoric funerary practices. Modern aspects of the current landscape, especially the forestry plantation surrounding the asset, currently obscure views between the assets, and the surrounding topography likely restricts any long-distance views to other cairns along the valley.

7.8.117 The asset derives part of its cultural heritage significance from its setting. The cairn is located in an upland environment, affording views to the south and east where the ground slopes downwards. In a bare earth scenario, views towards the east would likely be unobstructed however, commercial forestry is currently intervening. Cairns are often placed upon the higher ground at an elevated position, potentially indicating the presence of ancestors watching over a landscape they once interacted with. The ability to see a cairn when moving through a landscape may have been important as it may have produced a feeling of being watched over by ancestors. Furthermore, it is common for cairns to be located near natural routeways in the landscape, including watercourses, with the asset's location above the Cree Valley perhaps relating to this.

7.8.118 The ZTV (**Figure 7.2**) indicates that 13 proposed wind turbine tips would be visible from the asset, with the closest proposed wind turbine being T1 located 9.5 km to the southeast. The Proposed Development would not be visible when looking south from the asset towards the river valley nor when looking directly north from the river to the cairn. It may be present within views when approaching the asset down the Cree Valley from the west, however, due to the orientation of the wind farm to the southeast these views would be out of any main fields of view and any turbines would be peripheral at most.

7.8.119 As noted, whilst the Proposed Development would be fully visible from the asset in a bare earth scenario, the majority of the setting of the asset would remain intact, with the key views from the asset down into the Cree Valley and from the valley to the asset remaining unaffected. As such, a very low adverse magnitude of impact would be anticipated as a result of the Proposed Development, resulting in an overall **Very Minor** level of effect. This is **Not Significant** in EIA terms.

White Cairn (SM1049)

7.8.120 The White Cairn located 0.6 km west of Glentrool School is a chambered cairn or passage tomb, located in a clearing of a forestry plantation. The cairn measures 17.6 m by 15.3 m and is approximately 1.4 m in height. There is a singular narrow chamber running through the centre of the cairn, which is entered from the south and measures between 0.4 m and 0.8 m in width. Two lintels remain *in situ*, at the rear end of the cairn, with four pairs of orthostats lining the chamber. There are only seven visible orthostats.

7.8.121 This cairn is of the Bargrennan group, comprising cairns with narrow passages set within a round cairn. Bargrennan cairns are only found in southwest Scotland and approximately 16 Bargrennan cairns have been identified. The white cairn has been excavated in two instances, first in 1949 and then during 2004-2005. Whilst cremated remains were identified within the cairn, a definitive date could not be given for its construction. Evidence of pre-cairn Mesolithic material and later Bronze Age activity was recovered during the excavations; however, it is apparent that the cairn was heavily robbed pre-excavations.

7.8.122 The cairn derives much of its significance from its archaeological value. Whilst it has been previously excavated on two occasions, its well-preserved structure and advancements in scientific techniques provide the potential for further information regarding the dating of the asset, as well as providing further information about Bargrennan group cairns in general.

7.8.123 The asset is located at approximately 120 m AOD in an area of modern commercial forestry, *c.*0.46 km to the west of Glentrool Village. The landscape slopes gently to the east, culminating 0.5 km to the east at the Black Burn Watercourse. Cycle Route 7 runs 0.5 km west of the asset and meets the A714 *c.*1.7 km south of the cairn. The ground also slopes gently to the south, where it eventually meets the River Cree *c.*1.8 km to the south. Balunton Hill is located to the north of the asset, rising to 310 m AOD and screening long-distance views in that direction. An access path runs directly to the east of the asset and approaches the cairn from the south, with a sign constructed by Forestry Commission Scotland placed along this approach.

7.8.124 The setting of the cairn contributes to its significance. The cairn is a Bargrennan-type cairn, most often found in inland and upland landscapes, which is evident with this asset. The asset is in an upland area, and whilst not at the highest point in the landscape, it is certainly at a point which would offer wide-ranging views over the landscape to the south, east and west. The positioning of the opening of the tomb to the south may indicate that this is a particularly important view. The positioning of the cairn in an upland environment may have symbolically represented the deceased ancestors watching over land or people, or have significance when being viewed when approaching through a landscape. In addition, cairns are often found along natural routeways and may have acted as land or boundary markers.

7.8.125 Whilst the minor Black Burn is located *c.*0.5 km to the east of the asset, the potential for visibility from the asset to the burn and in return was unable to be ascertained due to the surrounding presence of the commercial forestry. In the same way, the visual association of the asset with the River Cree is unable to be determined due to the presence of commercial forestry surrounding the asset. In any case, whilst the River Cree may have been visible from the cairn, the cairn is unlikely to have been overly distinguishable within the landscape due to its distance from the Cree (2 km) and its height of 1.4 m.

7.8.126 The asset is situated within a wider prehistoric landscape, with multiple cairns nearby. The closest known cairn is SM1048, located *c.*1.2 km to the northwest. The intervening topography between these two cairns indicates that there is no intervisibility between these two cairns and they do not appear to be of the same typology, with SM1048 not being of the Bargrennan type. The closest Bargrennan-type cairn is Scheuchan's Cairn (SM1041) located *c.*6.2 km to the northwest. The intervening hilly landscape indicates that

there would have been no visibility between these cairns and as such a visual connection does not contribute to their significance, however, their spatial connection contributes to their significance.

7.8.127 The ZTV (**Figure 7.2**) indicates that 13 wind turbine tips would be visible from the asset, with the closest wind turbine (T1) being located *c.*8.4 km to the southeast. The Proposed Development would not be present within views to the south from the asset, from the entrance to the passage towards the River Cree, and would not be present in views directly north from the river to the asset.

7.8.128 The Proposed Development would be present in views when approaching the asset along the Cree from the west, however, due to the location of the development to the southeast it is unlikely that it would be present within a field of view when looking directly at the cairn.

7.8.129 As previously stated, there is currently commercial forestry surrounding the asset, which screens both external and internal views. However, as commercial forestry is temporary and there are periods of felling the potential for views of the Proposed Development cannot be dismissed.

7.8.130 The proposed wind turbines would be present within views to the east towards the Black Burn, as evidenced by the wireline (**Figure 7.11**) but due to their distance from the Black Burn they would not be so dominant in views as to impact the ability to understand, appreciate or experience the asset and its connection to its setting. As previously stated, there are no nearby cairns that share intervisibility with the asset however, the proposed turbines would be visible when looking towards Cairnsmore of Fleet, *c.*18 km to the southeast. Due to the height of the proposed turbines and their positioning directly in this field of view, they would likely distract from the prominence of the taller cairn within the landscape and impact the ability to understand and appreciate any relationship between the two cairns to some degree. Whilst it is not clear if this connection is intentional, due to differences in typology and distance, any connection would likely be impacted.

7.8.131 This aside, whilst the Proposed Development would be fully visible from the asset, there are no other parts of the asset's setting which contribute to its significance that will be impacted by the Proposed Development. The visual prominence of Cairnsmore of Fleet may be impacted when viewing from the asset, however, the relationship is undetermined.

7.8.132 As such, a very low adverse magnitude of impact would be anticipated as a result of the Proposed Development, resulting in an overall **Very Minor** level of effect. This is **Not Significant** in EIA terms.

Cairnsmore of Fleet (SM2316)

7.8.133 Cairnsmore of Fleet is a prehistoric burial cairn, believed to date from the Neolithic or Early Bronze Age. The cairn is roughly circular in shape, measuring 15 m in diameter and standing at a maximum of 2 m in height. There is evidence of a berm on the south and west sides, however, the scheduling description notes that this may be from modern involvement. There is currently a modern built cairn on its summit.

7.8.134 The cairn derives much of its significance from its archaeological interest, as an unexcavated prehistoric cairn. Further investigation of the cairn has the potential to further our understanding prehistoric burial practices and prehistoric society in general.

7.8.135 The cairn is located at the summit of Cairnsmore of Fleet Hill, *c.*40 m southwest of the modern summit cairn and trig point. The cairn is located on the summit plateau at approximately 710 m AOD, with Cairnsmore of Fleet being the highest point in the landscape. Cairnsmore of Fleet stretches into a ridge towards the southeast, with steep slopes in all other directions. The elevated position of the cairn provides wide ranging views in all directions, however, due to its placement at the south-west of the plateau,

views from the cairn appear to focus to the south, west and north rather than the east. The key feature that the cairn appears to focus on is the Solway Firth, Wigtown Bay and the River Cree. The River Cree runs from the northeast of the asset towards the south, where the bay and river meet the Solway Firth. The river is located *c*.6.7 km from the cairn at its closest point, however, the elevation of the asset means that it has wide ranging views along the river. The asset also has views across the Cree Valley and on clearer days Luce Bay and the Ayrshire coast can be seen to the west. The Galloway Hills can also be clearly seen to the northeast. From the cairn, the relatively rural landscape can be seen, with modern intrusions in the form of farmsteads, the village of Newton Stewart and surrounding settlements and a number of pre-existing windfarms, mainly focussed to the west and north-east.

7.8.136 The asset derives part of its cultural heritage significance through its setting. The asset's elevated position allows for the observation over the surrounding landscape, potentially symbolically allowing the dead to view over the lands that they once inhabited. Furthermore, the ability to see a cairn when moving through a landscape may have been important as it may have produced a feeling of being watched over by ancestors. As such, the placement of the cairn overlooking the natural routeway through the Cree Valley may have been extremely important. It was common for cairns to be located near natural routeways in the landscape, including watercourses, with the assets location above the Cree Valley perhaps relating to this. Cairns may have acted as boundary or land markers so their visibility when approaching through the landscape was likely of importance.

7.8.137 The asset sits within a wider prehistoric landscape, with evidence of significant prehistoric occupation throughout the Cree Valley and the surrounding hills. As mentioned previously, there are multiple prehistoric funerary cairns focused along the Cree Valley and due to the elevation of the Cairnsmore of Fleet cairn, it allows views over a large number of them. At a bare earth scenario, this includes SM5676, SM1019, SM10385, SM1021, SM1017 and The Thieves Standing Stones (SM1044).

7.8.138 Whilst any chronological connection between the assets cannot be ascertained without further archaeological investigation, the potential significance of the intervisibility between the assets is apparent and is significant in the ability to understand, appreciate and experience the prehistoric funerary landscape of the Cree Valley.

7.8.139 The ZTV (**Figure 7.2**) indicates that all 14 proposed wind turbines tips would be visible from the cairn. The photomontage (**Figure 7.12**) confirms this. The closest wind turbine to the cairn would be T13, located *c*.8.4 km to the northwest, with the Proposed Development orientated to the northwest.

7.8.140 The Proposed Development would not be present within views from the asset towards the Solway Firth and towards the Cree Valley to the south, southwest and west. The connection to this aspect of the assets setting would remain intact and the ability to understand the connection between the asset and this section of the landscape would be preserved.

7.8.141 Views towards the cairn when travelling along the Cree Valley from the south to the north would be unobstructed by the Proposed Development and whilst the Proposed Development may be present when looking directly to the north, it would not distract from the visual prominence of Cairnsmore of Fleet from the northeast and east. Parts of the Proposed Development would be present in views when travelling from the north of the Cree Valley towards the south and may be present within views towards Cairnsmore of Fleet. However, due to the distance of Cairnsmore of Fleet from this section of the river, it may be that the cairn would have been indistinguishable from the hilltop and views were not intended to be of significance.

7.8.142 The Proposed Development would not feature in views between the asset and cairns along the Cree Valley to the west, southwest and south, this includes SM1021, SM1017 and SM1938. The relationship between these cairns would remain intact.

7.8.143 However, the visual relationship between the asset and the cairns and other prehistoric assets to the northwest of Cairnsmore of Fleet would be impacted by the Proposed Development. These assets include SM1044, SM5676, and SM1019 and SM1048-9. The proposed turbines in the south of the Site, namely T11, T12, T13 and T14 would provide a visual obstruction both in views from and towards Cairnsmore of Fleet. Views towards Cairnsmore of Fleet from the assets along the more northernly part of the valley would be partially obstructed and Cairnsmore of Fleet's visual prominence within the landscape would be impacted. Furthermore, the placement of the turbines between the asset and the other cairns would mean that their visual relationship would be interrupted, but not fully eroded.

7.8.144 Whilst the sensitivity of setting is considering Medium and key parts of the asset's setting which contributes to its significance would be maintained, the relationship with cairns along the more northerly part of the Cree Valley would be impacted. As such, there would be an erosion, to a clearly discernible extent of the ability to understand and appreciate this aspect of the asset's cultural significance. It is anticipated that there would be a Medium Magnitude of Impact, resulting in a **Moderate** Significance of Effect.

7.8.145 Whilst this is considered **Significant** in EIA terms, it does not equate to a level of impact which would result on an impact on the integrity of setting on the asset, as all other key aspects of the assets setting, and its archaeological interest, remain intact.

7.8.146 Therefore, in line with NPF4 Policy 7, Paragraph h, ii *"significant adverse impacts on the integrity of the setting of a scheduled monument are avoided;"* it is not considered that the Proposed Development would be a significant adverse impact upon the integrity of setting which contributes to the overall cultural significance of the monument.

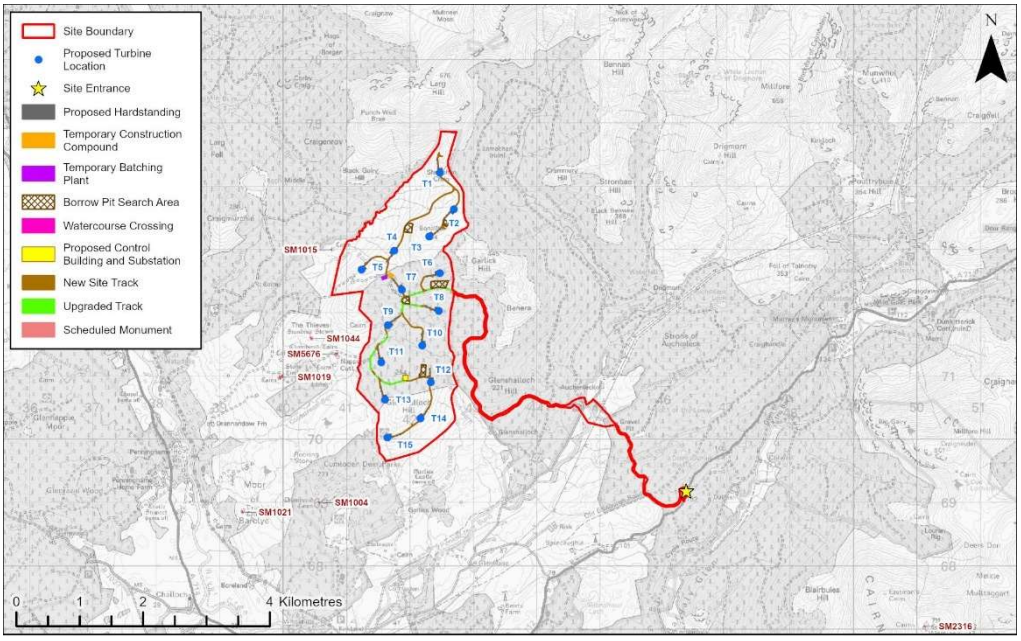
Group Value

7.8.147 Within the region of the Cree Valley there are a number of monuments that relate to one another through shared visibility and enhancing the understanding of how the landscape was utilised between the Neolithic to the end of the Bronze Age. These monuments are:

- Dalvaird Cairn (SM1015);
- The Thieves, Standing Stones (SM1044);
- Drumfern Cairn and Stone Circle (SM1019);
- Nappers Cottage, Chambered Cairn (SM5676);
- Cordorcan Cairn (SM10385);
- Drumwhirn, Cairn (SM1021);
- White Cairn (SM1048);
- White Cairn (SM1049); and
- Cairnsmore of Fleet (SM2316).

7.8.148 These monuments all share intervisibility with one another. It is theorised that there is a potential genealogical pattern which is reflected in a manner that represents a journey through the past of their ancestors. This is often linked to waterways and valleys and this can be shown through the intervisibility between the monuments and which asset looks at one another and vice versa.

Plate 7.8: Assets that relate to one another in proximity to the Proposed Development



7.8.149 For example, SM1015, only looks at SM10385 over the valley of Cordorcan Burn, however, SM10385 shares links with SM1021 and SM2316. Also looking at SM021, is SM1048 and despite their close proximity, SM1049 cannot be seen from SM1048. With many of the assets listed, many share intervisibility with SM2316, this is due to its placement upon the highest point in the landscape. Another which many share intervisibility with is SM1021, which appears to be a focal point in this prehistoric landscape. Many of the assets are able to appreciate it from their locations, all except SM1015 and SM1049.

7.8.150 Equally, as discussed in their own sections, the monuments relating to one other is key to their understanding, appreciation and experience in this landscape. It is also a key factor in the integrity of their settings, as they can each enhance the ability to understand this landscape further and what it was used for. Beyond this, their association with the valley and River Cree, as well as its tributaries, are fundamental in their setting. The cairns appear to follow the path of the valley throughout the landscape, stretching from the Solway Firth and reaching further inland. From their heavy concentration along the banks of the Cree it can be deduced that these monuments are heavily associated with the watercourse and the path it takes through the landscape.

7.8.151 It is worth noting however, that to the north and the south of the Proposed Development there is a significant number of modern intrusions, including the aforementioned windfarms to the north and the town of Newton Stewart to the south. As well as this, there are dense plantations of commercial forestry obscuring views surrounding many of the assets.

7.8.152 Whilst the Proposed Development would be visible from many of the monuments as set out above, the overall integrity of group value of the monuments would be retained in the contribution they provide to one another's setting. The Proposed Development would not alter the ability to understand, appreciate or experience the group value these monuments contribute to collectively. As such the Proposed Development is not considered to impact upon the group value's integrity to such a degree that would result in an adverse affect to the contribution of the prehistoric landscape surrounding the Cree Valley.

Other Assets

Garlies Castle (SM7916)

7.8.153 The monument comprises a late 15th-century tower house, with later extensions. Situated on the south eastern slopes of Glenmalloch Hill, the castle sits on the confluence of Peat Rig Strand, Castle Burn and Pulcree Burn. Depicted on Hole, 1607 as a fortification, it is later shown on Dorret, 1750 as a central place depicting the tower house. The monument is then depicted on Roy (1755), surrounded by forestry and farmsteads such as Glenmalloch and Glenshalloch. Later shown on Arrowsmith, 1807, it is surrounded by further post medieval farmsteads which are corroborated with the HER. Upon inspection of the 1st Edition OS Map (1847), the castle is shown to be in ruins but surrounded by Garlies Wood, a deer park associated with the monument. It currently sits within the remains of Garlies Wood in ruinous condition with large portions of rooting occurring upon the stonework of the monument, displacing the structural integrity of the asset.

7.8.154 The monument's placement is that of a defensive nature, bracketed by watercourses and boggy ground to make advancement difficult. It also overlooks the Valley of Penkiln Burn to the east and west. The ground to the south west flattens and provides outward views over Newton Stewart and the estuary of Solway Firth, which would have been a routeway into the area at the time.

7.8.155 A large overhead 132 kV line runs east to west within these views as well as large dense coniferous forestry to the north east (1.4 km) and south of the monument (0.9 km). Newton Stewart itself has also expanded since its inception, which may have been part of the castle's expansion in later times. Located 2.5 km to the south west, Newton Stewart is visible from the castle with many of its modern housing also visible.

7.8.156 **Figures 7.2** and **7.13** show that several hubs of the Proposed Development's wind turbines and four tips would be visible from the monument. The Proposed Development lies 1 km to the north west of the asset with the closest wind turbine being T14. The monument's significance derives from its ability to increase our understanding of medieval settlement and society in south west Scotland. The aspects of setting which contribute to the asset's cultural heritage significance primarily comprise its immediate topographic setting which provided natural defensive features and views to the east and west along the Penkiln Burn. It is therefore considered that the magnitude of impact from the Proposed Development would be Very Low, resulting in a **Very Minor** Significance of Effect. This is **Not Significant** in EIA terms.

Deil's Dyke (SM1966)

7.8.157 Deil's Dyke is a linear earthwork and, in it's entirety, extends approximately 10 km from north-west to south-east, roughly following the contours from New Cumnock to Burnmouth. The dyke was likely formed of scraped earth construction, giving it a rounded profile with a wide slope on either side. Some portions differ and appear to be of bank and ditch construction, where the surviving ditch is no wider than 0.5 m. The entire feature is an earthen bank, between 2 m to 4 m in width and 0.7 m high where visible. It is reduced where later agricultural activity and cultivation eroded the above-ground remains. It is unknown if the dyke was built as a continuous boundary, as its surviving remains are highly fragmented and parts have been utilised in the post-medieval and modern periods as agricultural boundaries, occasionally seen reinforced with stone. Some portions of the dyke follow an irregular course, presumed to be laid to enclose and separate the fertile land from the uplands. The scheduled portion of the asset is a 400 m stretch of the dyke, approximately 7 km to the west of the Site boundary. It survives as a severely degraded bank, reduced as a result of the use of the land for grazing and pasture land.

7.8.158 The dyke's original purpose is unknown, though thought to date from the medieval period, where the area was utilised for agriculture. Its presumed function is as an agricultural field boundary, where its course traversing the contours between 125 m and 300 m AOD divides upland pasture from lowland arable land. It possesses no qualities which would identify it as a defensive boundary and runs independently from any known parish or historical boundaries. In this, it would be unlikely to have been constructed as a continuous boundary, but rather as several fragments along a similar route. Its route is marked and labelled on the 6-inch 2nd edition OS map (1900).

7.8.159 Deil's Dyke has been identified as beginning from Burnmouth, heading west and terminating at the River Nith at New Cumnock. The dyke has few interactions with other potentially contemporary heritage assets. At some points, it intersects or runs alongside other field boundaries (Clenrie (MDG5209), Knockreoch (MDG3418), and Upper Knockreoch (MDG9461)) over 8 km to the east of the Site boundary. The scheduled area of the dyke is approximately 7 km to the west of the Site on the southern slope of Hill of Ochiltree. Approximately 300 m to the east, the dyke intersects an upstanding field system and boundary – Craigie, field system (MDG14686). An area of rig and furrow is visible to the southern, lower elevations on aerial imagery and is bounded to the north by the asset. From the scheduled portion, the dyke heads in a roughly east to west orientation across the sloped area. Following the line of the dyke to the east, there are extensive views to the hills north of Newton Stewart.

7.8.160 It is assumed that its cultural heritage significance lies in its survival as a possible medieval boundary, which has the potential to inform on the divisions and land-use of the agricultural activity of the period.

7.8.161 The asset derives part of its cultural heritage significance from its setting, composed of its relationship to the immediate landscape which it relates to as a boundary feature of some form. Its non-designated portions provide important setting elements, extending its perceived influence beyond the scheduled fragment. Where the dyke continues eastward, there would have likely been good visibility of the boundary it created across the landscape. Views downslope to the immediate worked land, surviving as visible rig and furrow, would have evidenced its possible demarcation of arable land.

7.8.162 The Proposed Development would place 13 wind turbines within the distant eastern views from the scheduled portion of the dyke. The majority of these would be visible above the horizon. This would not result in change that would affect an understanding of the dyke as the immediate views towards the rig and furrow would be unaffected and views along the length of the dyke's course to the east would not affect an understanding of a boundary feature. As such, **no impact** is predicted.

Challoch, All Saints Episcopal Church (LB19190)

7.8.163 This asset comprises a late 19th century episcopal church, its boundary walls and gatepiers. The church was built in 1871 to 1872 in an Anglican style as an aisleless church. The building is of decorative red sandstone, ashlar and whinstone construction and features two porches with timber trimmed openings, a chancel, and a vestry. The interior structure showcases the timber constructure vaulted ceiling, framing the entrance to the chancel. The interior retains the original fine fittings. The ashlar octagonal font, marble colonnetted pulpit and the decorative wrought-iron and brass lectern are of considerable note. Other original fittings include the forked brass candlesticks in pews, the scrolled wrought-iron posts, and the decorative tiling at the entrance and by the reredos.

7.8.164 The church has been in ecclesiastical use since its construction, originally built as a private chapel for Edward J Stopford Blair of Penninghame House, 2 km north of Challoch. The Scottish Episcopal Church of the Diocese of Glasgow and Galloway hold services here in the present day. The use of the church since its consecration has resulted in the preservation of its internal and external features.

7.8.165 The church is set within its boundary walls of whinstone rubble construction, with red sandstone coping. It has an irregular boundary with the main road to the east, and a squared boundary to the north, west, and southern sides with the church in the north-western corner. Surrounding the church on its eastern and southern sides are a cemetery, in use alongside the church. The church and the associated assets are the northern-most buildings in Challoch, which is composed of a parsonage, school, and smithy. Challoch church sits within an area of flat, rural fields which rise to an area of higher elevation to the north-east, approximately 1 km away. The church is prominently visible from the approach on the B7027 heading east and when travelling on the adjacent A714. The setting of the church is defined by its immediate boundaries and associated cemetery, as well as its prominence in the landscape on approach. The landscape has undergone very little change and development, preserving the original setting of the church.

7.8.166 The church derives much of its cultural heritage significance from its architectural and historical interest. The church's internal original fittings and furnishings have specifically been well-preserved, warranting its listing as a Category A listed building. The church's significance is also partially derived from its setting, described above, which has largely remained unchanged since its construction.

7.8.167 The Proposed Development would introduce 13 wind turbines within 7.6 km of the asset, with the nearest being T14 at 3.8 km to the north-west. The appreciation of the architectural and historic interest of the church is considered to be principally experienced within its internal spaces and within its immediate proximity, specifically (when considering external areas) its bound churchyard and its immediate vicinity. These experiences would be wholly unaffected as would the approach to the church should visibility of its relatively diminutive bell tower be considered important. It is therefore considered that the proposals would have **no impact** on the asset.

Cumloden House (LB17052)

7.8.168 Cumloden House was built by Sir William Stewart, the second son of the 7th Earl of Galloway, in approximately 1820. The house is a single storey with an attic and is built in a gothick cottage house style. The house is extensively gabled, has a painted render, painted margins, and rusticated quoins. The house has a number of interesting architectural features throughout, including scrolled barge boarding, pointed arched windows, diamond paned glazing, a braced timber balcony on the south elevation, armorial bearings of the Earls of Galloway, and extensive gabelling. The south elevation is the principal elevation, with an ogee-arched stone and heraldic stone that was transferred from nearby Garlies Castle in the early 20th century.

7.8.169 Cumloden House was originally a temporary residence for the Earls of Galloway, with the family primarily based at Galloway House from 1740. After Galloway House was sold in 1908, Cumloden House became their main seat. The Earls of Galloway owned a large amount of land in the Newton Stewart area, including Garlies Castle (SM7916) located *c.*1.5 km to the northeast, and Glenmalloch Lodge (LB17051) located *c.*0.8 km to the northeast. Garlies Castle was the original seat of power for the Earls of Galloway and Glenmalloch Lodge was originally built as Cumloden School, by the 9th Earl of Galloway and his wife, in order to educate children in the Newton Stewart area.

7.8.170 The asset derives much of its cultural heritage significance from its architectural and historical interest. The architectural interest of the house can be found in its well-preserved gothic cottage features and the parts of the earlier Garlies Castle used on its south elevation. The historic connection with the Earls of Galloway is also of interest as the earls are an important family throughout Scottish history.

7.8.171 Cumloden House is located within a designed landscape, which historically comprised a combination of woodland, parkland and outbuildings. Woodland throughout the estate is a mixture of deciduous and evergreen trees. The outbuildings surrounding the house

include the stables (LB17054) located *c*.90 m to the northeast, the garden cottage and walled garden (LB7037), and the aforementioned Glenmalloch Lodge (LB17051).

7.8.172 The setting of Cumloden House contributes to its cultural heritage significance. As previously stated, Cumloden House is located within a designed landscape. The main approach to the house is from the south, with a drive leading northwards from old Edinburgh Road. The drive is a tree-lined avenue at its most southernly point, before passing through the western extent of the historic Cumloden Wood and then an area of open parkland before arriving at a more open drive at the southeast of the house. This approach provides a secluded and enclosed approach towards the house, before opening up into views that provide points of appreciation of the house. Views to the north from the drive would include the house and the woodland that encloses the estate, screening views to the north.

7.8.173 The estate is bordered to the west by the Penkiln Burn. There is an area of parkland to the north of Cumloden House, with a wooded area between the house and the walled garden to the northeast. Historic mapping shows that an avenue once existed between the house and the walled garden, however, the presence of this is no longer visible from aerial photographs. A larger area of parkland is present within the centre of the estate and to the east of the house, with Cumloden wood surrounding it.

7.8.174 Cumloden Wood appears to have had a number of pathways and walks through it, including along the Penkiln Burn. Views outwards from the house appear to be screened by these historic plantations and the screening and surrounding of the estate with woodland likely intended to afford a sense of seclusion and privacy to the estate. Views out of the house in all directions are screened in part by the historic forestry that surrounds the house and estate.

7.8.175 The historical seat of the Earls of Galloway, Garlies Castle, is located *c*.1.4 km to the northeast and located at *c*.100 m AOD. As its situated at a higher elevation than Cumloden House, there is the potential that it was originally included in a designed view from the parkland to the north of the house. The ruinous nature of Garlies Castle and the density of trees surrounding both it and Cumloden House makes this visual connection indistinguishable in the present day. The placement of Glenmalloch Lodge to the northeast of Cumloden House between the house and the castle may have also been intentional, however as Glenmalloch Lodge is located at a lower elevation it is unlikely that it was intended to be visible within key views from the house.

7.8.176 The ZTV (**Figure 7.2**) indicates that the Proposed Development would be present in views from Cumloden House, with the closest wind turbine, T14, located *c*.2.3 km to the north. The wireline (**Figure 7.15**) shows that all 14 proposed wind turbine tips and blades would be visible from the drive to the south of the house in a bare earth scenario. In a bare earth scenario, these turbines would be present behind the house and would impact the ability the appreciate the house and its cultural heritage significance. However, the historic deciduous and coniferous trees that are present both surrounding the driveway and behind the house enclose the house completely. This would screen the Proposed Development in views towards the north.

7.8.177 As previously noted, the connection between Garlies Castle and Cumloden House is not visually perceivable due to the surrounding woodland and the ruinous nature of the castle. Whilst the Proposed Development would be present behind views between the house and the castle in a bare earth scenario, located behind the castle in views to the north, this relationship is no longer understood visually due to the survival of the castle and screening.

7.8.178 Views out from the principal elevation of the house are south facing, which would not include the Proposed Development.

7.8.179 As the aspects of the setting of Cumloden House that contribute to its cultural heritage significance will not be impacted by the Proposed Development, **no impact** is predicted.

Drannandow Farm (LB17056)

7.8.180 Drannandow Farmhouse is an early to mid-19th century single-storey and attic gabled farmhouse. The main house is asymmetrically gabled, has bull-faced granite margins, and long and short quoins. The eastern elevation is the principal elevation and contains two gables with asymmetrical windows on both the lower and attic storeys. There is evidence of some architectural changes over the years, with a modern glasshouse in the centre of the south elevation and a replacement panelled door on the eastern elevation. Whilst modernised in places, the house is a good example of a well-preserved 19th-century farmhouse and this architectural interest contributes to its cultural heritage significance.

7.8.181 The asset is situated within the Drannandow Farmstead, which can be seen on historic mapping dating back to the 1700s (Roy Military Survey of Scotland, 1747-1755). The farmstead is still a working farmstead, with later farm buildings to the direct northeast of the house screening views in that direction. The farmhouse has a drive that branches from National Cycle Route 7, which is located *c.*0.5 km to the southwest. The River Cree runs adjacent to National Cycle Route 7. Drannandow Farmstead currently farms livestock, with the majority of the surrounding land being used for rough grazing with a mixture of enclosed field systems and open spaces. There is a private garden to the west of the farmhouse itself. From historic mapping, it is clear that the agricultural land surrounding the farmstead has retained the historic nature of the landscape. Whilst there are elements of modern agricultural practices within the landscape, the agricultural aspects of the surrounding landscape contribute to the asset's significance. The setting of the asset derives from its placement within this agricultural and pastoral land, enabling our ability to understand and appreciate the farming function of the asset and its associated historic interest.

7.8.182 The ZTV (**Figure 7.2**) indicates that all 14 wind turbines would be visible from the Proposed Development, with the closest wind turbine being T12 *c.*2.8 km to the east. The photomontage (**Figure 7.16**, VPCH12) shows that four proposed wind turbine hubs and up to seven proposed wind turbine tips would be visible from the asset, as farm buildings to the north and east screen the majority of the turbines from view. Whilst the wind turbines are still present in views outside of the farm buildings, they do not cause a distraction to the ability to understand and appreciate the immediate agricultural setting of the asset, and its farming function. Furthermore, the Proposed Development is not present in any key views when looking at the key architectural features of the asset and would not impact the ability to appreciate this aspect of the asset that contributes to its significance.

7.8.183 As such **no impact** is predicted.

Coldstream Burn – Archaeologically Sensitive Area (ASA)

7.8.184 The Archaeological Sensitive Area of Coldstream is a complex and unique in its occupation through time. The area of the southwest of Blair Hill has been occupied consistently for Neolithic and Bronze age as a funerary landscape, showing the reuse of a funerary landscape across a series of generations in the area. Its resurgence of use in the medieval and post medieval periods indicates its rich land use through the farming reformation in the 15th century.

7.8.185 The prehistoric monuments contribute heavily to one another and their intwined relationships enhance the ability to further understand the ritualistic landscape they once held, especially in the funerary context of which, in Dumfries and Galloway in particular, very little is known. The relationships between the monuments enhance the ability to appreciate their function in a way that cannot be easily appreciated when they are considered in isolation. The full purpose of these monuments may be unclear but it is clear that they evidence the funerary landscape which may have been referenced in the

ritualism of the stone circles of Drumfern (SM1021) and the Theives (SM1044). The funerary landscapes of the ASA are fully appreciated in the centre of the area between Drumfern, The Thieves and Nappers Cottage. Whilst not all are wholly intervisible with one another the movement through the funerary landscape can be appreciated as outlined previously.

7.8.186 The improvement of the medieval and post medieval farming landscape demonstrates change which retained features from the prehistoric period.

7.8.187 The landscape of the ASA holds significance through the retention of the prehistoric features within a later landscape moulded by medieval and post medieval change, with assets from the later periods evidencing sequential occupation and activity.

7.8.188 The Proposed Development would be visible from much of the ASA, which sits partially within the boundary of the Site.

7.8.189 The physical area of the ASA which sits within the Site is considered to be relatively insignificant compared to other parts of the ASA. It is noted that no medieval or post medieval agricultural features identified by SLR during a walkover would be affected by the proposals. Notably, no remains of prehistoric date are recorded within this part of the ASA.

7.8.190 With regard to setting change, the effects as gauged in respect to contingent scheduled monuments would be an appropriate gauge in respect to assessing an impact.

7.8.191 The ASA as a designation is considered to be of Medium significance as it is protected under LDP and not at a national level. With the previously mentioned setting and it being considered of low sensitivity to change, it is considered that the magnitude of change would be **Medium** adverse resulting in a significance of effect as **Minor.** This is considered **Not Significant** in EIA terms.

7.9 Decommissioning Effects

Potential Effects

7.9.1 There would be no negative effects upon the setting or significance of any assets within 10 km, as the landscape would be returned to its original state. There would be no direct effects on any assets as there would be no new ground works during this stage.

Residual Post-Operation Effects

7.9.2 There would be no residual effects resulting from the decommissioning of the Proposed Development. The landscape would be reinstated to its original state following decommissioning.

7.10 Enhancement Proposals

7.10.1 Enhancement opportunities are detailed in **Appendix 7.3**.

7.10.2 All enhancement measures have been created in line with recent ALGAO Guidance (2023) and align with the principles that support HEP. It is considered that the measures set out for the assets outwith the Site are considered enhancement measures due to the lack of current access to the monuments, including the ability to understand and appreciate their contributors to cultural heritage significance.

7.10.3 A summary of the enhancements is outlined below:

- Enhancement of appreciation points at the assets along with the provision of Interpretation Boards to further the understanding and experience of the monuments as depicted in **Figure 7.**4.
- Creation of designated pathways to access monuments and limit foot erosion.

- Provision of improved parking availability to provide more access to appreciate the monuments.
- Outreach to local communities in the form of presentation by industry leaders for furthering understanding of the history in the area.
- Excavation and publication of results of any archaeological investigations within Site with local groups/Student Summer Schools in conjunction with Local Universities or Colleges. This would be subject to agreement with the local authority.
- Removal of intrusive vegetation upon Garlies Castle (SM) once agreement has been secured with Scottish Ministers in line with HES under Scheduled Monument Consent.
- A LiDAR survey of the Site to assist local groups in visually understanding their history.
- Appointment of a Heritage Ranger to oversee and implement the measures outlined above.

7.10.4 These measures shall be implemented under a Cultural Heritage Management Plan to be agreed with HES and DGC Archaeologist. The creation of designated pathways would be subject to the Bird Disturbance Management Plan (BDMP) and Black Grouse construction mitigation detailed in **Chapter 9: Ornithology**. Implementation of the proposed enhancements could be a condition of consent of the Proposed Development.

7.11 Assessment of Residual Effects

Construction (Direct) Effects

7.11.1 As outlined previously, mitigation in various forms is proposed in **Table 7.7**.

7.11.2 Any residual effects would be in accordance with those outlined in **Table 7.7;** however adverse effects would be offset by the positive effect that archaeological recording would have in respect to the wider benefit to the archaeological and local community and preserved through recording in agreement with DGC Archaeologist.

Operational (Settings) Effects

7.11.3 Residual Operational effects are summarised in **Table 7.8**.

Decommissioning Effects

7.11.4 As outlined previously, decommissioning of the Proposed Development would not result in any adverse effects and thus there would be no decommissioning effects.

7.12 Assessment of Cumulative Effects

7.12.1 Cumulative effects have been considered with regard to any wind farm developments that are:

- Consented or the subject of valid but currently undetermined planning or s36 applications);
- within 15 km of assets of any nationally important assets anticipated to be subject to a Moderate adverse effect (or above) as a result of the Proposed Development.

7.12.2 Operational wind farm developments are considered under the baseline assessments of assets.

Dalvaird Cairn, (SM1015)

7.12.3 The asset is described in Section 7.8. A photomontage of the asset is provided in **Figure 7.5**.

7.12.4 There are no consented or undetermined applications within 15 km of the asset, with the closest scheme being Kilgallioch Extension Wind Farm at 16.1 km to the north west. As such there is no cumulative impact to assess.

The Thieves, Standing Stones (SM1044)

7.12.5 The asset is described in Section 7.8. A photomontage of the asset is provided in **Figure 7.6.**

7.12.6 There are no consented or undetermined applications within 15 km of the asset, with the closest scheme being Kilgallioch Extension Wind Farm at 15.7 km to the north west. As such there is no cumulative impact to assess.

Drumfern Stone Circle and Cairn (SM1019)

7.12.7 The asset is described in Section 7.8. A photomontage of the asset can be found in **Figure 7.7**.

7.12.8 There are no consented or undetermined applications within 15 km of the asset, with the closest scheme being Kilgallioch Extension at 15.1 km to the north west. As such there is no cumulative impact to assess.

Nappers Cottage Chambered Cairn (SM5676)

7.12.9 The asset is described in Section 7.8. A photomontage of the asset can be found in **Figure 7.8**.

7.12.10 There are no consented or undetermined applications within 15 km of the asset, with the closest scheme being Kilgallioch Extension at 16 km to the north west. As such there is no cumulative impact to assess.

Cairnsmore of Fleet (SM2316

7.12.11 The asset is described in Section 7.8. A photomontage of the asset can be found in **Figure 7.12**.

7.12.12 There are no consented or undetermined applications within 15 km of the asset, with the closest scheme being Blackcraig at 24 km to the north west. As such there is no cumulative impact to assess.

7.13 Summary

7.13.1 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 and indirect 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.

7.13.2 The assessment has considered the potential setting impacts on the designated heritage assets outlined in **Table 7.8**, which provides a summary of the identified significance of effect upon them.

7.13.3 Mitigation through design has been embedded, as outlined in **Chapter 3: Design Evolution and Alternatives**, and efforts have been taken to ensure that the assets outlined in **Table 7.8** have been considered during the design process, as well as seeking ongoing

advice from HES in regard to mitigating any effects where possible. This has resulted in the reduction in number, and relocation of wind turbines away from assets.

7.13.4 Of the 24 assets assessed and listed in Table 7.8, Moderate adverse effects upon setting are predicted upon five monuments:

- The Thieves Standing Stones, (SM1044),
- Drumfern, Cairn and Stone Circle (SM1019),
- Nappers Cottage, Cairn (SM5676):
- Cairnsmore of Fleet (SM2306); and
- Dalvaird, Cairn, (SM1015).

7.13.5 These effects are considered **Significant** in EIA terms but not enough to adversely impact the integrity of setting upon the monuments.

7.13.6 Whilst the Proposed Development would marginally erode the ability to experience these monuments to an extent, the ability to understand and appreciate the monuments and their settings would be retained. Whilst the sense of place of Dalvaird Cairn (SM1015) monuments will be marginally eroded, the ability to understand, appreciate and experience this asset and the others will still remain. The integrity of the setting of these monuments is comprised of a large number of elements, primarily their outward views to the Cree Valley. The interrelationships between them are also a contributing factor in their group value and the visual connections they share, all of which would remain unaffected by the Proposed Development.

7.13.7 The intrinsic, associative and contextual characteristics of the monuments would be retained should the Proposed Development be constructed. These characteristics have heavily influenced the design of the Proposals. This has occurred through deletion and relocation of turbines as outlined above, in particular to avoid or minimise potential effects on the monuments of Dalvaird Cairn, (SM1015) and Nappers Cottage, Cairn (SM5676).

7.13.8 Therefore, the Proposed Development would impact on the setting of the monuments of assets outlined above, however, whilst these are considered Significant in EIA terms, they are not considered to impact upon the integrity of the setting of the monuments as outlined in NPF4 (2023). Under HEP4 of HEPS (2019) and NPF4 (2023) mitigation through design has occurred to reduce and remove impact on the setting of the monuments. As such the integrity of the assets setting would remain and therefore the Proposed Development would be in line with NPF4 (2023).

Table 7.8: Summary of Residual Effects

Asset	Type of Impact	Likely Significant Effect	Mitigation	Means of Implementation	Residual Effect	Significant in EIA terms
Clearence Cairn (SLR97)	Direct	Minor	Watching Brief	N/A	Minor	No
Sheep Fold (SLR49)	Direct	Minor	Fencing Off	Planning Condition	Minor	No
'Threave Cairn' Structure (SLR16)	Direct	Minor	Fencing Off	Planning Condition	Minor	No
Named Cairn (SLR78)	Direct	Minor	Fencing Off	Planning Condition	Minor	No
Boundary Bank (SLR52)	Direct	Minor	Photographic Record	Planning Condition	Minor	No
Glenmalloch Hill Enclosure ('old fence') (SLR41)	Direct	Very Minor	N/A	N/A	Very Minor	No
Unknown buried remains	Direct	Moderate	Possible watching brief	Planning Condition	Moderate	No
Dalvaird, Cairn (SM1015)	Direct (Setting)	Major	Embedded Measures/Enhancement[5]	Legal Agreement	Moderate	Yes
The Thieves, Standing Stones (SM1044)	Direct (Setting)	Moderate	Embedded Measures/Enhancement[5]	Legal Agreement	Moderate	Yes
Drumfern, Stone Circle and Cairn (SM1019)	Direct (Setting)	Moderate	Embedded Measures/Enhancement[5]	Legal Agreement	Moderate	Yes
Nappers Cottage, Chambered Cairn (SM5676)	Direct (Setting)	Moderate	Embedded Measures/Enhancement[5]	Legal Agreement	Moderate	Yes
Cordorcan Cairn (SM10385)	Direct (Setting)	Minor	N/A	N/A	Minor	No

[5] The creation of designated pathways and implementation of any measures such as fencing would be subject to the Bird Disturbance Management Plan (BDMP) and Black Grouse construction mitigation detailed in **Chapter 9: Ornithology**.

Asset	Type of Impact	Likely Significant Effect	Mitigation	Means of Implementation	Residual Effect	Significant in EIA terms
Drumwhirn, Cairn (SM1021)	Direct (Setting)	Minor	N/A	N/A	Minor	No
White Cairn (SM1048)	Direct (Setting)	Very Minor	N/A	N/A	Very Minor	No
White Cairn (SM1049)	Direct (Setting)	Very Minor	N/A	N/A	Very Minor	No
Cairnsmore of Fleet (SM2316)	Direct (Setting)	Moderate	N/A	N/A	Moderate	Yes
Garlies Castle (SM7916)	Direct (Setting)	Very Minor	Embedded Measures/Enhancement	Legal Agreement	Very Minor	No
Deils Dyke (SM1966)	Direct (Setting)	None	N/A	N/A	None	No
Challoch Church (LB19190)	Direct (Setting)	None	N/A	N/A	None	No
Cumloden House (LB17052)	Direct (Setting)	None	N/A	N/A	None	No
Drannandow Farm	Direct (Setting)	None	N/A	N/A	Neutral	No
Coldstream -ASA	Direct	Minor	N/A	N/A	Minor	No
Clearence Cairn (SLR97)	Direct	Very Minor	N/A	N/A	Very Minor	No
Sheep Fold (SLR49)	Direct	Minor	Fencing Off	Planning Condition	Minor	No

8 Ecology Assessment

8.1 Executive Summary

8.1.1 This chapter considers the potential for significant effects upon important ecological features (IEFs) associated with the construction, operation and decommissioning of the Proposed Development.

8.1.2 Baseline conditions to inform the design and assessment of the Proposed Development have been established through desk study, ecological field surveys in accordance with industry standard guidance, and consultation with nature conservation bodies.

8.1.3 The Site does not form part of any statutory designated site for nature conservation with ecological qualifying interests. There is a small area of ancient woodland within the Site, present along the existing access track to be upgraded, however no mature/semi-mature trees are expected to be lost here as a result of the Proposed Development.

8.1.4 Baseline studies have established the Site is used by badgers, bats, otters, reptiles and trout. The risk to all species, including high collision risk bat species, is considered to be low based on the levels and distribution of species activity recorded. The main and most extensive habitats present within the Site are commercial conifer plantation and marshy grassland, with several other habitat types making up the remainder of the Site, including areas of bracken, blanket bog, wet modified bog, wet heath and a range of grassland types.

8.1.5 The Proposed Development has been designed to minimise impacts on important habitats or protected species as far as practicable. Embedded mitigation, good practice measures, and pre-construction checks (as directed by an appointed suitably qualified Ecological Clerk of Works (ECoW)) will ensure the protection of protected species during construction works associated with the Proposed Development.

8.1.6 The most tangible effect during the construction phase of the Proposed Development will be direct habitat loss due to the construction of new infrastructure. Effects upon blanket bog and wet modified bog are assessed. No significant effects are predicted.

8.1.7 No significant effects are predicted with respect to protected species.

8.1.8 In addition to habitat reinstatement following the cessation of construction works, the Proposed Development also provides an opportunity to deliver long-term beneficial habitat enhancement measures for habitats and species, including specific management for peatland restoration and enhancement, bracken control for acid grassland restoration, riparian broadleaved planting, conifer replacement with native broadleaved woodland and green roof creation. These proposals form the basis of the Outline Biodiversity Enhancement Management Plan (OBEMP) (**Technical Appendix 8.6**) which will deliver significant biodiversity enhancement at the Site. A Biodiversity Net Gain (BNG) assessment and metric indicates measures proposed in the OBEMP would deliver a 29 % net gain for biodiversity.

8.1.9 Residual effects upon any IEFs are predicted to be not significant as a result of the Proposed Development alone, or cumulatively, with any other wind farm development.

8.2 Introduction

8.2.1 This chapter provides an assessment on the potential effect of the Proposed Development on non-avian ecology and the likely significant effects resulting from the construction, operation and decommissioning of the proposed wind turbines and associated infrastructure.

8.2.2 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 effects, including direct, indirect and cumulative effects;
- describe the mitigation measures proposed to address the likely significant effects; and
- assess the residual effects remaining following the implementation of mitigation measures.

8.2.3 The assessment has been carried out by MacArthur Green in accordance with NatureScot (2018) (formerly Scottish Natural Heritage) and Chartered Institute of Ecology and Environmental Management (CIEEM 2024) guidance. All staff contributing to this chapter have undergraduate and/or postgraduate degrees in relevant subjects, have extensive professional ecological impact assessment experience, hold professional membership of CIEEM and abide by CIEEM Code of Conduct.

8.2.4 The chapter is supported by:

- Technical Appendix 8.1 – National Vegetation Classification (NVC) and Habitats Survey Report[1];
- Technical Appendix 8.2 – Protected Species Survey Report[2];
- Technical Appendix 8.3 – Bat Survey Report;
- Technical Appendix 8.4 – Fish Survey Report;
- Technical Appendix 8.5 – Outline Species Protection Plan (SPP); and
- Technical Appendix 8.6 – Outline Biodiversity Enhancement Management Plan (OBEMP).

8.2.5 **Figures 8.1 – 8.16** and **Confidential Figure 8.9C** are referenced in the text where relevant. The **Confidential Annex E** of **Technical Appendix 8.2** and **Figure 8.9C** will not be published with the EIAR due to the potential risk to protected species. However, they will be issued to the Scottish Ministers, Dumfries and Galloway Council (DGC) and NatureScot.

8.3 Legislation, Policy and Guidance

8.3.1 Relevant legislation, policy and guidance documents have been reviewed and taken into account as part of this assessment and those of particular relevance are listed below.

Legislation

- European Union Council Directive 92/43/EEC on Conservation of Natural Habitats and of Wild Fauna and Flora (as amended) (Habitats Directive);
- European Union Council Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy ("Water Framework Directive");
- Environmental Impact Assessment Directive 85/337/EEC, as amended ("EIA Directive"), (as subsequently codified by Directive 2011/92/EU, and as amended by Directive 2014/52/EU);
- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (the EIA Regulations);
- The Electricity Act 1989;
- Nature Conservation (Scotland) Act 2004 (as amended);
- Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003;

[1] Includes **Annex D** for Peatland Condition Assessment.

[2] Includes **Confidential Annex E** for sensitive protected species information.

- The Conservation (Natural Habitats &c.) Regulations 1994 (as amended) 'The Habitats Regulations');
- The Protection of Badgers Act 1992;
- The Water Environment (Controlled Activities) (Scotland) Regulations 2011;
- The Water Environment and Water Services (Scotland) Act 2003 (WEWS);
- The Wildlife and Countryside Act 1981 (as amended); and
- The Wildlife and Natural Environment (Scotland) Act 2011 (WANE).

Policy

8.3.2 **Chapter 5: Legislative and Policy Context** sets out National Planning Framework (NPF) 4 and the planning policy framework that is relevant to this EIAR. The following planning policy of relevance to ecology have been considered in carrying out this assessment:

- Joint Nature Conservation Committee (JNCC) and Department for Environment, Food and Rural Affairs (DEFRA) (2012). UK Post-2010 Biodiversity Framework;
- Scottish Executive (2004). Scottish Biodiversity Strategy: It's in Your Hands;
- Scottish Executive (2000a). Planning Advice Note (PAN) 60: Planning for Natural Heritage;
- Scottish Government (2013). Planning Advice Note 1/2013 - Environmental Impact Assessment;
- Scottish Government (2022a). Onshore Wind Policy Statement 2022;
- Scottish Government (2022b). Scottish Biodiversity Strategy to 2045. Tackling the Nature Emergency in Scotland;
- Scottish Government (2023a). National Planning Framework (NPF) 4; and
- Dumfries and Galloway Council Adopted Local Development Plan (LDP2).

Guidance

8.3.3 This assessment is carried out in accordance with the principles contained within the following guidance documents:

- Chartered Institute of Ecology and Environmental Management (CIEEM) (2024). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (version 1.3). Chartered Institute of Ecology and Environmental Management, Winchester;
- Collins, J. (ed) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition). The Bat Conservation Trust, London;
- Collins, J. (2023) Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th edition). The Bat Conservation Trust, London;
- Dumfries and Galloway Council (2009). Local Biodiversity Action Plan;
- European Commission (2020). Guidance document on wind energy developments and EU nature legislation;
- JNCC (2013). Guidelines for selection of biological Sites of Special Scientific Interest (SSSI);
- NatureScot, Natural England, Natural Resources Wales, RenewableUK, Scottish Power Renewables, Ecotricity Ltd, the University of Exeter & Bat Conservation Trust (BCT) (2019, with minor updates 2021). Bats and Onshore Wind Turbines – Survey, Assessment and Mitigation;
- NatureScot (2021). Assessing the cumulative landscape and visual impact of onshore wind energy developments;
- NatureScot (2023). Advising on peatland, carbon-rich soils and priority peatland habitats in development management;
- NatureScot (2024). NatureScot pre-application guidance for onshore wind farms;
- Scottish Badgers (2018). Surveying for Badgers: Good Practice Guidelines. Version 1.
- Scottish Executive (2000b). Nature conservation: implementation in Scotland of EC Directives on the conservation of natural habitats and of wild flora and fauna and the

conservation of wild birds ('The Habitats and Birds Directives'). Revised guidance updating Scottish Office Circular no. 6/1995;
- Scottish Environment Protection Agency (SEPA) (2017a). Land Use Planning System Guidance Note 4 - Planning guidance on on-shore windfarm developments;
- SEPA (2017b). Land Use Planning System Guidance Note 31 - Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems;
- Scottish Executive Rural Affairs Department (SERAD) (2001). European Protected Species, Development Sites and the Planning Systems: Interim guidance for local authorities on licensing arrangements;
- Scottish Government (2006). European Protected Species – terms of guidance: Chief Planner letter;
- Scottish Government (2016). Draft Peatland and Energy Policy Statement;
- Scottish Government (2017a). Planning Advice Note 1/2013 - Environmental Impact Assessment, Revision 1.0;
- Scottish Government (2017b). Planning Circular 1/2017: Guidance on The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017;
- Scottish Government, SNH, SEPA (2017). Peatland Survey – Guidance on Developments on Peatland;
- Scottish Government (2019). The Scottish Forestry Strategy 2019–2029;
- Scottish Government (2020a). Scottish biodiversity strategy post-2020: statement of intent;
- Scottish Government (2020b). Securing a green recovery on a path to net zero: climate change plan 2018 – 2032 – update;
- Scottish Government (2021). Freshwater and diadromous fish and fisheries associated with onshore wind farm and transmission line developments: generic scoping guidelines;
- Scottish Government (2023b). Draft Planning Guidance: Biodiversity;
- SNH (2015). Scotland's National Peatland Plan;
- SNH (2016a). Planning for Development: What to consider and include in deer assessments and management at development sites (Version 2);
- SNH (2016b). Planning for Development: What to consider and include in Habitat Management Plans. Version 2;
- SNH (2018) Environmental Impact Assessment Handbook – Version 5: Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment process in Scotland; and
- Scottish Renewables, NatureScot, SEPA, Forestry Commission (Scotland), HES, AEECoW (2019, updated July 2024) Good Practice During Windfarm Construction (4th Edition).

8.4 Consultation

8.4.1 In undertaking the assessment, consideration has been given to the scoping responses which were received in relation to ecological matters, as detailed in **Table 8.1** below.

Table 8.1: Consultation Responses

Consultee	Consultation Response	Applicant Action
Energy Consents Unit (ECU) (13 November 2023)	Standing advice from Marine Directorate - Science Evidence Data and Digital (MD-SEDD).	Noted. Fisheries surveys have been undertaken for the Proposed Development and results summarised in this chapter (see **Technical Appendix 8.4** for full details,

Consultee	Consultation Response	Applicant Action
		also **Figures 8.14** and **8.15**). Relevant checklist also completed.
SEPA (22 August 2023)	Note the standard requirements for NVC mapping, peatland condition information, and an outline Habitat Management Plan.	NVC surveys and mapping, and a peatland condition assessment (PCA), has been undertaken for the Proposed Development (detailed in **Technical Appendix 8.1** and associated Figures). Habitat management proposals are contained within the OBEMP (**Technical Appendix 8.6** and **Figure 8.16**).
NatureScot (03 October 2023)	It is possible that construction and decommissioning activities could be connected to this designated site (Galloway Oakwoods Special Area of Conservation - SAC), depending on what activities take place close to the SAC. Of particular concern would be the potential for aerial pollutants arising from construction activities to affect sensitive lichen species, especially dust. At this stage in our understanding of the proposal and information given in the Scoping Report, our advice is that the proposal is unlikely to affect the SAC directly or indirectly. However, the nature of the proposal may change as the project develops, making connectivity with the SAC likely. If connectivity is considered likely, a Habitats Regulation Assessment (HRA) may be required.	Galloway Oakwoods SAC is 1.99 km from the Site and 2.27 km from the nearest proposed new infrastructure (i.e., T14)[3]. There is considered to be no connectivity between the SAC and the Proposed Development, furthermore embedded mitigation and good practice construction environmental measures will be implemented, meaning the Proposed Development is unlikely to affect the SAC directly or indirectly. A HRA is not considered necessary.
	Wood of Cree Site of Special Scientific Interest (SSSI) and Glentrool Oakwoods SSSI (components of the Galloway Oakwoods SAC) - it is possible that construction and decommissioning activities could affect these designated sites. The assessment of impacts on these SSSIs will be adequately addressed by the assessment of impacts on the Galloway Oakwoods SAC, as advised above.	See above with respect to Galloway Oakwoods SAC, the same applies here with regards the underpinning SSSI's[3].

[3] At the time of this scoping response, and the relevant infrastructure layout and Site boundary submitted at scoping, it should be noted that Galloway Oakwoods SAC, Wood of Cree SSSI and Glentrool Oakwoods SSSI at that time were adjacent to the Site with several proposed turbines closer to the SAC and SSSI's. Design iterations have since increased the distance from these designated sites to the Site and associated infrastructure.

Consultee	Consultation Response	Applicant Action
	Habitat and species surveys proposed and approach to the assessment of impacts appear appropriate. Where impacts on protected species are identified, mitigation measures should be outlined within a species protection plan. Reference to our standing advice notes for protected species may be helpful.	Noted. An outline Species Protection Plan (SPP) is provided in **Technical Appendix 8.5**.
	Information should be sought from local records centre - South West Scotland Environmental Information Centre (SWSEIC).	A data request was made to SWSEIC and relevant records are included within this chapter and respective technical appendices.
	We agree that the other designated sites listed in the Scoping Report (separate to the above) can be scoped out.	Noted.
	Note that a Biodiversity Net Gain (BNG) assessment of the proposal will be included in the EIAR for this development.	This is provided as part of **Technical Appendix 8.6**.
	Infrastructure currently is not proposed to be on any Class 1 peatland, therefore direct impacts are avoided. The design of the wind farm should ensure no indirect hydrological impacts on Class 1 peatland from the construction of the development.	All Class 1 peatland is avoided by the Proposed Development (see **Figure 8.2**). Potential hydrological effects are considered in **Chapter 10: Geology, Hydrology and Hydrogeology Assessment**.
RSPB (13 October 2023)	Welcome the proposal to include a Biodiversity Enhancement Management Plan (BEMP), but note that, as per the mitigation hierarchy, mitigation and enhancement are to be treated separately, the latter to go above and beyond achieving 'no net loss' and deliver positive effects in line with NPF4.	The Proposed Development will deliver significant biodiversity enhancement and biodiversity net gain of 29 % - see **Technical Appendix 8.6**.
Cree Valley Community Council (October 2023)	No designated site within 12 km of the Development should be scoped out of the EIAR.	5 km is generally the accepted standard for ecology. NatureScot are content with the scope of designated sites with respect to ecology, see further above within this table.

8.5 Assessment Methods and Significance Criteria

Scope of Assessment

8.5.1 This chapter considers the potential effects of construction, operation and decommissioning (including cumulatively) of the Proposed Development upon those ecological features identified during the EIA Scoping process, review of desk-based information and field surveys. Effects, both temporary and permanent, upon the following ecological features are assessed:

- designated nature conservation sites – effects include direct (i.e., derived from land-take or disturbance to habitats or protected species) and indirect (i.e., habitat fragmentation and modification, including through changes caused by impacts to supporting systems such as groundwater or overland flow);
- terrestrial habitats – effects include direct (i.e., derived from land-take) and indirect (i.e., habitat fragmentation and modification, including through changes caused by impacts to supporting systems such as groundwater or overland flow);
- aquatic habitats – effects are limited to the ecological impacts of changes in water conditions through potential pollution effects (hydrological effects are considered in **Chapter 10: Geology, Hydrology and Hydrogeology Assessment**); and
- protected species – effects considered include direct (i.e., loss of life as a result of the Proposed Development, loss of key habitat, displacement from key habitat, barrier effects preventing movement to or from key habitats, and general disturbance) and indirect (i.e., loss/changes of/to food resources, populations fragmentation, degradation of key habitat e.g., as a result of pollution).

8.5.2 This chapter also assesses the potential for additional cumulative effects as arising from the addition of the Proposed Development to other similar cumulative developments, which are consented or the subject of a valid planning application. Operational and under construction developments are considered as part of the baseline.

8.5.3 The assessment is based on the Proposed Development as described in **Chapter 2: Proposed Development**.

Effects Scoped Out

8.5.4 On the basis of the professional judgement of the EIA team, experience from other relevant projects and policy guidance, and feedback from consultees (e.g., **Table 8.1** above), the generally common and widely distributed habitats or species which *do not* fall within the following categories were scoped out of detailed assessment:

- Habitats listed in Annex I to the Habitats Directive, and species listed in Annex II to the Habitats Directive (i.e. European Union Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora);
- UK Biodiversity Action Plan (UKBAP)[4] or Scottish Biodiversity List (SBL) Priority Habitats[5]; and
- Habitats or species protected by other legislation such as the Wildlife and Countryside Act 1981 (as amended) the Nature Conservation (Scotland) Act 2004 (as amended), or The Protection of Badgers Act 1992.

8.5.5 Potential effects on designated sites are scoped out due to a lack of connectivity or the potential for adverse or significant effects, as noted in **Table 8.1** above.

8.5.6 Further ecological features and potential effects have been scoped out of the detailed assessment based on the results of the desk-based study and survey work undertaken for

[4] Available at: https://hub.jncc.gov.uk/assets/cb0ef1c9-2325-4d17-9f87-a5c84fe400bd. Accessed June 2024.

[5] Available at: https://www.nature.scot/doc/scottish-biodiversity-list. Accessed June 2024.

the Proposed Development, due to a lack of potential significant effect at a relevant species population or habitat extent scale. Details of ecological features and effects scoped out after further data searches and post-survey are provided in **Section 8.8**.

Methodology

Study Area/Survey Area

8.5.7 The area within which the desk-based research and field surveys were undertaken varies depending on the ecological feature and its respective search/survey requirements. Details of the extents are described in the relevant sections in the 'Baseline' section of this chapter and **Technical Appendices 8.1 – 8.5** and their respective Figures. Hereafter in this chapter, the areas covered by field surveys are termed the 'survey area', and these same areas which are considered as part of the assessment process are then collectively referred to as the 'study area' (N.B. the study area generally equates to the Site, except for designated sites where the study area is a 5 km distance band around the Site (**Figure 8.1**)).

Desk Study / Field Survey

8.5.8 The following data sources were considered as part of the assessment:

- National Biodiversity Network (NBN) Atlas Scotland for protected or notable species records within 5 km of the Site boundary from the last 15 years (i.e., 2009 and onwards)[6];
- NatureScot Sitelink for designated site information within 5 km of the Site boundary[7];
- Ancient Woodland Inventory (AWI) (Scotland) for ancient woodland sites within 5 km of the Site boundary[8];
- Scotland's Environment Map for the Carbon Peatland Map 2016[9];
- Saving Scotland's Red Squirrels website for local species records and Priority Areas of Red Squirrel Conservation[10];
- Deer Distribution Survey Results by the British Deer Society[11];
- South West Scotland Environmental Information Centre (SWSEIC)[12];
- SEPA Water Environment Hub[13] for watercourse classifications;
- Any relevant Environmental Statement (ES), EIARs or technical reports from other developments or Proposed Developments in the local area; and
- Relevant scientific literature on protected species' distribution, habitats distribution and conservation status etc.

8.5.9 Field surveys within and surrounding the Site were undertaken from October 2022 to May 2024. The following surveys were undertaken in line with standard methodologies and best practice guidance (respective survey areas or survey locations are shown on **Figures 8.3 - 8.15**) (refer to **Technical Appendices 8.1 - 8.4** for details of the survey methodology):

- NVC surveys, incorporating Phase 1 habitat characterisation and potential GWDTE habitats (October 2022, July 2023, October 2023 and May 2024);
- peatland condition assessment surveys (May 2024);

[6] Available at: https://scotland.nbnatlas.org. Accessed June 2024.

[7] Available at: https://sitelink.nature.scot/home. Accessed June 2024.

[8] Available at: https://map.environment.gov.scot/sewebmap/?layers=ancientWoodlandInventoryScotland. Accessed June 2024.

[9] Available at: https://map.environment.gov.scot/sewebmap/. Accessed August 2023.

[10] Available at: https://scottishsquirrels.org.uk/squirrel-sightings/. Accessed June 2024.

[11] Available at: https://bds.org.uk/science-research/deer-surveys/deer-distribution-survey/. Accessed June 2024.

[12] Available at: https://swseic.org.uk/. Accessed June 2024.

[13] https://www.sepa.org.uk/data-visualisation/water-environment-hub/. Accessed July 2024.

- protected species surveys (June 2023, November 2023 and May 2024) focusing on badger (*Meles meles*), red squirrel (*Sciurus vulgaris*), water vole (*Arvicola amphibius)*, otter (*Lutra lutra*) and pine marten (*Martes martes*);
- Habitat Suitability Index (HSI) assessment (October 2023 and May 2024) was carried out to determine the suitability of any waterbodies for great crested newt (GCN) (*Triturus cristatus*);
- preliminary bat roost assessments (June 2023, November 2023 and May 2024);
- automated bat activity surveys (May 2023 to October 2023 inclusive); and
- fisheries surveys (August 2023).

8.5.10 Incidental records of other protected species (e.g., reptiles) or signs or features of particular importance (i.e., potential hibernacula for reptiles), notable species, or invasive non-native species (INNS), were also recorded during all field surveys.

8.5.11 Surveys for beaver (*Castor fiber*) and wildcat (*Felis silvestris*) were scoped out of field surveys due to the absence of suitable habitat or the Site being located outwith the known range or distribution of these species.

Method of Assessment of Effects

8.5.12 The significance of the potential effects of the Proposed Development has been assessed by professional consideration of the sensitivity of the ecological features and the spatial and temporal magnitude of the potential effects.

8.5.13 The assessment method follows the process set out in the CIEEM (2024) guidance, which is in line with the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 and guidance on the implementation of the EU Birds and Habitats Directive (SERAD, 2001).

8.5.14 The assessment for wider countryside interests (i.e., unrelated to any Natura 2000 sites) involves the following process:

- identification of the potential ecological effects of the Proposed Development on ecological features, including both positive and negative;
- considering the likelihood of occurrence of potential effects;
- defining the nature conservation value and conservation status of the ecological features present to determine sensitivity;
- establishing the magnitude of change associated with the potential effect (both spatial and temporal);
- based on the above information, making a professional judgement as to whether or not the resultant effect is significant in terms of the EIA Regulations[14];
- if a potential effect is determined to be significant, measures to avoid, reduce, mitigate or compensate for the effect are suggested where required;
- considering opportunities for enhancement where appropriate; and
- confirming residual effects after mitigation, compensation or enhancement are considered[15].

Sensitivity of Ecological Features

8.5.15 The sensitivity of the baseline conditions, including the importance of environmental features on or near to the Proposed Development, or the sensitivity of potentially affected receptors, has been assessed in line with best practice guidance, legislation, statutory designations and/or professional judgement.

8.5.16 Determination of the level of sensitivity of an ecological feature is based on a combination of the feature's nature conservation value and conservation status. Nature conservation

[14] i.e. The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017.

[15] See Section 5.1 of the CIEEM (2024) guidance.

value is defined on the basis of the geographic context shown in **Table 8.2** below, which follows the CIEEM (2024) guidance.

8.5.17 Attributing a value to an ecological feature is generally straightforward in the case of designated sites, as the designations themselves are normally indicative of an importance level. For example, an SAC designated under the Habitats Directive is implicitly of European (International) importance. In the case of species, assigning value is less straightforward as contextual information about distribution and abundance is fundamental, including trends based on historical records. This means that even though a species may be protected through legislation at a national or international level, the relative value of the population on site may be quite different (e.g., the site population may consist of a single transitory animal, which within the context of a thriving local/regional/national population of a species, is therefore of local or regional value rather than national or international).

8.5.18 Determination of the level of importance of ecosystems, habitats and species is based on professional judgement and a combination of factors, such as level of protection, rarity, conservation status, population trends, and quality/extent of the feature on site. Published evaluation criteria (e.g., the SBL, JNCC on selection of biological SSSIs) are used where relevant.

8.5.19 In line with the CIEEM (2024) guidance, it is not necessary to carry out detailed assessment on features that are sufficiently widespread, unthreatened, and resilient to effects of the Proposed Development[16]. However, those ecological features affected by the Proposed Development and deemed to be of at least local importance are termed Important Ecological Features (IEFs) and are taken forward for assessment.

Table 8.2: Approach to Valuing Ecological Features[17]

Importance of Feature in Geographical Context	Summary of Consultation Response
International/European	An internationally designated site (e.g., SAC), or undesignated areas that meet the criteria for international designations, or qualifying species whose presence contributes to the maintenance of such a site. Species present in internationally important numbers (>1 % of biogeographic populations).
National (UK)	A nationally designated site (e.g., SSSI, or a National Nature Reserve ('NNR')), or sites meeting the criteria for national designation or qualifying species whose presence contributes to the maintenance of such a site. Species present in nationally important numbers (>1 % of UK population).
Regional (Natural Heritage Zone or Local Authority Area)	Regionally significant and viable areas of key habitat identified in a regional Biodiversity Action Plan ('BAP'). Species present in regionally important numbers (>1 % of Natural Heritage Zone ('NHZ') population). Areas of key habitat falling below criteria for selection as a SSSI (e.g., areas of semi-natural ancient woodland larger than 0.25 hectares (ha)).
Local	A site within the local area designated for nature conservation (e.g., Local Nature Reserves).

[16] See Section 4.1 of the CIEEM (2024) guidance.

[17] As adapted from Hill, D., Fasham, M., Tucker, G., Shewry, M and Shaw, P. (2005). Handbook of Biodiversity Methods – Survey, Evaluation and Monitoring. Cambridge University Press, Cambridge.

Importance of Feature in Geographical Context	Summary of Consultation Response
	Areas of semi-natural ancient woodland smaller than 0.25 ha. Areas of habitat or species considered to appreciably enrich the ecological resource within the local context, e.g., species-rich flushes or hedgerows.
Negligible	Usually widespread and common habitats and species that do not meet the above criteria. Features falling below local value are not considered in detail in the assessment process.

Magnitude of Impact

8.5.20 The magnitude of potential impacts refers to the level of change in the extent and integrity of an ecological feature. The following definition of ecological 'integrity' is found within Scottish Executive circular 6/1995 (updated by Scottish Executive (2000b)) which states that "*The integrity of a site is the coherence of its ecological structure and function, across its whole area, which enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified*". Although this definition is used specifically regarding European level designated sites (e.g., an SAC), it is applied to wider countryside habitats and species for the purposes of this assessment.

8.5.21 The magnitude of potential impact will be identified through consideration of the Proposed Development, the degree of change to baseline conditions predicted as a result of the Proposed Development, how the ecological features are likely to respond to the Proposed Development, the duration and reversibility of an effect and the application of professional judgement, best practice guidance and legislation. This change can occur during construction or operation of the Proposed Development, and effects can be beneficial, neutral or adverse.

8.5.22 Impacts are determined in terms of magnitude in space and time. There are five levels of spatial impact and five levels of temporal impact, described in **Table 8.3** and **Table 8.4** below.

Table 8.3: Definition of Spatial Impact Magnitude upon the IEFs

Magnitude of Impact	Definition
Very High	Would cause the loss of the majority of a feature (>80 %) or would damage a feature sufficiently to immediately affect its integrity.
High	Would have a major effect on the feature or its integrity, for example more than 20 % habitat loss or damage.
Medium	Would have a moderate effect on the feature or its integrity, for example between 10 and 20 % habitat loss or damage.
Low	Would have a minor effect upon the feature or its integrity, for example, less than 10 % habitat loss or damage.
Negligible	Minimal change on a very small scale; effects not dissimilar to those expected within a 'do nothing' scenario.

Table 8.4: Definition of Temporal Impact Magnitude upon the IEFs

Magnitude of Impact	Definition
Permanent	Impacts continuing indefinitely beyond the span of one human generation (taken here as >30 years), except where there is likely to

Magnitude of Impact	Definition
	be substantial improvement after this period in which case the category Long Term may be more appropriate.
Long Term	Between 15 years up to (and including) 30 years.
Medium Term	Between 5 years up to (but not including) 15 years.
Short Term	Up to (but not including) 5 years.
Negligible	No effect.

Cumulative Assessment

8.5.23 Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated to a particular location[18]. As such, NatureScot guidance sets out that cumulative effects require the assessment of the effects of the Proposed Development together with other developments, projects or activities (NatureScot, 2021). In the interests of focusing on the potential for significant effects, this assessment considers the potential for cumulative effects with other onshore wind farm EIA developments in the vicinity[19] of the Proposed Development. The context in which these effects are considered is heavily dependent on the ecology of the features assessed. For example, for water voles it may be appropriate to consider effects specific to individual catchments, should the distance between neighbouring catchments be sufficient to assume no movement of animals between them, whereas for blanket bog, the region or NHZ may be the relevant spatial scale. Therefore, where it is considered necessary, an assessment of cumulative effects will be made for each feature, appropriate to its ecology.

Significance Criteria

8.5.24 The predicted significance of potential effects is determined through a standard method of assessment based on professional judgement and available evidence, considering the sensitivity (nature conservation value and conservation status) of the IEF and the nature and magnitude of change, in a reasoned manner.

8.5.25 A significant effect may either support or undermine biodiversity conservation objectives. Significant effects include those which result from impacts on the structure and function of defined sites, habitats or ecosystems and the conservation status of habitats and species (including extent, abundance and distribution)[20].

8.5.26 **Table 8.5** details the significance criteria that have been used in assessing the effects of the Proposed Development.

Table 8.5: Significance Criteria

Magnitude of Effects	Definition
Major	The effect is likely to result in a long term effect on the structure and function of defined sites, habitats or ecosystems or on the conservation status of habitat and species.
Moderate	The effect is likely to result in a medium term or partial effect on the structure and function of defined sites, habitats or ecosystems or on the conservation status of habitats and species.

[18] See Section 5.19 of the CIEEM (2024) guidance.

[19] i.e. 5 km for habitats and most protected species, and 10 km for bats.

[20] See Section 5.25 of the CIEEM (2024) guidance.

Magnitude of Effects	Definition
Minor	The effect is likely to affect the feature at a low level by virtue of its limited duration and/or extent, but there will probably be no effect on the structure and function of defined sites, habitats or ecosystems or on the conservation status of habitats and species. The level of effect would be Minor and Not Significant.
Negligible	No material effect. The effect is assessed to be Not Significant.

8.5.27 Using these definitions, it must be decided whether there would be any effects which would be sufficient to adversely affect the IEF to the extent that its conservation status deteriorates from that which would be expected should baseline conditions remain (i.e., the 'do nothing' scenario).

8.5.28 Major and moderate effects are considered to be Significant within the context of the EIA Regulations.

8.5.29 Where adverse effects are identified, mitigation and/or compensation is considered to reduce or offset effects where possible, including avoidance or reduction through implementation of and compliance with best practice guidance and protected species legislation.

8.5.30 Residual effects are characterised as either adverse, neutral or beneficial and either Significant or Not Significant, taking account of mitigation proposals.

Assessment Limitations

8.5.31 Limitations exist regarding the knowledge base on how some species, and the populations to which they belong, react to impacts. A precautionary approach is taken in these circumstances, and as such it is considered that these limitations do not affect the robustness of this assessment.

8.5.32 Ecological surveys are limited by factors which affect the presence of plants and animals, such as the time of year, migration patterns, and behaviour. The ecological surveys undertaken to inform the assessment for Proposed Development have not therefore produced a complete list of plants and animals and the absence of evidence of any particular species should not be taken as conclusive proof that the species is not present or that it will not be present in the future.

8.5.33 No notable limitations were experienced with regards to habitats, fish, or protected species field surveys. The bat field surveys experienced some limitation due to one failed Anabat detector at one location during one survey (recording nine nights worth of data instead of the ten required), however all bat detectors are susceptible to limitations and the amount of static bat data collected overall greatly exceeded relevant guidance (NatureScot *et al*. 2021) requirements (see **Technical Appendix 8.3** for details).

8.5.34 A late design revision of the Site boundary resulted in minor protected species and NVC survey gaps along the access track towards Glenshalloch, Dalnader Wood and the Site entrance but these are not considered a notable limitation as infrastructure would not be sited within these areas and pre-construction surveys would be done as part of the SPP (**Technical Appendix 8.5**), with an ongoing watching brief onsite also by the ECoW for protected species. For the habitats data, these gaps all consisted of conifer plantation woodland of low ecological value and gaps were filled from a desk based review of the area using surveyor knowledge, aerial imagery, and the extrapolation of relevant adjoining mapped habitat polygons; this is not considered a notable limitation.

8.5.35 Whilst some general limitations have been identified, it is considered that there is sufficient information to enable a robust assessment to be taken in relation to the identification and assessment of potential effects on ecological features.

8.6 Embedded Mitigation

8.6.1 For the purposes of this Ecology Assessment, embedded mitigation is considered to include both primary mitigation (mitigation achieved through implementing changes during the design of the Proposed Development) and committed mitigation, as described below.

Iterative Design Process

8.6.2 As part of the iterative design process for the Proposed Development, ecological constraints identified through baseline survey results were considered to avoid or reduce negative effects on ecological features where possible (see **Chapter 3: Design Evolution and Alternatives**). This involves:

- a 50 m buffer for any infrastructure or construction activity around all watercourses where possible, except where a minimum number of watercourse crossings are required. This will minimise effects on associated habitats and species;
- using existing tracks and watercourse crossings wherever possible, and designing track length and alignment to reduce the extent of new track and number of watercourse crossings required, where feasible considering the topography of the Site;
- avoiding deeper peatland (>1 m), blanket bog and wet modified bog, and potential high GWDTEs for the location of wind turbines and other infrastructure as far as practicable; and
- establishing a 50 m buffer from turbine blade tips to important edge habitats, across the Site to safeguard bats[21].

Committed Mitigation

Pre-Construction and Construction

8.6.3 The assessment in this EIAR has been carried out on the basis that all works would be carried out in line with good industry practice construction measures, guidance and legislation.

8.6.4 To ensure all reasonable precautions are taken to avoid negative effects on habitats, protected species and aquatic interests, a suitably qualified ECoW will be appointed prior to the commencement of construction to advise the Applicant and the Contractor on all ecological matters. The ECoW will 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 sensitivities on the Site to the relevant staff of the Contractor and sub-contractors.

8.6.5 A SPP (outline SPP provided in **Technical Appendix 8.5**) will be implemented during the construction phase. The SPP details measures to safeguard protected species known or likely to be in the area. The SPP includes pre-construction surveys and good practice measures during construction. Pre-construction surveys will be undertaken to check for any new protected species or features in the vicinity of the construction works. The results of the pre-construction surveys will be used to update the outline SPP ahead of construction starting. The SPP will remain a live document to be updated as required and in agreement with the ECoW where changes to the distribution and status of protected species and features are recorded.

[21] NatureScot, Natural England, Natural Resources Wales, RenewableUK, Scottish Power Renewables, Ecotricity Ltd, the University of Exeter & Bat Conservation Trust (BCT) (2019, updated 2021). Bats and Onshore Wind Turbines – Survey, Assessment and Mitigation.

8.6.6 Any micrositing of infrastructure will be based on a review of existing ecological data and the completion of pre-construction surveys, to take into consideration the potential for direct encroachment onto protected species features, sensitive habitats or GWDTEs, or indirect alteration of hydrological flows supporting sensitive habitats or GWDTEs. Any micrositing will also take into consideration any buffer distances on protected features identified, as detailed within the SPP (**Technical Appendix 8.5**).

8.6.7 There will be a contractual management requirement for the successful Contractor to develop and implement a comprehensive, site-specific and robust Construction Environmental Management Plan (CEMP) in consultation with the SEPA and the planning authority. This document will detail how the successful Contractor will manage the works in accordance with all commitments and mitigation detailed in the EIAR, the SPP, statutory consents and authorisations, and good industry practice and guidance for environmental management, including implementation of appropriate pollution prevention (particularly in relation to watercourses). An outline CEMP is attached as **Technical Appendix 17.1**.

Operation

8.6.8 In line with best practice guidance on bats (NatureScot *et al.*, 2021) the Proposed Development will utilise the method of reduced rotation speed whilst idling by feathering, at all turbines, to reduce collision risks to bats during the bat active period (April to October). The guidance notes that, "*The reduction in speed resulting from feathering compared with normal idling may reduce fatality rates by up to 50 %*". Given the known presence of high collision risk bat species on-site, this measure will be put in place from the start of the operational phase of the Proposed Development, and it does not result in any loss of output.

8.6.9 Operational phase environmental management plans following relevant best practice and guidance will be in place during operation of the Proposed Development, these will for example include provisions for, but not limited to, ongoing pollution prevention control measures.

8.7 Baseline

8.7.1 This section details the results of the desk-based assessment and field surveys, providing the ecological baseline for the Site and study area, and includes:

- statutory nature conservation designated sites (not including those designated for only ornithological or geological features);
- habitats and vegetation; and
- protected or notable species.

Desk Study

Designated Sites

8.7.2 There are no statutory designated sites within the Site. There are two SACs, five SSSIs and one NNR within 5 km of the Site boundary that contain ecological (non-avian) qualifying interests. Details of these sites are listed in **Table 8.6** and shown on **Figure 8.1**.

Table 8.6: Ecological Designated Sites within 5 km of the Proposed Development

Site Name	Distance to Site Boundary	Qualifying Interest(s)	Condition and Last Assessed Date
Galloway Oakwoods SAC	1.99 km	Western acidic oak woodland	Favourable Maintained (May 2009)

Site Name	Distance to Site Boundary	Qualifying Interest(s)	Condition and Last Assessed Date
Wood of Cree SSSI	1.99 km	Upland oak woodland	Unfavourable Recovering (June 2014)
		Oligotrophic loch	Favourable Maintained (July 2009)
Glentrool Oakwoods SSSI	2.09 km	Upland oak woodland	Favourable Maintained (May 2009)
		Bryophyte assemblage	Favourable Maintained (October 2012)
		Lichen assemblage	Unfavourable Declining (June 2014)
Cairnsmore of Fleet NNR	2.31 km	N/A	N/A
Cairnsmore of Fleet SSSI	2.31 km	Blanket bog, Upland assemblage	Blanket bog Unfavourable Recovering (December 2006)
		Upland assemblage	Upland assemblage Favourable Maintained (January 2005)
Merrick Kells SAC	4.02 km	Acid peat-stained lakes and ponds	Favourable Maintained (July 2004)
		Acidic scree	Favourable Maintained (September 2010)
		Blanket bog	Unfavourable Recovering (September 2009)
		Clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels	Favourable Maintained (July 2009)
		Depressions on peat substrates	Favourable Recovered (September 2009)
		Dry heaths	Favourable Recovered (August 2013)
		Montane acid grasslands	Unfavourable No Change (August 2013)
		Otter	Favourable Maintained (April 2012)
		Plants in crevices on acid rocks	Favourable Maintained (August 2013)
		Wet heathland with cross-leaved heath	Unfavourable Recovering (September 2009)
Merrick Kells SSSI	4.02 km	Blanket bog	Favourable Recovered (August 2013)

Site Name	Distance to Site Boundary	Qualifying Interest(s)	Condition and Last Assessed Date
		Beetle assemblage	Favourable Maintained (September 2015)
		Upland assemblage	Unfavourable No Change (August 2013)
		Blue aeshna dragonfly (*Aeshna caerulea*)	Favourable Maintained (October 2017)
Lower River Cree SSSI	4.66 km	Smelt (Osmerus eperlanus)	Favourable Maintained (March 2004)

Ancient Woodland

8.7.3 There are three small areas of woodland listed on the AWI classified as Ancient (of semi-natural origin) that lie within the access track corridor of the Site (**Figure 8.1**). There are numerous areas of woodland listed on the AWI classified as Ancient and Long-Established within 5 km of the Site, with a large area of ancient woodland which overlaps with Galloway Oakwoods SAC and Wood of Cree SSSI. These are largely located to the west and south of the Site (**Figure 8.1**).

Local Biodiversity Action Plan

8.7.4 The Site is located within the Dumfries and Galloway Council local authority area and therefore forms part of the Dumfries and Galloway Biodiversity Action Plan (LBAP) (Dumfries & Galloway Biodiversity Partnership, 2009)[22]. The LBAP contains six key aims, four of which are potentially relevant to the Proposed Development:

- biodiversity conserved, enhanced and re-created at the landscape scale;
- genetic diversity conserved;
- biodiversity incorporated into all relevant decision-making; and
- local distinctiveness enhanced.

8.7.5 The LBAP identifies the importance of protecting the natural environment and ecosystems, in particular, priority habitats and species. The LBAP also identifies the objective to maintain and enhance a network of designated biodiversity sites, which includes Cairnsmore of Fleet NNR.

8.7.6 The LBAP also identifies the objective to minimise the impact of INNS on biodiversity and recommends the actions to co-ordinate any control or eradication programmes and monitor the spread of INNS.

Habitats

Terrestrial Habitats

8.7.7 The Carbon and Peatland Map 2016[23] was consulted to assess the likely peatland classes within the Site. The map is a "*predictive tool which provides an indication of the likely presence of peat on each individually mapped area, at a coarse scale*" and its purpose is "*a high-level planning tool to promote consistency and clarity in the preparation of spatial frameworks by planning authorities*". It identifies areas of "*nationally important carbon-rich soils, deep peat and priority peatland habitat*" which are categorised as Class 1 and

[22] Available at: https://swseic.org.uk/wp-content/uploads/2018/06/DGLBAP2009-part1.pdf. Accessed June 2024.

[23] Available at: https://soils.environment.gov.scot/maps/thematic-maps/carbon-and-peatland-2016-map/#:~:text=The%20map%20is%20a%20high,area%2C%20at%20a%20coarse%20scale. Accessed June 2024.

Class 2 peatlands. Class 1 peatlands are also "*likely to be of high conservation value*" and Class 2 "*of potentially high conservation value and restoration potential*".

8.7.8 **Figure 8.2** indicates that, according to this predictive tool and map, Class 3[24] and Class 4[25] peatlands and Class 5[26] soils cover much of the Site, with most turbines situated on the Class 3, 4 and 5 peatlands/soils. Three small pockets of Class 1 peatlands are located along the north-east border and south-east sections of the Site (all of which are avoided by the Proposed Development), with a single area of Class 2 peatland located within the north-west (short sections of access track for the Proposed Development is proposed here; see **Figure 8.2**).

8.7.9 As the Carbon and Peatland Map is a high-level tool, detailed habitat and peat depth surveys have been carried out across the Site to inform siting, design and mitigation and the detailed assessment on peatland and associated habitats. The results of the habitat surveys are discussed in **Technical Appendix 8.1**, and the results of the peat depth surveys are presented and discussed in **Chapter 10: Geology, Hydrology and Hydrogeology Assessment** and associated Technical Appendices.

Aquatic Habitats

8.7.10 Watercourses within the Site form tributaries to Cordorcan Burn and Penkiln Burn, which feed into the River of Cree. The River of Cree was classified by SEPA as part of their Water Framework Directive (WFD)[27] classification and was assessed in 2014 as having Moderate overall condition, Good water quality, flows and levels, with High freedom from invasive species and High access for fish migration. Penkiln Burn was assessed in 2014 as having Good overall condition, water quality, and physical condition and High water flows and levels, freedom from invasive species and access for fish migration.

Protected Species

Non-avian

8.7.11 The NBN Atlas Scotland[6] and the South West Scotland Environmental Information Centre (SWSEIC)[12] returned records of the following protected species within 5 km (10 km for bats (5 km search for SWSEIC)) of the Site boundary in the last 15 years (i.e., since 2009) (data licences and providers are detailed in **Technical Appendices 8.2** and **8.3**):

- brown hare (*Lepus europaeus*);
- common lizard (*Zootoca vivipara*);
- otter;
- palmate newt (*Lissotriton helveticus*);
- pine marten;
- red squirrel;
- slow worm (*Anguis fragilis*);
- water vole;
- Daubenton's bat (*Myotis daubentonii*);
- Natterer's bat (*Myotis nattereri*);
- *Myotis* spp.;
- Leisler's bat (*Nyctalus leisleri*);

[24] Class 3 - Dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type. Occasional peatland habitats can be found. Most soils are carbon-rich soils, with some areas of deep peat. Indicative soil = Predominantly peaty soil with some peat soil. Indicative vegetation = Peatland with some heath.

[25] Class 4 - Area unlikely to be associated with peatland habitats or wet and acidic type. Area unlikely to include carbon-rich soil. Indicative soil = Predominantly mineral soil with some peat soil. Indicative vegetation = Heath with some peatland.

[26] Class 5 - Soil information takes precedence over vegetation data. No peatland habitat recorded. May also include areas of bare soil. Soils are carbon-rich and deep peat. Indicative soil = Peat soil. Indicative vegetation = No peatland vegetation.

[27] Available at: https://www.sepa.org.uk/data-visualisation/water-environment-hub/. Accessed June 2024.

- Noctule bat (*Nyctalus noctule*);
- *Nyctalus* spp.;
- common pipistrelle (*Pipistrellus pipistrellus*);
- soprano pipistrelle (*Pipistrellus pygmaeus*);
- Brown long-eared bat (*Plecotus auritus*);
- Brandt's bat (*Myotis brandtii*); and
- Whiskered bat (*Myotis mystacinus*).

8.7.12 Sightings of red squirrels have been recorded on Saving Scotland's Red Squirrels within 5 km of the Site boundary in the past 13 years, particularly towards the town of Newton Stewart.

Fish

8.7.13 The Proposed Development falls within the River of Cree catchment, with this catchment extending over 198 square miles, draining the Carrick and Glentrool forests and those at Kirroughtree and Cairnsmore of Fleet. Salmon, brown/sea trout and smelt are present throughout the Cree catchment[28].

Other Species

Deer

8.7.14 Deer are not included in the assessment from a nature conservation perspective but are considered due to potential welfare issues and their potential impact on other ecological features through grazing.

8.7.15 The NBN Atlas Scotland and SWSEIC search returned records of fallow deer (*Dama dama*), red deer (*Cervus elaphus*), roe deer (*Capreolus capreolus*) and sika deer (*Cervus nippon*) within 5 km of the Site boundary in the last 15 years (i.e., since 2009).

8.7.16 The results of the Deer Distribution Survey[29] suggest the presence of roe, red, sika and fallow deer within the general area of the Site. These were all recorded in 2007 and/or 2011, and then reconfirmed in 2016 and 2023, except sika deer which were all recorded in 2007 and/or 2011, and then reconfirmed in 2023.

Invasive Non-Native Species (INNS)

8.7.17 INNS are a threat to biodiversity and there is a legal obligation to control their spread[30].

8.7.18 The NBN Atlas Scotland and SWSEIC search returned records of the following INNS within 5 km of the Site boundary in the last 15 years (i.e., since 2009):

- grey squirrel (*Sciurus carolinensis*);
- Himalayan balsam (*Impatiens glandulifera*); and
- Japanese knotweed (*Fallopia japonica*).

8.7.19 Sightings of grey squirrels have been recorded on Saving Scotland's Red Squirrels within 5 km of the Site boundary in the past 13 years.

Field Surveys

8.7.20 Details of field survey methodologies, survey timings, survey area extents, and survey results are included within **Technical Appendices 8.1 - 8.4**. The following sections summarise the baseline conditions as identified during these surveys.

[28] Available at: https://www.gallowayfisheriestrust.org/rivers-dumfries-galloway.php. Accessed August 2024.

[29] The British Deer Society (2023). Deer Distribution Survey Results. Available online: https://bds.org.uk/science-research/deer-surveys/deer-distribution-survey/. Accessed July 2024.

[30] See Section 14 of the Wildlife and Countryside Act 1981.

Habitats

National Vegetation Classification (NVC) and Phase 1

8.7.21 **Technical Appendix 8.1** presents information on the habitat surveys and the detailed descriptions of all habitat types and vegetation recorded in the surveys.

8.7.22 The habitats survey results are shown on **Figure 8.3** which display all data collected during surveys[31]. The survey area for habitats covered an area greatly exceeding the Site boundary as it was based on a previous design iteration.

8.7.23 The habitat extents provided and discussed below relate only to those within the Site boundary as these habitats form the baseline conditions and the basis for the assessment of potential effects and habitat loss, discussed further below.

8.7.24 The NVC data collected across the survey and study area were also cross-referenced to the Phase 1 Habitat Survey Classification (JNCC, 2010) to allow a broader characterisation of habitats. The extent of Phase 1 habitat types within the study area was calculated using the Site-specific correlation of NVC communities to their respective Phase 1 types (see **Technical Appendix 8.1** for full details), and their extents mapped within ArcGIS software, including within mosaic areas.

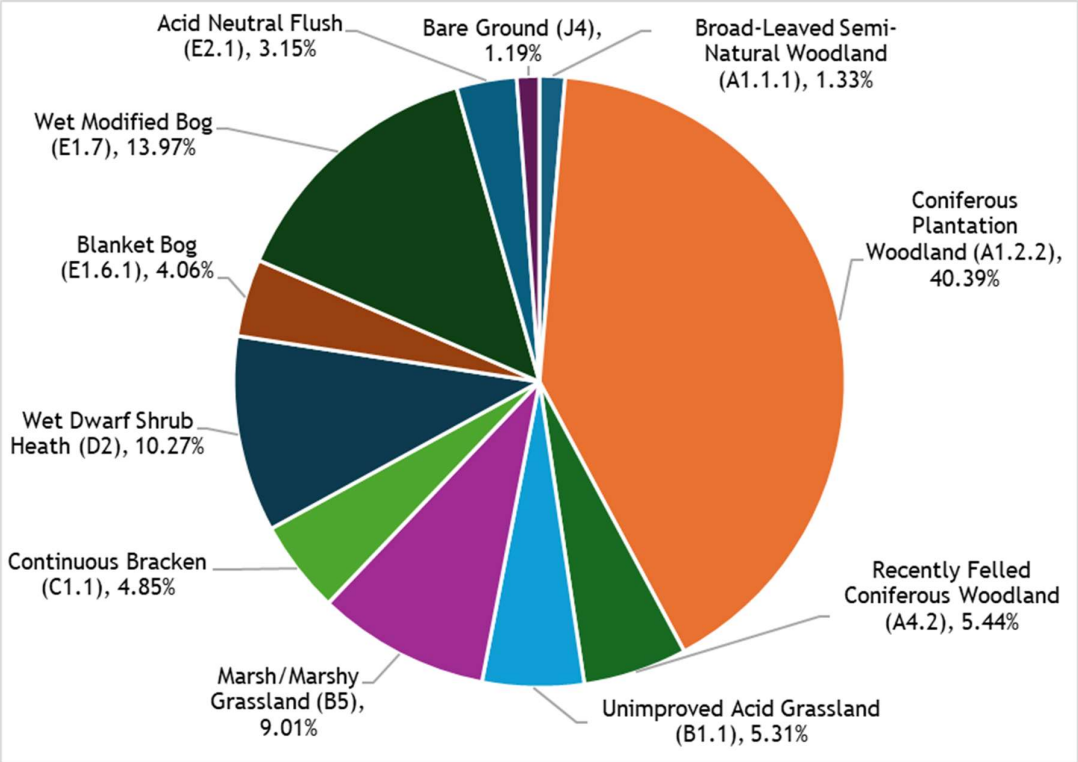
8.7.25 The NVC communities and non-NVC types recorded within the study area are provided in **Annex A**, **Table 8.11** (located at the end of this Chapter) and include proportions of particular habitat types that are found within the Site boundary, including those within mosaic habitats. Full descriptions of the habitats, NVC communities and associated flora of the Site boundary and wider survey area are provided in **Technical Appendix 8.1.**

8.7.26 **Chart 8.1** summarises the Phase 1 habitats which contribute over 1 % of the study area and shows that majority of the study area, 40.39 %, is comprised of coniferous plantation woodland (see also **Figure 8.3**). The other more extensive habitat types are wet modified bog (13.97 %), wet dwarf shrub heath (10.27 %) and marshy grassland (9.01 %). Broadleaved semi-natural woodland, recently felled coniferous woodland, unimproved acid grassland, bracken, blanket bog, acid/neutral flush, and bare ground are present at coverage levels of between 1 % and 5.5 % of the study area. Details of the NVC communities, and their respective extents, underpinning these Phase 1 habitat types, along with all other communities and habitat types covering less than 1 % of the study area is detailed in **Annex A**, **Table 8.11**.

8.7.27 As detailed in **Annex A**, **Table 8.11**, the study area contains a variety of habitat types, and whilst some relatively homogenous stands of vegetation occur, many of the identified communities form complex mosaics and transitional areas across the study area. The only habitat types that have subsequently been scoped in to the assessment of effects due to their extent and nature conservation value are blanket bog and wet modified bog. Detailed descriptions of these habitat types are included in **Technical Appendix 8.1**.

[31] The Phase 1 symbology shading in **Figure 8.3** has been used to broadly characterise stands of vegetation based on the dominant NVC community within a particular area. The Phase 1 characterisation has been utilised to allow a broader visual representation of the habitats within the survey and study area. Polygons or areas where there are mosaic NVC communities have generally been assigned a single Phase 1 classification based on the dominant NVC type (despite some polygons containing multiple Phase 1 types, often in low percentages). Therefore, the Phase 1 characterisation is generally a broader overview, and the NVC data should be referred to for further detail in any specific area.

Chart 8.1 Predominant Phase 1 Habitat Types Recorded within the study area (habitat types making up <1 % of the study area are not included)



Peatland Condition Assessment (PCA)

8.7.28 The PCA survey results are detailed in **Technical Appendix 8.1** and shown on **Figures 8.5** to **8.8** which display the data recorded during the survey. The PCA survey area covered areas within the Site boundary mapped from the habitat surveys as blanket bog, wet modified bog, wet dwarf shrub heath and mosaics containing these same habitat types (see **Technical Appendix 8.1** for sampling and survey locations).

8.7.29 In total, 96 samples out of 112 samples (85.7 %) were recorded as 'Modified' peatland, with no 'Near-natural' peatland recorded. Eight of these samples were recorded as not peatland and were not considered further in the analysis. Out of the 104 peatland samples, the following summary information has been gathered.

8.7.30 There is no evidence of peat cutting, muirburn or peat pans within the Site, and no areas were considered to have a near natural surface pattern. None of the following were recorded at sample locations or incidentally throughout the Site - *Sphagnum-Betula nana* ridges, *Sphagnum fuscum* / *S. austinii* hummocks, peat mounds, or *Rhynchospora fusca*. No bog pools were recorded at any sample locations (however, isolated M2 bog pools were recorded during the habitat surveys). *Vaccinium vitis-idaea, Vaccinium oxycoccos, Drosera* spp., *Rubus chamaemorus* and *Betula nana* were not recorded at the Site.

8.7.31 Evidence of grazing, trampling or poaching by large herbivores was present throughout the Site, with this recorded at all 104 peatland sample locations. The distribution of grazing impact levels is shown on **Figure 8.7**. *Polytrichum commune* was recorded at 43 sample locations, occasionally in relatively high cover. *Polytrichum commune* is often associated with some disturbance and negative influences on mire vegetation, e.g., trampling.

8.7.32 Manmade drains were recorded at five sample locations, with three of these being considered open and two being occluded. Two of the three open drains were cut through to the underlying substrates.

8.7.33 Woodland and scrub invasion is commonplace across the southern section of the Site, nearly all samples recorded as having woodland/scrub invasion or encroachment onto peatland (see **Figure 8.6**).

8.7.34 Sphagna-rich ridges were deemed present at 62 of the 104 peatland samples. However, when present were not abundant nor extensive, and also were often comprised of a single common species. Sphagna were recorded at 76 (73.1%) of sample locations, with the most common species being *S. capillifolium*, *S. fallax* and *S. papillosum*. Sphagna abundance was generally low, with just 25 quadrats with a 20 % or more basal coverage of Sphagna. As per **Figure 8.8**, Sphagna abundance is low throughout the south of the Site and is generally low in the north of the Site, with areas of relatively higher *Sphagnum* spp. cover being found along the plateau peatland ridge around Sheucanower to Benailsa (approximately T2 to T3) and towards Black Burn (south-west of T4).

8.7.35 Bare peat was recorded at 11 sample locations and peat haggs and/or gully was recorded at three sample locations (none through to underlying substrate).

8.7.36 The key and most common peatland foliar species, i.e., *Calluna vulgaris, Eriophorum vaginatum* and *Molinia caerulea* sample results are as follows. *Calluna vulgaris* is generally of low abundance and cover within the Site. It was recorded at 74 of 104 quadrats, although only three quadrats recorded 50 % cover or more; these were located in the south of the Site and generally correlated with less grazed areas of M15/M25a communities. *Eriophorum vaginatum* was recorded at 81 of 104 quadrats, again cover was often relatively low, with just 19 quadrats with an estimated cover of 30 % or more. All 19 of these quadrats were located in the more grazed north of the Site, and generally correspond to the areas of M20 mire. *Molinia caerulea* was recorded at 82 of 104 quadrats, with the higher coverage recorded in the south of the Site and correlating to areas of M15 and M25. The north of the Site only contained small amounts of *Molinia caerulea*. Other typical mire species such as *Trichophorum germanicum* and *Eriophorum angustifolium* were generally only occasionally present and in very low cover, whereas grasses were common within quadrats in the north of the Site.

Groundwater Dependant Terrestrial Ecosystems (GWDTEs)

8.7.37 The NVC results were referenced against SEPA guidance (2017a & 2017b) to identify those habitats which may be classified, depending on the hydrogeological setting, as being potentially groundwater dependent. Potential GWDTE NVC communities recorded within the survey area are detailed in **Technical Appendix 8.1** and shown on **Figure 8.4**.

8.7.38 GWDTE sensitivity has been assigned solely on the SEPA listings. However, many of the NVC communities on the list are common habitat types across Scotland and generally of low nature conservation value. Furthermore, depending on several factors such as geology, superficial geology, presence of peat and topography, many of the potential GWDTE communities recorded may in fact be only partially groundwater fed or not dependant on groundwater. Because designation as a potential GWDTE is related to groundwater dependency and not nature conservation value, GWDTE status has not been used as criteria to determine a habitat's nature conservation value and similarly does not factor in the identification of IEFs within ecological impact assessments. There is however a requirement to consider GWDTEs and the data gathered during the NVC surveys has been used to inform this assessment in **Chapter 10: Geology, Hydrology and Hydrogeology Assessment**.

Annex I Habitats

8.7.39 Many NVC communities can also correlate with various Annex I habitat types listed under the Habitats Directive. The fact that an NVC community can be attributed to an Annex I type however does not necessarily mean all instances of that NVC community constitute Annex I habitat. Its status can depend on various factors such as quality, extent, species assemblages, geographical setting, and substrates.

8.7.40 NVC survey data and field observations have been compared to JNCC Annex I habitat listings and descriptions[32]. Those habitats within the Site boundary which could be considered Annex I habitats are discussed within **Technical Appendix 8.1**.

Scottish Biodiversity List (SBL) Habitats

8.7.41 The SBL[33] is a list of animals, plants and habitats that Scottish Ministers consider to be of principal importance for biodiversity conservation in Scotland. The SBL identifies habitats which are the highest priority for biodiversity conservation in Scotland; these are termed 'priority habitats'. Some of the priority habitats are quite broad and can be correlated to many NVC types. Relevant SBL priority habitat types and corresponding associated NVC types recorded within the study area are summarised within **Technical Appendix 8.1**.

8.7.42 These SBL priority habitats correspond with UK Biodiversity Action Plan (BAP) Priority Habitats (JNCC, 2019).

Protected Species (non-avian)

8.7.43 This section outlines the results from the protected species surveys. Detailed methodologies, survey timings, and results, including the legal status of each species, are included within **Technical Appendices 8.2 – 8.4** and their associated annexes. Results are presented in **Figures 8.9 – 8.15**, with confidential information presented on **Figure 8.9C**.

Badger

8.7.44 In total, seven badger setts were identified within the survey area, including three main setts and four outlier setts. Four of the badger setts, three outliers and one main, fall within the Site boundary (detailed in **Technical Appendix 8.2: Confidential Annex E**, and **Figure 8.9C**). At the time of the surveys badger activity at the setts seemed relatively high, with the majority of setts being recorded as well-used. Foraging signs (i.e., snuffle holes) and dung were also recorded in the survey area (see **Technical Appendix 8.2: Confidential Annex E**).

8.7.45 The main sett within the Site is a six-holed sett located approximately 518 m from the nearest proposed infrastructure for the Proposed Development. Of the outlier setts within the Site, the closest proposed infrastructure is located 129 m away (i.e., a proposed new access track from a single-holed outlier sett, a major watercourse also separates the outlier sett from the proposed infrastructure) (**Figure 8.9C**).

Bats

8.7.46 This section provides a summary of the field surveys and associated results for bats. Full details are contained within **Technical Appendix 8.3**.

Preliminary Bat Roost Assessment

8.7.47 Surveys recorded 18 features as having potential suitability for roosting bats, including 17 trees and one structure: one with high suitability, two moderate, 11 low, one negligible

[32] Available at: https://sac.jncc.gov.uk/habitat/. Accessed July 2024.

[33] Available at: https://www.nature.scot/doc/scottish-biodiversity-list. Accessed June 2024.

and three PRF-I within the survey area, of which 12 fall within the Site boundary (**Figure 8.6**).

8.7.48 Following Collins (2016) and Collins (2023) guidance, no features with moderate or high suitability for roosting bats were recorded within 200 m plus rotor radius of a proposed turbine location, and no features are within 30 m of the proposed new infrastructure.

Automated Activity Surveys

8.7.49 Static bat activity surveys involved the deployment of 18 detectors on-site between May and October 2023 over a total period of 42 days, covering spring, summer and autumn and up to a maximum of 14 consecutive nights per season. This resulted in 747 associated data recording nights (significantly more than the 330 as required by NatureScot *et al.* (2021) guidance for a development of this size; see **Technical Appendix 8.3**). Anabat locations are detailed on **Figure 8.10**.

8.7.50 Bats were detected on all of 42 survey nights, with 28,565 bat registrations in total. A total of nine bat species and two genera were recorded during surveys. The total number of passes recorded for each species across all detectors is shown below in **Table 8.7**.

8.7.51 Soprano and common pipistrelles combined accounted for 79.59 % (n = 22,741) of registrations across all surveyed locations (**Table 8.7**).

Table 8.7: Total Number of Bat Passes for Each Species Across all Locations 2023

Species	No. of Registrations	Percentage of Total (%)[34]
Soprano pipistrelle	15,406	53.92
Common pipistrelle	7,335	25.67
Nathusius' pipistrelle	1	<0.001
Noctule	1,316	4.61
Leisler's	2,293	8.03
Nyctalus spp.	127	0.44
Daubenton's	1,084	3.79
Natterer's	366	1.28
Whiskered	293	1.03
Myotis spp.	23	0.08
Brown long-eared	321	1.12
Total	**28,565**	**99.98**

Quantifying Activity

8.7.52 NatureScot *et al.* (2021) recommends the use of Ecobat tool (Mammal Society, 2017[35]) as a measure of bat activity levels. Ecobat analyses activity levels during nights where bat activity was recorded and assigns a value to the activity levels (low, low/moderate, moderate, moderate/high or high) for each location on each night. These values are based on a comparison with other surveys within the local area. While this provides an objective assessment of activity levels in a given area, the reliability of the results can be impacted

[34] The 'Total' percentage may not be exactly 100% due to the rounding of the percentages per species – see **Technical Appendix 8.3**.

[35] Available at: http://www.ecobat.org.uk/home. Accessed June 2024.

by how many previous surveys within the comparison radius have been submitted to Ecobat. The Ecobat tool was offline and unavailable at the time of preparing this report.

8.7.53 In the absence of Ecobat, and on the advice of NatureScot, alternative quantitative methods are to be used to assess bat activity levels. As such, the data obtained from the 2023 static bat surveys was considered in accordance with NatureScot *et al.* (2021) as far as practicable to determine the overall Site risk level for each species of bat.

8.7.54 To generate a bat activity index value and allow a comparison of bat activity between locations, species and seasons, the number of bat passes per hour (bpph) was calculated. This method refers to the number of bat passes as opposed to the number of individual bats recorded, as it is not possible to definitively identify individual bats and the total number of individual bats present. The bpph is used to provide a quantitative measure of bat activity across the Site. Data on the activity levels for all species recorded across the Site and through the three deployments visits is provided in **Technical Appendix 8.3**. **Figures 8.11 – 8.13** also display the activity of high collision risk species.

Assessing Potential Risk

8.7.55 As detailed in **Technical Appendix 8.3,** the Site risk level was determined to be Medium, based on having a Medium project size and a Moderate habitat risk.

8.7.56 As per NatureScot *et al.* (2021) guidance, common pipistrelle, soprano pipistrelle and *Nyctalus* spp. were the only bat species recorded which are deemed to have a high collision risk[36]. All other bat species recorded are categorised as low collision risk and of low population vulnerability in line with the same guidance.

8.7.57 In analysing bat activity levels, professional judgement has been used previously in the absence of any recognised standard measure to define levels as being high, medium or low. This took into consideration the geographical and site location and habitats present as well as professional experience. NatureScot *et al.* (2021) recommends the use of Ecobat as a measure of activity levels; however, as noted above, at the time of preparation the Ecobat tool was offline and unavailable.

8.7.58 Therefore, Site specific details, knowledge of bat species behaviour, professional judgement and experience from other and similar projects has been used to assess the bat activity levels at the Proposed Development as high, medium or low. While the appraisal of activity levels was ascertained using professional judgement, the risk assessment has taken due consideration of the NatureScot *et al.* (2021) guidance to provide an assessment of risk.

8.7.59 **Figures 8.11 – 8.13** illustrate the results of the seasonal risk assessment for high collision risk bat species recorded at the Site at each survey location, to provide an overview of how bat activity and risk levels vary across the Site though the year and by species. As seen in these figures many locations in many of the survey months recorded no activity by high collision risk bat species (in particular *Nyctalus* spp.). However, in locations and months where bat activity was recorded, the Site risk level for common pipistrelle, soprano pipistrelle and *Nyctalus* spp. per month at each location was either 'Low' or 'Medium', with 'High' risk assessment scores recorded only at Locations 12 and 13 (within the Site boundary) and Location 14 (distant to the Site boundary).

8.7.60 Location 12 was situated in a location where higher bat activity would be expected, situated along a commuting woodland edge in an area of plantation and forestry clear-fell and beside a mature pond with abundant foraging resources. The direction of detector recording was also positioned to record over the waterbody, and therefore would collect data on bats foraging frequently at this location. Location 12 is situated 208 m from the

[36] Nathusius' pipistrelle were excluded from the assessment as only a single bat pass was recorded throughout the survey period for this species and therefore the risk to this species is considered negligible, and it is not discussed further.

closest proposed wind turbine (T8), which is located in open clear-fell and away from existing woodland edges. Location 13 was situated along plantation edges and a forestry track, with the bearing of detector recording along the edge features, such edge features act as commuting corridors of paths. Location 13 is situated 178 m from the closest proposed wind turbine (T10), which is located in dense conifer plantation and away from existing woodland edges.

8.7.61 At Location 14, High bpph were recorded for soprano pipistrelle in spring and summer (Low in autumn) and for *Nyctalus* spp., in spring (Low in summer and autumn). For common pipistrelle, the bpph at Location 14 were Moderate in spring and summer (Low in autumn). Location 14 was located along plantation edge and by a watercourse, it is also the closest surveyed location to the Wood of Cree. Bats are known to use woodland edges as commuting corridors, and the watercourse provides foraging opportunities. However, Location 14 is 1.8 km outwith the Site boundary and is approximately 2.2 km from the nearest proposed wind turbine (T10), due to the design evolution of the Proposed Development.

8.7.62 As shown in **Figure 8.11**, analysis of the risk assessment scores for common pipistrelle, when considering the bpph, indicate quite consistent levels of activity across the majority of survey locations throughout the year, with Locations 1-6, 8-11 and 15-18 all having less than 2 bpph in each survey Visit (Low overall risk). Peaks in spring and summer with bpph varying between 2.3 – 6.69 at Locations 7, 12 and 14, indicating Moderate risk. Location 13 was considered Moderate/High risk in summer (7.23 bpph) and Moderate in spring (5.21 bpph).

8.7.63 As shown in **Figure 8.12**, analysis of the risk assessment scores for soprano pipistrelle, when considering the bpph, indicate an activity pattern very similar to that of common pipistrelle with quite consistent levels of activity across the majority of survey locations throughout the year. There are peaks in spring with Moderate activity risk at Locations 7, 9, 13 and 15 (only Location 13 is within the Site boundary), with bpph varying between 2.74 – 5.87 and High risk recorded at Location 14 (15.45 bpph) and Location 12 (15.80 bpph). Summer recorded one Moderate risk within the Site boundary at Location 12 (5.51 bpph) with Location 18 having 4.23 bpph but is outwith the Site boundary. Location 14 again recorded High activity (40.31 bpph) for this species. Location 12 in autumn was the only location that recorded higher than a Low activity with 2.21 bpph (Moderate risk).

8.7.64 As shown in **Figure 8.13**, several of the survey locations recorded no *Nyctalus* spp. activity throughout autumn (Locations 1-5, 7 and 9). When considering the bpph, these indicate quite consistent levels of activity across the majority of survey locations throughout the year, with generally low numbers across all locations. Location 10 in spring and summer recorded Moderate risk with a maximum of 2.43 bpph, and Location 14 with a High risk of 7.51 bpph (both outwith the Site boundary). Only Location 16 in summer recorded a Moderate risk with 2.52 bpph, which is located 248 m to the closest wind turbine (T11).

Otter

8.7.65 Three records of otter spraints were recorded: two along Meg's Linn watercourse and one along Castle Burn. The spraints were recorded as old, suggesting the watercourses are not used regularly by otters. One sighting of an otter was incidentally recorded during an ornithology survey along Cordorcan Burn in May 2023 (**Figure 8.9**). No protected features for otter (i.e., holts or couches) were recorded.

8.7.66 The watercourses within the wider area of the Site provide suitable foraging and commuting habitat for otter, providing connectivity between the Site and the River Cree. Watercourses within the Site have limited opportunities for resting places for otter, with limited riparian woodland presence and heavily occluded streams.

Water Vole

8.7.67 No field signs attributable to water vole were recorded within the survey area. Within the wider survey area most of the smaller watercourses were of low suitability for this species.

Pine Marten

8.7.68 Four potential pine marten scats were recorded within the survey area. Areas of forestry within the Site were deemed to potentially offer some suitable habitats for hunting and foraging habitat for pine marten.

Red Squirrel

8.7.69 Six potential feeding red squirrel signs were recorded within the survey area. The Site contains large areas of conifer plantation which is suitable foraging and nesting habitat for red squirrel.

Great Crested Newt (GCN)

8.7.70 Two waterbodies within the survey area were recorded as 'Below Average' and 'Poor' in the HSI assessment (see **Technical Appendix 8.2** for full details of HSI assessment).

Reptiles

8.7.71 Two common lizard and one slow worm sightings were recorded within the survey area. Twelve features offering potential for use as hibernacula by reptile species were identified, which were mostly attributed to dry stone wall features, dilapidated stone structures and rock piles. The Site has habitat offering suitability for reptiles, with open ground and upland vegetation.

Fish

8.7.72 Electrofishing surveys were undertaken by the Galloway Fisheries Trust (GFT) in August 2023, with a total of twelve sites within the River Cree catchment surveyed. Ten of the 12 sites contained brown/sea-trout (*Salmo trutta*) and one site contained Atlantic salmon (*Salmo salar*), one site contained no salmonids but European eel (*Anguilla anguilla*) was present, and one site contained no fish of any species. Full results detailed in **Technical Appendix 8.4**; see also **Figures 8.14** and **8.15**.

8.7.73 No salmonids were recorded within Black Burn (an on-site tributary of the Cordorcan Burn) or an un-named tributary of Coldstream Burn downstream of the Site (**Figure 8.15**).

8.7.74 Atlantic salmon were only recorded in Peat Rig Strand (a tributary of Penkiln Burn; **Figure 8.14**) with salmon parr being found in very low density.

8.7.75 The remaining watercourses surveyed all contained trout. These included the Cordorcan Burn, tributaries of Coldstream Burn, Castle Burn, Peat Rig Strand, Glenshalloch Burn and Washing Burn – with often several electrofishing sites surveyed on some of these watercourses. Where present, the density of trout fry ranged from Very Low to Moderate, and trout parr density raged from Very Low to Very High, depending on location – see **Figure 8.14**.

8.7.76 European eel was a notable bycatch species in six of the twelve sampling sites.

Other Species & INNS

8.7.77 Two mammal holes were recorded across the survey area (**Figure 8.9**), which were of a size that would be suitable for use by protected species, although no field signs of any protected species were recorded. Such features may be used by other mammal species such as red fox (*Vulpes vulpes*) which are likely to be present in the area. Both of these records are within the Site, but the closest being 250 m from the nearest wind turbine for

the Proposed Development. An unidentified scat was recorded to the west of the Site, with no other protected species signs recorded close by.

8.7.78 Deer and signs of deer were recorded within and around the Site during surveys.

8.7.79 No other instances or signs of notable species or INNS were noted in the course of any ecology field surveys.

Future Baseline

8.7.80 In the future (i.e. up until the commencement of construction), it is likely that the IEFs would generally remain as they are at present, although numbers and distribution of species may fluctuate naturally. Vegetation and habitat composition, structure, quality and extents, particularly within the south of the Site, may be adversely affected by the further continued encroachment and invasion of non-native self-seeded conifer trees from adjoining forestry areas, and the continuing maturity of the existing self-seeded specimens. Vegetation and habitat composition may also fluctuate marginally in the long-term in line with increasing or decreasing livestock grazing and fluctuations in deer browsing. The conifer plantation forestry will continue to mature but would be subject to a future felling plan, which may create temporary localised habitat changes until replanting and canopy closure.

8.8 Assessment of Potential Effects

8.8.1 This section provides an assessment of the likely effects of the Proposed Development on the IEFs identified through the baseline studies. The assessment of effects is based on the project description outlined in **Chapter 2: Proposed Development**, and is structured as follows:

- construction effects;
- operational effects; and
- decommissioning effects.

Ecological Features Scoped Out of the Assessment

8.8.2 In addition to those ecological features and effects already scoped out as detailed within **Section 8.5**, based on the survey findings and with consideration of the additional desk study and baseline data collected, and following the iterative design and embedded mitigation measures described above (**Section 8.6**), and project assumptions in **Section 8.8** below, several potential effects on IEFs can be scoped-out of further assessment based on the professional judgement of the EIA team and experience from other relevant projects and policy guidance or standards. This includes effects from the construction and operational phases of the Proposed Development, as well as cumulative effects. The following paragraphs detail the ecological features and effects that have been scoped out following further desk studies and field surveys.

Designated Sites and Ancient Woodland

8.8.3 With respect to Galloway Oakwoods SAC, Wood of Cree SSSI, Glentrool Oakwoods SSSI, Cairnsmore of Fleet NNR, Cairnsmore of Fleet SSSI, Merrick Kells SAC and Merrick SSSI, given the locations of, and the distances between the Site boundary and the these designated sites, and the respective qualifying features for these designated sites (**Table 8.6**) it is considered that there is no connectivity between the Proposed Development and these designated sites and as such they are scoped out of the assessment - as has also been noted as acceptable by NatureScot (see **Table 8.1**).

8.8.4 The Lower River Cree SSSI is 4.66 km downstream of the Proposed Development with partial hydrological connectivity to the Site through the Cordoran Burn which runs along the

northern border of the Site and the Black Burn which runs through the Site. Given the distances from the Site, the respective qualifying features, and with embedded mitigation in place (including Site design (e.g., 50 m watercourse buffers) and a robust CEMP with pollution prevention measures) it is not anticipated that any potential significant effects would materialise on this designated site and the qualifying ecological feature of the SSSI (smelt), and as such they are scoped out of the assessment.

8.8.5 There are a few areas of ancient woodland within the Site along the access track, by Auchinleck Bridge (**Figure 8.1**). The track here is existing and will be the subject of minor upgrading works (e.g., verge widening, surface upgrading) to be deemed suitable for abnormal loads delivery for the Proposed Development. Habitat loss within this area is expected to be minimal and it is not anticipated that any elderly, mature or semi-mature trees would need to be felled, with these trees generally set back from the existing road verge, any loss of habitat here would be limited to existing verge habitats, which may include some young or scrub-like trees. No further fragmentation of the woodland is expected, as the track is existing, and no adverse impacts on ancient woodland are foreseen. Further detailed design at this location post consent and pre-construction to avoid sensitive features/trees through micrositing as necessary, combined with embedded mitigation and good practice, will ensure any potential effects on ancient woodland here are negligible, and as such ancient woodland has been scoped out of the detailed assessment. It should also be noted, in general, any losses of woodland will be mitigated and compensated for, for example see the OBEMP (**Technical Appendix 8.6**) and **Chapter 14: Forestry**.

Terrestrial Habitats

8.8.6 Habitats that are considered to be of lower conservation value and are very common habitat types locally and regionally are scoped out of the assessment, as per **Section 8.5**. Within the study area these include:

- coniferous plantation woodland;
- recently-felled coniferous woodland;
- scattered coniferous tree;
- dense/continuous scrub;
- unimproved and semi-improved acid grassland;
- unimproved neutral grassland;
- improved grassland;
- continuous bracken;
- tall ruderal vegetation; and
- bare ground.

8.8.7 Marshy grassland is scoped out of the assessment. As per **Annex A**, **Table 8.11**, marshy grassland covers 61.41 ha (9.01 % of the study area) and is characterised by several common and widespread communities, overwhelmingly dominated by purple moor-grass or rushes (*Juncus* spp.). The bulk of the marshy grassland vegetation within the Site is made up of NVC type M25 (M25, M25a & M25b) and non-NVC sharp-flowered rush (*Juncus acutiflorus*) and soft rush (*Juncus effusus*) acid grassland communities (i.e., 'Ja' and 'Je'). These marshy grassland communities recorded in the study area are species-poor and grazed, often consisting of little more than a dense sward of rushes or purple moor-grass with some grasses and common herbs; full descriptions of these communities are provided in **Technical Appendix 8.1**. The range of marshy grassland communities present in the study area are common habitat types locally, regionally and nationally and the small direct and indirect losses predicted as a result of the Proposed Development, as per **Annex A**, **Table 8.11**, are of minor significance. These marshy grassland communities are considered potential GWDTE's in line with guidance. However, designation as a GWDTE does not infer an intrinsic biodiversity value, and GWDTE status has not been used as criteria to determine conservation value in the ecology assessment. There is however a statutory requirement to

consider GWDTEs and the data gathered during the NVC surveys has been used to inform this assessment (see **Chapter 10: Geology, Hydrology and Hydrogeology Assessment**).

8.8.8 A number of other habitats recorded within the study area are of local importance, some due to their listing as Annex I habitats or SBL Priority Habitats. However, as they occupy such small areas within the study area, they are species-poor examples, and/or any direct or indirect effects on the habitat will not occur or will be negligible in magnitude (**Annex A**, **Table 8.11**) (particularly due to embedded mitigation assumptions described above) all effects on them are scoped out of the assessment. These habitats are:

- broadleaved semi-natural woodland;
- scattered broadleaved tree;
- wet dwarf shrub heath;
- dry heath;
- acid/neutral flush; and
- standing and running water.

Aquatic Habitats and Species

8.8.9 Effects on aquatic habitats including standing water, running water and fisheries interests are scoped out of the assessment. Migratory salmonids are able to access some watercourses with connectivity to the Proposed Development, and resident brown trout are present in varying densities in most of the watercourses on and around the Site. European eel were also recorded in the course of fisheries surveys in several watercourses (**Technical Appendix 8.4**). The Proposed Development has the potential to impact negatively on water quality and hydrogeomorphology in the absence of mitigation. However, to avoid direct or indirect impacts on these features a minimum 50 m buffer distance between infrastructure and watercourses has been maintained where possible (see **Chapter 2: Proposed Development**), except where a watercourse crossing cannot be avoided (see **Chapter 10: Geology, Hydrology and Hydrogeology Assessment**). The design of permanent and temporary access track watercourse crossings would comply with SEPA good practice guidance to minimise impacts on fish and their habitat. As detailed in **Section 8.6**, the embedded mitigation includes that construction work would comply with a CEMP developed by the Contractor, which would be monitored by a suitably experienced ECoW. The CEMP would include good practice mitigation for effective silt and pollution prevention and undertaking works in accordance with SEPA best practice guidelines. With this embedded mitigation in place, water pollution impacts and associated likely significant effects associated with the Proposed Development on watercourses, aquatic ecology and fish are considered unlikely and therefore these pollution impacts are scoped-out of further assessment. Further assessments of watercourses are provided in **Chapter 10: Geology, Hydrology and Hydrogeology Assessment**.

Protected Species

8.8.10 Effects on protected species that have been recorded locally or may be present locally such as badger, otter, brown hare, pine marten, great crested newt, water vole, red squirrel and reptiles are scoped out of the assessment due to the absence of protected features, lack of suitable habitat, limited desk-based or field evidence within the Site boundary and/or lack of potential effects from the Proposed Development.

8.8.11 Bats (roosting) are scoped out of the assessment. Whilst a small number of low to moderate suitability features with the potential to support roosting bats were identified along the access track to Site, none are of a size/character that could support maternity roosts or significant hibernation roosts. Additionally, the land passed through is actively worked farmland, and whilst an increase in traffic would be expected in addition to some temporary construction disturbance, it is expected that any bats potentially using roosts in this area would be somewhat habituated to a certain level of disturbance and as such no

significant effects on these are expected. Within the Site, there were no PRFs within 200 m plus rotor radius of any proposed turbine (**Technical Appendix 8.3**).

8.8.12 Overall, the SPP as described in **Section 8.6** (draft in **Technical Appendix 8.5**) will ensure that the provisions of the relevant wildlife legislation are complied with in relation to all protected species, should any evidence of presence be found during pre-construction surveys or during the construction period.

8.8.13 Operational and cumulative effects arising from collision mortality for low collision risk bat species are scoped out of the assessment[21Error! Bookmark not defined.]. Brown long-eared bat, Daubenton's bat, Natterer's bat, Whiskered bat and the *Myotis* spp. genera were the low collision risk species recorded at the Proposed Development. Effects on Nathusius pipistrelle (a high collision risk species) are also scoped out, due to the recording of just one registration during the surveys (**Table 8.7**).

8.8.14 Effects on all IEFs during operation of the Proposed Development (with the exception of collision risk to high risk bat species[37]) have been scoped out. Maintenance of the Proposed Development will involve vehicular access along the access tracks only, and any maintenance of turbines will be occasional, typically carried out by a small number of maintenance staff inside the turbines during normal working hours. This is unlikely to result in any operational effects on any species or habitats recorded at and around the Proposed Development.

Other Species

Deer

8.8.15 Effects on deer are scoped out of the assessment. Several species of deer are likely to be present in the local area. There is commercial forestry present within the Site boundary, which could support low numbers of deer. Operational effects are not anticipated as there is no deer fencing around the Proposed Development and therefore deer may use and pass through uninhibited. Due to the open nature of much of the Site, the loss of shelter habitat is not expected, and there is abundant sheltering woodland habitat adjacent to the Site. Grazing habitat loss has been minimised through design, and with the extensive amount of similar suitable grazing habitat in the surrounding land and its availability and accessibility, any loss of this habitat is expected to be negligible to the wide-ranging species. The size of the Proposed Development is not considered to pose a significant barrier to any local movements or migrations of deer. Construction effects, due to disturbance, are expected to be minimal due to the timing of works (primarily during the day when deer are least active) and short-term construction period (approximately 24 months as per **Section 8.8**). If individuals are displaced during construction, there are suitable routes around the Proposed Development which will not force deer into areas of risk, including public roads or towards built up areas. As a result of the size and location of the Proposed Development, temporary construction period, minimal habitat loss and extensive suitable habitat and commuting corridors locally within the Site and beyond, no negative effects on deer are predicted. Due to minimal displacement outwith the Site during construction and operation, no negative effects, through increased browsing/trampling on surrounding habitats are expected.

Important Ecological Features (IEFs)

8.8.16 A summary of the Nature Conservation Value of the remaining IEFs identified within the Site and surrounding area (as confirmed through survey results and consultation outlined above) which have been scoped in to the assessment is provided in **Table 8.8** below, together with the justification for inclusion. These comprise blanket bog and wet modified

[37] With the exception of Nathusius' pipistrelle as noted in **Section 8.8**.

bog, and bats (operational, high collision risk species common and soprano pipistrelle, and *Nyctalus* spp. only).

Table 8.8: Nature Conservation Value of Scoped in IEFs

IEF	Nature Conservation Value	Relevant Legislation/Guidance & Justification
Blanket Bog and Wet Modified Bog	Local	The Proposed Development would result in direct and indirect habitat loss for blanket bog and wet modified bog habitats. Blanket bog covers 27.66 ha (4.06 %) of the study area, whilst wet modified bog covers a further 95.19 ha (13.97 %) (**Annex A, Table 8.11**). These habitat types are also extensive locally outwith the Site. The blanket bog communities present include M17 and M19 with some infrequent M2 bog pools. These communities within the Site do not fall within the 'near-natural' classification and generally tend to represent areas of modified bog (see the peatland condition assessment information in the Baseline section above and details in **Technical Appendix 8.1**). Communities representing wet modified bog habitat within the Site comprise mostly M20/M20b with some areas of M25a^[38], these communities have a lower relative quality compared to the blanket bog communities. These habitats are associated with SBL blanket bog and Annex I type 7130 blanket bog habitat, however these mire habitats with the Site are generally considered modified due to effects such as grazing and self-seeded conifer invasion (see **Technical Appendix 8.1** for further details). The Site also contain some small areas of Class 1 and Class 2 peatland from the Carbon and Peatland Map[9], Class 1 peatland has been completely avoided by the Proposed Development (**Figure 8.2**); see also discussion in **Section 8.7.** It is recognised that this definition is not solely for nature conservation and so not directly applicable to evaluating the value of a peatland. Despite some of these communities being associated with Annex I and SBL blanket bog classifications, the habitat within the study area is not considered to be Nationally or Regionally important due to its size, condition and distribution. Therefore, assigning a Nature Conservation Value higher than Local is not deemed appropriate. In addition, mire habitat of this quality (and greater) is relatively widespread across the local area as well as within Dumfries & Galloway and beyond, which further reduces the relative value of this habitat within the Site.
Bats (high collision risk species: common pipistrelle, soprano	Local	All UK bat species are listed on Annex II of the Habitats Directive, and fully protected through the Conservation (Natural Habitats &c.) Regulations 1994 (as amended) ('The Habitats Regulations'). Nine species are listed on the SBL. Common and soprano pipistrelle are considered to have a favourable conservation status in the UK and Scotland, under

[38] In this chapter, where M25 is suffixed with a caret '^', e.g., M25a^, this implies the habitat is more likely to be considered a modified bog habitat with peat depth likely equal to or greater than 0.5 m in depth and characteristics or associate species aligning with a bog habitat, as opposed to a marshy grassland habitat on peat or peaty soils less than 0.5 m in depth (i.e., denoted without a caret, e.g., M25a).

IEF	Nature Conservation Value	Relevant Legislation/Guidance & Justification
pipistrelle, *Nyctalus* spp.)		Article 17 of the Habitats Directive and are listed as Least Concern (LC) in Scotland under the IUCN Red List criteria (Matthews *et al*. 2018, JNCC 2019a). *Nyctalus* spp. comprise Leisler's bat and noctule bat. *Nyctalus* spp. are considered to have a favourable conservation status in the UK (no Scotland specific categorisation), with noctule also listed as LC, and Leisler's as Near Threatened (NT), on the IUCN Red List (Matthews *et al*. 2018, JNCC 2019a). Reliable population estimates for *Nyctalus* spp. in Scotland are currently not available with some currently used population estimates of only a few hundred bats (e.g., Harris *et al*. 1995) outdated and based on expert opinion. Actual populations in Scotland, and their distribution range, are now thought to be much larger than previously reported with populations suggested to be in the region of many thousands (Newson *et al*. 2017). The majority of bat activity (79.59 % of overall bat activity, 92.67 % high collision risk bat species activity) was attributed to common or soprano pipistrelle bats, which are considered to have a 'common' population relative abundance and are considered of 'medium' potential vulnerability (NatureScot *et al*. 2021). *Nyctalus* spp. are considered to have 'rarest' population relative abundance and are considered of 'high' potential vulnerability (NatureScot *et al*. 2021); 3,736 *Nyctalus* spp. registrations were recorded during surveys, i.e., 13.08% of bat activity recorded (**Table 8.7**). Bat activity levels (bpph) and associated risk for each of these high collision risk species was generally low with within the Site and throughout the season, with most higher activity areas located outwith the Site and distant to proposed infrastructure (see Baseline section above, **Technical Appendix 8.3** and **Figure 8.11 - 8.13** for full details). Considering the above information, including a lack of potential roost sites within the Site, and the majority of species recorded being common and soprano pipistrelles, a Nature Conservation Value of Local is considered suitable for all bat species.

Assumptions of the Assessment

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

- Work on the Proposed Development, including vegetation clearance and construction of new tracks, wind turbine hardstand and other ancillary infrastructure, erection of the wind turbines and Site restoration is predicted to last for approximately 24 months.
- All electrical cabling between wind turbines and the associated infrastructure would be underground in shallow trenches which would be reinstated post-construction and, in all cases, follow the tracks.
- The construction compound and any temporary laydown areas will be temporary infrastructure. Any disturbance or earthworks around permanent infrastructure during construction would be temporary and areas reinstated or restored before the construction phase ends. The only excavation in these areas would be for cabling as

noted above and otherwise may only be periodically used for side-casting of spoil until reinstatement.

- The embedded pre-construction and construction phase mitigation described in the Embedded Mitigation section above will be fully applied, e.g., the presence of an ECoW, adherence to the agreed SPP and CEMP post-consent.

Predicted Construction Effects

8.8.18 This section provides an assessment of the likely effects of the construction of the Proposed Development upon the scoped-in IEFs.

8.8.19 The most tangible impact during construction of the Proposed Development would be direct habitat loss due to the construction of infrastructure such as new tracks, wind turbines, hardstands, laydown areas, compounds, borrow pits, batching plant and substation. Much of this infrastructure would be permanent, however the temporary construction compound, temporary crane pad sections, temporary batching plant and borrow pits would be restored at the end of construction.

8.8.20 There may also be some indirect habitat losses to wetland habitats due to drainage effects. For the purposes of this assessment, it is assumed that wetland habitat losses to wetland habitats due to indirect drainage effects may extend out to 10 m from infrastructure (i.e., in keeping with precautionary indirect drainage assumptions within the carbon calculator guidance (SEPA, 2018)). It is expected that any indirect drainage effects would only impact wetland habitat such as blanket bog, wet modified bog, wet heath, flushes etc. No indirect drainage effects are expected to impact or alter the quality or composition of non-wetland habitats, such as dry heath, bracken, acid grassland etc., as such only direct habitat loss applies to these habitats.

8.8.21 Temporary habitat losses due to the creation of temporary infrastructure and up to five borrow pit search areas (all of which, or the full search area extents, may not be used or required) have been calculated separately. These have been considered separately to permanent infrastructure as although these areas would be restored at the end of the construction period and therefore would not show a loss in habitat extent, the habitat type resulting after restoration may not be the same as the original due to changes in topographical or hydrological conditions. In particular, areas of land take for this temporary infrastructure may represent permanent losses for habitat types such as blanket bog/wet modified bog due to the effects on the structure and function of the habitat type, and the complexities and long timescales involved in restoring or re-creating these particular habitat types.

8.8.22 **Table 8.9** details the estimated relative losses expected to occur for scoped in habitats, for all new permanent and temporary infrastructure (with habitat loss estimated for all habitat types presented in **Annex A**, **Table 8.11**).

Table 8.9: Estimated Loss of IEF Habitats in study area for Permanent and Temporary Infrastructure

Habitat Type	Extent in study area (ha)	NVC community Code or Habitat Type[39]	Direct Habitat Loss (ha)	Direct Habitat Loss as a % of Habitat Type	Indirect Habitat Loss (ha) in study area	Indirect Habitat Loss as a % of Habitat Type in study area
Permanent						
Blanket Bog	27.66	M17, M19	0.16	0.58	0.66	2.38
Wet Modified Bog	95.19	M25a^, M20b, M20	1.40	1.47	2.06	2.16
Temporary						
Blanket Bog	27.66	M17, M19	0.03	0.12	N/A	N/A
Wet Modified Bog	95.19	M25a^, M20b, M20	0.77	0.81	N/A	N/A

8.8.23 The following Sections assess the effect of these losses for each IEF scoped in.

Blanket Bog & Wet Modified Bog

8.8.24 **Impact**: Impacts upon blanket bog and wet modified habitats will be direct (through permanent and temporary habitat loss) and indirect (through potential drying effects upon neighbouring bog habitats) occurring from the construction phase into the operational phase. Direct loss would occur in areas where permanent infrastructure such as tracks, wind turbine foundations, and hardstands are sited on these habitat types. The excavation of these habitat types for temporary infrastructure would also likely lead to the losses of blanket bog and wet modified bog due to the long-term effect on the ecological and hydrological structure and function of these habitat types. In addition, there may be indirect losses as a result of drainage around infrastructure (precautionarily around 10 m from infrastructure is assumed (SEPA, 2018)) and disruption to hydrological flows.

8.8.25 Fragmentation could involve the creation of smaller areas of habitat which in turn could impair the functioning and reduce the resilience of essential hydrological processes. This could make the impacted habitat more vulnerable to future decline in condition and potentially lead to a transition to a different habitat type such as blanket bog to wet modified bog/wet heath or wet modified bog to dry modified bog/wet heath, or more subtle sub-community shifts.

8.8.26 For blanket bog and wet modified bog, fragmentation effects are a function of the extent of the hydrological unit, location of impact within the unit and magnitude of direct and indirect impact in the context of the hydrological unit. **Figure 8.3** shows that blanket bog and wet modified bog habitats exist together and with other wetland habitats (e.g., mires, flushes and marshy grasslands) in large expansive hydrologically connected mosaics across the study area and in the wider local area. The large scale of these wetland habitat mosaics reduces the likelihood that small, fragmented habitat patches would be created. No small-scale habitat fragments appear to be created by the location of tracks and other infrastructure, and where some wetland habitats are subject to infrastructure there are

[39] Only specific IEF habitats, communities or features subject to habitat losses are presented within this table. Any IEF communities not listed here are not subject to any predicted direct or indirect habitat losses. Full details of habitat losses for all habitat types are presented in **Annex A**, **Table 8.11**.

good practice construction methods that will allow the maintenance of sub-surface hydrological connectivity between areas. It is therefore unlikely that the potential effects of fragmentation would lead to further loss of blanket bog and wet modified bog in addition to that predicted to occur as a result of direct loss and precautionary indirect loss figures detailed above.

8.8.27 **Nature Conservation Value**: Local (as detailed in **Table 8.8**).

8.8.28 **Conservation Status**: Conservation Status of this habitat as assessed in the 2019 JNCC report by the UK on blanket bog is 'Unfavourable Bad' and 'Stable' at the UK level (JNCC, 2019b).

8.8.29 **Magnitude of Impact**: The UK has an estimated 2,182,200 ha of blanket bog (JNCC, 2019b) of which around 1,759,000 to 1,800,000 ha is in Scotland (JNCC, 2019c) (approximately 23 % of the land area).

8.8.30 Blanket bog covers 27.66 ha (4.06 %) of the study area, with a relatively even split between the M17 and M19 NVC communities which comprise the bulk of the blanket bog vegetation (see **Annex A**, **Table 8.11**). As per **Table 8.9**, the direct habitat loss for blanket bog is predicted to be 0.16 ha due to permanent infrastructure with up to an additional 0.03 ha due to temporary works areas and borrow pits. This results in a potential total direct loss of 0.19 ha, equivalent to 0.70 % of the blanket bog within the study area.

8.8.31 Wet modified bog covers 95.19 ha (13.97 %) of the study area and is comprised of lower quality M25a^, M20b and M20. As per **Table 8.9**, the direct habitat loss for wet modified bog is predicted to be 1.40 ha due to permanent infrastructure with up to an additional 0.77 ha due to the temporary works areas and borrow pits. This results in a potential total direct loss of 2.17 ha, equivalent to 2.28 % of the wet modified bog within the study area.

8.8.32 For this blanket mire resource as a whole, i.e., combining blanket bog and wet modified bog, direct losses amount to 1.56 ha for permanent infrastructure and 0.81 ha for temporary works areas and borrow pits: a total of 2.37 ha, or 1.93 %, of the combined resource within the study area.

8.8.33 In addition, there may be some indirect losses because of the zone of drainage around infrastructure. The actual distance of the effects of drainage on a peatland is highly variable and depends on various factors such as the type of peatland and its characteristics and properties of the peat; the type, size distribution and frequency of drainage feature; and whether the drainage affects the acrotelm, penetrates the catotelm, or both. Consequently, drainage effects can be restricted to just a few metres around the feature or extend out to tens of metres, or further (e.g., see review within Landry & Rochefort (2012)). The hydraulic conductivity of the peatland is one of the key variables which affect the extent of drainage. In general, less decomposed more fibric peatlands (which tend to be found commonly in fen type habitats) generally have a higher hydraulic conductivity and drainage effects can extend to around 50 m, whilst in more decomposed (less fibrous) peat drainage effects may only extend to around 2 m. Blanket bog habitats commonly are associated with more highly decomposed peats (Nayak *et al.* 2008). For this assessment, indirect effects are precautionarily assumed to extend out to 10 m from infrastructure (as per SEPA, 2018).

8.8.34 As per **Table 8.9**, if indirect drainage effects are fully realised out to 10 m around permanent infrastructure in all blanket bog and wet modified bog areas, then the total predicted potential habitat modification or losses increase for blanket bog to 0.82 ha and 3.46 ha for wet modified bog. This worst-case scenario of direct and indirect habitat loss for permanent and temporary works areas is an overall total of 0.85 ha or 3.08 % of the study areas blanket bog and 4.23 ha or 4.44 % of the study areas wet modified bog. For this blanket mire resource as a whole, i.e., combining blanket bog and wet modified bog, direct

and indirect losses for permanent and temporary works areas overall amount to 5.08 ha, or 4.14 % of the combined resource within the study area.

8.8.35 However, it is considered highly unlikely that indirect drainage effects of this scale (i.e., out to 10 m either side of all permanent infrastructure) would occur or would have such an effect on the habitat as to result in any notable effect on the type of bog present or shifts to a lower conservation value habitat type (such as acid grassland for example). For instance, Stewart & Lance (1991) in their study found that a lowering of the water table next to drains was slight and confined to just a few metres either side of the drain, on sloping ground the uphill zone of drawdown was even narrower. Subtle variations in plant species abundance were noted, with species dependent on high water-tables having a lower cover-abundance near to drains, and species with drier heathland affinities having higher cover than at places farther away. However, there were no wholescale changes in vegetation or the species assemblage; for instance, declines in *Sphagna* cover were highly localised and took nearly 20 years to achieve statistical significance. Anecdotal observations from wind farms around Scotland also suggest that bog habitats readily persist around infrastructure and within this 10 m zone of possible influence.

8.8.36 It should also be noted that the predicted indirect losses due to drainage are calculated in GIS and based on the habitat survey mapping, there may be small-scale local specific factors such as those relating to natural breaks in hydrology, geology or topography, or the presence of non-wetland habitats that act as a barrier or buffer, that would prevent the full predicted indirect drainage effects from materialising.

8.8.37 Overall, evidence suggests that if some drainage effects materialise locally around infrastructure due to the Proposed Development the most likely effect will not be a major change in overall bog habitat type but rather a potential change in vegetation micro-topography, certain species cover, or abundance that may result in a subtle NVC community or sub-community shift, and which may only be apparent in the long term. If severe indirect drying effects are observed long term, then wet modified bog/blanket bog may transition to wet heath (e.g., NVC type M15), dry modified bog, or dry heath. Wet and dry heaths are still habitats of conservation interest, being Annex I, UKBAP and SBL Priority Habitats also.

8.8.38 When considering the scale of the above habitat losses (i.e., direct (permanent and temporary) and precautionary indirect effects on up to 4.14 % of the combined blanket bog and wet modified bog within the study area) and accounting for the relative abundance, distribution and quality of the blanket bog and wet modified bog within the study area and connected immediately adjacent to the Proposed Development, an effect magnitude of **low spatial** (c.f. **Table 8.3**) and **long-term temporal** is appropriate.

8.8.39 **Significance of Effect**: Given the above consideration of Nature Conservation Value, Conservation Status and Magnitude of Impact, the effect significance is considered to be **Minor adverse** and **Not Significant**.

Predicted Operational Effects

8.8.40 This section provides an assessment of the likely impacts of the operation of the Proposed Development upon the scoped-in IEFs.

Habitats

8.8.41 All likely direct and indirect impacts on habitats have been considered in the Predicted Construction Effects section above.

8.8.42 Although the majority of habitat loss is associated with infrastructure required for the operation of the Proposed Development (rather than temporary construction infrastructure), the physical loss of habitat would occur during the construction stage and is therefore considered above.

8.8.43 Indirect effects on wetland habitats would largely occur during the operational phase as potential drying effects become established. However, for ease and clarity of assessing effects on habitats these are considered together in Predicted Construction Effects.

Bats

8.8.44 **Impact**: During the operational phase, there is potential collision risk for commuting and foraging bat species in addition to the risk that bats may be affected by barotrauma[40] when flying in close proximity to moving turbine blades. For the purposes of this assessment, the potential effects from barotrauma are assumed to be the same as for collision risk. This is due to the lack of published empirical evidence in causes of bat fatalities around wind farms and the difficulties in determining whether bat fatalities are due to strikes (collisions) with the turbine blades or barotrauma.

8.8.45 Research undertaken by Exeter University on behalf of DEFRA (DEFRA, 2016) found that most bat fatalities at UK wind farms have been common pipistrelle, soprano pipistrelle and noctule bats. Further work (Richardson *et al*. 2021) found that common pipistrelle activity was higher at turbine locations than at control locations in similar habitat, suggesting that this species may be at particular risk. In the same study soprano pipistrelle activity was comparable between sites with no attraction or repulsion by turbines. It is suggested the observed higher levels of activity could be because there are more individual bats around turbines, or because bats spend more time in these locations relative to controls, even if the number of individual bats remains the same; however, it is not possible to distinguish between these possibilities using acoustic bat data (Richardson *et al*. 2021).

8.8.46 Because the proposed turbines would have a blade tip height of 210 m and 250 m, some of them will require red aviation warning lights. Refer to **Chapter 15: Aviation, Radar and Defence** for details on the aviation lighting scheme. A five-year study by Spoelstra *et al*. (2017) concluded that foraging bats are not attracted to red lighting. This is attributable to the fact that white and green spectrum lights attract insects whereas red lights do not. Based on this, Spoelstra *et al*. (2017) advised "*Hence, in order to limit the negative impact of light at night on bats, white and green light should be avoided in or close to natural habitat, but red lights may be used if illumination is needed*". A study by Voight *et al*. (2018) found evidence of attraction of migratory soprano pipistrelle to red lighting. However, soprano pipistrelles do not migrate in the UK as they do in continental Europe, so this finding is not relevant to the Proposed Development. With regard to *Nyctalus* spp., the results were inconclusive due to the difficulty in distinguishing between species, although there was some suggestion of attraction to red light. The explanation for the contrasting findings between these studies is given by Spoelstra *et al*. (2017) as "*migratory bats may be more susceptible to light sources of specific wavelength spectra because vision may play a more dominant role than echolocation during migration. Non-migratory bats might use orientation cues that are more involved during general hunting behaviour, for example, echoes reflected from local landmarks, instead of cues from natural or artificial light sources*".

8.8.47 Bats may also be displaced from their foraging grounds through avoidance of operational wind turbines (Scholz and Voigt, 2022). Barré *et al*. (2018) recorded a marked reduction in bat activity around operational wind turbines.

8.8.48 **Nature Conservation Value**: Local (as detailed in **Table 8.8**).

8.8.49 **Conservation Status**: Common pipistrelle are assessed in the 2019 JNCC report as 'Favourable' and 'Improving' at the UK level (JNCC 2019d); soprano pipistrelle, noctule bat and Leisler's bat are assessed as 'Favourable' and 'Stable' at the UK level (JNCC 2019e,

[40] Barotrauma describes injuries that occur when a bat (or other animal) encounters sudden and extreme changes in atmospheric pressure. The rapid pressure fluctuations can rupture air-containing structures in the bodies of mammals which causes internal bleeding and, potentially, death.

2019f, 2019g). Mathews *et al*. (2018) also consider common pipistrelle, soprano pipistrelle and *Nyctalus* spp. to have a 'Favourable' conservation status.

8.8.50 Further details on the Conservation Status of the high collision risk bat species recorded within the Site are provided below. Information on noctule, Leisler's bats and *Nyctalus* spp. are presented as registrations for both species and genera were present (**Technical Appendix 8.3**), however these bats are assessed at the genus level (i.e., *Nyctalus* spp.).

8.8.51 Both common and soprano pipistrelle are widespread in Scotland. The low population estimates for *Nyctalus* spp. in Scotland are outdated and likely underestimated due to under-recording (Matthews *et al*. 2018). The survey data indicates that both noctule and Leisler's bats are present at the Site. Studies by Newson *et al*. (2017) have shown a general east-west geographical divide between the species distribution in southern Scotland; Leisler's weighted towards the west, and noctules more towards the east. The location of the Proposed Development sits between the east/west divide, but is more to the west, which has resulted in both species being recorded, but relatively more Leisler's (see **Table 8.7**). The Proposed Development is on the northern extents of *Nyctalus* spp. distribution ranges (Matthews *et al*. 2018).

8.8.52 Population estimates of common pipistrelle in 2013 were 1,390,000 in the UK and 352,000 in Scotland (JNCC, 2013). More recently, the 2019 Article 17 of the UK Habitats Directive Reports estimates the population range to be from 1,100,600 to 7,843,000 in the UK (JNCC, 2019d) and from 285,000 to 2,160,000 in Scotland (JNCC, 2019h), although best single value estimates are not provided due to the uncertainty around population estimates. Matthews *et al*. (2018) provided a UK estimate of 3,040,000 for common pipistrelle (with a plausible range of 991,000 – 7,510,000); population estimates for Scotland were not provided in that review.

8.8.53 Population estimates of soprano pipistrelle in 2013 were 774,000 in the UK and 198,000 in Scotland (JNCC, 2013). The 2019 Article 17 of the UK Habitats Directive Reports estimates the population range to be from 2,024,000 to 8,563,000 in the UK (JNCC 2019e) and from 512,000 to 2,180,000 in Scotland (JNCC, 2019i), although best single value estimates are not provided due to the uncertainty around population estimates. Matthews *et al*. (2018) provided a UK estimate of 4,670,000 for soprano pipistrelle (with a plausible range of 970,000 –8,400,000); population estimates for Scotland were not provided in that review.

8.8.54 Population estimates of Leisler's bat in 2013 were 28,000 in the UK and 250[41] in Scotland (JNCC, 2013). There is no recent population estimate available for this species across the UK (Matthews *et al*. 2018, JNCC, 2019g) or Scotland (JNCC, 2019j) and there is limited accurate data on trends, and population changes, meaning that the detailed population status of this species in the UK and Scotland is currently unknown. However, Newson *et al*. (2017) in their study stated that the previously used population estimates in Scotland of only a few hundred bats are outdated, with their research indicating actual populations of *Nyctalus* spp. in Scotland, and their distribution range, are much larger than previously reported, with populations suggested to be in the region of many thousands.

8.8.55 Population estimates of noctule bat in 2013 were 50,000 in the UK and 250[41] in Scotland (JNCC, 2013). The 2019 Article 17 of the UK Habitats Directive Reports estimates the population range to be from 20,600 to 2,176,000 in the UK (JNCC, 2019f) with no population value provided for Scotland (JNCC, 2019k). Matthews *et al*. (2018) did not provide a UK population estimate; countrywide estimates were provided for England (565,000 with a plausible range of 17,700 - 1,872,000) and Wales (91,900 with a plausible range of 2,900 - 304,000); no estimate was provided for Scotland. As for Leisler's above, Newson *et al*. (2017) in their study stated that the previously used population estimates in Scotland of

[41] Estimate based on expert opinion with no or minimal sampling, expected to be an underestimate as per Newson, S.E., Evans, H.E., Gillings, S., Jarrett, D. & Wilson, M.W. (2017). A survey of high risk bat species across southern Scotland. Scottish Natural Heritage Commissioned Report No. 1008.

only a few hundred bats are outdated, with their research indicating actual populations of *Nyctalus* spp. in Scotland, and their distribution range, are much larger than previously reported, with populations suggested to be in the region of many thousands.

8.8.56 **Magnitude of Impact**: Evaluating the vulnerability of a bat populations to wind farms is based on three factors; activity level recorded, population vulnerability (determined by collision risk of species and population size) and Site risk level. These factors are used to generate an overall risk assessment score per species of either Low, Moderate or High in cognisance with relevant guidance; in the continued absence of Ecobat, Site specific details, knowledge of bat species behaviour, professional judgement and experience from other and similar projects has been used to assess the bat activity levels at the Proposed Development. **Technical Appendix 8.3** presents the results of this risk assessment for each high collision risk species and provides detailed results. **Figures 8.11 – 8.13** also present the spatial and temporal risk categories for high-risk species, based on the results of the surveys undertaken for the Proposed Development. A summary is provided below to inform the assessment.

8.8.57 Seasonal Site activity levels (based on bpph) were recorded for the following high collision risk bat species:

- common pipistrelle: Low to Moderate - High;
- soprano pipistrelle: Low to High; and
- *Nyctalus* spp.: No Activity to High.

8.8.58 Due to having a 'high' collision risk and a 'common' population abundance rating, common and soprano pipistrelle bats are classified as having 'medium' population vulnerability. With a 'high' collision risk and a 'rarest' population abundance rating, *Nyctalus* spp. are classified as having 'high' population vulnerability.

8.8.59 The evidence in Britain shows that most bat activity is close to habitat features e.g., woodland or wetlands. Foraging habitat quality and connectivity within the Site is moderate with woodland edges, small open upland burns and a fairly homogenous area of open grazed moorland habitat present outwith the conifer plantation areas. The Site has thus been categorised as a 'Medium' (level 3) Site risk to bats due to its 'Medium' project size and 'Moderate' habitat risk (see **Technical Appendix 8.3** for full details).

8.8.60 **Figures 8.11 – 8.13** display the bat site activity risk assessment categories per season and per Anabat location based on the bpph for the Site. As can be seen in these figures, the risk level varied temporally and spatially between spring, summer and autumn for each species, with spring generally being the season with the greatest bat activity levels across the Site.

8.8.61 The embedded mitigation described in **Section 8.6** with respect to bats, namely reduced rotor speed when idling through feathering of the blades, will be implemented throughout operation during the bat active period (April to October), reducing the risk of bat fatalities. The guidance (NatureScot *et al.* 2021) notes that *"The reduction in speed resulting from feathering compared with normal idling may reduce fatality rates by up to 50 %"*. The presence of this mitigation measure has been taken into account when assigning the Significance of Effect.

8.8.62 Further context on each high collision risk species is provided in the following paragraphs.

8.8.63 Common pipistrelle: There was one moderate to high-risk location identified for common pipistrelle within the Site or wider survey area in the summer season. Using the bpph, all locations within the Site were 'Low' risk in autumn, with locations 7 and 12-14 being 'Moderate' risk in spring (locations 7 and 14 are outwith the Site boundary), locations 12 and 14 in summer being 'Moderate', location 13 being 'Moderate-High' in summer (**Figure 8.11**). All other Anabat locations during summer and autumn had an overall risk

assessment of 'Low'. An effect magnitude of **low spatial** and **long-term temporal** is considered appropriate for common pipistrelle.

8.8.64 Soprano pipistrelle: There were three high-risk locations identified for soprano pipistrelle within the Site or wider survey area in the spring and summer season. Using the bpph, locations 7, 9, 13 and 15 were 'Moderate' risk and locations 12 and 14 were 'High' risk in spring (locations 7, 9, 14 and 15 are outwith the Site boundary), with locations 12 and 18 being 'Moderate' risk and location 14 being 'High' risk in summer, and only location 12 in autumn being 'Moderate' risk (**Figure 8.12**). All other Anabat locations during these seasons had an overall risk assessment of 'Low'. An effect magnitude of **low spatial** and **long-term temporal** is considered appropriate for soprano pipistrelle.

8.8.65 *Nyctalus* spp.: There was one high-risk location identified for *Nyctalus* spp. within the wider survey area in spring. Using the bpph, location 14 was 'High' risk in spring, however location 14 is over 1.8 km from the Site boundary, and locations 10 and 16 was 'Moderate' risk in summer (location 10 is outwith the Site boundary) (**Figure 8.13**). All other Anabat locations either had no bat activity or activity by *Nyctalus* spp. had an overall risk assessment of 'Low'. An effect magnitude of **low spatial** and **long-term temporal** is considered appropriate for *Nyctalus* spp.

8.8.66 As discussed above, despite some areas of relatively higher bat activity/risk recorded, these were generally outwith the Site boundary, distant to proposed infrastructure, localised, or seasonal, and therefore while there may be an effect on individuals, the assessment determines that the effect would be unlikely to occur in sufficient numbers to affect the local populations.

8.8.67 **Significance of Effect**: Given the above consideration of Nature Conservation Value, Conservation Status and Magnitude, the effect significance of collision risk on all high collision risk bat species recorded at the Site is considered **Minor adverse** and **Not Significant**.

Predicted Decommissioning Effects

8.8.68 Due to the distance time frame until their occurrence (>50 years), decommissioning effects are difficult to predict with confidence as the future baseline conditions of the Site and surrounding area, on which to base the assessment, is not yet known, and the proposals for decommissioning/repowering is not yet determined/known. In general, decommissioning effects are usually considered for the purposes of assessment to be similar to (or likely less than) those of construction effects in nature and are likely to be of shorter duration. A Decommissioning Environmental Management Plan (DEMP) would be prepared and agreed with the relevant statutory consultees prior to decommissioning of the Proposed Development, which would include the need for pre-works surveys.

8.8.69 Decommissioning of the Proposed Development would involve removal of all above-ground infrastructure and restoration of the associated ground. Restoration would seek to return areas to their pre-construction habitat type, or as similar as feasible depending on local substrates, topography, hydrology etc. As a result, decommissioning will not lead to any further direct or indirect habitat losses above those already incurred during construction, rather, it is predicted that due to restoration of upland habitats in these areas, there would be a net positive effect. Therefore, on this basis, effects are not assessed.

8.9 Mitigation, Compensation and Enhancement

Construction Phase

8.9.1 General and embedded mitigation measures for habitats and species, such as complying with best practice, micrositing provisions, presence of an ECoW and adherence to a detailed CEMP and SPP are included in **Section 8.6**.

8.9.2 No significant construction effects were identified on IEFs and therefore requiring additional mitigation measures; however, a number of additional mitigation, compensation and significant enhancement measures are proposed as part of the Proposed Developments OBEMP, as detailed in **Technical Appendix 8.6** and outlined below.

8.9.3 Enhancement, restoration and creation of habitats through the delivery of a BEMP would reduce effects on habitats further. Overall, the BEMP would deliver significant biodiversity enhancement at the Proposed Development, in line with objectives outlined in NPF4 Policy 3 the Onshore Wind Policy Statement, and the Scottish Biodiversity Strategy to 2045. The BEMP would include provisions for the protection, maintenance, restoration and enhancement of moorland and bog habitats locally. Furthermore, the BEMP would deliver native broadleaved woodland creation, expansion and connectivity (through new woodland creation and the replacement of conifer plantation with broadleaves), and bracken control for grassland restoration. It is also proposed that the Proposed Developments control building will incorporate a living 'green' roof.

8.9.4 The OBEMP is provided in **Technical Appendix 8.6**, also see **Figure 8.16**. The OBEMP is based on a number of identified land parcels or areas for each respective habitat management and biodiversity enhancement proposal. These areas may be refined following further specialist surveys and feedback from relevant consultees, and all areas may not be taken forward for the final BEMP, and other areas and/or proposals may also be considered (if deemed necessary); however, the Applicant remains committed to delivering significant biodiversity enhancement at the Proposed Development.

8.9.5 In summary the OBEMP includes the following proposals:

- Aim 1: Restore & enhance peatland habitat and improve bog and wet heath condition;
- Aim 2: Restore acid grassland habitats;
- Aim 3: Create and expand native broadleaved woodland cover; and
- Aim 4: Living Green Roof Creation.

8.9.6 Full details of the proposals and associated monitoring and reporting schedules are provided in **Technical Appendix 8.6**.

8.9.7 As part of the OBEMP a Biodiversity Net Gain (BNG) assessment was undertaken using a BNG metric. This demonstrates the measures proposed for the creation and enhancement of habitats would result in a significant increase in the biodiversity value of the Site post construction. The BNG metric was applied to the Proposed Developments baseline habitats, considered predicted habitat losses, and the habitat creation and enhancement measures as proposed in the OBEMP. The BNG metric indicates that following construction, Site restoration, BEMP implementation and subsequent habitat management, the Proposed Development would compensate for predicted habitat and biodiversity losses and on top of this provide further enhancement that would result in an increase and net gain for biodiversity of 29 % over and above the baseline and pre-development value (see **Technical Appendix 8.6**).

8.9.8 The detailed and final BEMP would be agreed with DGC and NatureScot in advance of construction and would ensure the Proposed Development secures significant biodiversity enhancements through restoring degraded habitats and strengthening nature networks.

Operational Phase

8.9.9 Bats are the only IEF scoped in to the assessment of potential operational effects, and mitigation during operation is detailed in **Section 8.6** this embedded mitigation has been considered as part of the assessment. No significant operational effects were identified, and no additional mitigation is proposed.

8.9.10 Creation of native broadleaved woodland and riparian habitat through the delivery of the BEMP, as detailed in **Technical Appendix 8.6**, would create and enhance bat foraging and commuting habitat within the Site and locally, and in the long term potentially provide roost features.

Decommissioning Phase

8.9.11 None proposed.

8.10 Assessment of Residual Effects

8.10.1 No significant effects are identified. All scoped-in IEFs have been assessed as having Minor adverse effects, or less, and which are **Not Significant** (as per the assessment sections above), and prior to the implementation of additional enhancement presented in the OBEMP. The implementation of the OBEMP will likely result in minor beneficial effects for certain IEFs (see **Table 8.10**).

8.11 Assessment of Cumulative Effects

8.11.1 The primary concern regarding the assessment of cumulative effects is to identify situations where effects on habitats or species populations that may be non-significant from individual developments, are judged to be significant when combined with nearby consented or proposed projects that are subject to an EIA process. In the interests of focusing on the potential for similar significant effects, this assessment considers the potential for cumulative effects with other wind farm developments that are consented or at application stage (operational and under construction developments are considered as part of the existing baseline). Wind farm projects at scoping stage have been scoped out of the cumulative assessment because they generally do not have sufficient information on potential effects to be included, as the baseline survey period is ongoing, or results have not been published. Projects that have been refused or withdrawn have also been scoped out.

8.11.2 Small projects with three or fewer turbines have also been excluded from the cumulative assessment as often these projects are not subject to the same level of detail of assessment, and so there are no directly comparable data. Because of the small scale of such projects, effects are likely to be negligible on the IEFs assessed.

8.11.3 There are no relevant Sites that fulfil the above criteria within 15 km of the Proposed Development, however in general for most wind farm developments, mitigation and/or additional management/restoration/enhancement/creation of habitats is usually proposed to compensate and offset any effects on IEFs. These mitigation and enhancement areas also tend to be larger or many orders of magnitude greater than the area of predicted loss. The requirement for each development project to provide significant biodiversity enhancement is also now imperative through NPF4 Policy 3.

8.11.4 Therefore, it is considered unlikely that any significant cumulative effects at a local or regional level will arise as a consequence of the Proposed Development adding to habitat loss associated with other projects. This is due to the small nature and not significant levels of habitat losses associated with the Proposed Development and the Applicant's

commitment to the delivery of a BEMP for the Proposed Development which would include provisions for the maintenance, creation, restoration and/or enhancement of various habitats and would be used to provide significant biodiversity enhancements in line with NPF4. As such, no adverse cumulative effects are predicted.

8.12 Summary

8.12.1 **Table 8.10** provides a summary of the effects detailed within this chapter.

Table 8.10: Summary of Effects

IEF	Potential Effect	Significance of Effect	Mitigation Proposed	Residual Effect
Construction Phase				
Blanket Bog and Wet Modified Bog	Direct and indirect habitat loss	Minor adverse – Not Significant	In addition to embedded mitigation, the implementation of a OBEMP which includes bog and upland moorland restoration/enhancement	Minor adverse and Not Significant in the short-term. Likely Minor-Moderate beneficial in the long-term when implementation of the OBEMP is taken into account
Operational Phase				
High collision risk bat species (common pipistrelle, soprano pipistrelle, and *Nyctalus* spp.)	Fatality through barotrauma or collision	Minor adverse – Not Significant	In addition to embedded mitigation (i.e., maintenance of a 50 m buffer from turbine blade tip to feature height and feathering whilst idling), proposals included as part of biodiversity enhancements detailed in the OBEMP (**Technical Appendix 8.6**) would create and improve bat foraging habitat and corridors	Minor adverse and – Not Significant
Decommissioning Phase				
None identified. Generally, as for Construction (or less). No further direct or indirect habitat losses; potential net positive effect on habitats after Site restoration.				
Cumulative				
None identified.				

8.13 References

Barré, K., Le Voil, I., Bas, Y., Julliard, R., and Kerbirou, C. (2018) Estimating habitat loss due to wind turbine avoidance by bats: Implications for European siting guidance. Biological Conservation, 2018, 226, pp.205-214. ff10.1016/j.biocon.2018.07.011.

Chartered Institute of Ecology and Environmental Management (CIEEM) (2024). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (version 1.3). Chartered Institute of Ecology and Environmental Management, Winchester.

Collins, J. (ed) (2016). Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition). The Bat Conservation Trust, London.

Collins, J. (ed) (2023). Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th edition). The Bat Conservation Trust, London.

DEFRA (2016). Understanding the Risk to European Protected Species (bats) at Onshore Wind Turbine Sites to inform Risk Management. University of Exeter.

Dumfries and Galloway Council (2009). Local Biodiversity Action Plan.

Dumfries and Galloway Council (2019). Adopted Local Development Plan (LDP2).

European Commission (2020). Guidance document on wind energy developments and EU nature legislation.

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

Harris S., Morris, P., Wray, S. & Yalden, D. (1995). A review of British mammals: population estimates and conservation status of British mammals other than cetaceans. JNCC, Peterborough.

JNCC (2010). Handbook for phase 1 habitat survey – a technique for environmental audit. JNCC, Peterborough.

JNCC (2013). Guidelines for selection of biological Sites of Special Scientific Interest (SSSI).

JNCC (2013). Individual Species Reports – 3rd UK Habitats Directive Reporting 2013.

JNCC (2019). UK BAP Priority Habitats. Available at: https://jncc.gov.uk/our-work/uk-bap-priority-habitats/.

JNCC (2019a). Article 17 Habitats Directive Report 2019: Species Conservation Status Assessments 2019. Available at: https://jncc.gov.uk/our-work/article-17-habitats-directive-report-2019-species/#regularly-occurring-species-vertebrate-species-mammals-terrestrial.

JNCC (2019b). Article 17 Habitats Directive Report 2019: Species Conservation Status Assessments 2019. H7130 - Blanket bogs, United Kingdom. https://jncc.gov.uk/jncc-assets/Art17/H7130-UK-Habitats-Directive-Art17-2019.pdf.

JNCC (2019c). Article 17 Habitats Directive Report 2019: Species Conservation Status Assessments 2019. H7130 - Blanket bogs, Scotland https://jncc.gov.uk/jncc-assets/Art17/H7130-SC-Habitats-Directive-Art17-2019.pdf.

JNCC (2019d). Article 17 Habitats Directive Report 2019: Species Conservation Status Assessments 2019 for the species: S1309 Common pipistrelle (Pipistrellus pipistrellus). United Kingdom https://jncc.gov.uk/jncc-assets/Art17/S1309-UK-Habitats-Directive-Art17-2019.pdf

JNCC (2019e). Conservation status assessment for the species: S5009 - Soprano pipistrelle (Pipistrellus pygmaeus). United Kingdom.

JNCC (2019f). Conservation status assessment for the species: S1312 - Noctule (Nyctalus noctula). United Kingdom. JNCC (2019f). Conservation status assessment for the species: S1331 - Leisler's bat (Nyctalus leisleri). United Kingdom.

JNCC (2019g). Conservation status assessment for the species: S1331 - Leisler's bat (Nyctalus leisleri). United Kingdom.

JNCC (2019h). Article 17 Habitats Directive Report 2019: Species Conservation Status Assessments 2019 for the species: S1309 Common pipistrelle (Pipistrellus pipistrellus). Scotland https://jncc.gov.uk/jncc-assets/Art17/S1309-SC-Habitats-Directive-Art17-2019.pdf

JNCC (2019i). Article 17 Habitats Directive Report 2019: Species Conservation Status Assessments 2019 for the species: S5009 - Soprano pipistrelle (Pipistrellus pygmaeus). Scotland https://jncc.gov.uk/jncc-assets/Art17/S5009-SC-Habitats-Directive-Art17-2019.pdf

JNCC (2019j). Article 17 Habitats Directive Report 2019: Species Conservation Status Assessments 2019 for the species: S1331 - Leisler's bat (Nyctalus leisleri). Scotland https://jncc.gov.uk/jncc-assets/Art17/S1331-SC-Habitats-Directive-Art17-2019.pdf

JNCC (2019k). Article 17 Habitats Directive Report 2019: Species Conservation Status Assessments 2019 for the species: S1312 - Noctule (Nyctalus noctule). Scotland https://jncc.gov.uk/jncc-assets/Art17/S1312-SC-Habitats-Directive-Art17-2019.pdf

Landry, J. & Rochefort, L. (2012). The Drainage of Peatlands: Impacts and Rewetting Techniques. Peatland Ecology Research Group, Université Laval, Quebec.

Matthews, F., Kubasiewicz, L.M., Gurnell, J., Harrower, C.A., McDonald, R.A., Shore, R.F. (2018). A Review of the Population and Conservation Status of British Mammals: Technical Summary. A report by the Mammal Society under contract to Natural England, Natural Resources Wales and Scottish Natural Heritage. Natural England, Peterborough.

NatureScot (2021). Guidance - Assessing the cumulative landscape and visual impact of onshore wind energy developments (update to 2012 guidance). Available at: https://www.nature.scot/doc/guidance-assessing-cumulative-landscape-and-visual-impact-onshore-wind-energy-developments.

NatureScot (2023). Advising on peatland, carbon-rich soils and priority peatland habitats in development management;

NatureScot (2024). NatureScot pre-application guidance for onshore wind farms;

NatureScot, Natural England, Natural Resources Wales, RenewableUK, Scottish Power Renewables, Ecotricity Ltd, the University of Exeter & Bat Conservation Trust (BCT) (2019, updated 2021). Bats and Onshore Wind Turbines – Survey, Assessment and Mitigation.

Nayak, R.A., Miller, D., Nolan, A., Smith, P., Smith, J. (2008). Calculating carbon savings from wind farms on Scottish peat lands - A New Approach.

Newson, S.E., Evans, H.E., Gillings, S., Jarrett, D., Wilson, M.W. (2017). A survey of high risk bat species across southern Scotland. Scottish Natural Heritage Commissioned Report No. 1008.

Richardson, S.M., Lintott, P.R., Hosken, D.J., Economou, T and Mathews, F. (2021). Peaks in bat activity at turbines and the implications for mitigating the impact of wind energy developments on bats. Sci Rep. 11, 3636.

Scholz, C. and Voigt, C.C. (2022). Diet analysis of bats killed at wind turbines suggests large-scale losses of trophic interactions. Conservation Scient and Practice, Volume 4, Issue 7.

Scottish Badgers (2018). Surveying for Badgers: Good Practice Guidelines. Version 1.

Scottish Environment Protection Agency (SEPA) (2017a). Land Use Planning System Guidance Note 4 - Planning guidance on on-shore windfarm developments.

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

SEPA (2018). Windfarm Carbon Calculator Web Tool User Guidance. Available at: https://informatics.sepa.org.uk/CarbonCalculator/assets/Carbon_calculator_User_Guidance.pdf.

Scottish Executive (2000a). Planning Advice Note (PAN) 60: Planning for Natural Heritage.

Scottish Executive (2000b). Nature conservation: implementation in Scotland of EC Directives on the conservation of natural habitats and of wild flora and fauna and the conservation of wild birds ('The Habitats and Birds Directives'). Revised guidance updating Scottish Office Circular no. 6/1995.

Scottish Executive Rural Affairs Department (SERAD) (2001). European Protected Species, Development Sites and the Planning Systems: Interim guidance for local authorities on licensing arrangements.

Scottish Government (2006). European Protected Species – terms of guidance: Chief Planner letter.

Scottish Government (2016). Draft Peatland and Energy Policy Statement.

Scottish Government (2017a). Planning Advice Note 1/2013 - Environmental Impact Assessment, Revision 1.0.

Scottish Government (2017b). Planning Circular 1/2017: Guidance on The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017.

Scottish Government (2019). The Scottish Forestry Strategy 2019–2029.

Scottish Government (2020a). Scottish biodiversity strategy post-2020: statement of intent.

Scottish Government (2020b). Securing a green recovery on a path to net zero: climate change plan 2018 – 2032 – update.

Scottish Government (2021). Freshwater and diadromous fish and fisheries associated with onshore wind farm and transmission line developments: generic scoping guidelines.

Scottish Government (2022a). Onshore Wind Policy Statement 2022.

Scottish Government (2022b). Scottish Biodiversity Strategy to 2045. Tackling the Nature Emergency in Scotland.

Scottish Government (2023a). National Planning Framework (NPF) 4.

Scottish Government (2023b). Draft Planning Guidance: Biodiversity.

Scottish Government, SNH, SEPA (2017). Peatland Survey – Guidance on Developments on Peatland.

Scottish Renewables, NatureScot, SEPA, Forestry Commission (Scotland), HES, AEECoW (2019, updated July 2024) Good Practice During Windfarm Construction (4th Edition).

SNH (2015). Scotland's National Peatland Plan.

SNH (2016a). Planning for Development: What to consider and include in deer assessments and management at development sites (Version 2).

SNH (2016b). Planning for Development: What to consider and include in Habitat Management Plans. Version 2.

SNH (2018) Environmental Impact Assessment Handbook – Version 5: Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment process in Scotland.

Spoelstra, K., van Grunsven, R. H. A., Ramakers, J. J. C., Ferguson, K. B., Raap, T., Donners, M., Visser, M. E. (2017). Response of bats to light with different spectra: Light-shy and agile bat presence is affected by white and green, but not red light. Proceedings Royal Publishing B, 284, 20170075. https://doi.org/10.1098/rspb.2017.0075.

Stewart, A.J.A. & Lance, A.N. (1991). Effects of Moor Draining on the Hydrology and Vegetation of Northern Pennine Blanket Bog. Journal of Applied Ecology 28: 1105-1117.

Voigt, C.C., Rehnig, K., Lindecke, O., Pētersons, G. (2018). Migratory bats are attracted by red light but not by warm white light: Implications for the protection of nocturnal migrants. Ecology and Evolution. 2018: 8:9353–9361.

Annex A

Table 8.11: Habitat Baseline Composition and Habitat Loss Calculations for Study Area

		Study Area (Baseline)				Permanent Direct Loss	Permanent Infrastructure Indirect Loss (only applies to Wetland Habitats)[42]	Temporary Direct Loss
Phase 1 Description (Code)	NVC	Phase 1 Area (ha)	Phase 1 % of study area	NVC Area (ha)	% of NVC Type within study area	NVC Area (ha)	NVC Area (ha)	NVC Area (ha)
Totals		681.54	100.00%	681.54	100.00%	14.31	7.69	9.64
Broadleaved Semi-Natural Woodland (A.1.1.1)	W7	9.04	1.33%	1.92	0.28%	0.11	0.00	0.00
	W4			0.70	0.10%	0.04	0.00	0.00
	W11			1.69	0.25%	0.07	0.00	0.00
	W10			2.69	0.40%	0.02	0.00	0.00
	W17			1.19	0.17%	0.09	0.00	0.00
	W17b			0.38	0.06%	0.01	0.00	0.00
	W4c			0.16	0.02%	0.01	0.00	0.00
	W7c			0.29	0.04%	0.02	0.00	0.00
	W9			0.01	<0.01%	0.00	0.00	0.00
Broad-Leaved Plantation Woodland (A1.1.2)	BP	0.12	0.02%	0.12	0.02%	0.00	0.00	0.00
Coniferous Plantation Woodland (A1.2.2)	CP	275.26	40.39%	181.09	26.57%	4.70	0.00	3.88
	YCP			94.17	13.82%	1.17	0.00	1.69
Dense/Continuous Scrub (A2.1)	W23	0.03	<0.01%	0.03	<0.01%	<0.01	0.00	0.00
Scattered Broad-Leaved Tree (A3.1)	SBT	0.21	0.03%	0.21	0.03%	0.02	0.00	0.00
Scattered Coniferous Tree (A3.2)	SCT	0.11	0.02%	0.11	0.02%	<0.01	0.00	0.01
Recently Felled Coniferous Woodland (A4.2)	CF	37.07	5.44%	37.07	5.44%	1.02	0.00	0.97
	U4a	36.19	5.31%	10.64	1.56%	0.18	0.00	1.37

[42] Based upon the precautionary 10 m indirect drainage assumption.

		Study Area (Baseline)				Permanent Direct Loss	Permanent Infrastructure Indirect Loss (only applies to Wetland Habitats)[42]	Temporary Direct Loss
Phase 1 Description (Code)	NVC	Phase 1 Area (ha)	Phase 1 % of study area	NVC Area (ha)	% of NVC Type within study area	NVC Area (ha)	NVC Area (ha)	NVC Area (ha)
Totals		681.54	100.00%	681.54	100.00%	14.31	7.69	9.64
Unimproved Acid Grassland (B1.1)	U5a			2.36	0.35%	0.02	0.00	0.15
	U4			13.42	1.97%	0.19	0.00	0.08
	U6			1.19	0.18%	0.00	0.00	0.00
	U5			8.57	1.26%	0.21	0.00	0.04
Semi-Improved Acid Grassland (B1.2)	U4b	1.15	0.17%	1.15	0.17%	0.00	0.00	0.00
Unimproved Neutral Grassland (B2.1)	MG1	0.10	0.01%	0.10	0.01%	0.00	0.00	0.00
	MG9a			<0.01	<0.01%	0.00	0.00	0.00
Improved Grassland (B4)	MG6	2.14	0.31%	2.14	0.31%	0.09	0.00	0.00
Marsh/Marshy Grassland (B5)	Ja	61.41	9.01%	28.85	4.23%	0.09	0.37	<0.01
	M25a			24.13	3.54%	0.24	0.48	0.03
	M25b			1.14	0.17%	0.02	0.05	0.32
	M25			3.87	0.57%	0.01	0.04	<0.01
	M23a			0.27	0.04%	0.01	0.05	0.00
	Je			1.62	0.24%	0.02	0.18	0.00
	MG10a			1.14	0.17%	0.01	0.07	0.00
	M23b			0.13	0.02%	0.01	0.02	0.00
	MG10			0.27	0.04%	0.01	0.07	0.00
	M27			<0.01	<0.01%	0.00	0.00	0.00
Continuous Bracken (C1.1)	U20	33.06	4.85%	31.46	4.62%	0.56	0.00	0.10
	U20a			1.42	0.21%	0.02	0.00	0.00
	U20c			0.05	0.01%	<0.01	0.00	0.00
	W25			0.10	0.02%	0.01	0.00	0.00
	U20b			0.02	<0.01%	<0.01	0.00	0.00
Tall Ruderal (3.1)	W24	0.45	0.07%	0.41	0.06%	0.03	0.00	0.00
	OV25			0.04	0.01%	<0.01	0.00	0.00
	H12a	1.96	0.29%	0.07	0.01%	<0.01	0.00	0.00

		Study Area (Baseline)				Permanent Direct Loss	Permanent Infrastructure Indirect Loss (only applies to Wetland Habitats)[42]	Temporary Direct Loss
Phase 1 Description (Code)	NVC	Phase 1 Area (ha)	Phase 1 % of study area	NVC Area (ha)	% of NVC Type within study area	NVC Area (ha)	NVC Area (ha)	NVC Area (ha)
Totals		681.54	100.00%	681.54	100.00%	14.31	7.69	9.64
Acid Dry Dwarf Shrub Heath (D1.1)	H12			0.73	0.11%	0.02	0.00	0.01
	H10			0.90	0.13%	0.04	0.00	0.01
	H21			0.03	0.00%	0.01	0.00	0.00
	H9			0.04	0.01%	0.01	0.00	0.00
	H9c			0.03	0.00%	<0.01	0.00	0.00
	H12b			0.01	0.00%	<0.01	0.00	0.00
	H10a			0.15	0.02%	0.01	0.00	0.00
Wet Dwarf Shrub Heath (D2)	M15d	69.97	10.27%	64.34	9.44%	1.08	2.77	0.13
	M15b			5.64	0.83%	0.02	0.08	0.00
Blanket Bog (E1.6.1)	M2	27.66	4.06%	0.07	0.01%	0.00	0.00	0.00
	M17			10.50	1.54%	0.12	0.44	0.03
	M19			17.09	2.51%	0.04	0.22	<0.01
Wet Modified Bog (E1.7)	M20b	95.19	13.97%	47.05	6.90%	0.57	0.86	0.10
	M25a^			9.80	1.44%	<0.01	0.03	0.00
	M20			38.34	5.63%	0.83	1.16	0.67
Acid Neutral Flush (E2.1)	M6d	21.44	3.15%	18.76	2.75%	0.25	0.69	0.04
	M6a			0.07	0.01%	0.00	0.00	0.00
	M6c			2.38	0.35%	0.01	0.09	<0.01
	M6b			0.23	0.03%	<0.01	<0.01	0.00
	M4			<0.01	<0.01%	0.00	0.00	0.00
Standing Water (G1)	SW	0.34	0.05%	0.34	0.05%	0.00	0.00	0.00
Running Water (G2)	RW	0.56	0.08%	0.56	0.08%	0.00	0.00	0.00
Bare Ground (J4)	BG	8.08	1.19%	8.08	1.19%	2.29	0.00	<0.01

9 Ornithology

9.1 Executive Summary

9.1.1 This chapter considers the potential for significant effects upon Important Ornithological Features (IOFs) associated with the construction, operation and decommissioning of the Proposed Development.

9.1.2 Baseline conditions to inform the design and assessment of the Proposed Development have been established through desk study, ornithological field surveys in accordance with industry standard guidance and consultation with nature conservation bodies and specialist species recording groups.

9.1.3 The Site does not form part of any statutory designated site for nature conservation with qualifying ornithological interests or lie within potential connectivity distances for any Special Protection Area (SPA).

9.1.4 Baseline studies have established the Site and adjacent habitats are used by breeding black grouse and foraging red kite, hen harrier, goshawk, merlin and peregrine falcon. Barn owl and red kite were identified to be breeding in the wider area. An assemblage of breeding ground nesting waders has also been recorded, typical of the locale and habitats present. Pink-footed goose, greylag goose and herring gull were infrequently recorded, however the Site and immediate area were not identified as being important for migratory waterfowl/gulls.

9.1.5 Collision mortality risks have been estimated for curlew, golden plover, greylag goose, hen harrier, herring gull, lapwing, merlin, peregrine falcon, pink-footed goose and red kite using the NatureScot Collision Risk Model (CRM). Collision mortality risks are predicted as being low or negligible for all species.

9.1.6 Embedded mitigation and pre-construction checks (as directed by an appointed suitably qualified Ecological Clerk of Works (ECoW) will enable the protection of breeding birds during construction works associated with the Proposed Development.

9.1.7 In addition to habitat reinstatement following the cessation of construction works, the Proposed Development also provides a clear opportunity to deliver long-term beneficial habitat enhancement measures for bird species, away from operational infrastructure, including specific management for breeding black grouse.

9.1.8 Residual effects upon any important ornithological features are predicted to be not significant as a result of the Proposed Development alone, or cumulatively with any other wind farm development.

9.2 Introduction

9.2.1 This chapter considers the potential for significant effects on ornithological features associated with the construction, operation and decommissioning of the Proposed Development.

9.2.2 The specific objectives of the chapter are to:

- describe the current ornithological baseline;
- describe the assessment methodology and significance criteria used in completing the impact assessment;
- describe the potential significant effects upon ornithological features, including direct, indirect and cumulative effects;
- describe the mitigation measures proposed to address any potential significant effects;

- assess the residual effects remaining following the implementation of mitigation measures.

9.2.3 The assessment has been carried out by MacArthur Green in accordance with NatureScot and Chartered Institute of Ecology and Environmental Management (CIEEM) (CIEEM 2022) guidelines. All staff contributing to this chapter have undergraduate and/or postgraduate degrees in relevant subjects, have extensive professional ornithological impact assessment experience, hold professional CIEEM membership and abide by the CIEEM Code of Conduct.

9.2.4 The chapter is supported by:

- Technical Appendix 9.1 – Ornithology (including Annexes A – E) (**Volume 3**); and
- Technical Appendix 9.2 – Confidential Ornithology (**Volume 5**).

9.2.5 Figures 9.1 – 9.18 (**Volume 2a**) and Confidential Figures 9.2.1 and 9.2.2 (**Volume 5**) are referenced in the text where relevant.

9.2.6 The information provided in **Volume 5** is information relating to the breeding locations (and any other sensitive details) of bird species included on Schedule 1 of the Wildlife and Countryside Act (1981, as amended; refer to **Technical Appendix 9.1 Annex A** for details) and its distribution will be restricted to relevant staff at the Energy Consents Unit (ECU), Dumfries and Galloway Council, NatureScot, the Royal Society for the Protection of Birds (RSPB) Scotland and the Dumfries and Galloway Raptor Study Group (DGRSG).

9.3 Legislation, Policy and Guidance

9.3.1 The assessment presented within this chapter has been undertaken with reference to the following key pieces of legislation, policy and industry guidance of relevance to ornithology:

- Legislation:
  - The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended).
  - EU Environmental Impact Assessment Directive 2014/52/EU.
  - EU Directive 2009/147/EC on the Conservation of Wild Birds ('Birds Directive');
  - EU Directive 92/43/EEC on Conservation of Natural Habitats and of Wild Fauna and Flora ('Habitats Directive');
  - The Habitats Regulations 1994 (as amended) and The Conservation of Habitats and Species Regulations 2010, as amended by The Conservation (Natural Habitats, &c.) (EU Exit) (Scotland) (Amendment) Regulations 2019 in Scotland (hereafter the 'Habitat Regulations');
  - The Wildlife and Countryside Act 1981; and
  - The Nature Conservation (Scotland) Act 2004 (as amended).
- Policy
  - Tackling the Nature Emergency – Scottish biodiversity strategy to 2045 (September 2023);
  - Draft Planning Guidance: Biodiversity (November 2023);
  - Scottish Government (2000). Planning Advice Note 60: Planning for Natural Heritage;
  - Scottish Government (2017). Planning Advice Note 1/2013-Environmental Impact Assessment, Revision 1.0;
  - National Planning Framework 4 ('NPF4') (February 2023);
  - The Scottish Biodiversity List; and
  - The Dumfries and Galloway Local Biodiversity Action Plan (2009).

- Guidance
  - Environmental impact assessment: NatureScot (SNH 2016a, 2018a, 2018b, NatureScot 2020a), CIEEM (2022), Goodship & Furness (2022), SERAD (2000);
  - Designated sites: SNH (2016b);
  - Collision risk modelling: SNH (2000, 2018c), Band *et al*. (2007);
  - Cumulative assessment: SNH (2018d);
  - Bird populations/species-specific guidance: Stanbury *et al*. (2021), SNH (2002, 2014, 2017), Pearce-Higgins (2021), Wilson *et al*. (2015); and
  - Construction and birds: SNH (2016c), Goodship & Furness (2022).

9.4 Consultation

9.4.1 In undertaking the assessment, consideration has been given to the scoping responses which were received in relation to ornithological matters, as detailed in **Table 9.1**.

Table 9.1: Consultation Responses

Consultee	Consultation Response	Applicant Action
NatureScot Scoping response (October 2023)	Solway Firth Special Protection Area (SPA) and Loch Ken and River Dee Marshes SPA - agreed connectivity is likely to be limited due to the habitats present on site and the location of the site in relation to the SPAs. Advised that sufficient information be presented in the EIA Report to enable a Habitats Regulations Appraisal (HRA) of the Proposed Development, should the results of the bird surveys indicate there is potential connectivity with the SPAs. We agree that the other sites listed in the Scoping Report can be scoped out, for the reasons given.	Information to inform a HRA of the Proposed Development in relation to the Solway Firth and Loch Ken and River Dee Marshes SPA is provided within the **Likely Significant Effects on SPAs** section in **Section 9.6**. As per NatureScot's agreement, Merrick Kells SSSI, Laughenghie and Airie Hills SSSI, Derskelpin Moss SSSI and Mochrum Lochs SSSI are scoped out of the assessment.
	In addition to the baseline sources listed, advised information should be sought from the South of Scotland Golden Eagle Project (SSGEP).	Information regarding the status of golden eagle in the area was provided by the SSGEP in August 2024, a summary of which is provided in **Section 9.6**.
	Baseline ornithology surveys proposed appear appropriate and in line with our guidance and are content with the approach proposed for baseline surveys of the additional area. This should be explained in the EIA Report.	Refer to the **Assessment Limitations** section in **Section 9.7** which provides justification on the approach to baseline surveys, and a review of inter-annual baseline coverage against the final Proposed Development layout. Refer to **Technical Appendix 9.1 Annex B** for detail of the survey methodology used during baseline surveys.
RSPB Scotland Scoping response (October 2023)	Advised RSPB holds data confirming current and historical black grouse lek sites within the development footprint, including in the area proposed turbines, and that data on regional and local populations of lekking black grouse is available from other sources. Advised that for Black Grouse, impacts should be assessed relating to more recent assessments of its status regionally and locally and which is available from GWCT and RSPB Scotland.	Data was provided relating to black grouse by the RSPB Data Unit, a summary of which is provided **Section 9.6**, with the data shown on **Confidential Figure 9.2.3**. This data has been considered in the assessment of the Proposed Development. The recommendation to utilise more recent population estimates/an alternative population region to the NHZ is noted – refer to **Table 9.10** for the black grouse population estimates considered which include the more regionally relevant Galloway population.
	Commented that the survey area within 1.5 km of the project boundary including the south-east of the site where turbines 19-22 are proposed, was only surveyed for lekking Black Grouse in year two. Advised the survey effort for Black Grouse should	Refer to the **Assessment Limitations** section in **Section 9.7** which provides justification on the approach to baseline surveys, and a review of inter-annual baseline coverage against the final Proposed Development layout.

Consultee	Consultation Response	Applicant Action
	ideally include two years of survey work across the 1.5km buffer of the whole project boundary. Advised location information on black grouse lek sites recorded during surveys should be presented to inform the requirements for further survey.	Details of black grouse lek locations (and black grouse activity) are provided in the **Black Grouse** section of **Section 9.6** and **Figure 9.8**.
	Turbines 7, 8, 21, 22 in year one and turbines 2 and 8 in year two were not covered by vantage point surveys. Recommended this omission should be factored into the EIA for this project in relation to its potential impact to Black Grouse and other IOFs identified for assessment.	Refer to the **Assessment Limitations** section of **Section 9.7** for a review of viewshed coverage against the finalised turbine layout.
	We note cumulative assessment will be assessed for each IOF in relation to projects and activities in relation to this proposal, however it is recommended these projects should include new forestry proposals.	Whilst cumulative assessments seek to quantify all impacts, it is usually not possible to accurately do this for all possible risks (e.g., climate change, woodland planting schemes, housing developments) due to a lack of comparable data (i.e. data readily and clearly available on local planning portals that have been subject to a similar level of planning and assessment methodology / regulation). It is acknowledged that the cumulative assessment presented in this chapter only considers other wind farm developments within NHZ 19, however considering the information readily available it is considered to be representative.
	Support the carrying out of a Habitats Regulations Appraisal (HRA) under the Conservation of Habitats and Species Regulations 2017.	Information to inform a HRA of the Proposed Development in relation to the Solway Firth and Loch Ken and River Dee Marshes SPA is provided within the **Likely Significant Effects on SPAs** section in **Section 9.6**.
Cree Valley Community Council Scoping response (October 2023)	No designated site within 12 km of the Development should be scoped out of the EIAR.	Ornithological designated sites have been scoped in or out of the assessment based on guidance available from NatureScot (SNH 2016b).
	The Glenvernoch Wind Farm which is in the pre application stage must be included in the Cumulative Assessment.	**Section 9.10** presents the approach to cumulative assessment. As per NatureScot guidance (SNH 2018b), those wind farm developments at pre-application stage (i.e. scoping stage) have been excluded from assessment as it is unknown if those developments will progress to planning application stage and sufficient information is not available to inform a meaningful appraisal (either because the baseline survey period is ongoing or because results have not been published).

9.5 Assessment Methods and Significance Criteria

Scope of Assessment

9.5.1 This chapter considers the following potential impacts upon ornithological features associated with the Proposed Development:

- Direct temporary and permanent habitat loss for birds through construction and operation of the Proposed Development;
- Displacement of birds from the Proposed Development and its surrounding area due to construction disturbance, turbine operation, maintenance, and visitor disturbance. This also includes potential barriers to commuting or migrating birds due to the presence of the Proposed Development turbines;
- Habitat modification due to change in land type or changes in hydrological regime, and consequent impacts on bird populations; and
- Death or injury of birds through collisions with turbine blades, or fences (if any) associated with the Proposed Development.

9.5.2 The chapter also assesses the potential for additional cumulative impacts when considered in addition to other consented or proposed developments which are subject to EIA.

9.5.3 The assessment is based on the Proposed Development as described in **Chapter 2: Proposed Development**.

Methodology

Study Area

9.5.4 The ornithology assessment considers the following study areas (as defined by NatureScot) which are based on the final turbine layout and associated infrastructure (**Figure 9.1**):

- Designated sites – the Proposed Development and a 20 km study area buffer (from the proposed turbines) (based on the greatest foraging range for any species, as provided in SNH 2016b) (**Figure 9.2**);
- Collision risk modelling – the results of the flight activity surveys have been used to inform collision modelling. A Collision Risk Analysis Area ('CRAA') has been created using a 500 m buffer around the proposed turbine locations to create a wind farm area (as per relevant guidance, SNH 2017) (**Figure 9.3**);
- Scarce breeding birds[1] – the Proposed Development and a 2 km (turbines, SNH 2017) / 800 m (access track) study area buffer (**Figure 9.1**);
- Black grouse – the Proposed Development and a 1.5 km (turbines, SNH 2017) / 750 m (access track) study area buffer (**Figure 9.1**);
- Breeding upland waders and wintering waders, raptors, owls and wildfowl – the Proposed Development and a 500 m study area buffer (around the proposed turbine locations and infrastructure, SNH 2017) (**Figure 9.1**); and
- Cumulative assessment – as per NatureScot guidance (SNH 2018d), the Natural Heritage Zone (NHZ) level is considered practical and appropriate for breeding species of wider countryside interest.

[1] Scarce breeding birds are those listed on Annex 1 of the EU Birds Directive or Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) and in the case of the Proposed Development consists of any raptor and owl species listed on either Annex 1 or Schedule 1.

Desk Study / Field Survey

9.5.5 The following data sources have been consulted as part of the assessment:

- NatureScot SiteLink website for designated site information;
- Dumfries and Galloway Raptor Study Group (DGRSG) in relation to existing records of breeding/roosting Schedule 1 raptors and owls – the data provided is summarised in the relevant baseline species sections below;
- RSPB data unit in relation to historical black grouse data - a summary of which is provided in the black grouse baseline section below;
- South Scotland Golden Eagle Project (SSGEP) to request an update in relation to the released golden eagle and whether any birds are suspected to be forming/may form territories within 6 km of the Site;
- Forestry Land Scotland (FLS) in relation to any black grouse or Schedule 1 raptor/owl data they may hold (in particular along the access track which goes through FLS land).

9.5.6 Baseline ornithology surveys within and surrounding the Site were undertaken between March 2022 to July 2024. This covers three consecutive breeding seasons (2022, 2023 and 2024) and two consecutive non-breeding seasons (2022/2023 and 2023/2024). The following surveys were undertaken following NatureScot survey guidance (SNH 2017) (refer to **Technical Appendix 9.1: Ornithology Annex B** for details of the survey methodologies):

- Flight activity surveys – March 2022 to March 2024. It should be noted that following the completion of the first year of surveys from four Vantage Points (VPs) (**Figure 9.3**), the VPs (and associated viewsheds) were revised following the inclusion of additional land and the second year of surveys was undertaken from five alternative VPs (**Figure 9.4**);
- Scarce breeding bird surveys – spring/summer 2022 and 2023 on the main Site[2], 2024 on the access track (**Figure 9.5**);
- Black grouse surveys – spring 2022 and 2023 on the main Site[2], 2024 on the access track (**Figure 9.6**);
- Breeding bird (wader) surveys – spring/summer 2022 and 2023 on the main Site[2] (**Figure 9.7**); and
- Winter walkover surveys – autumn/winter 2022/2023 and 2023/2024 on the main Site[2] (**Figure 9.7**).

Assessing Wider-Countryside Ornithological Features

9.5.7 The evaluation for wider-countryside features (i.e., features unrelated to Special Protection Areas (SPAs), but including Sites of Special Scientific Interest ('SSSIs') and Ramsar Sites) has been made using the following process:

- Identifying the potential impacts associated with the Proposed Development on an ornithological feature;
- Considering the likelihood of occurrence of potential impacts on an ornithological feature;
- Defining the sensitivity of a feature to an impact from its Nature Conservation Importance ('NCI') and conservation status;
- Establishing the magnitude of the impact (both spatial and temporal);
- Based on the above criteria, making a judgement as to whether or not the resultant effect on an ornithological feature is significant with respect to the EIA Regulations;
- If a potential effect is determined to be significant, outlining measures proposed to mitigate or compensate the effect where required; and

[2] The 'main Site' is defined as the area within which development (of the turbines/a wind farm) was identified to be focussed, refer to the relevant figures referenced for further clarity/guidance.

- Considering residual effects after mitigation, compensation and/or enhancement.

Habitats Regulations Appraisal (HRA) Process

9.5.8 The method for assessing the likely significant effects on a European site (in this context, an SPA) is different from that outlined above for wider-countryside ornithological interests. This is based on the Habitats Directive, which is transposed into domestic legislation by the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in Scotland) Regulation 48 and includes a number of steps to be taken by the competent authority before granting consent (these are referred to here as an HRA). In order of application, the first four are:

- Step 1: consider whether the proposal is directly connected to or necessary for the management of the SPA (Regulation 48(1)(b)).
- if not, Step 2: consider whether the proposal (alone or in combination) is likely to have a significant effect on the SPA (Regulation 48(1)(a)).
- if so, Step 3: make an Appropriate Assessment of the implications for the SPA in view of that SPA's conservation objectives (Regulation 48(1)(a)).
- Step 4: consider whether it can be ascertained that the proposal will not adversely affect the integrity of the SPA ("Integrity Test") having regard to the manner in which it is proposed to be carried out or to any conditions or restrictions subject to which they propose that the consent, permission or other authorisation should be given (Regulation 48(5) and 48(6)).

9.5.9 It can clearly be established that the Proposed Development does not meet the criteria for Step 1. Where likely significant effects have been identified (Step 2), the results of baseline surveys and scientific conclusions presented in this chapter are therefore used to inform the HRA process, and allow the competent authority, in this case, the Scottish Ministers, to conduct an Appropriate Assessment (Step 3), and to conclude whether any adverse effects on site integrity can be ascertained (Step 4) if required.

Sensitivity Criteria

9.5.10 The sensitivity of ornithological features on or near to the Proposed Development is assessed in line with best practice guidance, legislation, statutory designations and/or professional judgement.

9.5.11 Determination of the level of sensitivity of an ornithological feature is based on a combination of the feature's NCI and conservation status. There are three levels of NCI as detailed in **Table 9.2**.

Table 9.2: Determining Factors of a Feature's NCI

Importance	Description
High	Populations receiving protection by an SPA, proposed SPA, Ramsar Site, SSSI or which would otherwise qualify under selection guidelines. Species present in nationally important numbers (>1 % national breeding or wintering population).
Medium	The presence of breeding species listed on Schedule 1 of the Wildlife and Countryside Act 1981. The presence of species listed in Annex I of the Birds Directive (but population does not meet the designation criteria under selection guidelines). The presence of rare, Red-listed breeding species noted on the latest Birds of Conservation Concern ('BoCC') Red list (Stanbury *et al*. 2021). Regularly occurring migratory species, which are either rare or vulnerable, or warrant special consideration on account of the proximity of migration routes, or

Importance	Description
	breeding, moulting, wintering or staging areas in relation to the Proposed Development. Species present in regionally important numbers (>1 % regional breeding population).
Low	All other species' populations not covered by the above categories.

9.5.12 Important Ornithological Features ('IOFs', as per CIEEM 2022) to be assessed for the purposes of the EIA Report, are taken to be those species of high or medium NCI.

9.5.13 As defined by NatureScot (SNH 2018a), the conservation status of a species is "the sum of the influences acting on it which may affect its long-term distribution and abundance, within the geographical area of interest". Conservation status is considered by NatureScot (SNH 2018a) to be 'favourable' under the following circumstances:

- "*population dynamics indicate that the species is maintaining itself on a long-term basis as a viable component of its habitats;*
- *the natural range of the species is not being reduced, nor is likely to be reduced for the foreseeable future; and*
- *there is (and probably will continue to be) a sufficiently large habitat to maintain its population on a long-term basis.*"

9.5.14 NatureScot (SNH 2018a) recommends that "*the concept of favourable conservation status of a species should be applied at the level of its Scottish population, to determine whether an impact is sufficiently significant to be of concern. An adverse impact on a species at a regional scale (within Scotland) may adversely affect its national conservation status*". Thus, "*An impact should therefore be judged as of concern where it would adversely affect the existing favourable conservation status of a species or prevent a species from recovering to favourable conservation status, in Scotland.*"

9.5.15 In the case of non-designated sites in Scotland, the relevant regional context for many breeding species is considered to be the appropriate NHZ (SNH 2002) which the Site falls within, which in this case is NHZ 19 (Western Southern Uplands and Inner Solway).

9.5.16 For wintering or migratory species, the national UK population or flyway population is considered to be the relevant scale for determining effects on the conservation status, and this approach is applied here.

Magnitude of Impact

9.5.17 An impact is defined as a change of a particular magnitude to the abundance and/or distribution of a population as a result of the Proposed Development. Impacts can be adverse, neutral, or beneficial.

9.5.18 In determining the magnitude of impacts, the resilience of a population to recover from temporary adverse conditions is considered in respect of each potentially affected population.

9.5.19 The sensitivity of individual species to anthropogenic activities is considered when determining spatial and temporal magnitude of impact and is assessed using guidance described by Goodship & Furness (2022).

9.5.20 Impacts are judged in terms of magnitude in space and time. There are five levels of spatial and temporal effect magnitude as detailed in **Table 9.3** and **Table 9.4** respectively.

Table 9.3: Spatial Magnitude of Impact

Spatial Magnitude	Description
Very high	Total/near total loss of a bird population due to mortality or displacement. Total/near total loss of productivity in a bird population due to disturbance. Guide: >80 % of population lost or increase in additive mortality.
High	Major reduction in the status or productivity of a bird population due to mortality or displacement or disturbance. Guide: 21-80 % of population lost or increase in additive mortality.
Medium	Partial reduction in the status or productivity of a bird population due to mortality or displacement or disturbance. Guide: 6-20 % of population lost or increase in additive mortality.
Low	Small but discernible reduction in the status or productivity of a bird population due to mortality or displacement or disturbance. Guide: 1-5 % of population lost or increase in additive mortality.
Negligible	Very slight (or no discernible) reduction in the status or productivity of a bird population due to mortality or displacement or disturbance. Reduction barely discernible, approximating to the "no change" situation. Guide: <1 % of population lost or increase in additive mortality.

Table 9.4: Temporal Magnitude of Impact

Temporal Magnitude	Description
Permanent	Effects continuing indefinitely beyond the span of one human generation (taken as approximately 25-30 years), except where there is likely to be substantial improvement after this period. Where this is the case, long-term may be more appropriate.
Long-term	Approximately 15-25 years or longer (see above).
Medium-term	Approximately 5-15 years.
Short-term	Up to approximately 5 years.
Negligible	<12 months.

Significance Criteria

9.5.21 The potential significance of effects was determined through a standard method of assessment based on professional judgement, considering both sensitivity and magnitude of impact as detailed in **Table 9.5**.

9.5.22 **Major** and **moderate** effects are considered '**significant**' in the context of the EIA Regulations.

Table 9.5: Determining Significance of Effects

Significance of Effect	Definition
Major	The impact is likely to result in a long-term significant effect on the integrity of a feature.
Moderate	The impact is likely to result in a medium term, significant (or potentially significant) effect on the integrity of a feature.

Significance of Effect	Definition
Minor	The impact is likely to affect a feature at an insignificant level by virtue of its limitations in terms of duration or extent, but there will probably be no effect on its integrity.
Negligible	No material impact.

Assessing Cumulative Impacts

9.5.23 The potential for significant cumulative impacts is considered in **Section 9.10**, which presents information about predicted residual impacts arising from the Proposed Development in-combination with impacts predicted for other operational, consented or proposed wind farm projects located within NHZ 19.

9.5.24 NatureScot (SNH 2018d) has provided guidance on assessing the cumulative effects on birds. This assessment follows the principles set out in that guidance.

9.5.25 Cumulative effects may include cumulative disturbance-displacement, collision mortality, habitat loss or barrier effects. Some cumulative effects, such as collision risk, may be summed quantitatively, but according to NatureScot (SNH 2018d) "*In practice, however, some effects such as disturbance or barrier effects may need considerable additional research work to assess impacts quantitatively. A more qualitative process may have to be applied until quantitative information becomes available for developments in the area, e.g., from post-construction monitoring or research*".

Project Assumptions

9.5.26 The assessment of potential effects is based on the Proposed Development description (outlined in **Chapter 2: Proposed Development**). In relation to describing impacts on ornithological features, the relevant specifications used to determine the 'worst-case' Proposed Development involve:

- Up to 14 turbines with a maximum tip height of 250 m/maximum rotor diameter of 170 m.
- The associated infrastructure will include wind turbines and associated foundations, access tracks, crane hardstands, underground cabling, on-site substation and maintenance building, temporary construction compounds, laydown area and borrow pits.
- Existing access tracks have been incorporated into the track layout where possible.
- The construction period will last for approximately 24 months, comprising a construction programme as described in **Chapter 2: Proposed Development**. The number of bird breeding seasons potentially disrupted would depend on the month in which construction commences and the breeding season of the potentially affected species. The main breeding season of most birds at the Site extends from March to August. For the purposes of this assessment, it is assumed that, for any given species of bird, construction activities would commence during the breeding season and would therefore potentially affect up to three breeding seasons. This, therefore, represents a worst-case scenario.

9.5.27 In addition to the above considered during the design process, this Chapter has been prepared on the basis of the assumptions listed below:

- All electrical cabling between the proposed turbines and the associated infrastructure will be underground in shallow trenches which would be reinstated post-construction and, in most cases, follow the proposed access tracks.
- Any disturbance areas around permanent infrastructure during construction will be temporary and land will be reinstated or restored before the construction period ends.

The only excavation in these areas will be for cabling as noted above and otherwise may only be periodically used for side-casting of spoil until reinstatement.

- Borrow pits will be excavated during the construction period and will be reprofiled at the end of the construction period.

Committed Mitigation

9.5.28 To ensure all reasonable precautions are taken to avoid disturbance to birds and comply with environmental legislation, prior to construction and decommissioning the Applicant will appoint a suitably qualified Ecological Clerk of Works (ECoW) who will advise the Applicant and the Contractor on all ornithological matters (with the assistance of a suitably qualified/licenced ornithologist if required). The ECoW will be required to be present on Site during the construction and decommissioning periods and will carry out monitoring of works and briefings with regards to any ornithological sensitivities on the Site to the relevant staff within the Contractor and subcontractors.

9.5.29 A Bird Disturbance Management Plan (BDMP) will be implemented during construction of the Proposed Development and will form part of the Construction Environmental Management Plan (CEMP). The BDMP will detail measures to ensure legal compliance and safeguard breeding birds known to be in the area and will include species-specific guidance. The BDMP shall include pre-construction surveys and good practice measures during construction. Pre-construction surveys will be undertaken to check for any new breeding bird activity in the vicinity of the construction works. The ECoW will oversee the implementation of the above measures.

Assessment Limitations

9.5.30 Survey effort either met or exceeded the minimum requirements stipulated in NatureScot guidance (SNH 2017). In general, weather conditions were appropriate for the surveys, but where not, surveys were suspended (or additional surveys were undertaken) (refer to **Technical Appendix 9.1: Ornithology**).

9.5.31 Limitations exist with regard to the knowledge base on how some species, and the populations to which they belong, react to impacts associated with onshore wind farms and associated construction activities. A precautionary approach is taken in these circumstances, and as such it is considered that these limitations do not affect the robustness of this assessment.

9.5.32 As noted in the Scoping Report, the parcel of land comprising of the open ground around Glenmalloch Hill in the south east of the Proposed Development (the area in which T13 and T14 are situated, **Figure 9.1**) was included at the start of the second year of bird surveys (at which point the survey areas were adjusted). During the first year of surveys, surveyors were not able to access this land but as is standard practice, where the year 1 survey buffers extended out over this land surveyors scanned the ground from the permitted access land/from public roads in the area. **Figure 9.5**, **Figure 9.6** and **Figure 9.7** show the comparison between the 2022 (year 1) and 2023 (year 2) survey coverage[3] for the scarce breeding bird, black grouse and breeding wader/winter walkover surveys (refer to the **Desk Study / Field Survey** section of **Section 9.5** in comparison to the relevant study areas (refer to the **Study Area** section of **Section 9.5).** These figures show that there is only a small strip of the bottom of the study areas that was not covered by the year 1 survey buffers. Considering the relatively small size of this additional area, the comparable habitats present within the year 1 survey area, and the low ornithological sensitivity of the Site,

[3] Note that **Figure 9.4** and **Figure 9.5** also show the access track survey area – additional surveys were scheduled for the 2024 breeding season for scarce breeding birds and black grouse following the confirmation of the access route by the applicant.

the data gathered from the year 1 surveys (alongside that collected in year 2 on the revised survey areas) is considered sufficient and representative to allow for a robust assessment on the potential impacts to ornithology (as confirmed by NatureScot in their scoping consultation response, **Table 9.1**).

9.5.33 It is acknowledged that T1, T2, T13 and T14 are just outside the 2 km viewshed coverage in year 1 (by approximately 20 m to 360 m, **Figure 9.3**), however all turbines were covered by the year 2 viewshed coverage (**Figure 9.4**). Whether this would affect the robustness of the collision risk modelling depends on how similar the flight activity rates in the un-surveyed areas around these four turbine locations are to the flight activity rates recorded in the viewshed areas surveyed. In this case it is considered that the recorded flight activity rates would be sufficiently representative. The four turbines are located in similar habitat and on similar gradients to the remaining 10 turbines covered by the year 1 viewsheds (VPs 1-4). It is therefore likely that flight activity, particularly from large raptors (e.g., red kite and golden eagle), would be similar around the four turbines as recorded across the Site. Therefore, the mean flight activity rates per unit area (hectare) used in the collision model inputs are considered to be appropriate, and unlikely to result in unrepresentative collision rates.

9.6 Baseline

Current Baseline

9.6.1 A range of surveys were employed to accurately record baseline ornithological conditions within the Site and appropriate survey buffers. Terms referred to are as follows:

- 'survey area' is defined as the area covered by each survey type at the time of survey; and
- 'study area' is defined as the area of consideration of impacts on each species at the time of assessment and as the area used for any desk-based study (**Figure 9.1**).

9.6.2 The spatial extent of each survey area is detailed in **Technical Appendix 9.1: Ornithology**.

Designated Sites

9.6.3 There are no statutory designations with ornithological features within the Site. The desk-based study has identified two SPAs, five SSSIs (of which one which underpins an SPA), and one Ramsar within 20 km of the Site (**Figure 9.2**). Note that the distances provided below are to the nearest proposed turbine. Note that the distances provided below are to the nearest proposed turbine.

- Solway Firth SPA (underpinned by the Cree Estuary SSSI) – 15.3 km/13.3 km[4] to the south (to the nearest proposed turbine/Site boundary respectively) and designated for non-breeding barnacle goose, bar-tailed godwit, black-headed gull, common gull, common scoter, cormorant, curlew, dunlin, golden plover, goldeneye, goosander, grey plover, herring gull, knot, lapwing, oystercatcher, pink-footed goose, pintail, red-throated diver, redshank, ringed plover, sanderling, scaup, shelduck, shoveler, teal, turnstone, whooper swan and its waterfowl assemblage (non-breeding).
- Loch Ken and River Dee Marshes SPA (underpinned by the Loch Ken and River Dee Marshes Ramsar site), approximately 21 km/18.4 km (to the nearest proposed turbine/Site boundary respectively) to the east and designated for non-breeding Greenland white-fronted goose and greylag goose.

[4] Note that the Cree Estuary SSSI extends further north than the Solway Firth SPA and is 8.7 km/7 km to the south of the Site.

- Merrick Kells SSSI, approximately 4.7 km/4.4 km to the north (to the nearest proposed turbine/Site boundary respectively) and designated for a breeding bird assemblage[5].
- Laughenghie and Airie Hills SSSI, approximately 18 km/13.5 km to the east (to the nearest proposed turbine/Site boundary respectively) and designated for its breeding bird assemblage[6] and non-breeding hen harrier. The citation also notes that white-fronted geese use the site in winter months.
- Derskelpin Moss SSSI, approximately 18 km to the south-west (to the nearest proposed turbine/Site boundary) and designated for breeding dunlin and its breeding bird assemblage[7].
- Mochrum Lochs SSSI, approximately 18.8 km to the south-west (to the nearest proposed turbine/Site boundary) and designated for breeding cormorant.

9.6.4 For the Merrick Kells SSSI, Laughenghie and Airie Hills SSSI, Derskelpin Moss SSSI and Mochrum Lochs SSSI, there is considered to be no potential for connectivity between the sites and the Site on the basis of distance and/or the species listed within the SSSI designations and as per NatureScot's agreement (**Table 9.1**), the **Merrick Kells SSSI, Laughenghie and Airie Hills SSSI, Derskelpin Moss SSSI and Mochrum Lochs SSSI are scoped out** of the assessment.

Fight Activity Summary

9.6.5 A summary of all target species recorded during flight activity surveys at the Site is presented in **Table 9.6**. This summarises all flights observed during the baseline survey period regardless of the location of the flights in relation to proposed wind turbine locations. For further details of the flight activity surveys, refer to **Technical Appendix 9.1: Ornithology**.

9.6.6 A summary of the collision risk model results is presented in **Table 9.7** (refer to **Technical Appendix 9.1: Ornithology Annex E** for detailed results). Note that whilst black grouse and goshawk were recorded during flight activity surveys (**Table 9.6**), they were not identified to be 'at-risk'[8] and so were not included in the collision risk model (and are not presented in **Table 9.7**).

Table 9.6: Target Species Recorded During Flight Activity Surveys, 2022-2024

Species	Total Number of Flights Recorded	Total Number of Birds Recorded	Total Bird Seconds[9] Recorded
Black grouse	1	3	45
Curlew	1	1	60
Golden plover	2	28	4,060
Goshawk	2	2	48
Greylag goose	1	3	102

[5] No further details of the bird species breeding on the SSSI is provided in the SSSI citation: https://apps.snh.gov.uk/sitelink-api/v1/sites/1148/documents/1

[6] The citation lists osprey, teal, goosander, goldeneye, non-feral graylag goose, golden plover, curlew, raven and white-fronted goose: https://apps.snh.gov.uk/sitelink-api/v1/sites/911/documents/1

[7] The citation lists teal, tufted duck, common sandpiper, redshank, oystercatcher, golden plover and occasionally black grouse with the area also being used for hunting by hen harrier, merlin and short-eared owl: https://apps.snh.gov.uk/sitelink-api/v1/sites/509/documents/1

[8] 'At-risk' is defined as – a flight having at least part of its duration (i) at Potential Collision Height (PCH), 80 m to 250 m for the Proposed Development; (ii) within the CRAA; and (iii) recorded within the 2 km viewshed of the associated VP.

[9] Bird seconds are calculated for each observation as the product of flight duration and number of individuals. This has then been summed to provide the total bird seconds for each species recorded over the entire survey period.

Species	Total Number of Flights Recorded	Total Number of Birds Recorded	Total Bird Seconds[9] Recorded
Hen harrier	12	12	746
Herring gull	1	4	420
Lapwing	1	5	660
Merlin	9	9	368
Peregrine falcon	1	1	120
Pink-footed goose	1	27	1,404
Red kite	49	55	5,038

Table 9.7: Predicted Collision Rates

Species	Mean Breeding Season	Mean Non-Breeding Season	Mean Annual	Number of Years Per Collision
Curlew	n/a	0.0003	0.0003	3,256
Golden plover	0.0021	n/a	0.0021	469
Greylag goose	n/a	0.0008	0.0008	1,195
Hen harrier	n/a	0.0002	0.0002	4,107
Herring gull	0.0116	n/a	0.0116	86
Lapwing	n/a	0.0034	0.0034	291
Merlin	0.0001	n/a	0.0001	8,576
Peregrine falcon	n/a	0.0008	0.0008	1,187
Pink-footed goose	n/a	0.0174	0.0174	57
Red kite	0.0298	0.0050	0.0348	28.8

Black Grouse

9.6.7 Baseline surveys identified two leks within the 2022, 2023 and 2024 survey areas (**Table 9.8**, **Figure 9.8**). Data provided by the RSPB Data Unit for black grouse between 2013 and 2023 provided additional lek records for lek 1 and lek 2 along with an additional five lek areas (all shown on **Confidential Figure 9.2.3**) – a summary of the RSPB records is provided below with the detail provided in **Confidential Technical Appendix 9.2** (please note that the lek IDs used below have been assigned by MacArthur Green for ease of summarising).

- Lek 1: one to two males between 2014-2018 and 2021-2022;
- Lek 2: one to two males between 2013-2015 and 2017;
- Lek A: over 1 km from the nearest turbine and infrastructure, two males in 2023;
- Lek B: approximately 75 m from the nearest turbine, one male in 2017;
- Lek C: approximately 190 m from the nearest turbine, two males in 2021;
- Lek D: approximately 520 m from the nearest turbine, one male in 2023; and
- Lek E: over 1.5km from the nearest turbine, one male in 2015 and 2017.

9.6.8 Flight activity surveys recorded one flight (**Table 9.6**, **Figure 9.9**), which were not identified to be 'at-risk' and therefore no risk of collision is predicted.

Table 9.8: Black Grouse Leks (Maximum Counts)

Lek	Distance to Nearest Turbine	Distance to Nearest Infrastructure	2022	2023	2024
1	2022: 750 m (T12) 2023: 1 km (T12)	2022: 698 m 2023: 975 m	1 male (2 records)	2 males (2 records)	Outwith 2024 survey area[10]
2	2023: 829 m (T7) 2024: 1 km (T7)	2023: 118 m 2024: 300 m	No activity recorded	1 male (3 records)	3 males (3 records)

9.6.9 Considering the lek activity recorded within the study area and the species' potential sensitivity to wind farm disturbance (e.g., SNH 2018a), **black grouse is scoped in** to the assessment

Raptors and Owls

Barn Owl

9.6.10 Barn owl were identified during the baseline surveys to be breeding at one location within the Site (687 m from the nearest proposed wind turbine, **Confidential Figure 9.2.1**). An owl box was also recorded at a second location (2.9 km from the nearest proposed wind turbine, **Confidential Figure 9.2.1**), however it was not established to be in use by any owl species. Further details are presented in **Confidential Technical Appendix 9.2: Confidential Ornithology**.

9.6.11 Consultation with the DGRSG provided 13 additional breeding barn owl locations within 1.5 km to 4.2 km from the Site (distances to the nearest proposed wind turbine, **Confidential Figure 9.2.2**).

9.6.12 Guidance from Shawyer (2011) for continuous activity disturbance distances provides a range of 20 m (pedestrian movement) to 175 m (heavy construction works) for breeding barn owl and more recently, a review of bird disturbance distances by Goodship & Furness (2022) recommends a buffer of 50 m to 100 m. No turbines or infrastructure are within 500 m of any of the locations and so considering this and the limited activity within the rest of the study area, **barn owl are scoped out** of the assessment.

Golden Eagle

9.6.13 A single adult golden eagle was recorded in November 2023 (**Figure 9.10**). Consultation with the DGRSG also did not identify any known nests within the 2 km study area. The SSGEP provided a review of current known golden eagle activity within the vicinity of the Site in August 2024 which confirmed that there were no known nest sites used within the past 15 years but that a female of breeding age was possibly establishing a territory in the local area. The SSGEP provided a grid coordinate for a possible nesting area for this establishing territory which is over 7 km from the Proposed Development.

9.6.14 A NatureScot commissioned report on golden eagle in southern Scotland (Fielding and Haworth 2014) identifies areas of habitat with the potential to support or form part of breeding golden eagle ranges, with the primary aim of providing a robust estimate of the number of potential territories that could be occupied in southern Scotland. The authors split south Scotland into ten regions/hill groups and provided an assessment on the number of pairs each region could support. The Proposed Development is situated on the southern edge of the Galloway Hills region (as indicated by the site boundary on **Image 9.1**).

[10] As detailed in the **Desk Study / Field Survey** section of **Section 9.5**, surveys in 2024 were only undertaken along the proposed access track and lek 1 is situated outwith this survey area (refer to **Figure 9.6** and **Figure 9.8**.

9.6.15 Fielding and Haworth (2014) identified that the Galloway Hills region:

- Currently contains two separate golden eagle ranges (historically this was four);
- Has many cliff nesting opportunities (similar to the more rugged highland areas);
- Has sufficient habitat and breeding sites existing to support at least two pairs (despite significant ground loss to forestry) but that it is considered unlikely that there are sufficient prey resources to support high enough productivity to allow the region to become a 'source population' rather than a 'sink population'; and
- That general raptor persecution incidents are low.

9.6.16 The Proposed Development is located within closed canopy plantation forestry and open ground (**Figure 9.1**) and in review of published probabilities of range establishments (Fielding and Haworth 2014), it can be seen that the majority of the Site is situated in an area identified to be of low probability, with a small part of the northern part of the Site identified to be of moderate probability (**Image 9.1**). It is therefore considered that the Site is very unlikely to form an important part of any future golden eagle range, with any loss of potential foraging habitat for golden eagles (breeding or non-breeding) negligible and unlikely to impact an individual's survival probability or limit re-establishment of the population. Fielding *et al*. (2024) presents an extensive account of the movements of tagged birds and when reviewing the data available for the released/re-establishing birds across south Scotland (refer to Figure 3 of Fielding *et al*. 2024) it can be seen that the Site is situated to the west of the main clusters of activity recorded which further indicates the Site is not located in an area of importance.

9.6.17 Considering the above, the Proposed Development is not considered to be situated in an area of importance for re-establishing golden eagle territories in south Scotland/the Galloway Hills region and **golden eagle is scoped out** of the assessment.

Image 9.1: The Galloway Hills Region and Probable Golden Eagle Range Activity (Site Boundary shown as red outline) (reproduction of Figure 14 from Fielding and Haworth 2014)

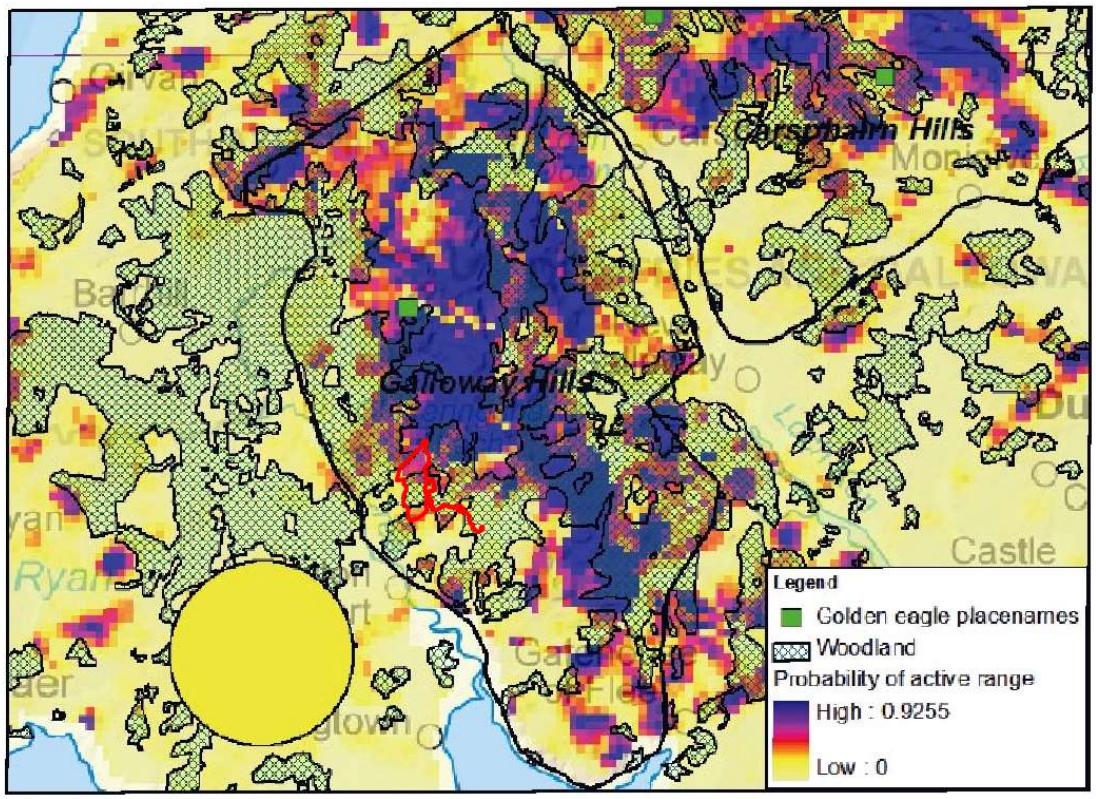


Figure 14. Galloway Hills region. Yellow circle is a 6 km radius indicating maximum range size. The background (legend shown in inset) is the probability of breeding habitat from the random forest analyses overlain with current woodland. Contains Ordnance Survey data © Crown copyright and database right 2010.

Goshawk

9.6.18 Goshawk were infrequently recorded across the baseline survey period (individual birds in April and August 2022 and April, August and November 2023, **Figure 9.10**) and no evidence of breeding was identified within the Site.

9.6.19 Consultation with the DGRSG also did not identify any known nests within the 2 km study area.

9.6.20 Flight activity surveys recorded two flights (**Table 9.6**, **Figure 9.11**), which were not identified to be 'at-risk' and therefore no risk of collision is predicted.

9.6.21 Considering this species' limited presence within the study area and absence of predicted collision risk, **goshawk is scoped out** of the assessment.

Hen Harrier

9.6.22 Hen harrier were infrequently recorded across the baseline survey period (individual birds in July 2022 and August 2023, **Figure 9.10**) and no evidence of breeding/roosting was identified within the Site.

9.6.23 Consultation with the DGRSG also did not identify any known nests/roosts within the 2 km study area.

9.6.24 Flight activity surveys recorded 12 flights (**Table 9.6**, **Figure 9.12**), and collision risk modelling predicted a mean collision rate of one bird every 4,107 years (**Table 9.7**).

9.6.25 Considering this species' limited presence within the study area and negligible predicted risk of collision, **hen harrier is scoped out** of the assessment.

Merlin

9.6.26 Merlin were infrequently recorded across the baseline survey period (a pair in June 2023 and a single bird in July 2023, **Figure 9.10**) and no evidence of breeding was identified within the Site.

9.6.27 Consultation with the DGRSG also did not identify any known nests within the 2 km study area.

9.6.28 Flight activity surveys recorded nine flights (**Table 9.6**, **Figure 9.13**), and collision risk modelling predicted a mean collision rate of one bird every 8,576 years (**Table 9.7**).

9.6.29 Considering this species' limited presence within the study area and negligible predicted risk of collision, **merlin is scoped out** of the assessment.

Peregrine Falcon

9.6.30 No potential breeding sites for peregrine falcon were recorded within the Site.

9.6.31 A single breeding site is known to the DGRSG to be breeding approximately 2.9 km from the Site (**Confidential Figure 9.2.2**).

9.6.32 Flight activity surveys recorded one flight (**Table 9.6**, **Figure 9.11**), and collision risk modelling predicted a mean collision rate of one bird every 1,187 years (**Table 9.7**).

9.6.33 Considering this species' limited presence within the study area and negligible predicted risk of collision, **peregrine falcon is scoped out** of the assessment.

Red Kite

9.6.34 Red kite were the most frequently recorded species across the baseline survey period. Individual birds were recorded on 19 occasions, with two different birds noted at the same time (**Figure 9.10**). Activity was predominately during the breeding seasons, however birds were also occasionally noted during January/February.

9.6.35 Consultation with the DGRSG identified one breeding pair of red kite just outside the study area. During the period 2018 to 2024 the pair have moved between four different nest sites, **Confidential Figure 9.2.2**. No nest sites for the pair are located within 1 km of the Site, with the nearest nest site located 2 km from the nearest turbine and 1.3 km from the access track at the closest point. The DGRSG did not indicate any roost areas were present within the study area.

9.6.36 Flight activity surveys recorded 49 flights (**Table 9.6**, **Figure 9.14**), and collision risk modelling predicted a mean collision rate of one bird every 28.8 years (**Table 9.7**).

9.6.37 Considering this species' lack of breeding evidence within 2 km of the proposed turbine layout and low predicted collision risk which would unlikely be measurable at any population level, **red kite is scoped out** to the assessment.

Waders

Curlew

9.6.38 Flight activity surveys recorded one flight (**Table 9.6**, **Figure 9.15**), and collision risk modelling predicted a mean collision rate of one bird every 3,256 years (**Table 9.7**).

9.6.39 Curlew were not recorded at any other time across the baseline survey period (breeding or in passage/wintering) and no evidence of breeding was recorded on the Site.

9.6.40 Considering this species' limited presence within the study area and negligible predicted risk of collision, **curlew is scoped out** of the assessment.

Golden Plover

9.6.41 Flight activity surveys recorded two flights (**Table 9.6**, **Figure 9.15**), and collision risk modelling predicted a mean collision rate of one bird every 468.8 years (**Table 9.7**).

9.6.42 A single bird was heard calling near Black Burn in April 2022 (situated in the north of the Site running west to east across the Site to the north of wind turbines 5 and 6), however no further evidence of golden plover was recorded and it was assumed to be a bird on passage.

9.6.43 Considering this species' limited presence within the study area and negligible predicted risk of collision, **golden plover is scoped out** of the assessment.

Lapwing

9.6.44 Flight activity surveys recorded one flight (**Table 9.6**, **Figure 9.15**), and collision risk modelling predicted a mean collision rate of one bird every 291 years (**Table 9.7**).

9.6.45 Lapwing were not recorded at any other time across the baseline survey period (breeding or in passage/wintering) and no evidence of breeding was recorded on the Site.

9.6.46 Considering this species' limited presence within the study area and negligible predicted risk of collision, **lapwing is scoped out** of the assessment.

Geese, Swans and Gulls

Greylag Goose

9.6.47 Flight activity surveys recorded one flight (in March 2023) (**Table 9.6**, **Figure 9.16**), and collision risk modelling predicted a mean collision rate of one bird every 1,195 years (**Table** 9.7).

9.6.48 A pair of greylag geese were recorded on two occasions during April and May 2022 during breeding wader/scarce breeding bird surveys (**Figure 9.17**) and greylag geese were not recorded to be foraging on or adjacent to the Site during baseline surveys.

9.6.49 Considering this species' limited presence within the study area and negligible predicted risk of collision, **greylag goose is scoped out** of the assessment.

Pink-Footed Goose

9.6.50 Flight activity surveys recorded one flight (**Table 9.6**, **Figure 9.16**), and collision risk modelling predicted a mean collision rate of one bird every 57 years (**Table 9.7**).

9.6.51 Two pink-footed geese were also noted to be overflying the Site in May 2023 during a black grouse survey (**Figure 9.17**) and pink-footed geese were not recorded to be foraging on or adjacent to the Site during baseline surveys.

9.6.52 Considering this species' limited presence within the study area and negligible predicted risk of collision, **pink-footed goose is scoped out** of the assessment.

Herring Gull

9.6.53 Flight activity surveys recorded one flight (**Table 9.6**, **Figure 9.16**), and collision risk modelling predicted a mean collision rate of one bird every 86.3 years (**Table 9.7**).

9.6.54 Herring gull were not recorded at any other time across the baseline survey period.

9.6.55 Considering this species' limited presence within the study area and negligible predicted risk of collision, **herring gull is scoped out** of the assessment.

Future Baseline

9.6.56 In the absence of the Proposed Development, assuming the continuation of the current predominately commercial land management practices within and around the Site (a mixture of forestry and upland sheep grazing) and allowing for changes in bird behaviour and distribution related to climate change, the bird populations are likely to continue to be present in largely similar abundances and distributions to those described in the baseline. Any changes in numbers and diversity of species are likely to be a reflection of their wider population trends and influences such as climate change (e.g., delayed breeding, reduced or increased breeding success depending on the species range, Pearce-Higgins (2021)) or re-introduction programs (e.g. such as those for red kite and golden eagle), rather than site-specific factors.

Likely Significant Effects on SPAs (and underpinning SSSIs) – Information to Inform an HRA

9.6.57 As acknowledged in the Scoping Report and in the scoping consultations from NatureScot and RSPB Scotland (**Table 9.1**), on the basis of guidance regarding connectivity with SPAs (SNH 2016b) there is potential for connectivity between the Site and the Solway Firth SPA for pink-footed goose (15-20 km foraging range, SNH 2016b) and the Loch Ken and River Dee Marshes SPA for greylag goose (15-20 km foraging range, SNH 2016b). Consequently, there is the potential for a likely significant effect on the SPA (step 2).

9.6.58 Any potential connectivity with these SPAs is however, agreed to be limited when considering the unsuitability of forestry and moorland habitats present on the Site for these species and the location of the Site in relation to the SPAs (i.e., situated on upland ground away from the river valley and estuary). The potential for connectivity is therefore only considered on the basis of geese overflying the Site whilst moving between the SPAs and foraging areas.

9.6.59 The remaining species listed on the Solway Firth SPA citation are designated for their non-breeding/wintering populations and comprise waders, waterfowl and true seabirds that are reliant on the coastal/wetland habitats present within/adjacent to the SPA boundary. As such, there is considered to be no connectivity between these SPA species and the Proposed Development. There is also considered to be no connectivity between the Loch Ken and River Dee Marshes SPA Greenland white-fronted goose population on the basis of their maximum foraging range (5-8 km, SNH 2016b).

Solway Firth SPA

9.6.60 Pink-footed geese were also only recorded on three occasions and no evidence of wintering geese using the Site or immediately adjacent areas was recorded across the baseline period (to be expected given the habitats on Site are not considered to be suitable for wintering geese). A review of pink-footed goose feeding distributions provided by Mitchell (2012) (**Figure 9.2**) shows that the main feeding areas for the Solway populations are centred around the Cree Estuary, with inland areas occurring up the River Cree to the south of Newton Stewart, over 5 km from the Site. The Site does not lie on a flyway between the known foraging areas and SPAs, which is supported by the very low levels of flight activity recorded.

9.6.61 Collision modelling predicted a mean collision rate of 0.0519 (or one every 63 years, **Table 9.7**). The Solway Firth SPA population is estimated to be 14,900 birds[11] and the additional mortality due to collision would be an increase over the baseline mortality rate (0.171, BTO BirdFacts[12]) of 0.00003 %. This additional mortality is considered negligible in comparison to the baseline mortality expected for the SPA population and is not considered to present an adverse effect on the integrity of the SPA population.

9.6.62 It can therefore be concluded that there would be **no adverse effects on the integrity of the Solway Firth SPA pink-footed goose population** or the underpinning Cree Estuary SSSI, as a result of the construction, operation or decommissioning of the Proposed Development.

Loch Ken and River Dee Marshes SPA

9.6.63 Greylag geese were only recorded on three occasions and no evidence of wintering geese using the Site or immediately adjacent areas was recorded across the baseline period (to be expected given the habitats on Site are not considered to be suitable for wintering geese). A review of greylag goose feeding distributions provided by Mitchell (2012) (**Figure 9.2**) shows that foraging is predominately focussed on the lowland habitats along the River Cree (over 6 km to the south of the Site) and the Dee Valley (over 20 km to the east of the Site). There are no known foraging areas within 4 km of the Site and the Site does not lie on a flyway between the known foraging areas and SPA (both core areas are located to the south of the A74/A712 whereas the Site is located to the north, **Figure 9.2**), which is supported by the very low levels of flight activity recorded.

9.6.64 Collision modelling predicted a mean collision rate of 0.0008 (or one every 1,213 years, **Table 9.7**). The Loch Ken and River Dee Marshes SPA population is estimated to be 1,150 birds[13] and the additional mortality due to collision would be an increase over the baseline mortality rate (0.17, BTO BirdFacts[14]) of 0.0004 %. This additional mortality is considered negligible in comparison to the baseline mortality expected for the SPA population and is not considered to present an adverse effect on the integrity of the SPA population.

9.6.65 It can therefore be concluded that there would be **no adverse effects on the integrity of the Loch Ken and River Dee Marshes SPA greylag goose population** or the underpinning Cree Estuary SSSI, as a result of the construction, operation or decommissioning of the Proposed Development.

Summary of Scoped In Important Ornithological Features

[11] https://sitelink.nature.scot/site/10487 (accessed July 2024)

[12] https://www.bto.org/understanding-birds/birdfacts/pink-footed-goose (accessed July 2024)

[13] https://sitelink.nature.scot/site/8528 (accessed July 2024)

[14] https://www.bto.org/understanding-birds/birdfacts/greylag-goose (accessed July 2024)

9.6.66 The assessment is applied to those scoped in IOFs of medium or high NCI (**Table 9.2**), as confirmed through survey results and consultations outlined above. This is limited to black grouse.

Table 9.9: Scoped In IOFs

Feature	NCI	Reason for Inclusion
Black grouse	Medium	BoCC Red listed, priority bird species for assessment in Scotland (SNH 2018a).

9.6.67 The conservation status of black grouse is detailed in **Table 9.10**, below.

Table 9.10: Conservation Status of Scoped In IOFs

IOF	Conservation Status	Information
Black grouse	BoCC Red list (HD, BDp^1, BDp^2, $BDMr^2$)	Black grouse is Red-listed due to an historical decline in the UK between 1800 and 1995, without substantial recent recovery. It also qualifies due to a severe decline in the UK breeding population size of >50 % over 25 years. Breeding numbers in the UK declined by 80 % between 1991 and 2004. Sim *et al.* (2008) estimated there to be 5,078 male black grouse in the UK in 2005, with approximately two-thirds of these occurring in Scotland. However, Forrester *et al.* (2012) estimate that in Scotland there are around 3,550 to 5,750 lekking males, representing about 71 % of the British population. In Scotland the breeding range is contracting, and numbers are declining, though the rate of decline varies regionally, being higher in south western Scotland (-49 %) compared to north Scotland (-16 %). Evidence suggests that the national and regional populations are in unfavourable conservation status. The NHZ 19 (Western Southern Uplands and Solway) population was estimated by Wilson *et al.* (2015) to be 121 (range 71-168) displaying males. The Black grouse conservation strategy for south Scotland (Warren 2016) considers the Galloway region of the South West Scotland population to be 147 displaying males (2011-2015) across the four connected population regions of West Galloway, Cairnsmore, Galloway Forest Park and East Galloway (these have individual estimates of 0[15], 20, 92 and 35 displaying males respectively).

BoCC Red-list criteria (Stanbury *et al.* 2021)
HD = historical decline in the breeding population.
$BDp^{1/2}$ = severe breeding population decline over 25 years/longer term.
BoCC Amber-list criteria (Stanbury *et al.* 2021)
$BDMr^2$ = moderate breeding range decline over 25 years/longer term

[15] Warren (2016) notes that West Galloway is considered to be under surveyed for black grouse.

9.7 Assessment of Potential Effects

Construction Effects

9.7.1 The main potential impacts of construction activities due to the Proposed Development are the displacement and disruption of breeding or foraging birds as a result of noise and general disturbance over a short-term period (either the duration of a particular construction activity within working hours, or the duration of the whole construction period).

9.7.2 Impacts on breeding birds would be confined to areas in the locality of temporary construction compounds, turbines, tracks and other infrastructure.

9.7.3 Direct habitat loss would also occur due to the Proposed Development's construction, which would be both temporary (e.g. construction compounds, borrow pits) and long-term (access tracks, turbines and substation). This has the potential to affect breeding or foraging individuals.

Black Grouse

9.7.4 **Impact**: lekking or foraging black grouse may be displaced during construction, either by disturbance or direct habitat loss.

9.7.5 **Sensitivity**: medium NCI (**Table 9.2**) and unfavourable conservation status (**Table 9.10**). Consequently, black grouse sensitivity in the context of the Site is considered to be medium-high.

9.7.6 **Magnitude of impact**: according to an expert review by Goodship & Furness (2022), lekking males may be actively disturbed at up to 500 m to 750 m from a disturbance source, and NatureScot generally advocates that a buffer of up to 750 m should be applied to avoid all disturbance during the construction phase, based on information in Zwart *et al*. (2015).

9.7.7 Whilst there will be no direct habitat loss to the lek sites themselves, there will be some small direct loss of breeding or foraging habitats within 750 m of the leks and within the rest of the Site.

9.7.8 Lek 1 is approximately 750 m from the nearest proposed turbine and 698 m from the infrastructure associated with that turbine (**Table 9.8**, **Figure 9.8**). Given the distance from the lek and the presence of forestry between the Proposed Development and this lek location, it is unlikely that birds lekking at this location would be displaced by construction activities, however in a worst-case scenario there is a risk that up to two males may be disturbed by construction activities.

9.7.9 Lek 2 is over 750 m from all proposed turbines (closest is 892 m) however birds at lek 2 have been recorded within 118 m to 300 m of the proposed access track (**Table 9.8**, **Figure 9.8**). Whilst it is likely that grouse lekking at this location are already habituated to a certain level of traffic given the track currently exists as a Forestry Land Scotland track, traffic levels will be higher during the construction phase and so as a worst-case there is a risk that birds (up to three males) at this lek may be displaced by traffic accessing the Proposed Development during the operational phase.

9.7.10 Of the further five lek areas identified from the data provided by the RSPB Data Unit (**Confidential Figure 9.2.3**), Leks A and E are over 750 m from the Proposed Development and so would not be displaced by construction activity. Of the remaining leks identified by the RSPB data:

- Lek B – is approximately 75 m from the nearest turbine (**Confidential Figure 9.2.3**), however activity at this lek was only recorded in 2017 (a single male) and no activity has been recorded since (despite this lek area being within the Site and within the black grouse survey area for surveys undertaken in 2022 and 2023). Furthermore, this

lek area was situated within the commercial plantation present within the Proposed Development and was likely a temporary lek as a result of the felling of plantation within the coupe the lekking male was recorded. Considering that there has been no activity recorded at this lek area since 2017 and that in the absence of the Proposed Development this lek would be replaced by the replanted commercial plantation, there is considered to be no additional displacement of lekking black grouse as a result of the construction of the Proposed Development.

- Lek C and Lek D – are approximately 190 m and 520 m respectively from the nearest turbine (**Confidential Figure 9.2.3**). Much like Lek B, lekking activity was only recorded at these lek locations in a single year each with two males at Lek C in 2021 and one male at Lek D in 2023.

9.7.11 Whilst Lek areas 1, A, C and D are over 250 m apart (the distance at which leks are considered to be separate lekking areas, SNH 2017), they are all situated within contiguous open habitat that wraps to the west and south of the Site (**Confidential Figure 9.2.3**) and it is considered likely that lekking males will move between these four lek areas as studies have shown that single males or males in low density populations do not generally have fixed lek sites and are more mobile; most likely to increase chances of securing a mating by locating females (Warren *et al.* 2015 & 2017, SNH 2017). The mobility of single male leks is acknowledged in NatureScot guidance (SNH 2017) and by Warren *et al.* (2015), with Warren *et al.* (2017) stating "*Thus, males at low densities may be more mobile to increase their chances of securing a mating by locating females, compared to males in high density areas where females come to leks and therefore males remain close to the home lek*". Given the small numbers of males in attendance at these lek areas (one to two males), the above evidence of mobility of males between lek areas and the contiguous habitat between these four lek areas (Leks 1, A, C and D, **Confidential Figure 9.2.3**), it is therefore an appropriate assumption to consider the males at these leks as one local population (jointly referred to as the 'west-south lekking area').

9.7.12 Across all the known lekking areas (Leks 1, 2, A, B, C, D and E) there has been one to three males recorded at any one time at any lek, with a peak of three males at Lek 2 (2024) and a peak of three males (recorded on the same date at Lek A and D) at the west-south lekking area.

9.7.13 Warren (2016) estimates the Galloway population of south west Scotland to be 147 lekking males (**Table 9.10**). The potential disturbance of up to six lekking males across the whole Site at two lek sites at any one time would represent around 4.08 % of this biogeographic population.

9.7.14 This worst-case scenario of the temporary loss of up to six lekking males (the maximum Site lekking male population) is considered to be of medium spatial and short-term temporal magnitude.

9.7.15 **Significance of effect**: the unmitigated effect on the regional (Galloway area of south west Scotland) black grouse population as a result of construction is considered to be **minor-moderate adverse** and therefore **potentially significant** in the context of the EIA regulations.

Operational Effects - Displacement

Black Grouse

9.7.16 **Impact**: wind farm operation may cause some displacement of lekking, breeding and foraging black grouse from areas close to turbines and other infrastructure.

9.7.17 **Sensitivity**: medium-high.

9.7.18 **Magnitude of impact**: according to an expert review by Goodship & Furness (2022), leks may be actively disturbed at 500 m to 750 m from a disturbance source, and NatureScot

has advocated that a buffer of up to 500 m should be applied to avoid all potential displacement effects during wind farm operation. Evidence from Austria has suggested that leks may be adversely affected by wind farms, although it is not clear what the exact causes may be – potentially a combination of turbine noise, maintenance activities or collisions (Zeiler and Grünschachner-Berger 2009). Early-stage operational monitoring (in 2014 and 2015) at Berry Burn Wind Farm indicated that there were no obvious effects on black grouse behaviour with two different leks recorded within 250 m and 420 m of turbines and black grouse activity recorded across the whole wind farm (droppings and birds) (Nevis 2015 and 2016).

9.7.19 Lek 1 is not located within 500 m of the Proposed Development (698 m from the nearest part of the Proposed Development, **Table 9.8**, **Figure 9.8**) and consequently there is considered to be no operational displacement to this lek.

9.7.20 Lek 2 is not located within 500 m of the main area of the Proposed Development (892 m to the nearest turbine, **Table 9.8**, **Figure 9.8**), however it is located within 500 m of the proposed access track (115 m, **Table 9.8**, **Figure 9.8**). Whilst traffic on the proposed access track will be considerably reduced in comparison to during the construction phase and that it is likely that grouse lekking at this location are already habituated to a certain level of traffic given the track currently exists as an FLS track, as a worst-case there is a risk that birds at this lek may be displaced by traffic accessing the Proposed Development during the operational phase.

9.7.21 Of the further five leks identified from the data provided by the RSPB Data Unit (**Confidential Figure 9.2.3**), Leks A, D and E are over 500 m from the Proposed Development and so would not be displaced by the operation of the Proposed Development. Of the remaining leks identified by the RSPB data:

- Lek B – is approximately 75 m from the nearest turbine (**Confidential Figure 9.2.3**), however activity at this lek was only recorded in 2017 (a single male) and no activity has been recorded since (despite this lek area being within the Site and within the black grouse survey area for surveys undertaken in 2022 and 2023). Furthermore, this lek area was situated within the commercial plantation present within the Proposed Development and was likely a temporary lek as a result of the felling of plantation within the coupe the lekking male was recorded. Considering that there has been no activity recorded at this lek area since 2017 and that in the absence of the Proposed Development this lek would be replaced by the replanted commercial plantation, there is considered to be no additional displacement of lekking black grouse as a result of the operation of the Proposed Development as it is proposed that this plantation would remain.
- Lek C – is approximately 190 m from the nearest turbine (**Confidential Figure 9.2.3**). As discussed above in paragraph 9.7.11, the lek areas associated with Leks 1, A, C and D are considered to be formed of one mobile population of lekking males. As such, the two males associated with Lek C (only recorded on one occasion in 2021 and not recorded during the black grouse surveys undertaken in 2022 and 2023 despite this lek area being within the Site and within the black grouse survey area) would be considered highly unlikely to be displaced from the population as they would most likely continue to lek at Lek 1 (considered to be the main lekking area for this west-south lekking area population given the higher density of records between 2013 and 2024). As such, no additional operational displacement for lekking black grouse is considered to be likely occur.

9.7.22 The potential disturbance of up to three lekking males along the access track at any one time would represent around 2 % of the Galloway population of south-west Scotland biogeographic population (147 lekking males as per Warren 2016).

9.7.23 **Significance of effect**: the unmitigated effect on the regional (Galloway area of south-west Scotland) black grouse population as a result of operation is considered to be **minor-**

moderate adverse and therefore **potentially significant** in the context of the EIA regulations.

Operational Effects – Collision Risk

Black Grouse

9.7.24 **Impact**: birds that utilise the airspace within the Proposed Development at potential collision heights may be at risk of collision with wind turbines, thereby increasing the annual mortality rate of the population above background levels. Black grouse are known to be at risk of colliding with structures close to ground level, such as fences and wires - deer and stock fencing has proved to be a particular hazard for this species (Trout and Kortland 2012). Zeiler and Grünschachner-Berger (2009) reported cases of black grouse mortality resulting from collisions with various structures close to ground level, and they report strong declines in black grouse numbers in local populations in areas where three wind farms were constructed in the Alpine zone in Austria.

9.7.25 **Sensitivity**: medium-high.

9.7.26 **Magnitude of impact**: as shown in **Table 9.7**, the CRM predicted no collision risk for black grouse.

9.7.27 The risk of collisions with turbine blades for this species is however expected to be low to negligible as typical flight behaviour suggests that the large majority of flights would be below rotor height (the flight recorded during flight activity surveys was below 20 m, **Technical Appendix 9.1 Annex D**) and so whilst there is no predicted collision as a result of black grouse flying through the rotor swept area of the proposed turbines, there may be some mortality through the collision with the turbine towers themselves/other structures such as rails associated with steps leading into the turbines and fencing constructed for the Proposed Development. The permanent forestry removal for the Proposed Development infrastructure will result in open areas of habitat closer to the turbines, which may be more suitable for black grouse, thereby increasing the risk of collisions with infrastructure. However, even taking into account the potential for collisions with other infrastructure, the magnitude of effect on the regional (Galloway area of south-west Scotland) population is considered to be **negligible**, **long-term**.

9.7.28 **Significance of effect**: the unmitigated effect on black grouse from collision risk is considered to be **negligible** and therefore **not significant** in the context of the EIA Regulations.

Operational Effects – Turbine Lighting

9.7.29 Where turbines have a tip height over 150 m, lighting would be required, in accordance with Article 222 of the Air Navigation Order 2016 (ANO) (in line with current guidance from the Civil Aviation Authority (CAA 2016). As advised by NatureScot (2020b), there are potential lighting effects on birds which require consideration within an EIA.

9.7.30 **Impact**: lighting could have various impacts on birds: they may be attracted to lights and thereby placed at higher risk of collisions, have migration patterns disrupted, show avoidance of lights with a consequent displacement effect, or be subject to increased predation threat. NatureScot (2020b) has identified attraction (phototaxis) as posing the principal threat to birds (in relation to turbines). For black grouse it should be noted that foraging is diurnal (and so unaffected by nocturnal lighting), and the species does not undertake large scale nocturnal migration movements, however black grouse will undertake shorter local movements prior to sunrise/post sunset to attend lek sites (lekking occurs predominantly at dawn and dusk).

9.7.31 **Sensitivity**: medium-high.

9.7.32 **Magnitude of impact**: in NatureScot's (2020a) advice on the scope of assessment for turbine lighting, it is identified that an assessment of the possible effects of lighting on birds may be required in the following three situations, where risk is greater: (i) turbines on or adjacent to a seabird colony that hosts burrow nesting species; (ii) turbines that are on or adjacent to protected areas that host large concentrations of wintering waterbirds, where such sites are located within open country away from other sources of artificial light; and (iii) where wind farms are located on migratory corridors or bottlenecks for nocturnally migrating passerines.

9.7.33 It is clear that the Proposed Development does not fit any of these situations. As such, whilst there is a possibility for black grouse moving to the lek areas in darkness to be impacted by turbine lighting, based on guidance provided by NatureScot (2020a, 2020b) and the low flying behaviour of black grouse, it is considered that there is little evidence to indicate that any species would be significantly affected either negatively or positively by lighting requirements of the Proposed Development (at which it should be noted that it is proposed for only six of the 14 turbines to be lit, see **Figure 15.1**). An effect of **negligible**, **long-term/permanent magnitude** is therefore predicted.

9.7.34 **Significance of effect**: the unmitigated effect on black grouse as a result of operational turbine lighting is predicted to be **negligible** and **not significant** in the context of the EIA Regulations.

Decommissioning Effects

9.7.35 Decommissioning effects for the Proposed Development are difficult to predict with any confidence because of the long timeframe until their occurrence. Decommissioning effects are considered for the purpose of this chapter to be similar in nature to those of construction effects but are likely to be of shorter duration. The significance of effects predicted in the construction section are therefore considered appropriately precautionary for assessing decommissioning effects on IOFs.

9.8 Mitigation

Construction

9.8.1 The only identified effect during the construction phase (and decommissioning phase) that was considered to be potentially significant for any IOF was disturbance to lekking black grouse (moderate adverse). Mitigation during construction for lekking black grouse, in addition to standard procedures within the BDMP, has been considered and is summarised below.

9.8.2 No further specific mitigation other than the standard mitigation already outlined (BDMP, ECoW and pre-construction surveys, refer to the **Project Assumptions** and **Committed Mitigation** sections of **Section 9.5)** is required for ornithology and these measures will aim to ensure that no breeding activity is disrupted by construction activities.

Black Grouse

9.8.3 To avoid a significant disturbance effect occurring during construction, the BDMP will also extend to protection of black grouse leks (as well as nest sites). Specific pre-construction surveys for lekking black grouse will be undertaken during the main black grouse lekking season (March to May, following methodology provided by Gilbert *et al*. (1998) and NatureScot (SNH 2017) to provide an up to date understanding of where black grouse are lekking within 750 m of the Proposed Development.

9.8.4 Should pre-construction surveys record lekking black grouse within 750 m of any proposed works (or should lekking black grouse be identified on the site by any site personnel), all construction activities would be prohibited within the 750 m disturbance zone until a risk assessment is undertaken. The risk assessment would consider the likelihood and possible implications of the associated construction activities on the lek and set out necessary measures to ensure that no disturbance occurs.

9.8.5 Restrictions to construction activity within the 750 m disturbance zone would include (but are not limited to) the following:

- No construction activity (including vehicle movements) before 09:00 hours in the months of April and May.

9.8.6 Furthermore, given the presence of Lek 2 along the access track (**Figure 9.8**), the BDMP will include the following mitigation for implementation along the section of the proposed access track identified to be within 750 m of lek 2 (**Figure 9.8**).

- A maximum speed limit of 15 mph will be enforced at all times of day on the track throughout the breeding season;
- Personnel will be required to remain within vehicles and will not be permitted on foot within this zone;
- Gates within this zone will remain open after first arrival, therefore avoiding the need for every subsequent entry to open and close the gate and the associated potential disturbance to the lek due to pedestrian activity.

9.8.7 Any deviations to the proposed timing restrictions and/or extent of any disturbance-free zone would be agreed with NatureScot.

9.8.8 The ECoW will oversee the implementation of the above measures.

Operation

9.8.9 The only identified effect during the operational phase that was considered to be potentially significant for any IOF was disturbance to lekking black grouse (moderate adverse) – specifically black grouse lekking at lek 2 due to its proximity to the access track. Mitigation during operation for lekking black grouse, has been considered and is summarised below.

Black Grouse

9.8.10 To avoid a significant disturbance effect occurring during the operational phase of the Proposed Development it is proposed to extend the BDMP to cover the operational phase with the provisions detailed to protect lek 2 during the construction phase to be extended within 750 m of lek 2 (**Figure 9.8**) for the operational phase as following:

- Planned access to the wind farm will be restricted to after 09:00 hours in the months of April and May (it is noted that should emergency access be required, this would not be restricted);
- Appropriate signage will be installed at key locations stating no entry before 9 a.m. in April and May, dogs must be kept on leads at all times and no access is allowed off-track, as a minimum.
- A maximum speed limit of 15 mph will be enforced at all times of day on the track throughout the breeding season;
- Personnel will be required to remain within vehicles and will not be permitted on foot within this zone;
- Gates within this zone will remain open after first arrival, therefore avoiding the need for every subsequent entry to open and close the gate and the associated potential disturbance to the lek due to pedestrian activity.

9.8.11 The wind farm operational management team will oversee the implementation of the above measures.

9.8.12 In addition, to minimise risk of black grouse collisions with fencing/met mast guy lines the following will be implemented:

- Fencing related to the Proposed Development will be kept to a minimum and any fencing used will be 'marked' using suitable materials to reduce the likelihood of black grouse collisions with fences (Trout and Kortland 2012);
- Any wires/guy-lines (e.g., those associated with met masts) will also be marked with suitable bird flight diverters/line markers to reduce collision likelihood (SNH 2016d); and
- Consideration of marking the turbine towers/railings associated with the steps leading to the tower access point to increase their visibility to black grouse.

9.9 Assessment of Residual Effects

9.9.1 Following the mitigation detailed above, the residual effect for the regional (Galloway area of south-west Scotland) black grouse population as a result of construction and operational disturbance is considered to be **negligible** and therefore **not significant** in the context of the EIA Regulations.

9.9.2 Operational effects for black grouse relating to collision risk and turbine lighting were predicted to be **negligible** and therefore **not significant** in the context of the EIA Regulations. Consequently, mitigation to reduce the predicted effects to be not significant was not required, however as best practice to minimise the risk of collision for black grouse with turbine towers themselves/other structures such as rails associated with steps leading into the turbines and fencing constructed for the Proposed Development, mitigation to make these structures more visible to black grouse has been proposed.

9.10 Biodiversity Enhancement

9.10.1 Biodiversity enhancement and habitat management options have been considered jointly with **Chapter 8: Ecology** and the proposed measures are detailed in **Technical Appendix 8.6: Outline Biodiversity Enhancement and Management Plan (OBEMP)** and shown on **Figure 8.16**. The main management measures of the OBEMP that will provide enhancement of the mosaic of habitats required by black grouse are:

- Aim 1: Restore and enhance peatland habitat and improve bog and wet heath condition (Units A and B).
- Aim 2: Restore acid grassland habitats (Units B and C).
- Aim 3: Create and expand native broadleaf woodland cover (Units D and E).

9.11 Assessment of Cumulative Effects

9.11.1 This section presents information about the potential cumulative effects of the Proposed Development combined with other operational, consented or proposed wind farm projects that are located within the appropriate spatial context on the basis of the species considered.

9.11.2 NatureScot (SNH 2018b) has provided guidance on assessing the cumulative effects on birds. This assessment follows the principles set out in that guidance.

9.11.3 Cumulative effects may include cumulative disturbance-displacement, collision mortality, habitat loss or barrier effects. Some cumulative impacts, such as collision risk, may be summed quantitatively, but according to NatureScot "*In practice, however, some effects such as disturbance or barrier effects may need considerable additional research work to assess impacts quantitatively. A more qualitative process may have to be applied until quantitative information becomes available for developments in the area, e.g. from post-construction monitoring or research*" (SNH 2018b).

9.11.4 The main projects likely to cause similar effects to those associated with the Proposed Development are other operational wind farm developments, or those under construction, consented, or in the planning process within NHZ 19.

9.11.5 Wind farm projects at scoping stage have been scoped out of the cumulative assessment because either they do not have sufficient information on potential effects to be included; because the baseline survey period is ongoing; or because results have not been published. Projects that have been refused (and no longer capable of appeal) or withdrawn have also been scoped out of the cumulative assessment.

9.11.6 Small wind farm projects with three or fewer turbines have also been scoped out from the cumulative assessment as often these projects are not subject to the same level of detail of ornithological assessment, and so there are no directly comparable data. Because of the small scale of such projects, effects are likely to be negligible on the IOFs assessed here. No other renewable or non-renewable projects within NHZ 19 were identified that could have a cumulative effect on the IOFs.

9.11.7 Based on the conclusions of the assessment presented in **Section 9.7**, and the committed mitigation outlined in **Section 9.8**, the following have been scoped out of the cumulative assessment:

- Cumulative collision effects for all black grouse due to no predicted collision risk;
- Cumulative construction effects for black grouse – negligible effects considering the proposed mitigation; and
- Cumulative operation effects for black grouse – negligible effects considering the proposed mitigation.

9.12 Summary

9.12.1 **Table 9.11** provides a summary of the potentially significant effects detailed in this chapter, along with a summary of proposed mitigation and the consequent likely residual effects.

Table 9.11: Summary of Residual Effects

Feature	Potential Effect	Mitigation	Means of Implementation	Residual Effect
Construction phase				
Black grouse	Lekking or foraging black grouse displaced by construction.	Specific targeted pre-construction surveys for black grouse to identify up to date lek areas within 750 m of construction activity immediately prior to construction commencing. Extension of the BDMP to include protection of lek sites and specific construction control measures to minimise lek disturbance for any leks within 750 m of the Proposed Development.	BDMP and ECoW	Not significant
Operational phase – displacement				
Black grouse	Lekking or foraging black grouse displaced during the operation of the Proposed Development (either by the infrastructure itself or by maintenance /recreational disturbance).	Extension of the BDMP to the operational phase with specific mitigation detailed to ensure black grouse using lek 2 along the access track are protected/disturbance to this lek by operational access to the wind farm is avoided.	Operational phase BDMP	Not significant
Operational phase – collision risk				
Black grouse	Birds flying within the Site may be subject to a collision risk with wind turbines/other infrastructure.	Marking of met mast guy lines and any deer fencing to minimise collisions.	N/A	Not significant
Operational phase - lighting				
Black grouse	Artificial lighting associated with the Proposed Development may negatively affect birds	No mitigation required.	N/A	Not significant

Feature	Potential Effect	Mitigation	Means of Implementation	Residual Effect
	using/commuting through the Site.			

9.13 References

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

https://digitalpublications.parliament.scot/Committees/Report/ECCLR/2019/3/7/The-Conservation--Natural-Habitats---c.---EU-Exit---Scotland---Amendment--Regulations-2019#The-Conservation--Natural-Habitats---c.---EU-Exit---Scotland---Amendment--Regulations-2019

Scottish Government (1994) The Conservation (Natural Habitats, &c.) Regulations 1994. Available at: https://www.legislation.gov.uk/uksi/1994/2716/contents (accessed June 2024)

Conservation of Wild Birds ('Birds Directive'). Directive 2009/147/EC of the European Parliament and of the Council. Available at: https://www.legislation.gov.uk/eudr/2009/147/contents (accessed July 2024)

Fielding, A.H. and Haworth, P.F. 2014. Golden eagles in the south of Scotland: an overview. Scottish Natural Heritage Commissioned Report No. 626.

Fielding, A.H.; Anderson, D.; Barlow, C.; Benn, S.; Reid, R.; Tingay, R.;Weston, E.D.; Whitfield, D.P. Golden Eagle Populations, Movements, and Landscape Barriers: Insights fromScotland. Diversity 2024, 16, 195. https://doi.org/10.3390/d16040195 (accessed July 2024)

Forrester, R.W., Andrews, I.J., McInerny, C.J., Murray, R.D., McGowan, R.Y., Zonfrillo, B., Betts, M.W., Jardine, D.C. & Grundy, D.S. (eds) 2012. The Digital Birds of Scotland. The Scottish Ornithologists' Club, Aberlady.

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

Goodship, N.M. and Furness, R.W. (MacArthur Green) Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species. NatureScot Research Report 1283.

Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (version 1.2). Chartered Institute of Ecology and Environmental Management, Winchester: Chartered Institute of Ecology and Environmental Management (CIEEM): September 2018, updated April 2022.

Mitchell, C. (2012). Mapping the distribution of feeding Pink-footed and Iceland Greylag Geese in Scotland. Wildfowl & Wetlands Trust / Scottish Natural Heritage Report, Slimbridge.

National Planning Framework 4 https://www.gov.scot/publications/national-planning-framework-4/documents/ (accessed July 2024)

Natural Heritage: Policy Advice Note 60 https://www.gov.scot/publications/pan-60-natural-heritage (accessed July 2024)

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

NatureScot (2020b). The Effect of Aviation Obstruction Lighting on Birds at Wind Turbines, Communication Towers and Other Structures. NatureScot Information Note.

NatureScot SiteLink website https://sitelink.nature.scot/home (accessed July 2024)

Nevis (February 2016). 2015 Habitat Management Plan Implementation.

Nevis (June 2015). 2014 Habitat Management Plan Implementation.

Pearce-Higgins, J.W. (2021). Climate Change and the UK's Birds. British Trust for Ornithology Report, Thetford, Norfolk.

Scottish Biodiversity List https://www.nature.scot/scotlands-biodiversity/scottish-biodiversity-strategy-and-cop15/scottish-biodiversity-list (accessed July 2024)

Scottish Government (1981). Wildlife and Countryside Act 1981. Available at: https://www.legislation.gov.uk/ukpga/1981/69 (accessed July 2024)

Scottish Government (1992). Council Directive 92/43/EEC. Available at: https://www.legislation.gov.uk/eudr/1992/43/contents (accessed July 2024)

Scottish Government (1992). Council Directive 92/43/EEC. Available at: https://www.legislation.gov.uk/eudr/1992/43/contents (accessed July 2024)

Scottish Government (1994). The Conservation (Natural Habitats, &c.) Regulations 1994. Available at: https://www.legislation.gov.uk/uksi/1994/2716/contents (accessed July 2024)

Scottish Government (2004). Nature Conservation (Scotland) Act 2004. Available at: https://www.legislation.gov.uk/asp/2004/6/contents (accessed July 2024)

Scottish Government (2014). Directive 2014/52/EU of the European Parliament and of the Council. Available at: https://www.legislation.gov.uk/eudr/2014/52 (accessed July 2024)

Scottish Government (2017). Planning Advice Note 1/2013 – Environmental Impact Assessment, Revision 1.0. Scottish Government, Edinburgh.

Scottish Government (2017). The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017. Available at: https://www.legislation.gov.uk/ssi/2017/101/contents (accessed July 2024)

Scottish Government (2023). Tackling the Nature Emergency – Scottish biodiversity strategy to 2045. The Scottish Government, Edinburgh. https://www.gov.scot/publications/scottish-biodiversity-strategy-2045-tackling-nature-emergency-scotland-2/ (accessed July 2024)

Scottish Natural Heritage (2000). Windfarms and birds: calculating a theoretical collision risk assuming no avoidance action.

Scottish Natural Heritage (2002). Natural Heritage Zones: A National Assessment of Scotland's Landscapes. Scottish Natural Heritage.

Scottish Natural Heritage (2014). Assessing impacts to pink-footed and greylag geese from small-scale wind farms in Scotland.

Scottish Natural Heritage (2016). Assessment and mitigation of impacts of power lines and guyed meteorological masts on birds.

Scottish Natural Heritage (2016a). Environmental Statements and Annexes of Environmentally Sensitive Bird Information; Guidance for Developers, Consultants and Consultees. Version 2.

Scottish Natural Heritage (2016b). Assessing connectivity with Special Protection Areas (SPAs). Version 3.

Scottish Natural Heritage (2016c). Dealing with construction and birds.

Scottish Natural Heritage (2017). Recommended Bird Survey Methods to inform impact assessment of Onshore Windfarms

Scottish Natural Heritage (2018a). Assessing significance of impacts from onshore windfarms on birds out with designated areas. Version 2.

Scottish Natural Heritage (2018b). Environmental Impact Assessment Handbook – Version 5: Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment process in Scotland.

Scottish Natural Heritage (2018c). Avoidance Rates for the onshore SNH Wind Farm Collision Model. Version 2.

Scottish Natural Heritage (2018d). Assessing the cumulative impacts of onshore wind farms on birds.

SERAD (Scottish Executive Rural Affairs Department) (2000). Habitats and Birds Directives, Nature Conservation; Implementation in Scotland of EC Directives on the Conservation of Natural Habitats and of Wild Flora and Fauna and the Conservation of Wild Birds ("the Habitats and Birds Directives"). Revised Guidance Updating Scottish Office Circular No 6/1995.

Shawyer, C. R. 2011. Barn owl Tyto alba Survey Methodology and Techniques for use in Ecological Assessment: Developing Best Practice in Survey and Reporting. IEEM, Winchester.

Sim, I.M.W., Eaton, M.A., Setchfield, R.P., Warren, P.K. and Lindley, P. (2008). Abundance of male black grouse Tetrao tetrix in Britain in 2005, and change since 1995-96. Bird Study 55: 304-313.

Stanbury, A., Eaton, M., Aebischer, N., Balmer, D., Brown, A., Douse, A., Lindley, P., McCulloch, N., Noble, D., and Win, I. (2021). Birds of Conservation Concern 5: The population status of birds in the UK, Channel Islands and Isle of Man and second ICUN Red List assessment of extinction risk for Great Britain. British Birds 114: 723-747.

Trout, R. and Kortland, K. (2012). Fence marking to reduce grouse collisions. Forestry Commission Technical Note.

Warren, P., Atterton, F., Baines, D., Viel, M., Deal, Z., Richardson, M., & Newborn, D. (2015). Numbers and distribution of Black Grouse Tetrao tetrix males in England: results from the fourth survey in 2014. Bird Study, 62(2), 202–207

Warren, P., (2016). Black grouse conservation in southern Scotland – Phase 2 Development of a regional strategic conservation plan. Scottish Borders Council, Forestry Commission Scotland, RSPB Scotland, Scottish Natural Heritage and the Lammermuirs Moorland Group Commissioned Report. https://www.gwct.org.uk/media/641731/black-grouse-in-southern-Scotland.pdf (accessed July 2024)

Warren, P., Atterton, F., Anderle, M. and Baines, D. (2017) Expanding the range of black grouse Tetrao tetrix in northern England through translocating wild males. Wildlife Biology, 2017.

Wilson, M. W., Austin, G. E., Gillings S. and Wernham, C. V. (2015). Natural Heritage Zone Bird Population Estimates. SWBSG Commissioned report number SWBSG_1504. pp72. Available from: www.swbsg.org

Zeiler H., V. Grünschachner-Berger (2009). Impact of wind power plants on black grouse, Lyrurus tetrix in Alpine Regions. Folia Zool. 58(2): 173–182

Zwart, M. C., P. Robson, S. Rankin, M. J. Whittingham, and P. J. K. McGowan (2015). Using environmental impact assessment and post-construction monitoring data to inform wind energy developments. Ecosphere 6(2):26. http://dx.doi.org/10.1890/ES14-00331.1

10 Geology, Hydrology & Peat

10.1 Executive Summary

10.1.1 This chapter considers the potential impacts of Blair Hill Wind Farm (the Proposed Development) on geology, hydrology and hydrogeology receptors within the study areas shown in Fig10.1.

10.1.2 The Site is located within the River Cree, Penkiln Burn and Palnure Burn surface water catchments. The watercourses and their on-site tributaries have been classified in accordance with the EU Water Framework Directive (WFD) to be of 'Good' status as of 2022.

10.1.3 The bedrock beneath the Site is largely sedimentary rocks of the Shinnel Formation. The Portpatrick Formation underlies the north of the Site, while the "Gala Unit 1" of the Gala Group underlie the access track. The Moffat Shale Group is present in the north and along the access track. Basaltic pillow lava of the Crawford Group is mapped at the northern Site boundary, and small intrusions of the Siluro-Devonian Calc-Alkaline Dyke Suite is present across the Site. East-west trending faults sit on the geological boundaries towards the north of the site, and on the southern access track. No significant faulting is mapped at 1:50 k scale within the remainder of the Site.

10.1.4 Superficial deposits comprise largely Devensian Till in the centre, north-west and south-east of the Site with areas of localised Peat. Alluvial deposits are mapped along larger watercourses on-site with a small area of Glaciofluvial deposits mapped to the west of Glenmalloch Hill. The peat is predominately identified as Class 3 and Class 5 peatland with less extensive areas of Class 1 and 2 (priority peatland) according to the Scottish Natural Heritage (SNH) (now NatureScot) Carbon and Peatlands Map 2016.

10.1.5 Extensive peat probing surveys found deep peat deposits locally across the site, which have been largely avoided through design iterations. The Stage 2 peat probing phase, which targeted proposed infrastructure locations, found 82% of probes at the sites of proposed turbines, hardstands, tracks and other infrastructure recorded probe depths of 0.01 m to 0.50 m thick, with the soils therefore defined as peaty/organic soils rather than peat. Also, a further 11% of probes recorded peat depths of between 0.51 m to 1.00 m, which are not classified as deep peat.

10.1.6 A Peat Landslide and Hazard Risk Assessment (PLHRA) has identified that there is a negligible to low likelihood of a peat landslide at the proposed turbine locations and associated infrastructure, with the Proposed Development avoiding areas of increased likelihood.

10.1.7 Potential construction and operational effects include changes to surface water and groundwater flow and quality, excavation of peat, peat slide risk and effects to designated sites.

10.1.8 The mitigation measures set out in this chapter will be included within a Construction Environmental Management Plan (CEMP) prior to the commencement of construction activities. An outline CEMP is provided as Technical **Appendix 17.1** and PMP in Technical **Appendix 10.4.** These mitigation measures are considered to be robust and implementable and will reduce the potential impacts on peat resources, watercourses and groundwater. The significance of residual effects on geology, peat, hydrology and hydrogeology receptors following the implementation of these mitigation measures, including additional water quality monitoring, is considered to be negligible to minor and therefore not significant.

10.2 Introduction

10.2.1 This chapter assesses the potential impacts of the Proposed Development, as described in **Chapter 2**, on hydrological, hydrogeological, and geological resources, including peat. This includes potential impacts on surface watercourses, groundwater, water abstractions, designated receptors, and flood risk within the local area.

10.2.2 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 effects, including direct, indirect, and cumulative effects;
- describe the mitigation measures proposed to address the likely significant effects; and
- assess the residual effects remaining following the implementation of mitigation measures.

10.2.3 All staff contributing to this chapter have undergraduate and/or postgraduate degrees in relevant subjects, have extensive professional geological and hydrological impact assessment experience, and hold professional membership of the Geological Society or Chartered Institute of Water and Environmental Management.

10.2.4 This chapter is supported by the following figures (**Volume 2a**) and Technical Appendices (**Volume 3**):

- Figure 10.1: Site and Study Area;
- Figure 10.2: Hydrological Features;
- Figure 10.3: Superficial Geology;
- Figure 10.4: Peat Classification;
- Figure 10.5: Peat Depth;
- Figure 10.6: Bedrock Geology;
- Figure 10.7: Hydrogeological Features;
- Figure 10.8: Watercourse Crossings;
- Figure 10.9: Private Water Supplies;
- Figure 10.10: Groundwater Dependent Terrestrial Ecosystems (GWDTE);
- Technical Appendix 10.1: Watercourse Crossing Schedule (WCS);
- Technical Appendix 10.2: Private Water Supply Risk Assessment (PWSRA);
- Technical Appendix 10.3: Groundwater Dependent Terrestrial Ecosystems Risk Assessment (GWDTERA);
- Technical Appendix 10.4: Peat Management Plan (PMP); and
- Technical Appendix 10.5: Peat Landslide Hazard Risk Assessment (PLHRA).

10.2.5 In addition, an outline Borrow Pit Management Plan (oBPMP) has been prepared by the Applicant and is attached as Technical Appendix 10.6.

10.3 Legislation, Policy & Guidance

10.3.1 Relevant legislation and guidance documents have been reviewed and taken into account as part of this assessment.

Legislation

10.3.2 The European Union (EU) Water Framework Directive (WFD) has been implemented in Scotland through the Water Environment and Water Services (Scotland) Act 2003. The act introduced a regulatory system with the Scottish Environment Protection Agency (SEPA) as the lead authority, to establish a framework for co-ordinated controls on activities with

the potential to negatively impact the water environment. Water monitoring and classification systems are maintained by SEPA to provide the data to support the aim of the WFD.

10.3.3 The European Parliament and of the Council (EC) Groundwater Directive (GWD) is implemented in Scotland through the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR) (as amended).

10.3.4 Other relevant legislation includes:

- The Water Environment (Controlled Activities) (Scotland) Amended 2021;
- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017;
- The Water Resources (Scotland) Act 2013;
- The Private Water Supplies (Scotland) Regulations 2006; amended 2015
- The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017;
- Flood Risk Management (Scotland) Act 2009;
- The Conservation (Natural Habitats, & c.) Amendment (Scotland) Regulations 2019;
- Environmental Protection Act 1990;
- Environment Act 1995; (EU Exit) (Scotland) (Amendment etc.) Regulations 2019
- The Contaminated Land (Scotland) Regulations 2000 (as amended 2005);
- The Conservation (Natural Habitats, & c.) Regulations 1994, (as amended in Scotland 2019).

Planning Policy

10.3.5 Local strategies are considered within Dumfries and Galloway Local Development Plan (DGLDP2), which sets out policies on development and land use within Dumfries and Galloway.

10.3.6 This section also considers the relevant aspects of the National Planning Framework 4 (NPF4), DGLDP2, Planning Advice Notes (PAN) and other relevant guidance. Planning policy, however, is considered in detail in **Chapter 5** of this EIA Report. Of relevance to the geology, hydrology and peat assessment presented within this chapter are the following policies and advice notes:

- NPF4: Policy 5 Soils;
- NPF4: Policy 22 Flood Risk;
- DGLDP2 Policy ED13: Minerals;
- DGLDP2 Policy NE4: Sites of International Importance for Biodiversity;
- DGLDP2 Policy NE6: Sites of National Importance for Biodiversity and Geodiversity;
- DGLDP2 Policy NE11: Supporting the Water Environment;
- DGLDP2 Policy NE12: Protection of Water Margins;
- DGLDP2 Policy NE13: Agricultural Soil;
- DGLDP2 Policy NE14: Carbon Rich Soil;
- DGLDP2 Policy NE15: Protection and Restoration of Peat Deposits as Carbon Sinks;
- DGLDP2 Policy IN1: Renewable Energy;
- DGLDP2 Policy IN2: Wind Energy;
- DGLDP2 Policy IN7: Flooding and Development;
- DGLDP2 Policy IN8: Surface Water Drainage and Sustainable Drainage Systems (SuDS);
- DGLDP2 Policy IN10: Contaminated and Unstable Land;
- PAN 51: Planning, Environmental Protection and Regulation (Scottish Executive, 2006);
- PAN 79: Water and Drainage (Scottish Executive, 2006); and
- Flood Risk: planning advice (Scottish Government, 2015).

Guidance

10.3.7 Guidance for Pollution Prevention (GPPs) series provide guidance on responsibilities and good practice to prevent pollution from a range of development activities. SEPA's environmental regulatory guidance applies to Scotland:

- GPP1: Understanding your environmental responsibilities – good environmental practices (2021);
- GPP2: Above ground oil storage tanks (2021);
- GPP4: Treatment and disposal of wastewater where there is no connection to the public foul sewer (2021);
- GPP5: Works and maintenance in or near water (2018);
- GPP6: Working at construction and demolition Sites (2023)
- GPP8: Safe storage and disposal of used oils (2021);
- GPP13: Vehicle washing and cleaning (2021);
- GPP21: Pollution incident response planning (2021); and
- GPP22: Dealing with spills (2018).

10.3.8 The following relevant guidance from SEPA has been considered as part of the assessment of geology, peat, hydrology and hydrogeology:

- Land Use Planning System Guidance Note 4 (LUPS GU4) Planning guidance on on-shore windfarm developments (SEPA, 2017);
- Land Use Planning System Guidance Note 31 (LUPS-GU31) Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems (SEPA, 2017);
- Supporting Guidance (WAT-SG-75) Sector Specific Guidance: Water Run-Off from Construction Sites (SEPA, 2021);
- Technical Flood Risk Guidance for Stakeholders, Version 13 (SEPA, 2022);
- Developments on Peat and Off-Site Uses of Waste Peat (SEPA, 2017);
- Guidance on Developments on Peatland (Scottish Government, SNH and SEPA, 2017);
- Developments on Peatland: Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste (Scottish Renewables and SEPA, 2012); and
- Groundwater Protection Policy for Scotland, Version 3 (SEPA, 2009).

10.3.9 The following relevant guidance has also been considered:

- CIRIA C532: 'Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors' (CIRIA, 2001);
- CIRIA C811: Environmental good practice on Site guide (fifth edition) (CIRIA 2021)
- Good practice during wind farm construction, 4th edition (NatureScot, 2019);
- Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments (ECU Scottish Government, 2017);
- The Scottish Soil Framework (Scottish Government, 2009);
- Advising on Peatland, Carbon-Rich Soils and Priority Peatland Habitats in Development Management (NatureScot, 2023); and
- BS 5930:2015+A1:2020 Code of practice for ground investigations (British Standards Institute, 2020).

10.4 Consultation

10.4.1 Table 10.1 provides details of consultations undertaken with regulatory bodies, together with action undertaken by the Applicant in response to consultation feedback.

Table 10.1: Consultation Responses

Consultee	Consultation Response	Applicant Action
SEPA (22/08/2023) Scoping Opinion	There are no details regarding the peat probing planned to inform the development design. This should follow the requirements of Peatland Survey – Guidance on Developments on Peatland (2017). Peat condition assessment is also required to identify peatland in near natural condition and to help identify areas where peatland restoration could be carried out.	A description of the formation of peat probing is provided in **Section 10.5**. A peatland condition survey was carried out concurrently with peat depth surveys, with peat coring undertaken following the phase II survey. **Technical Appendices 10.4 PMP and 10.5 PLHRA**, outline the details of these surveys, describing degree of peat humification and overall peat condition.
	We support the scoping of impacts on peat, watercourses, GWDTE and private water supplies into the EIA as discussed in Section 9 of the Scoping Report. Please note in relation to peat, the development must avoid peatland in near natural condition and peat > 1 m depth	A map of peat depths overlain by the Proposed Development is shown in **Figure 10.5**. Design iterations and micrositing have avoided areas where depths of peat >1.0 m were identified during phase I and phase II surveys. The PMP (**Technical Appendix 10.4**) will discuss peat management and re-use strategies.
	We note from Figure 10.1 – Hydrological Features that a number of wind turbines are proposed within the 50 m watercourse buffer. We request as the development design is progressed it be modified to remove infrastructure from these areas. We also note there are a number of existing tracks across the Site and request these are reused and / or upgraded wherever possible to minimise the extent of new works on previously undisturbed ground.	A minimum buffer of 50 m from surface water features has been embedded into the design, as outlined in **Section 10.7** and shown in **Figure 10.2**. Where this buffer could not be avoided due to watercourse crossings, this is outlined in **Technical Appendix 10.1 WCS**. Design iterations and micrositing have, where possible, utilised existing infrastructure, such as tracks to minimise impact on watercourses and hydrological connectivity across the site. See also **Chapter 3** for a discussion of the design principles and environmental constraints that influenced the design evolution of the Proposed Development.
	The Site layout should be designed to minimise watercourse crossings and avoid other direct impacts on water features. The submission must include a map showing: a) All proposed temporary or permanent infrastructure overlain with all lochs and watercourses. b) A minimum buffer of 50 m around each loch or watercourse. If this minimum buffer cannot be achieved	**Section 10.6**, outlines the surface hydrology on the Site, detailing the main surface water features characterising the drainage and movement of water across the Site. **Figure 10.2**, shows the main watercourse features, including 50 m buffers around all watercourses. The WCS (**Technical Appendix 10.1**) outlines

Consultee	Consultation Response	Applicant Action
	each breach must be numbered on a plan with an associated photograph of the location, dimensions of the loch or watercourse and drawings of what is proposed in terms of engineering works. Measures should be put in place to protect any downstream sensitive receptors. Refer to our Flood Risk Standing Advice for advice on flood risk. Crossings must be designed to accommodate the 0.5% Annual Exceedance Probability flows (with an appropriate allowance for climate change), or information provided to justify smaller structures. If it is considered the development could result in an increased risk of flooding to a nearby receptor then a Flood Risk Assessment (FRA) must be submitted.	proposed water crossing types which include 37 existing and five new crossings, locations and photographs where 50 m buffer could not be maintained. Watercourse crossings have been designed to maintain hydrological connectivity following relevant guidance. At detailed design stages these crossing types will be confirmed and designed to accommodate 0.5% AEP flows, the limited flood risk found on-site is detailed in **Section 10.6.**
	Where proposals are on peatland or carbon rich soils the following should be submitted to address the requirements of NPF4 Policy 5: a) layout plans showing all permanent and temporary infrastructure, with extent of excavation required, which clearly demonstrates how the mitigation hierarchy outlined in NPF4 has been applied. These plans should be overlaid on: i. peat depth survey (showing peat probe locations, colour coded using distinct colours for each depth category and annotated at a usable scale) ii. peat depth survey showing interpolated peat depths iii. peatland condition mapping iv. National Vegetation Classification survey (NVC) habitat mapping. b) an outline Peat Management Plan (PMP). c) an outline Habitat Management Plan (HMP)	Detailed peat survey work has been undertaken in line with relevant guidance and detailed in **Section 10.5**. The interpolation of results of the peat surveys are shown in **Figure 10.5** with all permanent and temporary infrastructure. The peat depths together with assessment of impacts on peat soils and an outline PMP detailed are in **Technical Appendix 10.4.**
	Groundwater Dependent Terrestrial Ecosystems (GWDTE) are protected under the Water Framework Directive. Excavations and other construction works can disrupt groundwater flow and impact on GWDTE and existing groundwater abstractions. The layout and design of the development must avoid impacts on such areas. A National Vegetation	A detailed National Vegetation Classification survey was completed as outlined in **Chapter 8** and **Technical Appendix 8.1**. Following this, all potential GWDTE identified were assessed using a combination of desk-based assessment and hydrological surveys to determine groundwater dependency and

Consultee	Consultation Response	Applicant Action
	Classification survey which includes the following information should be submitted: a) A map demonstrating all GWDTE and existing groundwater abstractions are outwith a 100 m radius of all excavations shallower than 1 m and outwith 250 m of all excavations deeper than 1 m and proposed groundwater abstractions. The survey needs to extend beyond the Site boundary where the distances require it. b) If the minimum buffers cannot be achieved, a detailed Site specific qualitative and/or quantitative risk assessment will be required. Please refer to Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems for further advice and the minimum information we require to be submitted.	potential impact. **Technical Appendix 10.3** and **Figure 10.10** shows all GWDTEs scoped into the assessment overlain with the Proposed Development and relevant excavation buffers.
	If forestry is present on the site, we prefer a Site layout which avoids large scale felling as this can result in large amounts of waste material and a peak in release of nutrients which can affect local water quality.	**Section 10.7** details an assessment of impacts on water quality. **Chapter 3** discusses the design evolution of the Proposed Development. Due to a combination of environmental constraints, it was not possible to site all of the proposed wind turbines outside of forested areas. Wherever possible, however, existing access tracks were incorporated into the design of the Proposed Development. Refer to **Chapter 14**: Forestry for an indication of proposed infrastructure felling and management felling to be undertaken to accommodate the construction and operation of the wind turbines and ancillary infrastructure and to enable abnormal indivisible loads (AILs) to gain access to the main Site via the existing forestry track during construction.
	The following information should also be submitted for each borrow pit: a) A map showing the location, size, depths and dimensions.	The Outline Borrow Pit Management Plan is included as **Technical Appendix 10.6** of this EIA Report. The report will include an overview of aggregate

Consultee	Consultation Response	Applicant Action
	b) A map showing any stocks of rock, overburden, soils and temporary and permanent infrastructure including tracks, buildings, oil storage, pipes and drainage, overlain with all lochs and watercourses to a distance of 250 m. You need to demonstrate that a site-specific proportionate buffer can be achieved. On this map, a site-specific buffer must be drawn around each loch or watercourse proportionate to the depth of excavations and at least 10 m from tracks. c) Sections and plans detailing how restoration will be progressed including the phasing, profiles, depths and types of material to be used.	requirements, including an overview of borrow pit design, how this will reduce potential impacts of receptors such as surface and ground water, and detail restoration measures.
	A schedule of mitigation supported by the above site specific maps and plans must be submitted. These must include reference to best practice pollution prevention and construction techniques (for example, limiting the maximum area to be stripped of soils at any one time) and regulatory requirements. They should set out the daily responsibilities of Ecological Clerk of Works, how site inspections will be recorded and acted upon and proposals for a planning monitoring enforcement officer. Please refer to the Guidance for Pollution Prevention (GPPs) and our water run-off from construction sites webpage for more information.	As part of this EIA Report, an outline CEMP has been included (**Technical Appendix 17.1**) which outlines all best practice guidance and mitigation measures that will be employed on-site to protect sensitive receptors. This has included reference to GPPs. The OCEMP also summarises a proposed programme of water quality monitoring, which will be committed to within a Water Quality Monitoring Plan (WQMP).
Scottish Water 22/08/2023 Scoping Opinion	A review of our records indicates that there are no Scottish Water drinking water catchments or water abstraction sources, which are designated as Drinking Water Protected Areas under the Water Framework Directive, in the area that may be affected by the proposed activity.	A review of desk-based resources was undertaken to identify any Drinking Water Protected Areas (DWPAs). Following this additional consultation was undertaken with Scottish Water, outlined in **Section 10.5**, to confirm that the Site is not located within a DWPA.
NatureScot 3/10/2023 Scoping Opinion	In relation to peatland, we note that infrastructure is currently not proposed to be located on the Class 1 peatland within the site, therefore direct impacts are avoided. The design of the wind farm should ensure that there are no indirect hydrological impacts on Class 1 peatland from the construction of the development.	Design iterations and micrositing have avoided areas where nationally important peatlands are indicated. Any potential impacts on peatland from indirect hydrological impacts are outlined in **Section 10.8**. As discussed within **Technical Appendix 17.1** (OCEMP), best practice measures will be utilised to maintain hydrological

Consultee	Consultation Response	Applicant Action
		connectivity in peatlands. Management of peat during construction is outlined within Technical **Appendix 10.5** PMP.
Cree Valley Community Council 3/10/2023 Scoping Opinion	No designated site within 12 km of the Development should be scoped out of the EIAR. The Glenvernoch Wind Farm which is in the pre application stage must be included in the Cumulative Assessment. The Blair Hill EIA Scoping Report erroneously states that the Killgallioch Extension is 18.9 km west of the site. It is 11 km west of the site.	As detailed in the chapter assessment methodology in **Section 10.5**, the study area for cumulative developments from hydrological and hydrogeological effects is considered to be within 10 km. This is on the basis of the exercise of professional judgement in the consideration of effects from attenuation and dilution in reducing cumulative effects outwith this study area. Assessment of cumulative developments is discussed in **Section 10.11.** Kilgallioch Wind Farm Extension is located 16.7 km west of the site, and is therefore outwith the study area for cumulative developments.

10.5 Assessment Methodology and Significance Criteria

Consultation

10.5.1 Following receipt of scoping responses, consultation was undertaken with Dumfries and Galloway Council (DGC) to identify potential PWS within a 2 km radius of the site. DGC responded to the Freedom of Information (FOI) request on 14 September 2023. DGC confirmed there to be 12 PWS located within a 2 km radius of the site. Consultation by letter and then a follow up site visit was undertaken with residents with registered PWS. Further detail is given in **Section 10.6** and **Technical Appendix 10.2.**

10.5.2 An FOI request (F0197055) was issued to SEPA 17 April 2024, to request details of CAR licences within 2 km of the site. A response was received 15 May 2024, which included 24 registrations or licences (bridging culvert, bridge, existing sewage treatment system, and private sewage, pipeline/cable crossing) within 2 km. A Water Use Licence was recorded at the River Cree Hatchery. Further details regarding CAR licenses can be found in **Section 10.6**.

10.5.3 A registration (CAR/R/1009409) was also recorded by SEPA for the abstraction of groundwater from a borehole at Boreland Farm at NX 3925 6755. This was located outwith the 2 km study area, so has not been assessed further.

10.5.4 Following the scoping response from Scottish Water, further consultation was undertaken regarding the potential Drinking Water Protected Area (DWPA) identified in the Cordorcan Burn which is within the Solway Tweed River Basin District. A response was received on 21 February 2024 confirming that 'this Scoping Request is out with catchment'.

10.5.5 Regarding the presence of assets that may be affected, a utility report (Utility Site Search, ref DG87BW) of the area was obtained to confirm the location of assets located within the site. This concluded that there would be no assets impacted by the Proposed Development.

Study Area

10.5.6 The study area for assessment of hydrological and hydrogeological receptors, including designated sites with hydrological reasons for designation, incorporates the area within the Site and up to 10 km from the Site boundary. Potential effects to PWS are considered within 2 km from the site. The study area for assessment of geological receptors is the Site itself.

10.5.7 These study areas are based on professional judgement and experience assessing similar developments, with due consideration of relevant guidance on hydrological and geological assessment. It is considered that in excess of these distances, due to attenuation and dilution, the Proposed Development is unlikely to have an effect.

Desk Study

10.5.8 Baseline conditions have been established primarily through desk-based assessment which has included:

- Consultation with relevant bodies and collation of data (refer to **Section 10.4**).
- Identification of surface watercourses and waterbodies, including WFD classifications.
- Identification of hydrogeological receptors, including aquifers.
- Identification of underlying bedrock and superficial geology, including assessment of peat depth contours.
- Assessment of topography, land use and climate conditions to inform drainage patterns.
- Identification of any PWS and DWPAs.
- Identification of potential GWDTEs, including review of NVC survey data; and
- Assessment of flood risk.

10.5.9 The following information sources have been reviewed to inform the desk study:

- The Ordnance Survey (OS) Mapping (1:50,000);
- British Geological Survey (BGS) GeoIndex Online Map Viewer;
- BGS Geological Survey of Scotland 4 Wigtown. 1964 Solid and Drift Map (1:63,360);
- National Soils Map of Scotland;
- The James Hutton Institute Soil Classification;
- Scottish Natural Heritage (SNH) (now NatureScot) Carbon and Peatland 2016 Map;
- NVC survey data and report (refer to **Technical Appendix 8.1**);
- SEPA Online Flood Map;
- SEPA Waste Site and Capacity Data Tool;
- Scotland's Environment Map;
- SEPA and BGS Open Report 'Scotland's aquifers and groundwater bodies';
- National River Flow Archive (NRFA); and
- Meteorological Office Rainfall Data.

Site Visit

Peat Surveys

10.5.10 A phase I peat depth survey was undertaken by a team of suitably qualified and experienced surveyors, following relevant guidance, in October and November 2023. Peat depths were measured on a 100 m grid across the site. In addition to the 100 m grid supplementary peat depth measurements were taken in locations that were being considered in early design iterations for wind turbine placement.

10.5.11 Data obtained from the peat depth surveys was used to plot the presence and distribution of peat across the Site and feed into the detailed design process. Following the design process, a 'design chill layout' (see Iteration H on **Figure 3.3**) was agreed, considered by the project team to represent the optimal wind turbine and infrastructure layout to

maximise electricity yield whilst minimising environmental effects, including effects on geology, peat, hydrology, and hydrogeology.

10.5.12 A phase II peat depth survey was undertaken in March 2024 based on the design chill layout, to target areas of proposed infrastructure. The phase II survey probed all of the 14 proposed wind turbines locations and ancillary infrastructure areas, and was carried out using the following pattern:

- Probe wind turbine centre and every 10 m to the north, east, south, and west, out to 50 m from the centre;
- Probe points every 50 m along the proposed tracks, with staggered, offset probes 25 m either side of the access track centre line, and at turning heads (allowing for coverage of any micrositing allowance); and
- Other infrastructure locations were probed to an approximate 25 m grid, with increased density where peat was identified.

10.5.13 The phase II peat survey also undertook probing at the new proposed location for the new Auchinleck Bridge (Penkiln Burn crossing). The location of this crossing had not been confirmed at the time of the phase I probing.

10.5.14 As well as taking peat depth measurements, the team recorded observations of peat condition, erosion, evidence of impacts such as drainage, cutting and fire, any evidence of substrate (e.g. outcropping rock) and other notes considered relevant to the assessment of impacts on, and potential for restoration of, peat and peatland habitat.

10.5.15 Supplementary, targeted peat condition surveys were undertaken by the project ecologists, MacArthur Green in May 2024.

10.5.16 The detailed surveying informed the final design and ensured coverage of peat depth measurements extended to the final layout. This data also informed **Technical Appendix 10.5.**

Hydrological Walkover

10.5.17 A hydrological walkover of the Site was undertaken in March 2024. Site observations included topography, habitats, ground conditions and features of watercourses and waterbodies. The walkover also allowed ground-truthing of receptors identified during the desk study and identification of any further hydrological receptors.

10.5.18 A visit to residents as part of the PWS assessment was also undertaken in March 2024, to confirm the locations and supply type.

10.5.19 Habitat survey work, including mapping of NVC communities, was undertaken by MacArthur Green in October 2022, July, October and November 2023, and May 2024. This included the identification of habitats which had the potential to be GWDTE. Further details of this are provided in **Chapter 8** and **Technical Appendix 8.1**. Review of the GWDTEs was undertaken on-site as part of the hydrological walkover to determine whether any of the potential GWDTEs are likely to be dependent on groundwater.

Assessment of Potential Effect Significance

Sensitivity of Receptors

10.5.20 The sensitivity characteristics of geological, peat, hydrological and hydrogeological resources have been guided by the matrix presented in **Table 10.2** below. These criteria for sensitivity have been developed based on a hierarchy of factors, following experience and professional judgement and in line with appropriate guidance, legislation and best practice.

Table 10.2: Sensitivity of Receptors Criteria

Sensitivity	Sensitivity Criteria
High	• Highly sensitive land use including raised or blanket bog, carbon-rich or peat soils (Class 1 or 2 priority peatland). • Highly permeable superficial deposits, allowing storage and transport of contaminants. • Designated receptor present protected under national or international legislation, including SSSIs, SACs and SPA. • A waterbody with a SEPA WFD Overall or Ecological classification of 'High' or 'Good'. • An aquifer, classified by BGS as a 'highly productive aquifer' or 'moderately productive aquifer', or that is of regional importance. • Extensive areas of 'High Likelihood' or 'Moderate Likelihood' of river, surface water or coastal flooding which acts as an active floodplain. • Public Water Supplies or Private Water Supplies that abstract from a hydrological receptor underlying or connected to the Site. • Potential GWDTE identified through NVC survey classified by SEPA to be 'highly groundwater dependent' with minimal degradation, that are found to have site-specific groundwater dependency and are not ombrotrophic.
Medium	• Moderately sensitive land use including carbon-rich or peat soils (Class 3 or 4 priority peatland). • Moderately permeable superficial deposits, allowing limited storage and transport of contaminants. • Designated Receptors of regional importance, including Regionally Important Geological and Geomorphological Sites (RIGS), or receptors of local importance • A waterbody with a SEPA WFD Overall or Ecological classification of 'Moderate'. • An aquifer, classified by BGS as a 'low productivity aquifer' that does not support abstractions. • Isolated areas of 'High Likelihood' or 'Moderate Likelihood' of surface water flooding or river or coastal flooding that is confined to waterbody extents and is not an active floodplain. • Potential GWDTE identified through NVC survey classified by SEPA to be 'highly groundwater dependent' with extensive degradation, that are found to have Site specific groundwater dependency and are not ombrotrophic. • Potential GWDTE identified through NVC survey classified by SEPA to be 'moderately groundwater dependent', that are found to have Site specific groundwater dependency and are not ombrotrophic.
Low	• Low sensitive land use that do not include carbon-rich or peat soils (Class 5 or 0). • Geological or hydrological features not currently protected and not considered worthy of protection. • Low permeability superficial deposits likely to inhibit the transport of contaminants. • A waterbody with a SEPA WFD Overall or Ecological classification of 'Poor' or 'Bad', or no classification.

Sensitivity	Sensitivity Criteria
	• A non-aquifer, classified by BGS as a 'Rocks with essentially no groundwater'. • Areas of 'Low Likelihood' of surface water, river or coastal flooding. • Public Water Supplies or Private Water Supplies are not supported by hydrological receptor underlying or connected to the Site. • Potential GWDTE identified through NVC survey classified by SEPA to be 'highly groundwater dependent' or 'moderately groundwater dependent', that are not found to be groundwater dependent and are instead ombrotrophic.

Magnitude of Change

10.5.21 The magnitude of change criteria that apply to the baseline sensitivities of the identified receptors are set out in **Table 10.3**. Similar to criteria for sensitivity, these have been developed based professional judgement and appropriate guidance, legislation and best practice.

Table 10.3: Magnitude of Change Criteria

Magnitude of Change	Magnitude of Change Criteria
High	Total loss of, or alteration to key features of the baseline resource such that post development characteristics or quality would be fundamentally and irreversibly changed, for example, extensive excavation of peatland or watercourse realignment.
Medium	Loss of, or alteration to key features of the baseline resource such that post development characteristics or quality would be partially changed, for example, in-stream permanent bridge supports or partial excavation of peatland.
Low	Small changes to the baseline resource, which are detectable, but the underlying characteristics or quality of the baseline situation would be similar to pre-development conditions e.g., culverting of very small watercourses/drains.
Negligible	A very slight change from baseline conditions, which is barely distinguishable, and approximates to the 'no change' situation, for example short term compaction from machinery movements.

10.5.22 Using these criteria, potential effects resulting from the Proposed Development including embedded and committed mitigation, have been assessed. Where a finding of significance is made, details of additional mitigation measures included in management plans are outlined in **Section 10.9**.

Table 10.4: Significance of Effect

Magnitude of Impact	Sensitivity			
	High	Medium	Low	Negligible
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Negligible	Negligible	Negligible

10.5.23 The guideline criteria for the categories of significance of effect are provided in **Table 10.5** below.

Table 10.5 Significance of Effect Criteria Guidance

Significance	Definition	Guidance Criteria
Major	A fundamental change to the environment	Changes in water quality or quantity affecting widespread catchments or groundwater reserves of strategic significance, or changes resulting in substantial loss of conservation value to geological or aquatic habitats and designations.
Moderate	A large, but non-fundamental change to the environment	Changes in water quality or quantity affecting part of a catchment or groundwaters of moderate vulnerability, or changes resulting in loss of conservation values to geological or aquatic habitats or designated areas.
Minor	A small but detectable change to the environment	Localised changes resulting in minor and/or reversible effects on soils, surface and groundwater quality or habitats.
Negligible	No detectable change to the environment	Essentially no effects on geological resources, drainage patterns, surface and groundwater quality or aquatic habitats.

10.5.24 In the above classification, fundamental changes are those which are permanent, either adverse or beneficial, and would result in widespread change to the baseline environment. For the purposes of this assessment, those effects identified as being major or moderate have been evaluated as significant environmental effects in terms of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017.

10.5.25 These matrices have been used to guide the assessment, though they have been applied using professional judgement, since the evaluation of effects will always be subject to location-specific characteristics which must be considered.

Embedded Mitigation

10.5.26 For the purposes of this Geology, Hydrology and Peat Assessment, embedded mitigation is considered to include both primary mitigation (mitigation achieved through implementing changes during the design of the Proposed Development) and committed mitigation, as described below.

10.5.27 Potential effects of the Proposed Development on geology, hydrology and peat receptors have been addressed and mitigated firstly through an iterative design process. The impacts of the Proposed Development have been assessed on this basis. A summary of mitigation is provided in **Chapter 17** of this EIA Report and in the outline CEMP attached as **Appendix 17.1**.

Additional Mitigation

10.5.28 Additional mitigation measures are presented within this chapter to address significant effects. Additional mitigation has been outlined in this chapter and those to be implemented during the construction and operational phases include for mitigation and monitoring within Water Quality Monitoring Plan and Borrow Pit Restoration Plan.

Assessment of Operational Effects

10.5.29 An assessment of potential operational effects is set out in **Section 10.8**. The operational effects are considered for any operational activities which may have potential effects to receptors. Operational effects are largely considered to be at a reduced magnitude compared to construction effects, with the same assessment methodology outlined above also used to assess significance.

Assessment of Cumulative Effects

10.5.30 An assessment of potential cumulative effects is set out in **Section 10.11**.

Assessment of Residual Effect Significance

10.5.31 An assessment of any predicted significant residual effects on sensitive geological, hydrological or hydrogeological receptors is presented within this chapter **(Section 10.10)**.

Limitations to Assessment

10.5.32 Other than peat depth survey work, no water quality monitoring or intrusive investigations have been undertaken. This is not considered to represent a significant limitation to the assessment of effects, as detailed intrusive site investigation works and water quality monitoring would be undertaken prior to and during construction to inform detailed engineering design, micrositing and as part of environmental protection and control mitigation measures.

10.5.33 It has also been noted that within the Site boundary, there is high variability in watercourse locations on OS background maps. This can be clearly seen in **Figure 10.8,** with watercourse locations varying by approx. 80 m between OS 1:50 k and OS 1:10 k in some locations. Ground-truthing undertaken by the engineering and hydrology teams, and comparison of the location of the watercourses with aerial mapping, 1:25 k OS mapping and 1:10 k OS mapping indicated that the locations of the watercourses on site are accurately represented on 1:25 k and 1:10 K OS mapping. To clarify: this assessment has used OS 1:50 k mapping to identify watercourses that may require CAR authorisation but has used OS 1:10 k surface watercourses and surface waterbodies to create 50 m watercourse buffers and inform both the design of the Proposed Development and this EIA.

10.6 Baseline

Topography and Land Cover

10.6.1 The Proposed Development is located in Dumfries and Galloway, approx. 2.7 km north of Newton Stewart and approx. 3 km east of the River Cree (**Figure 10.1**). The Proposed Development is characterised by coniferous plantation woodland in the centre, modified bog and marshy grassland in the north and bracken and acidic grassland across the south of the Site. The Site is currently accessed by an existing track from the east that crosses the Penkiln Burn at NGR 244780 570542.

10.6.2 The topographic setting of the Site is characterised by Sheuchan Craig, 410 m Above Ordnance Datum (AOD), and Benisla, 404 m AOD, in the north of the Site, sloping towards Glenmalloch Hill, 240 m AOD in the south of the Site. The Site slopes from moderate to gentle slopes to the River Cree and Penkiln Burn in the south-west and south-east respectively, which are bound by fields of farmland.

Climate

10.6.3 The nearest National River Flow Archive (NRFA) monitoring station to the Site is the Cree at Newton Stewart. It records an average annual rainfall in the standard period (1961 –

1990) of 1,757 mm. The closest Meteorological Office climate station is Glenlee, which records an annual average rainfall in the climate period (1991 – 2020) of 1,780.61 mm.

Bedrock Geology

10.6.4 The bedrock geology underlying the Site is shown in **Figure 10.6**.

10.6.5 A review of BGS GeoIndex Onshore Viewer identified that the Site is largely underlain by the Ordovician age Shinnel Formation (SHIN), with bedrock of the Portpatrick Formation (PPF) present to the north which are within the turbidite sequence of the Scaur Group. The SHIN and PPF are described to be formed of 'wacke sandstone and siltstone turbidite succession', and to reach thicknesses of 2 km in places.

10.6.6 The Moffat Shale Group (MFS) and the "Gala Unit 1" (GAL1) of the Gala Group are mapped along the access track. The GAL1 and the MFS underlie the initial section of the access track, consisting of graded beds of wacke, siltstone and mudstone, and black and grey shale respectively. The MFS also underlies a very small area at the northern boundary of the Site.

10.6.7 Basaltic pillow lava of the Crawford Group is mapped in the northern extent of the Site with small intrusions of microdiorite porphyritic, felsite, meladiorite and hornblende of the Siluro-Devonian Calc-Alkaline Dyke Suite intrude across the Site.

10.6.8 In the north of the Site and along the access track there are east-west trending inferred thrust or reverse faults which are segmented by north-south trending faults with unknown displacements. These faults separate the bedrock units detailed above. There is minimal faulting within the centre of the Site, due to the presence of the large SHIN bedrock unit.

Superficial Geology

10.6.9 The superficial geology underlying the Site is shown in **Figure 10.3**.

10.6.10 A review of the BGS Geoindex Onshore identified that the majority of superficial deposits present on-site are located in the centre, and along the north-west and south-east boundary of the Site. Superficial deposits are mostly situated in the lower lying topography surrounding Benailsa and Glenmalloch Hill and along watercourses on-site. The superficial deposits consist predominantly of Devensian Till with areas of isolated Peat. Additionally, Alluvial deposits are mapped along the Cordorcan Burn and the Penkiln Burn watercourse crossing, and a small area of Glaciofluvial deposits is noted to the west of Glenmalloch Hill.

Soils

10.6.11 The National Soil Map of Scotland shows the Site to be underlain by two soil types of the Podzol group, Peaty podzols and Peaty gleys. Both soil types are derived from Lower Palaeozoic greywackes and shales.

10.6.12 Peaty gleys are organic (peaty) soils which are generally more affected by poor drainage of surface water. They are located in the north and the south of the Site and are typically present in lower lying topography.

10.6.13 Peaty Podzols are well drained acid soils with an organic surface layer. Some peaty podzols may have a degree of waterlogging, generally in the lower horizons. They are situated in the centre and in the west of the Site and are generally associated with higher topography.

Peat

10.6.14 Published priority peatland mapping by NatureScot, Carbon and Peatland Map 2016, indicates that the Site comprises Class 1, 2, 3, and 5 peatland (**Figure 10.4**). Class 5 peatland is mapped across the east and west boundaries of the Site. Class 5 peatland is defined as having potential peat or carbon-rich soils; however, peatland vegetation is absent. Class 3 peatland is mapped in the north and south extent of the Site, Class 3 peatlands are defined as not being priority peatlands but associated with wet and acidic

habitats. Small, isolated areas of Class 1 and Class 2 peatlands are mapped in the north. Class 1 and Class 2 peatlands are considered 'nationally important carbon-rich soils, deep peat and priority peatland habitat'.

10.6.15 Phase I and Phase II peat surveys have been undertaken as described in Section 10.5. As shown in **Figure 10.5**, the majority of probe depths are <0.5 m. There are localised areas of deep peat present which reach a maximum depth of 4 m. As noted above, results from the Phase I and Phase II probing informed design iteration work such that these areas of peat were avoided. The results of probing show the average depth across the Site was 0.4 m, with 82 % of probes record peat depths of 0.01 m to 0.5 m, which are not classified as peat (but rather as peaty soils). Also, a further 11 % of probes recorded peat depths of between 0.51 m to 1.00 m, which are not classified as deep peat.

10.6.16 Targeted peat condition surveys have been undertaken showing the majority of the peatland on Site to be in a modified, drained or actively eroding condition, with no areas of near natural peatland identified.

10.6.17 Of the limited potential peat deposits that may be excavated as a result of the Proposed Development, all of it can be reused within the Site as detailed in the Outline PMP in **Appendix 10.4**. **Appendix 10.5** details the PLHRA for the Site, with the likelihood of a peat landslide occurring deemed to be negligible to low across the Site.

Borrow Pit Search Areas

10.6.18 There are five potential locations for borrow pits that have been identified and are indicated in **Figure 1.2**. **Figure 2.18** shows an indicative drawing of a typical borrow pit that would likely be used on-site. The borrow pits were also described in Section 2.3 of **Chapter 2: Project Description**.

10.6.19 ITPEnergised visited the borrow pit search areas when undertaking the Phase II survey in March 2024. The proposed borrow pit search areas have been predominantly selected due to their location, where mapping indicates bedrock is likely to occur close to surface or where rock has been proven from adjacent, existing forestry borrow pits. Other factors included environmental impacts, morphology, accessibility from the Site or existing roads, orientation, and the expected proximity of rock to the surface. Limited superficial soils are expected at these locations. The borrow pit locations are located a minimum of 50 m from watercourses.

10.6.20 An approximate volume of excavated materials has been calculated for the proposed borrow pit locations, this volume is based on initial calculations and assumptions that would be verified by detailed intrusive investigation post-consent. Further information is provided within the Outline Borrow Pit Assessment (**Technical Appendix 10.6).**

Contaminated Land

10.6.21 According to BGS GeoIndex Onshore, there is no artificial or worked ground recorded on-site, or in the surrounding area.

10.6.22 A review of SEPA Waste Site and Capacity Tool was undertaken and no landfill or waste sites were recorded on-site and no landfill sites are recorded within 10 km study area surrounding the Site. There is a civic amenity recycling centre located in Newton Stewart approximately 5 km from the Site.

10.6.23 The Scottish Pollutant Release Inventory (SPRI) by SEPA, shows there are no waste or wastewater management areas recorded near the Site.

Hydrogeology

10.6.24 The hydrogeological features of the Site are shown in **Figure 10.7**.

10.6.25 The Site is underlain by the Silurian-Ordovician bedrock aquifers, formed of predominantly greywackes and siltstones. In accordance with BGS and SEPA Open Report (OR/15/028), the dominant groundwater flow path length is described to be controlled by fracture patterns with relatively shallow depths of 50 m. Flow paths tend to be localised, however, some connect over several kilometres from higher topography to low.

10.6.26 The bedrock aquifers underlying the Site are the Portpatrick Formation and Glenwhargen Formation, Crawford Group and Moffat Shale Group, Shinnel Formation and Glenlee Formation, and the Gala Group. The primary bedrock aquifer underlying the Site is the Shinnel Formation and Glenlee Formation. The Scottish Environment Web Map defines the aquifer as low productivity Class 2C aquifer, described as 'highly indurated rocks with limited groundwater in near surface weathered zone and secondary fractures'.

10.6.27 The SEPA Water Classification Hub shows the bedrock aquifers on-site to be within the Galloway groundwater body (ID: 150694). The groundwater body was noted to have an overall status and water quality of 'Good' in 2022.

10.6.28 Groundwater in the entirety of Scotland is protected as a Drinking Water Protected Areas (DWPA) (Ground). The groundwater underlying the Site is also therefore a DWPA (Ground).

Hydrology

10.6.29 The Site lies within the surface water catchments of the River Cree, Penkiln Burn and Palnure Burn, as shown in **Figure 10.2.** The west of the Site is located within the River Cree catchment upstream of Newton Stewart (ID 10520), the east of the Site is located within the Penkiln Burn catchment (ID 10533), and the first 100 m of the access track and Site entrance is within the Palnure Burn catchment (ID 10534). In accordance with the SEPA Classification Hub, these watercourses have an overall status of 'Good' in 2022. Upstream, along the River Cree and its upstream tributaries have recorded overall status of 'Moderate', 'Poor' and 'Bad' in 2022. The pressures responsible for this are either unknown pressures affecting ecological status, or have been attributed to acid rain.

10.6.30 Two tributaries of the River Cree catchment are located in the north and west of the Site, the Cordorcan Burn, and Coldstream Burn. The tributaries of the Cordorcan burn flows north-east to south-west, draining the north of the Site. The Cordorcan Burn confluences with the River Cree at approx. 3.1 km south-west of the Site, at NGR 237998, 570887. The tributaries of the Coldstream Burn flows north to south draining the west of the Site. The Coldstream Burn confluences with the River Cree approx. 2.9 km south-west of the Site at NGR 238534, 569749.

10.6.31 Tributaries of the Penkiln Burn catchment are located in the south of the Site, the Glenshalloch Burn and tributaries of the Pulcree Burn, Castle Burn and Peat Rig Strand. Castle Burn and Peat Rig Strand rise within the Site draining the south-west, with unnamed tributaries of the Glenshalloch Burn flowing south-east draining the centre and east of the Site. The Glenshalloch Burn confluences with the Penkiln Burn approx. 2.2 km south of the Site at NGR 243447, 568991. The Pulcree Burn flows south and confluences with the Penkiln Burn a further 1.6 km downstream.

10.6.32 An unnamed tributary of the Palnure Burn is located at the Site entrance. This tributary flows west to east and confluences with the Palnure Burn approx. 600 m downstream of the Site at NGR 247219 569101. The Penkiln Burn and Palnure Burn drain to the south-west into the River Cree. The River Cree flows south, discharging into the Bladnoch and Cree Estuary (ID 200323), which has an overall status of 'Good' in 2022.

10.6.33 A Watercourse Crossing Survey was carried out in March 2024, with the watercourse observations detailed in **Appendix 10.1**. Following consultation with SEPA (FOI Reference F0197055), it was confirmed that there are no surface water or groundwater monitoring stations within 2 km of the Site.

Flooding

10.6.34 A review of the SEPA Flood Maps showed that there is a high likelihood of fluvial flooding (10% annual probability of flooding) along the main channels of the Cordorcan Burn and the Glenshalloch Burn at the boundaries of the Site. The extent of high likelihood flooding is largely confined to within the watercourse channel and doesn't extend to the tributaries present on-site. There are small, isolated areas of pluvial flooding across the Site. These areas are largely confined to either banks of watercourses or on slopes above small streams in the headwaters.

10.6.35 SEPA Flood Maps show limited pluvial or fluvial flooding which is associated with plantation forestry artificial drains across the Site. The forestry drains and existing access tracks drainage noted to be present on-site during the Site walkover, will likely decrease rainfall infiltration and direct overland flow to main watercourses.

10.6.36 While extensive flooding is not recorded on-site, in the lower reaches of the Cordorcan Burn and Glenshalloch Burn, and along River Cree and Penkiln Burn, there is fluvial flooding present. Along the large watercourses of the River Cree and Penkiln Burn this is noted to extend across the associated floodplain. While there is no risk of coastal flooding on-site, coastal flooding is noted within the River Cree Estuary, approximately 8 km south.

10.6.37 Following large flooding events in Newton Stewart and Minnigaff in 2012 and 2015, a detailed flood study was undertaken by Kaya Consulting Ltd in 2015. The original model '*predicted that 134 properties would be affected during a 200 year flood*'. This was significantly reduced in comparison to previous studies due to '*improved methods and datasets used in the detailed flood study*'.

10.6.38 The 2015 flood study considered potential flood mitigation options including flood storage upstream of Newton Stewart. While flood storage upstream in the River Cree Valley was considered, it found that the storage area was not predicted to be able to reduce a 200 year flow sufficiently so additional defences would still be required. It was also not considered to be economically viable or practical considering the other environmental and social effects.

10.6.39 In 2017 a subsequent update to the report and a re-assessment of cost benefit analysis found that a flood mitigation scheme for a 200 year event may now be economically viable. DGC have preliminarily confirmed the Flood Protection Scheme, and a Hearing has been requested with the Scottish Government. It has been included within the Solway Local Flood Risk Management Plan 2022-2028 for the Solway Local Plan District (LPD 14).

Public Water Supply

10.6.40 In the scoping response, Scottish Water indicated that "*there are no Scottish Water drinking water catchments or water abstraction sources, which are designated as Drinking Water Protected Areas under the Water Framework Directive, in the area that may be affected by the proposed activity*". Due to this being inconsistent with Scotland's Environment online map as was raised during Scoping, additional consultation was undertaken with Scottish Water in February 2024. On 21 February 2024, Scottish Water confirmed that "*the Scoping Request is out with catchment*" and that an update would be provided to DGC.

Private Water Supply

10.6.41 A data request to SEPA (F0197055) via email on 17 April 2024 was issued to confirm the nature of any CAR authorisations within 2 km of the Site. CAR authorisations regulate activities which may affect Scotland's water environment and are intended to control impacts on the water environment, including mitigating the effects on other water users.

10.6.42 A response from SEPA on 5 May 2024 confirmed there are 24 CAR registered or licenced water abstractions within 2 km. The CAR registrations and licences identified within 2 km were for activities including bridging culvert, bridge, existing sewage treatment system, and private sewage, pipeline/cable crossing. A water abstraction licence was recorded, at the River Cree Hatchery (Authorisation No. CAR/S/1088082), abstracted for environmental service. The abstraction location is on the Penkiln Burn downstream of the proposed watercourse crossing upgrade. The Private Water Supply Risk Assessment (PWSRA), included as **Technical Appendix 10.2**, includes a discussion of any potential effects and recommended additional mitigation measures required for the River Cree Hatchery PWS.

10.6.43 An FOI request was issued to DGC for all PWS registered within the 2 km PWS Study Area. A desk-based review of these sources was then undertaken, with consideration to potential hydrological and hydrogeological connectivity to the Site. From these, 18 properties were scoped into consultation, and letters were issued to residents to complete a location map and questionnaire. From responses and consultation with residents, an additional two supplies were scoped into assessment.

10.6.44 Following responses received, a site visit to PWS was undertaken to confirm source type, details and location with residents. From this, seven sources were confirmed to be within 2 km of the Site and potentially hydrologically connected were scoped into further assessment, which include:

- Claughrie Lodge;
- Craigdistant;
- Cumloden House;
- Dallash;
- Glenmalloch;
- Glenshalloch; and
- River Cree Hatchery.

10.6.45 A detailed assessment of these sources is included in **Technical Appendix 10.2**. The PWSRA includes each source location, potential source catchments, and proximity to the Proposed Development to determine any potential effects and recommended additional mitigation measures where required. Following the detailed assessment of these sources, a total of four PWS have been determined to be likely to experience significant effects from the Proposed Development and included in **Section 10.7**. These are Craigdistant, Dallash, Glenshalloch, and River Cree Hatchery.

Designated Sites

10.6.46 Designated sites within the 10 km study area have been identified within **Table 10.5.**

Table 10.5 Designated Sites

Designated Site	Distance	Features	Connected to the Site?
Talnotry Mine SSSI	1.7 km	Mineralogy of Scotland (Favourable maintained)	Disconnected by Loch of the Lowes Strand and tributary of Palnure Burn.
Galloway Oakwoods SAC	2.1 km	Western acidic oak woodland (Unfavourable declining)	Yes, Galloway Oakwoods to the east of the Site are hydrologically connected by the Cordorcan Burn and Coldstream Burn.
Glentrool Oakwoods SSSI	2.1 km	Upland oak woodland, bryophyte assemblage (Favourable maintained)	Disconnected by topography and located within separate Water of Trool catchment.

Designated Site	Distance	Features	Connected to the Site?
		Lichen assemblage (Unfavourable declining)	
Wood of Cree SSSI	2.2 km	Oligotrophic loch (Favourable maintained) Upland oak woodland (Unfavourable recovering)	Yes, hydrologically connected by the Cordorcan Burn and Coldstream Burn.
Cairnsmore of Fleet SSSI	2.5 km	Blanket bog (Unfavourable recovering) Upland assemblage (Favourable maintained)	Disconnected by Palnure Burn.
Merrick Kells SAC	4.0 km	Acid peat-stained lakes and ponds, acidic scree, clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels, otter, plants in crevices on acid rocks, beetle assemblage, blue aeshna dragonfly, breeding bird assemblage, Caledonian igneous, quaternary of Scotland (Favourable maintained) Depressions on peat substrates, dry heaths (Favourable recovered) Blanket bog, wet heathland with cross-leaved heath (Unfavourable recovering) Montane acid grasslands, Upland assemblage (Unfavourable no change)	Disconnected by topography and catchments of Water of Trool and River Dee.
Lower River Cree SSSI	4.2 km	Smelt (Favourable maintained)	Yes, hydrologically connected by the Cordorcan Burn and Coldstream Burn, Penkiln Burn and Palnure Burn, which are tributaries of the River Cree.
Cairnbaber SSSI	5.5 km	Upland assemblage (Favourable maintained)	Disconnected by topography and located within separate River Dee catchment.
Ellergower Moss SSSI	6.8 km	Raised bog (Favourable maintained)	Disconnected by topography and located within separate River Dee catchment.
Cree Estuary SSSI	7.2 km	Coastal geomorphology of Scotland, mudflats, pink-footed goose (non-breeding), smelt (Favourable maintained)	Yes, hydrologically connected by the Cordorcan Burn and Coldstream Burn, Penkiln Burn and Palnure Burn, which are tributaries of the River Cree.

Designated Site	Distance	Features	Connected to the Site?
		Saltmarsh (Unfavourable no change)	
Silver Flowe Ramsar	7.3 km	Blanket bog (Unfavourable declining) Depressions on peat substrates	Disconnected by topography and catchments of Water of Trool and River Dee.
River Bladnoch SAC	7.7 km	Atlantic salmon (Unfavourable recovering)	Disconnected by the River Cree catchment.
Ring Moss SSSI	8.3 km	Raised bog (Unfavourable declining)	Disconnected by the River Cree catchment.
Lea Larks SSSI	9.8 km	Caledonian igneous (Favourable maintained)	Disconnected by the Palnure Burn.

10.6.47 The Geological Conservation Review (GCR) sites of Round Loch of Glenhead, Loch Dee, Lea Larks, Talnotry Mine and Cree Dumfriesshire were identified within the surrounding area. As these geological receptors are not located within the Site, they will not be impacted by the Proposed Development and are therefore scoped out of further assessment.

10.6.48 As outlined in **Table 10.5**, designated receptors which are scoped into further assessment of potential risks from the Proposed Development are:

- Galloway Oakwoods SAC;
- Wood of Cree SSSI;
- Lower River Cree SSSI; and
- Cree Estuary SSSI.

Groundwater Dependent Terrestrial Ecosystems (GWDTE)

10.6.49 A detailed National Vegetation Classification (NVC) survey was completed, as outlined in **Chapter 8 Ecology** and reported in **Technical Appendix 8.1**. From the NVC survey data, communities have been identified that have the potential to be groundwater dependent in accordance with SEPA Land Use Planning System Guidance Note 31 (SEPA-LUPS-GU31). The survey methodology for this is outlined in **Chapter 8 Ecology.**

10.6.50 The following potential GWDTE communities were identified, as shown in **Figure 10.10**, with *potential* groundwater dependency, based on SEPA-LUPS-GU31, shown in brackets:

- M6a/M6b/M6c/M6d (High);
- M23a/M23b (High);
- CG10 (High);
- W4/W4c (High);
- W7/W7c (High);
- M15b/M15d (Moderate);
- M25/M25a/M25b (Moderate);
- M27 (Moderate);
- MG10/MG10a (Moderate);
- U6 (Moderate); and
- W6 (Moderate).

10.6.51 A review of the baseline features including topography, underlying geology, surface water features, was undertaken to determine the groundwater dependency. This is outlined in the GWDTE Risk Assessment (Technical **Appendix 10.3**) where further assessment of GWDTEs was undertaken.

10.6.52 All of the above-noted communities were assessed as having low groundwater dependency, based on characteristics that disconnect them from underlying groundwater or show the habitat to be likely dependent on surface water or ombrogenous. The underlying bedrock was also noted to be of low groundwater productivity, with the few faults or fractures present on-site located in the north and south. Disconnection from groundwater in the underlying bedrock aquifers would occur from an impermeable superficial deposit, either till or peat. These have been identified from BGS GeoIndex mapping and results of peat probing. Areas which are potentially fed by surface water have also been identified, these include areas around surface watercourses, or downslope of ombrogenous habitat, plantation forestry or track drainage where high surface water runoff and collection is likely. Most potential GWDTEs were identified downslope of ombrogenous habitats, along watercourses or overlying impermeable peat.

10.6.53 Following this analysis, no potential GWDTE habitats identified during the NVC surveys were found to be highly or moderately groundwater dependent. GWDTEs are therefore scoped out of further assessment.

Future Baseline

10.6.54 The future baseline characterisation of the Site under a 'do nothing' scenario would be impacted by different current activities occurring across the Site, including pastoral farming, plantation forestry and felling.

Surface Water

10.6.55 There is current potential impact to surface water quality from felling of plantation forestry within the catchment, resulting in soil erosion, releasing nutrients, acidification and affecting surface water quality. The future forestry baseline in 2029 (estimated start of construction), including planned future felling, is discussed in **Chapter 14**.

Flooding

10.6.56 There is current potential impact from flooding, which is present along tributaries across the Site, largely confined to watercourse channels. Downstream of the Site there has also been flooding recorded along the River Cree and Penkiln Burn. Flooding is currently affected by artificial forestry drainage increasing overland flow within plantation forestry areas and existing trackside drainage. There are also existing crossings present along both the River Cree and Penkiln Burn. It is anticipated with climate change that extent of flooding is likely to increase, with anticipated increase in rainfall and sea level rise. Review of SEPA future flood maps was undertaken which were developed based on '*projections for a single future scenario for the 2080s'*. Higher variability was noted between present and future predictions at the confluence of Penkiln Burn and Glenshalloch Burn, noting increased flooding extent and sensitivity to climate change.

Peat

10.6.57 The isolated peat deposits on-site would continue to be impacted by forestry planting within the Site. This leads to excavation and removal of areas with felling, creation of brash impacting groundwater quality, and forestry drainage impacting groundwater flow.

Private Water Supply

10.6.58 PWS which are hydrologically connected to the Site, may have impacts to their supply water quality and quantity as a result of felling and pastoral farming within their source catchments. The PWS would also continue to be affected by climate with prolonged dry weather reducing water quantity, low flow during drier months was noted by several residents when visiting PWS.

Designated Sites

10.6.59 As outlined above current works within the catchment may continue to affect downstream receptors, hydrologically connected to the Site. This could include nutrient loading from forestry and farming activities.

10.7 Mitigation

Embedded Mitigation

10.7.1 The following considerations have been taken into account in the iterative design of the Proposed Development, considered as embedded mitigation.

- A 50 m buffer has been maintained around all surface watercourses and waterbodies identified in OS 1:10k mapping, except where tracks are required to cross watercourses and where it was proved unavoidable through design iterations due to constraints. The watercourse buffer is intruded by temporary hardstand at T4, T7, T9, and T14. The need for watercourse crossings has been minimised as far as practicable while taking account of other technical and environmental constraints. A minimum of 10 m watercourse buffer has been maintained for all infrastructure as required for pollution prevention.
- As a result of limited peat on-site and several design iterations, the Proposed Development infrastructure is largely outwith areas of peat soils and deep peat.
- Proposed Development infrastructure has been sited outwith areas of increased likelihood, and in areas of negligible to low likelihood.
- As there are no GWDTEs assessed to be present on-site, no infrastructure and excavation is located within 100 m or 250 m of GWDTEs.

Committed Mitigation

10.7.2 In undertaking the assessment of potential effects from the Proposed Development, good practice measures to be implemented as part of the CEMP and other proposed management plans will be considered as committed mitigation.

Pre-Construction

10.7.3 Prior to construction being undertaken, relevant detailed Site investigations would be conducted. This could include investigations of underlying deposits, in particular where proposed infrastructure is sited, to inform detailed design and suitable micrositing of the turbines and associated infrastructure.

10.7.4 If there are assessed to be potential effects to surface watercourses or groundwater, baseline water quality monitoring will be undertaken as required. A Water Quality Monitoring Plan will be prepared and agreed with DGC, in consultation with SEPA, prior to commencement of construction. It is anticipated that this will include a programme of pre-construction monitoring, over a period to be set out in the plan.

Construction

10.7.5 Following review of best practice outlined in relevant guidance and legislation a CEMP will be compiled which will be based on the outline CEMP attached as **Technical Appendix 17.1**, as well as any environmental planning and licensing conditions, including a borrow pit management plan. The Principal Contractor will implement measures set out in the CEMP, to be agreed with relevant consultees. This would also include a construction method statement, which would account for:

10.7.6 Best practice measures to prevent sedimentation pollution and erosion, including:

- All earthworks would be carried out in accordance with BSI Code of Practice for Earth Works BS6031:2009;
- Stockpiles will be placed at least 50 m from watercourses. The height and maximum slope angle will be in accordance with BSI guidance. Where there are stockpiles of peat, re-wetting will occur to prevent peat drying out. Sediment pollution mitigation measures, including drains will be implemented at the base of stockpiles.
- Sediment pollution mitigation measures will be emplaced across the proposed development, this may include: drainage; silt fencing; settlement lagoons; and check dams.
- Plant movements will be minimised through management measures. Measures to prevent sediment on public roads may include wheel washing or road sweeping at the Site entrance.
- Any CAR licences required for Site discharges or watercourse crossings will be applied to from SEPA prior to construction.
- A 'wet weather policy' will be in place where the Principal Contractor would reduce or suspend works during periods of significant rainfall at the Site. The policy will include that Site management checks local weather forecast daily, regularly checks and maintains pollution control system and suspends work during adverse conditions.
- Where topography dictates that working platforms are needed, these would be formed to ensure that surface water drains away from watercourses.
- To avoid unnecessary compaction and disturbance to Site soils, working areas and corridors would be established and demarcated, with construction operatives appropriately inducted and trained to avoid work outside the designated work areas.

10.7.7 Best practice measures to prevent chemical pollution include:

- Sufficient and continued dewatering at the turbine foundation excavation until the concrete is cured, to prevent leaching.
- Dewatering at the turbine will be minimised through careful management and reducing the time the excavation is open, including concrete pouring.
- A method statement to address the transport, transfer, handling and pouring of liquid concrete at foundations will be undertaken by the Principal Contractor.
- Cement, grout and unset concrete will not be allowed to enter the water environment. No operations involving concrete transfer will take place within 50 m of watercourses.
- There will be no washing out of vehicles used for concrete delivery or washing of vehicles within 50 m of watercourses.
- Fuel and chemicals will be stored in impermeable bunded containers at least 110% of the volume stored. All fuelling on-Site will occur in a designated location, at least 50 m from watercourses.
- Spill kits will be stored across the Site and within all vehicles and plant. On-site toolbox talks with construction staff will include to report all on-site spills and the correct implementation of spill kits.
- All vehicles and plant will be checked regularly with regular maintenance undertaken as required.

10.7.8 Best practice measures to enable surface water drainage management include:

- A suitable surface water drainage strategy with detailed drainage design will be prepared and agreed prior to construction, but the following outline measures will be included.
- Identified watercourse crossings in **Technical Appendix 10.1** will be designed to convey flows of 0.5%AEP (1:200yr) plus climate change, to prevent exacerbating downstream flood risk.
- Trackside drainage ditches will be designed to ensure separation of clean water drainage from potentially contaminated drainage.

- Check dams will be employed to slow down the flow of water and decrease erosion within drainage ditches.
- Sumps and settlement lagoons will be used to treat and slow down the flow of water during periods of high rainfall. This will be employed at drainage outlets prior to reaching watercourses.
- Areas of excavation and earthworks will have drainage designed to drain to a sump to prevent pollution and increase surface water run-off.
- Hydrological connectivity between upslope and downslope will be maintained through cross-drainage and culverts.

10.8 Assessment of Potential Effects

Construction

Impact on Surface Water Quality

10.8.1 Surface water runoff containing silt and other sediments, particularly during and after rainfall events, has the potential to enter the watercourses and field drains on and adjacent to the Site. Silt- and sediment-laden surface water runoff is predicted to arise from excavations, exposed ground, and any temporary stockpiles. This has the potential to temporarily impact on the water quality and hydrological and ecological function of the receiving watercourse at and downstream of the works in the absence of any mitigation. Additionally, if appropriate controls are not enacted, pollutants such as oils, fuel and cement may be mobilised through mechanical leaks or spillage and carried in surface drainage.

10.8.2 Additionally, forestry felling can impact surface water quality with release of nutrients from decay of felled organic material, slow release of nutrients from brash and watercourse acidification from surface water run off over exposed peatlands. Areas where felling is required are discussed in detail in **Chapter 14**.

10.8.3 As noted previously, a minimum buffer of 50 m around all watercourses was embedded as part of the design of the Proposed Development, excepting areas where watercourse crossings are required. In a few locations due to the design being heavily constrained by slope, ecology constraints, and peat, infrastructure has been sited within 50 m watercourse buffers. This includes infrastructure associated with T14 and T7, and temporary hardstands of T4. T9 also minorly infringes on the watercourse buffer by 3 m. In these areas, best practice mitigation measures for during construction will be set out within the CEMP and fully implemented to minimise the risk of pollution to surface watercourses.

10.8.4 The magnitude of impact is considered to be low, on a high sensitivity receptor. Therefore, there is potential for a direct, temporary, short-term effect of **Moderate** significance. The effect is therefore found to be **Significant** in terms of the EIA Regulations.

Impact on Surface Water Flow

10.8.5 The access tracks and turbine hardstands could result in an increased rate of surface water run-off from the Site. This could potentially increase sedimentation and erosion in watercourses and risk of flooding downstream. It can also result in the diversion of surface water flows.

10.8.6 Runoff from permanent infrastructure will be controlled through suitable construction drainage provision, the outline principles of which are noted in **Section 10.8** and in the CEMP, with the detailed design of which will be developed and agreed with SEPA and DGC. Hydrological connectivity and maintenance of existing drainage pathways will be undertaken through installation of trackside and cross drainage.

10.8.7 As outlined in the Watercourse Crossing Schedule (**Technical Appendix 10.1**), there are several watercourse crossings required across the Site, the outline solutions of which include culvert (bottomless arch or closed) and single span bridge. Measures outlined within the WCS and the CEMP will prevent constricting and increase in flow. Prior to construction there will be further detailed design of the watercourse crossings, including the new single span bridge over the Penkiln Burn. An indicative drawing of this proposed crossing is shown in **Figure 2.10**. Where CAR authorisation is applicable, all necessary registration or licences would be sought prior to commencement of construction on-site.

10.8.8 The magnitude of impact is therefore considered to be negligible, on a high sensitivity receptor. There is potential for a direct, temporary, short-term effect of **Minor** significance, this is considered to be **Not Significant** in terms of the EIA Regulations.

Impact on Groundwater Quality

10.8.9 As previously outlined, the geology underlying the Proposed Development is characterised by typically low permeability, sedimentary bedrock of the Shinnel Formation. There are smaller areas of the Site characterised by the Gala Group, Crawford Group and Moffat Shale Group which are also low productivity bedrock.

10.8.10 The installation of the turbine foundation has the potential to impact groundwater quality because of alkaline leachate from concrete foundations. Due to the characteristics of the underlying geology, the spatial impact of any alkaline leachate is therefore likely to be limited to the localised area at the turbine foundation. Other forms of chemical pollution that may occur include spills of fuels and chemicals stored on-site or from vehicle and plant spills.

10.8.11 Committed mitigation measures will be included within the CEMP to secure sufficient and continued dewatering at the turbine foundation excavation until the concrete is cured, to prevent leaching. To prevent pollution to groundwater, the CEMP will implement mitigation which includes appropriate management measures for transfer of concrete and minimising the duration of concrete pouring. Other measures will include appropriate storage of fuels and chemicals, refuelling of plant and vehicles at designated locations and distributing spill kits throughout the Site and within all plant and vehicles.

10.8.12 The magnitude of impact is therefore considered to be negligible, on a medium sensitivity receptor. There is potential for a direct, temporary, short-term effect of **Negligible** significance, this is considered to be **Not Significant** in terms of the EIA Regulations.

Impact on Groundwater Flow

10.8.13 The installation of turbine foundations and permanent access tracks can result in the diversion of groundwater flows within underlying geology by creating a barrier. If dewatering occurs at turbine foundations during construction, this could locally reduce groundwater quantity.

10.8.14 As outlined in **Section 10.6**, superficial deposits are absent across much of the Site, with some till, and peat deposits present. Till is typically of low permeability, the underlying bedrock is largely described as having low productivity with limited near-surface groundwater, therefore there is likely to be limited groundwater flow.

10.8.15 The spatial impacts of drawdown from dewatering will be a localised area at each turbine foundation. It is also considered to be a short-term impact with localised groundwater levels anticipated to restore relatively quickly following the cessation of dewatering activities due to relatively high and frequent average rainfall. Mitigation measures will be implemented as part of the CEMP to prevent impacts to groundwater, which will include completing excavation and dewatering as quickly as practicable. Any water from dewatering will be discharged to ground in the area surrounding the turbine foundation to promote recharge.

10.8.16 Diversion of groundwater flows by the hardstand and permanent access tracks is a potential impact. Drainage will be utilised to maintain hydrological connectivity upslope and downslope of access tracks.

10.8.17 The magnitude of impact is considered to be negligible on a medium sensitivity receptor. Therefore, there is potential for a direct, temporary, short-term effect of **Negligible** significance, this is considered to be **Not Significant** in terms of the EIA Regulations.

Removal and Impact on Peat

10.8.18 As discussed, there are localised deposits of peat present on-site. As outlined in embedded mitigation measures and in **Chapter 3: Design Evolution and Alternatives**, proposed turbines and infrastructure have been sited to minimise the excavation of peat as far as practicable, taking account of other constraints.

10.8.19 Approximately 37,541 m^3 of peat and peaty soils are proposed to be excavated as part of the Proposed Development. All peat can be appropriately reused on site, with no surplus materials (waste). Further information is included within the PMP (**Technical Appendix 10.4**).

10.8.20 Mitigation measures outlined in this EIA Report, the PMP (**Technical Appendix 10.4**), outline CEMP (**Technical Appendix 17.1**) and Pollution Prevention Plan (PPP) (**Technical Appendix 17.2**) will be implemented by the Principal Contractor, to reduce the potential effects on peat during construction. This includes measures to prevent drying out of peat, if found, in stockpiles, to enable the peat to be successfully restored, where practicable, as mentioned in the outline CEMP.

10.8.21 The presence of turbine foundations, hardstands and other infrastructure elements have the potential to interrupt groundwater flow by acting as barriers to flow. This could result in drying out of surrounding peat deposits. As outlined previously, there is considered to be limited groundwater in the low productivity bedrock and limited, highly localised peat deposits present on-site.

10.8.22 There may be impacts to peat immediately surrounding areas excavated during construction for hardstand and foundations, however, as it is considered that these are likely to be localised to the immediate areas around excavations, they are unlikely to produce long-term effects and water levels are likely to rebound quickly following construction.

10.8.23 The magnitude of impact is considered to be negligible, on a high sensitivity receptor. Therefore, there is potential for a direct, temporary, short-term effect of **Minor** significance, this is considered to be **Not Significant** in terms of the EIA Regulations.

Peat Landslide Impact on Watercourses

10.8.24 Construction on peat soils can result in destabilisation of peat deposits on slopes and lead to slope failure. This can result in peat and debris reaching watercourses, potentially resulting in sedimentation and changes to flow and fluvial geomorphology. Peat landslides can also pose a threat to life in certain circumstances.

10.8.25 A detailed assessment of peat landslide risk has been undertaken as presented in **Technical Appendix 10.5**. This has identified the risk of peat landslides at the proposed turbines, hardstand and other infrastructure, to downslope receptors. Mitigation measures proposed include avoiding construction in areas of increased likelihood, committed measures including best practice construction methods. During construction a geotechnical risk register would be implemented by the geotechnical engineer to monitor any areas identified as a risk.

10.8.26 Based on the findings of **Appendix 10.5** the potential magnitude of impact from peat landslides is assessed to be negligible to low on a medium sensitivity receptor. Therefore,

there is potential for an indirect, temporary, short-term effect of **Minor** significance, this is considered to be **Not Significant** in terms of the EIA Regulations.

Compaction of Soils

10.8.27 As part of the Proposed Development there will be a requirement for construction of permanent access tracks and hardstand. During construction there will also be movement of vehicles and plant. There is therefore potential for this to result in soil compaction, leading to reduced permeability, increasing the potential for surface water runoff. Reduced permeability could also reduce the flood storage capacity within the Site and could potentially lead to localised flooding incidents.

10.8.28 As discussed previously, marked superficial deposits are present on-site with primarily low permeability. There is unlikely to be a significant change in flood storage capacity between low permeability till and peaty soil superficial deposits to low permeability hardstand. In addition, the area of hardstand of the Proposed Development has been minimised and the existing access track will be utilised as far as practicable, as part of the embedded design measures.

10.8.29 The magnitude of impact is considered to be negligible, on a low sensitivity receptor. Therefore, there is potential for a direct, temporary, short-term effect of **Negligible** significance, this is considered to be **Not Significant** in terms of the EIA Regulations.

Impacts to Private Water Supplies

10.8.30 Construction of the Proposed Development has the potential to affect the quality and quantity of the 11 PWS identified within the 2 km Study Area. As outlined within the PWSRA (**Technical Appendix 10.2**), prior to any additional mitigation, there is considered to be potential for significant effects to Craigdistant, Dallash, Glenshalloch, and River Cree Hatchery PWSs. This is due to these abstracting from watercourses that are hydrologically connected to the Proposed Development, and being in close proximity for effects of attenuation to be minimal.

10.8.31 No PWS sourced from groundwater are located within 250 m of turbines, in accordance with SEPA guidance. These are therefore not considered to be at potential impact from highly localised drawdown of groundwater at turbine excavations, as outlined within **Technical Appendix 10.2**.

10.8.32 The magnitude of impact prior to any additional mitigation and monitoring of Craigdistant, Dallash, Glenshalloch, and River Cree Hatchery, is considered to be medium, on a high sensitivity receptor. Therefore, there is potential for a direct, temporary, short-term effect of **Moderate** significance, this is considered to be **Significant** in terms of the EIA Regulations.

Impacts to Designated Sites

10.8.33 Following a review of the Proposed Development, it was found that Wood of Cree (SSSI), Galloway Oaklands (SAC), Lower River Cree (SSSI), and Cree Estuary (SSSI) are hydrologically connected by Cordorcan Burn and Coldstream Burn, and River Cree respectively. These designated sites therefore have the potential to be affected by changes in surface water quality or quantity.

10.8.34 The Galloway Oaklands (SSSI) and Wood of Cree (SSSI) occupy the same area and are designated for western acidic oak woodland, and oligotrophic loch and upland oak woodland respectively. According to the Wood of Cree Site Management Statement, there are three lochs of oligotrophic water within the designated area, with the features noted to be favourable maintained in 2004. From OS mapping and aerial imagery, two of these lochs are considered to be associated with Dow Lochs upstream of Cordorcan Burn and Coldstream Burn, and another is present downstream of Cordorcan Burn within the

floodplain of River Cree. Infrastructure within the catchment of the Cordorcan Burn includes T1 to T4 and borrow pit search areas.

10.8.35 The Lower River Cree (SSSI) is protected based on smelt, for which the further downstream Cree Estuary (SSSI) is also designated. The Cree Estuary (SSSI) is also designated for its coastal geomorphology, mudflats, saltmarsh and non-breeding pink footed goose. The designated sites are located downstream of the Site, hydrologically connected by the tributaries of the River Cree, including Penkiln Burn, Palnure Burn, Cordorcan Burn and Coldstream Burn. The protected habitats and smelt may be affected by changes to water quality from polluted surface water run-off. The Proposed Development is located within connected sub-catchments; however, it is located 4.2 km and 7.2 km from Lower River Cree (SSSI) and Cree Estuary (SSSI) respectively.

10.8.36 During construction, silt management measures will be included within the CEMP to follow best practice to minimise risk of pollution to surface watercourses and downstream designated sites. The CEMP will also include for surface water monitoring during construction, regular visual checks by the Environmental Clerk of Works (EnvCoW) and an emergency procedure plan in the event of a chemical spill within these catchments.

10.8.37 All infrastructure, except watercourse crossings where required, have been sited 50 m from surface watercourses, which has been embedded into the design, except where this has found to be unavoidable through design iterations due to a combination of constraints. Upstream of Galloway Oaklands (SSSI) and Wood of Cree (SSSI), infrastructure has been sited outwith 50 m watercourse buffers, except for temporary hardstand associated with T4 which intrudes into these buffers by approximately 15 m. The watercourse buffers are also intruded minorly at T9, and T7 and T14. These areas of infrastructure are all located outwith the 10 m buffer from watercourses required for pollution prevention.

10.8.38 The magnitude of impact prior to any additional mitigation, is considered to be low, on a high sensitivity receptor. Therefore, there is potential for a direct, temporary, short-term effect of **Moderate** significance, this is considered to be **Significant** in terms of the EIA Regulations.

Operation

Impacts on Surface Water Flow

10.8.39 The access tracks and turbine hardstand could result in an increased rate of surface water runoff from the Site. This could potentially increase sedimentation and erosion in watercourses and risk of flooding downstream. Permanent hardstand can also alter natural drainage pathways.

10.8.40 The reinstatement of temporary construction areas will reduce exposed ground and hardstand areas during the operational phase as compared to the construction phase. Measures to manage drainage of surface water will be implemented during the construction phase and continue during the operational phase.

10.8.41 The magnitude of impact is considered to be negligible, on a high sensitivity receptor. Therefore, there is potential for a direct, temporary, long-term effect of **Minor** significance, this is considered to be **Not Significant** in terms of the EIA Regulations.

Impacts on Fluvial Geomorphology

10.8.42 **The Watercourse Crossings Schedule (Technical Appendix 10.1)** details the five new watercourse crossings required and suggested crossing types to ensure maintenance of suitable flow and therefore heterogeneity. These crossings should be maintained and kept free for debris from watercourses. Any damage to watercourse crossings during operation should be repaired or replaced as required.

10.8.43 The magnitude of impact on a high sensitivity receptor is assessed to be negligible. This is considered to be an indirect, long-term effect of **Minor significance** and is considered to be **Not Significant** in terms of the EIA Regulations.

Impacts on Groundwater Flow and Drying Out of Peat

10.8.44 As outlined previously, hardstand and infrastructure can interrupt existing groundwater flow paths, which can result in drying out of peat downslope. As the peat deposits on-site are highly localised, there is considered to be limited long term effects, with water levels likely to return to baseline during the operational phase.

10.8.45 As outlined in **Technical Appendix 10.1**, watercourse crossings will be used to maintain hydrological connectivity across the Site. Within the CEMP, measures will be designed to maintain groundwater connectivity, which will also include regular cross-drainage.

10.8.46 Taking account of embedded mitigation measures, the magnitude of impact is assessed as negligible, on high sensitivity receptors. There is therefore potential for an indirect, temporary, long-term effect of **Minor significance**, which is considered to be **Not Significant** in terms of the EIA Regulations.

Impacts on Surface Water and Groundwater Quality from Chemical Pollution and Sedimentation

10.8.47 As outlined during the construction phase, surface water and groundwater quality can be impacted by polluted run-off from the Site. Following the construction phase, there will also be less disturbance to sediments during the operational phase. Many of the activities that may have resulted in chemical pollution including refuelling and cement pouring, will not occur during the operational phase.

10.8.48 Activities which may result in chemical pollution during the operational phase would be from fuel spills from onsite vehicles. Best practice measures to mitigate potential chemical pollution including spill kits to be present within each vehicle will continue within the operational phase. Additional best practice measures, outlined within the CEMP, will be implemented to prevent impacts to surface water and groundwater quality from the Proposed Development. A Pollution Prevention Plan (PPP) will also outline mitigation including inspection and maintenance of vehicles, rapid response actions in the event of a spill, and person responsible for implementation.

10.8.49 Impact on surface water quality is assessed to be of negligible magnitude of impact on a high sensitivity receptor. This is assessed to be a direct, temporary, short-term effect of **Minor** significance and considered to be **Not Significant** in terms of the EIA Regulations.

10.8.50 Impact on groundwater quality is assessed to be of negligible magnitude on medium sensitivity receptors. This is assessed to be a direct, temporary, short-term effect of **Negligible** significance and considered to be **Not Significant** in terms of the EIA Regulations.

Decommissioning

10.8.51 The potential effects of the decommissioning phase will be similar to during construction. Due to reduced Site activity, impacts are predicted to be of the same or lesser magnitude, with resultant effects being the same or lesser significance to construction phase effects.

10.8.52 A Decommissioning Environmental Management Plan (DEMP) will be approved prior to decommissioning and secured by condition.

10.9 Additional Mitigation

10.9.1 As noted above, no significant potential construction phase environmental effects were identified, taking account of embedded primary and committed good practice mitigation, except for surface water quality and hydrologically connected receptors, including designated sites and PWS. Prior to additional mitigation, potential significance of effects to surface water quality, designated sites and PWS, are assessed to be **Moderate**.

10.9.2 Best practice and guidance to limit effects to water quality to watercourses and connected designated sites and PWS, are also outlined within the CEMP. This will include an emergency response plan in the event of a fuel or chemical spill, siting fuel, chemical, plant and vehicles outwith 10 m from watercourses, and installation of silt management measures. This will be visually monitored by the on-site ECoW throughout construction.

10.9.3 To ensure compliance with mitigation measures to protect surface waterbody water quality from the Proposed Development, water quality monitoring prior to, throughout and following construction will be undertaken, as outlined in **Technical Appendix 10.2** and within the outline CEMP.

10.9.4 A Water Quality Monitoring Plan (WQMP) will be prepared and agreed with DGC, in consultation with SEPA, prior to commencement of construction. The following sampling frequency is proposed and will be fully outlined within the CEMP:

- Monthly for 12 months prior to construction, following this a baseline monitoring report will be produced and maximum and minimum thresholds for parameters agreed with DGC and SEPA;
- Monthly throughout the construction phase; and
- Monthly for 12 months post-construction.

10.9.5 The WQMP will also include for water quality monitoring at the same sampling frequency outlined above at hydrologically connected PWS Craigdistant, Dallash, Glenshalloch, and River Cree Hatchery.

10.9.6 Following implementation of additional mitigation impact on surface water quality, designated sites and PWS is assessed to be of negligible magnitude on high sensitivity receptors. This is assessed to be a direct, temporary, short-term effect of **Minor** significance and considered to be **Not Significant** in terms of the EIA Regulations.

10.10 Assessment of Residual Effects

Construction

10.10.1 As noted above, no significant potential construction phase environmental effects were identified, taking account of embedded primary and committed secondary mitigation, except for surface waterbody water quality and hydrologically connected receptors, including designated sites and PWS.

10.10.2 Following implementation of additional secondary mitigation measures with accompanying water quality monitoring, the magnitude of impact is considered to be negligible on high sensitivity receptors. Therefore, there is potential for an indirect, temporary, short-term effect of **Minor significance,** this is considered to be **Not Significant** in terms of the EIA Regulations**.**

Operation

10.10.3 As noted above, no significant potential operational-phase environmental effects were identified, taking account of embedded and good practice mitigation. The level of potential

effect assessed for all operational phase impacts is minor to negligible, and is therefore **Not Significant** in terms of the EIA Regulations.

Decommissioning

10.10.4 The residual effects of the decommissioning phase will be similar to construction, however, due to reduced Site activity, these will be of lesser magnitude. Embedded and committed mitigation will be implemented in accordance with an approved DEMP.

10.11 Assessment of Cumulative Effect

10.11.1 Cumulative developments have been considered where they are located within the study area of 10 km from the Site. These developments are listed below in **Table 10.6.**

10.11.2 Operational developments are scoped out of consideration from cumulative effects. This is due to impacts to receptors being of greatest magnitude during the construction phase, and there being no operational wind farms within 10 km.

Table 10.6 Cumulative Developments Considered in the Assessment

Development	Phase	Distance from Proposed Development Turbine (approx. km)	Surface Water Catchment
Glenvernoch Wind Farm	Scoping	5.4 km	River Cree

10.11.3 Glenvernoch Wind Farm will likely require an EIAR, including a hydrology, hydrogeology and geology chapter which will assess potential impacts to surface water and groundwater receptors. The EIAR will require implementation of mitigation measures to ensure protection of any identified receptors. Additionally, the application will require a CEMP, schedule of mitigation, and will also be required to consider potential cumulative impacts from the Proposed Development.

10.11.4 It is considered that the cumulative effects on surface water and groundwater receptors will be no greater than **minor** (not significant).

10.12 Summary

10.12.1 Potential construction and operational effects include changes to surface water and groundwater flow and quality, compaction of soils, and impacts to designated sites and PWS.

10.12.2 While potential GWDTE were identified within 100 m and 250 m of infrastructure, following hydrological walkover and desk-based assessment, these were found to be ombrogenous and to be of low groundwater dependency.

10.12.3 While seven PWS sources were scoped into further assessment, following implementation of guidance and best practice measures, three PWS are considered to require additional mitigation. Implementation of a Water Quality Monitoring Plan (WQMP) is proposed to minimise any potential risk from the Proposed Development.

10.12.4 A PLHRA has identified that Proposed Development infrastructure is located in areas of negligible or low likelihood of a peat slide occurring, as outlined in **Technical Appendix 10.5.**

10.12.5 The mitigation measures set out in this Chapter will be included within a CEMP prior to commencement of construction activities. These mitigation measures are considered to be robust and implementable and will reduce the potential impacts on hydrological,

hydrogeological and geological receptors. A programme of water quality monitoring would also be implemented.

10.12.6 The significance of residual effects on geology, peat, hydrology and hydrogeology receptors following the implementation of these mitigation measures are considered to be minor to negligible significance and therefore **Not Significant** in terms of the EIA Regulations. Potential effects, mitigation measures and residual effects are summarised in **Table 10.7.**

Table 10.7 Summary of Residual Effects

Likely Significant Effect	Mitigation	Means of Implementation	Residual Effects
Construction			
Impacts on Surface Water Quality	• Minimum 50 m buffer from watercourses. • Use of existing infrastructure as far as practicable. • Implementation of mitigation measures in CEMP. • Drainage Strategy to be implemented. • Final design of watercourse crossings to be implemented. • Dewatering undertaken for as short a time as practicable. • Pre-construction ground investigation works. • Water Quality Monitoring Plan (WQMP) to be agreed and implemented. • Siting infrastructure to minimise peat excavation requirements. • Management, storage and restoration in	• Embedded design. • Good practice mitigation measures. • Outlined within CEMP, Drainage Strategy and WQMP. • Implementation by Principal Contractor. • Verification by ECoW.	Minor (Not Significant)
Impacts on Surface Water Flow			Minor (Not Significant)
Impacts to Groundwater Quality			Negligible (Not Significant)
Impacts to Groundwater Flow			Negligible (Not Significant)
Removal and Impact on Peat			Minor (Not Significant)
Peat Landslide Impact on Watercourses			Minor (Not Significant)
Compaction of Soils			Negligible (Not Significant)
Impacts to Private water supplies			Minor (Not Significant)
Impacts to Designated Sites (Galloway Oakwoods (SAC), Wood of Cree (SSSI), Lower River Cree (SSSI) and Cree Estuary (SSSI)			Minor (Not Significant)

Likely Significant Effect	Mitigation	Means of Implementation	Residual Effects
	line with the PMP.		
Operation			
Impacts on Surface Water Flow	• Embedded design and good practice mitigation • Implementation of a Drainage Strategy, to include trackside and cross drainage. • Regulation of watercourse crossings by CAR, to include maintenance and removing any blockages • Implementation of a Drainage Strategy including trackside and cross drainage • Implement best practice and correct storage of fuels and management plans in the event of spills. • Water Quality Monitoring Plan (WQMP) to be agreed and implemented.	• Embedded design. • Good practice mitigation measures. • Outlined within CEMP, Drainage Strategy and WQMP. • Implementation by Principal Contractor. • Verification by ECoW.	Minor (Not Significant)
Impacts on Fluvial Geomorphology			Minor (Not Significant)
Impacts to Groundwater Flow and Drying out of Peat			Minor (Not Significant)
Impacts on Surface Water and Groundwater Quality from Chemical Pollution and Sedimentation			Negligible to Minor (Not Significant)
Decommission			
All decommissioning effects are assessed as being the same as, or lesser than, construction phase effects.			

10.13 References

BGS (2015) Scotland's Aquifers and Groundwater Bodies. Available at: https://nora.nerc.ac.uk/id/eprint/511413/1/OR15028.pdf Accessed on 24 June 2024.

BGS (2020) Online GeoIndex Map Viewer. Available at: https://mapapps2.bgs.ac.uk/geoindex/home.html. Accessed on: 24 June 2024.

British Standards Institute (2015). BS5930:2015 Code of Practice for Site Investigation.

CIRIA. (2001). C532 Control of water pollution from construction sites: guidance for consultants and contractors. CIRIA, London.

CIRIA. (2015). C741 Environmental Good Practice on Site guide. 4th Edition. CIRIA, London.

DGC (2022) Solway Local Plan District (LPD 14) Flood risk management plan 2022-2028. Available at: https://www.dumgal.gov.uk/media/27017/Solway-Local-Flood-Risk-Management-Plan-Cycle-2/pdf/Solway-Local-Flood-Risk-Management-Plan-Cycle-2.pdf?m=1671615046557 Accessed on 25 June 2024.

James Hutton Institute (2023) Soil Classification. Available at: https://www.hutton.ac.uk/soil-maps/ Accessed on 25 June 2024.

Kaya Consulting Ltd (2015) Newton Stewart Flood Study. Available at: https://dumgal.gov.uk/media/19637/Newton-Stewart-Kaya-Flood-Report/pdf/Kaya_Flood_Report.pdf Accessed on 25 June 2024.

Kaya Consulting Ltd (2017) Newton Stewart: Outline Flood Mitigation Options – Addendum. Available at: https://www.dumgal.gov.uk/media/19636/Newton-Stewart-Kaya-Mitigation-Options/pdf/kaya_mitigation.pdf Accessed on 25 June 2024.

MetOffice (2016) Western Scotland: climate. Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/weather/regional-climates/western-scotland_-climate-met-office.pdf. Accessed on 26 June 2024.

NatureScot. (2019). Good practice during wind farm construction, 4th edition. Available at: https://www.nature.scot/guidance-good-practice-during-wind-farm-construction. Accessed on: 24 June 2024.

NatureScot (2022) SiteLink Map Search. Available at: https://sitelink.nature.scot/map. Accessed on: Accessed on 24 June 2024.

Dumfries and Galloway Council (2019) Adopted Local Development Plan 2. Available at: https://www.dumgal.gov.uk/media/21885/Adopted-Local-Development-Plan-2/pdf/Adopted_LDP2_OCTOBER_2019_web_version.pdf?m=1641567969937 Accessed on 26 June 2024.

Scotland's Soils (2022) Carbon and Peatland Map 2016. Available at: https://map.environment.gov.scot/Soil_maps/?layer=1# Accessed on: 24 June 2024.

Scotland's Soils (2022) National Soil Map of Scotland. Available at: https://map.environment.gov.scot/Soil_maps/?layer=1# Accessed on: 24 June 2024.

Scottish Government (2006). The Private Water Supplies (Scotland) Regulations 2006. Available at: https://www.legislation.gov.uk/ssi/2006/209/contents/made Accessed on: 1 July 2024.

Scottish Government (2009). Flood Risk Management (Scotland) Act 2009. Available at: https://www.legislation.gov.uk/asp/2009/6/contents Accessed on: 1 July 2024.

Scottish Government (2009). The Contaminated Land (Scotland) Regulations 2000 (as amended). Available at: https://www.legislation.gov.uk/ssi/2000/178/contents/made Accessed on: 1 July 2024.

Scottish Government (2009). The Scottish Soil Framework. Available at: https://www.gov.scot/publications/scottish-soil-framework/ Accessed on: 26 June 2024.

Scottish Government (2011). The Water Environment (Controlled Activities) (Scotland) Regulations 2011. Available at: https://www.legislation.gov.uk/ssi/2011/209/contents/made Accessed on: 26 June 2024.

Scottish Government (2011). Water Environment and Water Services (Scotland) Act 2003. Available at: https://www.legislation.gov.uk/asp/2003/3/contents Accessed on: 28 June 2024.

Scottish Government (2013). The Water Resources (Scotland) Act 2013. Available at: https://www.legislation.gov.uk/asp/2013/5/enacted Accessed on: 28 June 2024.

Scottish Government (2017). The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017. Available at: https://www.legislation.gov.uk/ssi/2017/101/contents/made Accessed on: 26 June 2024.

Scottish Government, SNH, SEPA (2017). Guidance on Developments on Peatland. Available at: https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2018/12/peatland-survey-guidance/documents/peatland-survey-guidance-2017/peatland-survey-guidance-2017/govscot%3Adocument/Guidance%2Bon%2Bdevelopments%2Bon%2Bpeatland%2B-%2Bpeatland%2Bsurvey%2B-%2B2017.pdf Accessed on: 26 June 2024.

Scottish Government (2017). Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments. Available at: https://www.gov.scot/publications/peat-landslide-hazard-risk-assessments-best-practice-guide-proposed-electricity/documents/ Accessed on: 26 June 2024.

Scottish Government (2017). The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017. Available at: https://www.legislation.gov.uk/ssi/2017/282/contents/made Accessed on: 26 June 2024

Scottish Government (2020). Scottish Planning Policy. 2020. Available at: https://www.gov.scot/publications/scottish-planning-policy/ Accessed on: 26 June 2024.

Scottish Government. (2022). Planning Advice Notes. Available at: https://www.gov.scot/collections/planning-advice-notes-pans/ Accessed on: 26 June 2024.

Scottish Government (2022) National Planning Framework 4: revised draft. Available at: https://www.gov.scot/publications/national-planning-framework-4/ Accessed on 01 July 2024.

SEPA (2012). Developments on Peatland: Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste. Available at: https://www.gov.scot/publications/assessment-of-peat-volumes-reuse-of-excavated-peat-and-minimisation-of-waste-guidance/ Accessed on: 27 June 2024.

SEPA. (2009). Groundwater Protection Policy for Scotland, Version 3 Environmental Policy Number 19. Available at: https://www.sepa.org.uk/media/34371/groundwater-protection-policy-for-scotland-v3-november-2009.pdf Accessed on: 25 June 2024.

SEPA (2017) Developments on Peat and Off-Site Uses of Waste Peat. Available at: https://www.sepa.org.uk/media/287064/wst-g-052-developments-on-peat-and-off-site-uses-of-waste-peat.pdf Accessed on: 27 June 2024.

SEPA. (2017). Land Use Planning System SEPA Guidance Note 31 Available at: https://www.sepa.org.uk/media/144266/lups-gu31-guidance-on-assessing-the-impacts-of-development-proposals-on-groundwater-abstractions.pdf Accessed on: 25 June 2024.

SEPA. (2017). Land Use Planning System SEPA Guidance Note 4. Available at: https://www.sepa.org.uk/media/136117/planning-guidance-on-on-shore-windfarms-developments.pdf Accessed on: 26 June 2024.

SEPA (2019) Technical Flood Risk Guidance for Stakeholders. Available at: https://www.sepa.org.uk/media/162602/ss-nfr-p-002-technical-flood-risk-guidance-for-stakeholders.pdf Accessed on: 27 June 2024.

SEPA. (2020). Online Water Environment Hub and Classification Hub. Available at: https://www.sepa.org.uk/data-visualisation/water-environment-hub/ Accessed on: 25 June 2024.

SEPA. (2021). Supporting Guidance (WAT-SG-75) – Sector Specific Guidance: Construction Sites. Available at: https://www.sepa.org.uk/media/340359/wat-sg-75.pdf Accessed on: 24 June 2024.

SEPA (2022) Flood Maps. Available at: https://map.sepa.org.uk/floodmaps Accessed on: 26 June 2024.

SEPA (2022). Guidance for Pollution Prevention. Available at: https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/ Accessed on: 1 July 2024.

SEPA (2022) Scotland's Environment Map. Available at: https://www.environment.gov.scot/maps/scotlands-environment-map/ . Accessed on: 26 June 2024.

SEPA (2022) Solway Local Plan District (LPD 14) Draft flood risk management plans 2022-2028. Available at: https://consultation.sepa.org.uk/evidence-and-flooding/flood-risk-management-plan-solway/supporting_documents/LPD14%20Solway%20full%20FRMP%20consultation%20document.pdf Accessed on: 26 June 2024.

SEPA. (2022). The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) A Practical Guide, Version 10.1. Available at https://www.sepa.org.uk/regulations/water/ Accessed on: 1 July 2024.

SEPA (2023) Waste Sites and Capacity Tool. Available at: https://www.sepa.org.uk/data-visualisation/waste-sites-and-capacity-tool/ . Accessed on 27 June 2024.

Sweco UK Ltd (2017) Newton Stewart Flood Protection Scheme. Available at: https://www.dumgal.gov.uk/media/19639/Newton-Stewart-Value-Management-meeting/pdf/VM_Report.pdf Accessed on 26 June 2024.

UK Government (1990). Environmental Protection Act 1990. Available at: https://www.legislation.gov.uk/ukpga/1990/43/contents Accessed on: 26 June 2024.

UK Government (1994). The Conservation (Natural Habitats, & c.) Regulations (1994, as amended Scotland). Available at: https://www.legislation.gov.uk/uksi/1994/2716/contents/made Accessed on 27 June 2024.

UK Government (1995). Environment Act 1995. Available at: https://www.legislation.gov.uk/ukpga/1995/25/contents Accessed on: 25 June 2024

11 Traffic and Transport

11.1 Introduction

11.1.1 This Chapter considers traffic and transport impacts and potential significant environmental effects resulting from the construction of the Proposed Development in accordance with the Institute of Environmental Management and Assessment (IEMA) Guidelines for Environmental Assessment of Traffic and Movement July 2023 and the scope agreed with Transport Scotland (TS) and Dumfries and Galloway Council (DGC). An assessment of traffic and transport operational and decommissioning impacts and effects has been scoped out, as agreed with both TS and DGC.

11.1.2 The specific objectives of the Traffic and Transport Chapter are to:

- describe the current baseline context;
- describe the assessment methodology and significance criteria used to inform the assessment;
- describe the potential environmental effects and cumulative effects;
- describe any mitigation measures proposed to address the likely significant effects; and
- assess the residual effects remaining following the implementation of mitigation measures.

11.1.3 This Chapter is supported by:

- **Technical Appendix 11.1** Abnormal Loads Route Assessment (ALRA)

11.1.4 **Figure 11.1** Traffic and Transport Study Area and **Figure 11.2** Traffic Count Locations should be read in conjunction with this Chapter.

11.2 Legislation, Policy and Guidance

11.2.1 The following policy and guidance has informed this Chapter:

- National Planning Framework 4 (NPF4);
- TS: Transport Assessment Guidance (TAG);
- DGC Local Development Plan 2;
- Design Manual for Roads and Bridges (DMRB); and
- IEMA Guidelines: Environmental Assessment of Traffic and Movement.

11.3 Consultation

11.3.1 **Table 11.1** presents comments received on the submitted Environmental Impact Assessment (EIA) Scoping Opinion relating to traffic and transport. A response is provided to illustrate how consultee comments have been addressed as part of this Chapter.

Table 11.1 - Scoping Comments and Response

Consultee	Consultation Response	Applicant Action
Transport Scotland	"Chapter 10 of the SR [Scoping Report] presents the proposed methodology for the assessment of Transport and Access. We note that the thresholds as indicated within the Institute of Environmental Management and Assessment (IEMA) Guidelines for the Environmental Assessment of Road Traffic are to be used as a screening process for the assessment. Transport Scotland is in agreement with this approach. The SR also indicates that potential environmental impacts such as severance, driver delay, pedestrian delay, pedestrian amenity and accidents and safety etc will be considered and assessed where the IEMA Guideline thresholds for further detailed assessment are breached. These specify that road links should be taken forward for detailed assessment if: • Traffic flows will increase by more than 30%, or • The number of HGVs will increase by more than 30%, or • Traffic flows will increase by 10% or more in sensitive areas. The SR states that the proposed Study Area will comprise the M8, M74 / A74(M) and M6, as well as the A75(T) and the A712. We note that base traffic data for these routes will be obtained from the Department for Transport (DfT) website and supplemented by an Automatic Traffic Count (ATC) survey on the A712. This is considered appropriate, however, we would add that an alternative source of traffic data is Traffic Scotland's National Traffic Data System. Transport Scotland would add that base traffic data will require to be factored to the peak construction year flows using National Road Traffic Forecasts (NRTF) Low Growth. The SR states that any impacts associated with the operational and decommissioning phases of the development are to be scoped out of the EIA. We would consider this to be acceptable in this instance.	It can be confirmed that the methodology adopted in this assessment is the same as suggested by comments received from TS. Traffic counts have been taken from the Traffic Scotland National Traffic Data System as opposed to Department for Transport (DfT) Traffic Counts as suggested by TS. Swept Path Analysis is included in **Technical Appendix 11.1.**

Consultee	Consultation Response	Applicant Action
	We understand that the proposed Port of Entry for Abnormal and Indivisible Load deliveries is King George V Docks in Glasgow. The SR states that an Abnormal Loads Routes Assessment (ALRA) Report for Abnormal Indivisible Loads (AIL) will be provided. Transport Scotland will require to be satisfied that the size of wind turbines proposed can negotiate the selected route and that their transportation will not have any detrimental effect on structures within the trunk road route path. The ALRA should identify key pinch points on the trunk road network and swept path analysis should be undertaken with details provided with regard to any required changes to street furniture or structures along the route. We would also state that any proposed changes to the trunk road network must be discussed and approved (via a technical approval process) by the appropriate Area Managers prior to the movement of any abnormal loads."	
Dumfries and Galloway Council	"Roads Officer has no objection in principle to the proposal and has no issue with the proposed assessment scope or methodology. Makes a number of observations (to be considered in full by transport consultant). Points of particular note include: - It should be noted that whilst the A712 is a public road which is utilised by forestry traffic and suitable for the use by Heavy Goods Vehicles (HGVs), it should be noted that there have been no wind farm developments along this stretch of road. As such it will require strengthening and widening in sections to allow for use during AIL movements. There are several sections along the A712 between the A75(T) and the forestry haul road which are severely restricted in geometry, width and forward visibility. Therefore, it would be appropriate that accommodation works would be necessary (including widening and carriageway strengthening), which may require the use of 3rd party land, outwith the public road boundary. - Routes leading to the Site cross a number of bridges/structures, many of which may be unsuitable for heavy HGVs and larger AILs, and that have limitations on safe axle loadings and/or restricted parapet widths. Where a proposed access route crosses bridges and culverts, the Applicant will require to get approvals and safe axle loadings (in respect of those structures) from the Council's Engineering Services (Bridges and Structures) unit."	It is confirmed that stakeholders including Transport Scotland and DGC Bridges team have been consulted as part of the preparation of this EIA Chapter. This EIA Chapter also includes details on traffic management within a Construction Traffic Management Plan (CTMP) Framework. Swept Path Analysis is included in **Technical Appendix 11.1**.

11.4 Assessment Methods and Significance Criteria

Scope of Assessment

11.4.1 The methodology detailed in the Chartered Institution of Highways and Transportation's (IHT) 'Guidelines for Traffic Impact Assessments' (IHT, 1994), recommends that the environmental impact of the traffic generated by a proposed development should be assessed taking cognisance of the Institute of Environmental Assessment (IEA), now Institute of Environmental Management and Assessment (IEMA) with an updated Guidance document titled 'Environmental Assessment of Traffic and Movement' published in July 2023. This forms the basis for the assessment included in this Chapter and the document is hereafter referred to as IEMA Guidelines.

11.4.2 As defined by the IEMA Guidelines the scope of the assessment is therefore concerned with public road links which Proposed Development construction traffic is anticipated to use to access and egress the Site. As such, no review of the private tracks leading to the site is included within this assessment. The road links considered within the study area, as agreed with TS, are described in more detail in the following paragraphs and shown in **Figure 11.1**:

- The first section of the study area concerns the route used to deliver abnormal loads to the Site. Abnormal loads are expected to travel from King George V (KGV) Docks in Glasgow to the M8 Motorway (M) at Junction 25A before continuing eastbound to join the M74(M) at M74(M) Junction 1.
- The route then continues southbound on the M74(M)/A74 Trunk Road (T) to the Scotland / England border (approximately 140 km). At this point the A74(T) joins the M6(M) and the route continues southbound to M6(M)Junction 42 Golden Fleece Interchange.
- From here, the route takes the sixth exit of the Golden Fleece Interchange, essentially turning back on itself to head northbound on the M6(M) and subsequently the A74(T) when back across the Scotland / England border. This movement is required to allow abnormal load vehicles to then exit the A74(T) at Junction 22 and travel westbound on the A75(T) at Gretna. From here the route continues westbound on the A75(T) for approximately 115 km. At this point the route joins the A712 and travels northbound for approximately 5.9 km to an access point on to private land upon which the Site is located. A private access track is available via a priority junction which leads to the Site. Please refer to **Technical Appendix 11.1** and **Figure 11.1**.
- Other construction traffic (non-abnormal loads) would arrive to the Site from the A712, however may come from either a westerly or easterly direction on the A75(T). Those travelling from a westerly direction would connect to the A712 via the A75(T) from Stranraer. Those travelling from the east would connect from Gretna via Dumfries.

Methodology

Overview

11.4.3 The assessment methodology in this Chapter is based on that set out in **Chapter 4** of this EIA, however is adjusted to take account of the specific guidance and standards for assessments relating to traffic and transport, namely the IEMA Guidelines and DMRB.

11.4.4 The IEMA Guidelines do not apply specifically to temporary traffic movements associated with construction, however, have been adopted for the purposes of this assessment. The assessment methods employed in this Chapter conform with those set out in the IMEA Guidelines and therefore focus on:

- potential impacts on local roads and the users of those roads; and
- potential impacts on land uses and environmental resources fronting those roads, including the relevant occupiers and users.

11.4.5 The IEMA Guidelines state that the perceptible impact of changes in traffic flow on the environment is less sensitive than changes in traffic flow at junctions on the surrounding network. The Guidelines suggest that the following criteria are adopted to assess whether public road links are to be the subject of 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%)"; and
- "Rule 2 – include highway links of high sensitivity where traffic flows have increased by 10% or more".

11.4.6 The IEMA Guidelines state that projected changes in traffic of less than 10% over the course of a day creates no discernible environmental impact (the nature of the environmental impacts considered are described below), given that daily variations in background traffic flow may fluctuate by this amount, and that a 30% change in traffic flow represents a reasonable threshold for including a public road link within the assessment. Although construction traffic movements are temporary in duration, an increase in traffic could adversely affect the users of road links, and the land uses that front them, including the relevant occupiers and users. Consequently, the receptors that have been assessed are the public road links which would be used by Proposed Development construction traffic.

11.4.7 In accordance with IEMA Guidelines, the following environmental effects related to traffic and transport are to be considered on public road links where a full assessment of effects is warranted e.g. where the anticipated change in traffic flow exceeds Rule 1 or 2 thresholds:

- severance;
- driver delay;
- pedestrian delay and amenity;
- fear and intimidation;
- road safety; and
- dust and dirt.

11.4.8 Consequential impacts of increased traffic to, from and on the Site such as carbon emissions are not considered within this chapter of the EIA Report. The carbon emissions from construction and operational traffic of the Proposed Development are accounted for in **Chapter 13: Climate Change** and the carbon calculator attached in **Technical Appendix 13.1.** Air Quality impacts were scoped out of the EIA.

11.4.9 Receptors are locations or land uses categorised by their degree of sensitivity (or Environmental Value) with guidance provided in the DMRB, LA 104 Revision 1 (DMRB, 2020).

11.4.10 IEMA Guidelines identify a list of potential sensitive receptors which should be accounted for in the process of any assessment. This list includes:

- people at home;
- people at work;
- sensitive and/or vulnerable groups;
- locations with concentrations of vulnerable users (hospitals, places of worship, schools);
- retail areas;
- recreational areas;
- tourist attractions;
- collision clusters; and
- junctions and highway links at or over capacity.

11.4.11 **Table 11.2** provides the guidance used in this assessment to quantify the sensitivity of the receptors to the effect of the predicted traffic associated with the construction of the Proposed Development.

Table 11.2 - Sensitivity of Receptors

Sensitivity	Receptor Description
Very High	Nationally or internationally important site with special sensitivity to increase in road traffic.
High	Regionally important site with special sensitivity to increases in road traffic.
Medium	Residential (with frontage onto road under consideration), educational, healthcare, leisure, public open space or town centre / local centre land use.
Low	Employment or out of town retail land use, such as retail park.
Negligible	No adjacent settlements.

11.4.12 On the basis of the criteria set out in **Table 11.2**, and the list of potential sensitive user groups listed within the IEMA Guidelines, the M8(M), M74(M) / A74(T) and M6(M) motorways are considered to have sensitivity levels corresponding to a Very High level of sensitivity, with the A75(T) as having High Sensitivity and the A712 as having Medium Sensitivity.

EIA Approach, difficulties and uncertainties

11.4.13 This chapter has been prepared following IEMA Guidance and also informed by a site visit and preparation of an ALRA (Technical Appendix 11.1). Through preparation of the ALRA it was established that traditional wind turbine towers would not be transportable to site via the trunk and local road networks due to transport dimensions required for a 165m hub height. As such, a hybrid tower configuration is proposed. Whilst the hybrid tower does not constitute the worst case in terms of dimensions of components it does create additional traffic generation due to the hybrid tower being broken up in to more sections for transport than a traditional tower. As such, from a traffic generation perspective this configuration does represent a worst case.

11.4.14 In order to calculate a robust scenario, information was provided by the Applicant regarding the materials required and the size of the average loads associated with construction vehicles, excluding staff vehicles. **Table 11.8** includes an estimate of construction vehicles required for each task during the construction phase. This includes a robust worst-case assumption that aggregate materials would be imported from off-site. It is, however, the intention of the Applicant that up to 100% of materials could be obtained from borrow pits on-site. The result of this would be a lower number of trips (potentially zero) relating to the importing of aggregate materials and therefore a lower traffic impact.

11.4.15 A final assumption relates to severance. The IEMA Guidelines advise that "severance is the perceived division that can occur within a community when it becomes separated by major transport infrastructure". The IEMA Guidelines recognise that specific measurement or prediction of severance can be extremely difficult, given there is no simple formula to predict the relationship between traffic and severance.

Study Area

11.4.16 The study area for the assessment of traffic and transport effects has been identified considering the assessment thresholds set within the IEMA Guidelines.

11.4.17 The proposed study area (**Figure 11.1**) includes the transport network which would be used to access the Proposed Development by construction vehicles and staff. Sensitive receptors include for example, but are not limited to: private homes, bus passengers, schools, public rights of way and active travel routes along or immediately adjacent to this transport network are included in the study area.

11.4.18 From the proposed Port of Entry for abnormal load deliveries at KGV Docks in Glasgow, the study area predominantly covers the M8(M), M74(M) / A74(T) and M6(M) motorways. These are all national speed limit roads with a minimum of two lanes provided in each direction for the entirety of the route.

11.4.19 The study area also covers the A75(T) from Gretna to Stranraer. The A75(T) is predominantly a single carriageway route operating at national speed limit. National Cycle Route (NCN) 7 crosses the A75(T) to the north of Girthon.

11.4.20 The A75(T) passes through a number of small settlements, although bypasses larger towns including Dumfries, Gretna and Annan. Footway provision is provided on the A75(T) as it passes through settlements and the A75(T) is also a bus route.

11.4.21 The Breedon Boreland, Barlockhart and Tongland Quarries are all located off of the A75(T) to the east (Boreland (approx. 25km from Newton Stewart) and Barlockhart (approx. 22km from Newton Stewart)) and west (Tongland (approx. 30km from Newton Stewart)) of Newton Stewart. These have been assumed as the best case suppliers to minimise travel distances to the site for the construction of the Proposed Development, subject to applicable commercial agreements.

11.4.22 Finally, the study area includes the A712 before joining a privately owned forestry track leading to the Site where the route also crosses Old Edinburgh Road.

11.4.23 The A712 is a local single carriageway road which operates at national speed limit in proximity to the Site. There are no pedestrian facilities provided on the A712 and cyclists are expected to cycle on the carriageway. The NCN 7 crosses the A712 immediately north of it's junction with the A75(T). The A712 is also signposted as a local cycle route. There are approximately six properties located off of the A712 between it's junction with the A75(T) and access to the FLS track.

Desk Study / Field Survey

11.4.24 A desk-based study and field survey (undertaken on 3 August 2023) was undertaken which focussed on the public road network in the vicinity of the Site.

Magnitude of Impact

11.4.25 In terms of magnitude of impact (or magnitude of change), the IEMA Guidelines point to changes (increases) in traffic in excess of 30%, 60% and 90% as being representative of 'Low', 'Medium' and 'High' impacts respectively. The categories shown in **Table 11.3** reflect IEMA Guidelines and have been used in this assessment to quantify the magnitude of impact of the predicted traffic associated with the Proposed Development.

Table 11.3 - Magnitude of Change/Impact

Magnitude	Description
High	Considerable deterioration/improvement in local conditions or circumstances (>90% increase in traffic)
Medium	Readily apparent change in conditions or circumstances (60 – 90% increase in traffic)
Low	Perceptible change in conditions or circumstances (30 – 60% increase in traffic)
Negligible	Very small change in conditions or circumstances (<30% increase in traffic)

11.4.26 Where existing traffic levels are exceptionally low (for example, on unclassified roads), any increase in traffic flow is likely to result in a predicted increase in traffic levels which exceeds these thresholds. Where this situation presents itself, it is important to consider any increase both in terms of its relative increase in respect of existing traffic flows, as well as the overall total flow in respect to the available capacity of the section of road being considered.

11.4.27 The number of abnormal load deliveries anticipated for the Proposed Development is low in terms of traffic volumes, when compared to the baseline traffic flows on the delivery route (see **Table 11.11**). However, the movement of abnormal loads on the road network can sometimes result in other road users being held at junctions since the largest vehicles may be slow moving or require the use of the full carriageway at sections along the route. It is also acknowledged that abnormal load movements can have the potential to impact upon pedestrians and other vulnerable road users due to their size. The identification of the magnitude of impact as a result of the movement of abnormal loads on the delivery route is assigned on a qualitative basis, using professional judgment rather than numerical thresholds.

Significance Criteria

11.4.28 The significance of each effect is considered against the criteria within the IEMA Guidelines where possible, and also DMRB LA 104 Revision 1 (DMRB, 2020). The IEMA Guidelines state that *"for many effects there are no simple rules or formulae which define the thresholds of significance and there is, therefore, a need for interpretation and judgement on the part of the assessor, backed-up by data or quantified information wherever possible. Such judgements will include the assessment of the numbers of people experiencing a change in environmental impact as well as the assessment of the damage to various natural resources."*

11.4.29 The assessment of the significance of the effect of traffic changes along the identified study routes as a result of the construction of the Proposed Development should have regard to both the magnitude of the traffic increase (change / impact) and the receptor's environmental value (sensitivity). The level of significance can be determined from the matrix in **Table 11.4** (based upon the guidance given in DMRB LA104 Revision 1 (DMRB, 2020)).

11.4.30 Any combination of magnitude of change and sensitivity of receptor which results in a significance of Moderate or greater is considered to be Significant and require mitigation to resolve. Any combination which results in a significance of Minor or lower is considered to be Not Significant and does not require any mitigation.

Table 11.4 - Approach to Significance of Effects

Magnitude of Change / Impact	Sensitivity of Receptor				
	Very High	High	Medium	Low	Negligible
High	Major	Major	Moderate	Moderate	Minor
Medium	Major	Moderate	Moderate	Minor	Negligible
Low	Moderate	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Minor	Negligible	Negligible	Negligible

11.5 Baseline

Current Baseline

General

11.5.1 The study area includes the public road links which would be used by construction traffic to access and egress the Site and the following sensitive receptors:

M8(M)

11.5.2 The M8(M) forms part of the strategic trunk road network and runs from Greenock to Edinburgh. The study area focusses specifically on a section of the M8(M) between Junction 26 at KGV Docks to Junction 22 at Cessnock in Glasgow.

11.5.3 The M8(M) is a motorway class road with national speed limit and three lanes in each direction. For a 'Motorway' with three lanes, DMRB TA 79/99 states the two-way capacity over a 24-hour period would be 67,200 vehicles in an urban area. Whilst TA79/99 was withdrawn previously by DMRB, TS have stated that this document is still applicable to trunk road assessment in Scotland.

11.5.4 The M8(M) is designated as having Very High Sensitivity.

11.5.5 In accordance with IEMA Guidelines there are no sensitive receptors considered as part of this assessment on the M8(M) as motorway classified roads are not identified as being sensitive to changes in traffic nor do they provide an active frontage to other receptor types which may be considered as sensitive.

M74(M) / A74(T)

11.5.6 The M74(M) / A74(T) runs from Glasgow to the Scotland / England border at Gretna. The M74(M) / A74 (T) forms part of the strategic trunk road network and has a minimum of two lanes in each direction and national speed limit. As stated in DMRB TA79/99 the two-way capacity over a 24-hour period would be 67,200 vehicles in an urban area. The M74(M) / A74 (T) runs through areas which could be considered both rural and urban. As such the capacity over a 24-hour period is taken as a minimum of 25,000 vehicles and a maximum of 67,200 vehicles in accordance with DMRB TA 46/97, which is also endorsed by TS.

11.5.7 The M74(M) / A74(T) is designated as having Very High Sensitivity.

11.5.8 In accordance with IEMA Guidelines there are no sensitive receptors considered as part of this assessment on the M74(M) / A74(T) as motorway classified roads are not identified as being sensitive to changes in traffic nor do they provide an active frontage to other receptor types which may be considered as sensitive.

M6(M)

11.5.9 The M6(M) forms part of the motorway network in England. The M6(M) runs from the Scotland / England Border to a junction with the M1(M) east of Coventry.

11.5.10 Within the study area the M6(M) has three lanes in each direction and a national speed limit. As such, for the purposes of this EIA it is assumed that the M6(M) would operate with a capacity of 25,000 vehicles to 67,200 vehicles depending in rural and urban areas respectively.

11.5.11 In accordance with IEMA Guidelines there are no sensitive receptors considered as part of this assessment on the M6(M) as motorway classified roads are not identified as being sensitive to changes in traffic nor do they provide an active frontage to other receptor types which may be considered as sensitive.

A75(T)

11.5.12 The A75(T) forms part of the strategic trunk road network running from Gretna at the eastern end to Stranraer in the west, bypassing Dumfries, Castle Douglas and Newton Stewart.

11.5.13 The A75(T) is predominantly a single carriageway road with overtaking sections in places. It has an approximate width of 7.3 m and is generally of a good condition and geometric standard. The speed limit of the road varies depending on the location, between national speed limit and 30 mph through settlements. No formal cycleways or footways are provided however, footways of approximately 2 m width and street lighting are provided within settlements such as Dumfries, Castle Douglas, Newton Stewart and Stranraer.

11.5.14 The National Cycle Route NCN7 travels along short sections of the A75(T) with a mixture of both on and off-road sections. NCN7 crosses the A75(T) at one location approximately 20km west of Castle Douglas.

11.5.15 No formal crossing infrastructure for pedestrians or cyclists exists outwith the town/village centres of Dumfries, Castle Douglas, Newton Stewart and Stranraer, although there is limited requirement to cross the A75(T) in rural environments. Crossing facilities in the town/village centres are provided in the form of dropped kerbs and tactile paving.

11.5.16 For a 'Rural–good single 7.3 m' road which this section of A75(T) would be considered as, DMRB states the approximate two–way capacity of such a link as 28,800 two-way vehicles in a 24–hour period.

11.5.17 There are a number of bus stops along the A75(T) which are served by the following bus routes:

- DGC Buses – 555, and 410 buses provide local services between Dumfries, Kirkcudbright and Stranraer;
- McCalls – 385, 521, 502, 503 buses provide services between Annan, Laurieston and Castle Douglas;
- Stagecoach – 79, 246, 501, 500, 420, x75 and 407 buses provide services between Dumfries, Annan, Whitesands, Castle Douglas, Stranraer, Newton Stewart, Girvan and Drummore; and
- Houston's – 117 and 43 buses provide local services between Dumfries, Lockerbie, Kirkcudbright and Gatehouse of Fleet.

11.5.18 All construction related traffic (abnormal loads, construction HGVs and staff vehicles) would utilise sections of the A75(T) to reach the Site access (north and south of the Site), however abnormal loads would approach from the east only (from KGV Docks via Gretna).

11.5.19 The A75(T) is designated as having High sensitivity and Key sensitive receptors along the A75(T) include:

- Four roundabout junctions at Dumfries;
- Cyclists on NCN7;
- Bus Passengers using services on the A75(T);
- Dumfries and Galloway Royal Infirmary;
- Castle Douglas Hospital; and
- Galloway Community Hospital.

A712

11.5.20 The A712 is a single carriageway road travelling between Newton Stewart and Crocketford. The road passes through a number of small settlements such as New Galloway but is generally rural in nature and has approximately four properties with direct frontage to the road within the study area.

11.5.21 For a 'Rural single' road with a width generally between 5.8 m and 6.5 m, which this section of A712 would be considered as, DMRB states the approximate two-way capacity of such a link as 13,000 two-way vehicles in a 24-hour period.

11.5.22 A local, signposted cycle route travels along the A712, however, no formal infrastructure for cyclists is provided.

11.5.23 At the access to the Site the A712 continues in a northerly direction whilst access to the forestry track leading to the Site is priority controlled.

11.5.24 An indicative drawing of the entrance to the Site from the A712 is provided in **Figure 2.5**.

11.5.25 It is understood through correspondence with DGC that sections of the A712 may require mitigation works to accommodate larger vehicles. This is considered in **Technical Appendix 11.1**.

11.5.26 The A712 is designated as having Medium sensitivity and sensitive receptors along the A712 include residents of properties fronting on to the road within the study area.

Old Edinburgh Road

11.5.27 Old Edinburgh Road is a single-track road originating in Minnigaff near Newton Stewart, and travels approximately 7.5km north-east generally following Penkiln Burn to the west of the A712.

11.5.28 Construction related vehicles would be required to use a section of the road approximately 150m in length including Auchinleck Bridge, connecting two sections of the FLS track.

11.5.29 The section of Old Edinburgh Road which will be used by construction related vehicles is designated as having Negligible sensitivity with no sensitive receptors along the route.

11.5.30 An indicative drawing of the junction on Old Edinburgh Road is provided in **Figure 2.6**.

Traffic Counts

11.5.31 Baseline traffic flow data for the A75(T) was obtained *from Traffic Scotland's National Traffic Data System* online database which includes data for trunk roads. This source was suggested by TS as an alternative to the DfT Counters within their scoping opinion response. 2023 Baseline counts have been utilised as full results along the A75(T) are not available for 2024. It was agreed during scoping that traffic counts on the M8(M), M74(M) and M6(M) are not required as the traffic impact on these roads caused by the Proposed Development would be negligible.

11.5.32 **Table 11.5** indicates the baseline two-way Average Annual Daily Traffic Flows (AADT) along routes within the study area, and the percentage of traffic which is classified as HGVs.

11.5.33 Furthermore, traffic counts were commissioned on the A712 between 3 May 2024 and 9 May 2024 to further inform the assessment. No traffic counts have been gathered along Old Edinburgh Road.

11.5.34 Baseline traffic counts are shown in **Table 11.5**. Traffic count locations are shown in **Figure 11.2**.

Table 11.5 - Baseline Traffic Counts

Counter No. on A75(T) (unless specified)	2023 Baseline AADT	2023 Baseline HGV	% HGV
ATCW020	10,399	2,953	28.4%
115042	10,942	1,849	16.9%
ATC09009	8,591	2,474	28.8%
ATC09040	11,136	2,706	24.3%
JTC00374	11,056	1,868	16.9%
ATC09011	13,366	2,914	21.8%
ATC09026	11,414	1,301	11.4%
ATC09029	16,100	2,431	15.1%
ATC09034	14,054	2,965	21.1%
ATC09036	16,241	2,095	12.9%
ATCW022	11,180	2,493	22.3%
JTC00375	9,316	2,022	21.7%
115321	9,072	1,415	15.6%
ATCW023	9,674	1,983	20.5%
ATC09015	6,082	1,770	29.1%
ATC09016	6,433	1,801	28.0%
ATC09017	8,835	2,076	23.5%
JTC00376	6,253	2,582	41.3%
ATC09021	6,364	1,222	19.2%
JTC08196	5,101	1,178	23.1%
ATC09023	5,397	1,678	31.1%
JTC00377	4,621	1,372	29.7%
JTC00119	4,140	1,064	25.7%
JTC00118	7,309	1,637	22.4%
JTC00117	5,676	868	15.3%
Manual AADT Count on A712 by Streetwise Services	646 (2024 Count Data)	182 (2024 Count Data)	28.0%

Source: Traffic Scotland's National Traffic Data System / Manual ATC Count on A712

Road Safety

11.5.35 The Crashmap website has been utilised to determine the number of accidents that have occurred in the previous five years (2018–2022) on the A75(T) and A712. Motorway sections of the study area have been removed from consideration as the traffic impact on these roads caused by the Proposed Development would be negligible. The results of this investigation are indicated by **Table 11.6** with additional commentary provided on serious and fatal accidents if applicable. Accidents have been attributed to the nearest counter location with a section of road assigned to each counter.

Table 11.6 - Road Accident Statistics

Counter No. / Road	Road Length	Slight	Serious	Fatal	Comment
ATCW020 – A75(T)	1.04km	4	1	0	No grouping of accidents
115042- A75(T)	8.94km	2	2	0	No grouping of accidents
ATC09009- A75(T)	3.29km	1	0	1	No grouping of accidents
ATC09040- A75(T)	1.42km	3	0	1	No grouping of accidents
JTC00374- A75(T)	14.78km	5	4	1	No grouping of accidents
ATC09011- A75(T)	2.91km	0	0	0	
ATC09026- A75(T)	2.26km	0	2	0	No grouping of accidents
ATC09029- A75(T)	2.29km	17	8	0	Accident rate higher due to multiple junctions. No specific grouping observed.
ATC09034- A75(T)	4.58km	6	3	0	No grouping of accidents
ATC09036- A75(T)	0.93km	3	2	0	No grouping of accidents
ATCW022- A75(T)	2.26km	2	1	0	No grouping of accidents
JTC00375- A75(T)	9.77km	6	0	2	No grouping of accidents
115321- A75(T)	6.30km	2	2	0	No grouping of accidents
ATCW023- A75(T)	2.50km	3	0	0	No grouping of accidents
ATC09015- A75(T)	3.75km	5	1	0	No grouping of accidents
ATC09016- A75(T)	1.38km	2	0	0	No grouping of accidents
ATC09017- A75(T)	4.25km	1	3	0	No grouping of accidents
JTC00376- A75(T)	1.03km	0	0	0	
ATC09021- A75(T)	14.30km	5	1	0	No grouping of accidents
JTC08196- A75(T)	12.22km	3	3	0	No grouping of accidents
ATC09023- A75(T)	14.46km	7	3	2	No grouping of accidents
JTC00377- A75(T)	3.07km	4	1	0	No grouping of accidents
JTC00119- A75(T)	16.55km	6	6	0	No grouping of accidents
JTC00118- A75(T)	16.70km	5	4	2	No grouping of accidents
JTC00117- A75(T)	0.25km	2	1	0	No grouping of accidents
Manual AADT Count on A712	5.9km	2	2	0	No grouping of accidents
Total		96	50	9	

11.5.36 **Table 11.6** indicates that 96 slight, 50 serious and nine fatal accidents occurred within the study area between 2018 and 2022. A review of the data demonstrates that there do not appear to be any accident 'hot spots' within the study area which would warrant special consideration as part of this assessment. The higher number of slight and serious accidents at the road approaching counter number ATC09029 reflects the location of the counter as the A75(T) passes through Dumfries where multiple junctions including four roundabouts must be navigated.

Future Baseline

Traffic Counts

11.5.37 If the Proposed Development was not implemented then it is likely that there would be no significant changes to the traffic and transport situation in the vicinity of the Site, other than changes to background traffic. To account for this uplift, as agreed with TS, the National Road Traffic Forecast (NRTF) 'low growth' rate has been applied to the latest available baseline data (shown in **Table 11.5**) at each count location to represent 2029 projected flows which reflect the peak expected construction year.

11.5.38 Estimated 2029 future baseline traffic flows are demonstrated in **Table 11.7**.

Table 11.7 - Projected Future Traffic Flows

Counter No. on A75(T) (unless specified)	2029 Projected AADT	2029 Projected HGV	% HGV
ATCW020	10,721	3,045	28.4%
115042	11,281	1,907	16.9%
ATC09009	8,857	2,551	28.8%
ATC09040	11,481	2,790	24.3%
JTC00374	11,399	1,926	16.9%
ATC09011	13,780	3,004	21.8%
ATC09026	11,768	1,342	11.4%
ATC09029	16,599	2,506	15.1%
ATC09034	14,490	3,057	21.1%
ATC09036	16,744	2,160	12.9%
ATCW022	11,527	2,570	22.3%
JTC00375	9,605	2,084	21.7%
115321	9,353	1,459	15.6%
ATCW023	9,974	2,045	20.5%
ATC09015	6,271	1,825	29.1%
ATC09016	6,632	1,857	28.0%
ATC09017	9,109	2,141	23.5%
JTC00376	6,447	2,663	41.3%
ATC09021	6,561	1,260	19.2%
JTC08196	5,259	1,215	23.1%
ATC09023	5,564	1,730	31.1%
JTC00377	4,764	1,415	29.7%
JTC00119	4,268	1,097	25.7%
JTC00118	7,536	1,688	22.4%
JTC00117	5,852	895	15.3%
Manual AADT Count on A712	663	187	28.0%

11.6 Assessment of Potential Effects

11.6.1 The assessment of potential effects during the Operational and Decommissioning Phases has been scoped out. This section of the EIA Report therefore focuses on the potential effects likely to arise during the Construction Phase.

Construction Traffic

11.6.2 The estimated construction programme is 24 months and, subject to consent, could commence in 2029.

11.6.3 The construction traffic associated with the Proposed Development would comprise of construction staff, HGVs / light goods vehicles (LGVs) carrying construction materials and plant, and abnormal load vehicles carrying the main wind turbine components.

11.6.4 There is expected to be approximately 35 construction staff working on-site at any one time. All staff are anticipated to access the Site by private car. It is important to note that the number of personnel on-site would vary during the construction programme. In general, working hours are expected to be between 07:00 to 19:00 on weekdays, and 07:00 – 13:00 on Saturdays and bank holidays. Staff would generally be expected to arrive and depart the Site outside the typical peak hours associated with the surrounding road network (typically 08:00 to 09:00, and 17:00 to 18:00). Wind turbine delivery, erection and commissioning activities would likely take place outwith these hours depending on weather conditions.

11.6.5 Estimates of traffic generation associated with the construction phase of the Proposed Development have been calculated from first principles and consider the following activities:

- mobilisation;
- construction of site entrance and access tracks;
- crane hardstands;
- wind turbine foundations;
- substation;
- cable installation;
- wind turbine deliveries;
- wind turbine erection;
- testing, commissioning and energisation; and
- operational take-over.

11.6.6 In order to calculate a robust scenario, information was provided by the Applicant regarding the materials required and the size of the average loads associated with construction vehicles, excluding staff vehicles. **Table 11.8** includes an estimate of construction vehicles required for each task during the construction phase. This includes a robust worst-case assumption that aggregate materials would be imported from off-site. It is, however, the intention of the Applicant that up to 100% of materials could be obtained from borrow pits on-site. The result of this would be a lower number of trips (potentially zero) relating to the importing of aggregate materials and therefore a lower traffic impact.

Table 11.8 - Estimated Number of Goods Vehicle Trips During Construction

Construction Task	Vehicle Type	Approximate Number of Trips
Site Establishment	LGVs, Low Loader and Dump Truck	229
General Site Deliveries	LGVs, Low Loader and Dump Truck	191
Forestry Removal	Articulated Low Loader	303
Imported Stone	Dump Truck	4,791
Reinforcement	Low Loader	36
Foundations	Concrete Wagon	1,886
Cabling Deliveries	Low Loader	504
Geotextile Separators	Low Loader	176
Delivery of HV Electrical Items	Dump Truck	34
Construction of Substation	Various	157
Cranes and Lifting Equipment	Crane Vehicle	40
Erection of Wind Turbines (Delivery of Blades)	Abnormal Loads	84
Erection of Wind Turbines (Delivery of Tower Components)	Articulated Low Loader	1,176
Site Reinstatement	Various	70
Total (One-way trips)		9,677
Total (Two-way trips)		19,355

11.6.7 It is envisaged that construction of the Proposed Development would take approximately 24 months to complete. Using an indicative construction programme provided, the number of HGV deliveries anticipated at the Site for each month of the programme is illustrated in **Table 11.9**. To provide a worst case all vehicles, other than staff vehicles are presumed to be HGVs.

Table 11.9 - Estimated Number of Goods Vehicle Trips per Month of Construction Programme

Task	Month																							Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
Site Establishment	57	57	57	57																					229
General Site Deliveries		8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	191
Forestry Removal		101	101	101																					303
Imported Stone		399	399	399	399	399	399	399	399	399	399	399	399												4,791
Reinforcement								4	4	4	4	4	4	4	4										36
Foundations								189	189	189	189	189	189	189	189	189	189								1,886
Cabling Deliveries																84	84	84	84	84	84				504
Geotextile Separators													35	35	35	35	35								176
Delivery of HV Electrical Items																9	9	9	9						34
Construction of Substation							16	16	16	16	16	16	16	16	16	16									157
Cranes and Lifting Equipment													20			20									40
Erection of Wind Turbines (Delivery of Blades, Nacelle and Steel)													11	11	11	11	11	11	11	11					84
Erection of Wind Turbines (Delivery of Tower Components)													147	147	147	147	147	147	147	147					1176
Site Reinstatement																				14	14	14	14	14	70
Total (One-way trips)	57	566	566	566	408	408	423	616	616	616	616	616	829	410	410	518	482	258	258	264	106	22	22	22	9,677
Total (Two-way trips)	115	1,132	1,132	1,132	815	815	847	1,233	1,233	1,233	1,233	1,233	1,658	819	819	1,036	964	517	517	528	213	45	45	45	19,355

11.6.8 The construction site may be operational for 12 hours every weekday (07:00–19:00) and six hours on a Saturday (07:00–13:00), which equates to a 5.5 day working week. Construction vehicles, except abnormal loads, would be arriving and departing the Site at regular intervals during the envisaged working hours.

11.6.9 **Table 11.9** indicates that Month 13 would be the worst-case month in terms of the number of construction vehicles accessing the Site, with 1,658 two-way HGV movements. Assuming an average 4 weeks per month, this equates to 414 two-way HGV movements per week.

11.6.10 Assuming a 5.5 day working week, the daily HGV trip generation for Month 13 of the construction programme would equate to 75 two-way movements or approximately 6 two-way HGV movements per hour over the course of 12 hour working day.

11.6.11 Whilst these trips cover a temporary construction period only, the significance of the traffic impact will be assessed in the following sections in accordance with the IEMA Guidelines.

11.6.12 In addition to the estimated HGV movements, there is approximately 35 personnel expected to be on-site at any one time. A maximum of 70 two-way vehicle movements per day (non-HGV) has been assumed for the purposes of this assessment, representing a robust (worst-case) scenario with all construction personnel choosing to drive individually to the Site. In reality, this is unlikely to be the case, and so it is expected that the realistic case would have less effect on overall impact significance than the worst-case scenario assessed in this chapter.

11.6.13 Additional detail on the abnormal loads vehicles that will be accessing the Site is provided in **Technical Appendix 11.1**.

Impact of Construction Traffic

11.6.14 In order to assess the impact of construction traffic, it is necessary to determine the distribution of generated trips. As the origin of personnel and construction materials has not yet been finalised, the following assumptions have been made for the purposes of the assessment:

- 80% of vehicles route between the Site access and Gretna along the A75(T) and A712; and
- 80% of vehicles route between the Site access and Stranraer along the A75(T) and A712.

11.6.15 The above assumptions are theoretical only and represent a robust assessment of each road link as if 80% of construction traffic approached from the east of the Site only 20% of traffic could approach from the west and vice versa.

11.6.16 **Table 11.10** indicates the proportion and number of daily two-way construction vehicles and HGVs specifically that have been distributed across each counter location within the study area during the assessed worst-case month of the construction programme.

Table 11.10 - Construction Traffic Distribution

Counter No. on A75(T) (unless specified)	% Distribution	No. of Daily Two-way Vehicle Trips	No. of Daily Two-way HGV Trips
ATCW020	80%	116	60
115042	80%	116	60
ATC09009	80%	116	60
ATC09040	80%	116	60
JTC00374	80%	116	60
ATC09011	80%	116	60
ATC09026	80%	116	60
ATC09029	80%	116	60
ATC09034	80%	116	60
ATC09036	80%	116	60
ATCW022	80%	116	60
JTC00375	80%	116	60
115321	80%	116	60
ATCW023	80%	116	60
ATC09015	80%	116	60
ATC09016	80%	116	60
ATC09017	80%	116	60
JTC00376	80%	116	60
ATC09021	80%	116	60
JTC08196	80%	116	60
ATC09023	80%	116	60
JTC00377	80%	116	60
JTC00119	80%	116	60
JTC00118	80%	116	60
JTC00117	80%	116	60
Manual AADT Count on A712	100%	145	75

11.6.17 **Table 11.11** details the percentage increases in daily total and HGV only traffic associated with the construction of the Proposed Development across the public roads within the study area, during the worst-case month of the construction programme.

Table 11.11 - Construction Traffic Impact on Routes Within Study Area

Counter No. on A75(T) (unless specified)	2029 Forecast AADT	2029 Forecast HGV	No. of Daily Two-way Vehicle Trips	% Increase	No. of Daily Two-way HGV Trips	% Increase
ATCW020	11,054	3,139	116	1%	60	2%
115042	11,631	1,966	116	1%	60	3%
ATC09009	9,132	2,630	116	1%	60	2%
ATC09040	11,837	2,876	116	1%	60	2%
JTC00374	11,752	1,986	116	1%	60	3%
ATC09011	14,208	3,097	116	1%	60	2%
ATC09026	12,133	1,383	116	1%	60	4%
ATC09029	17,114	2,584	116	1%	60	2%
ATC09034	14,939	3,152	116	1%	60	2%
ATC09036	17,264	2,227	116	1%	60	3%
ATCW022	11,884	2,650	116	1%	60	2%
JTC00375	9,903	2,149	116	1%	60	3%
115321	9,643	1,504	116	1%	60	4%
ATCW023	10,283	2,108	116	1%	60	3%
ATC09015	6,465	1,881	116	2%	60	3%
ATC09016	6,838	1,915	116	2%	60	3%
ATC09017	9,391	2,207	116	1%	60	3%
JTC00376	6,647	2,745	116	2%	60	2%
ATC09021	6,765	1,299	116	2%	60	5%
JTC08196	5,422	1,253	116	2%	60	5%
ATC09023	5,737	1,784	116	2%	60	3%
JTC00377	4,912	1,459	116	2%	60	4%
JTC00119	4,401	1,131	116	3%	60	5%
JTC00118	7,769	1,740	116	1%	60	3%
JTC00117	6,033	923	116	2%	60	7%
Manual AADT Count on A712	663	187	145	22%	75	40%

11.6.18 As stated previously, IEMA Guidelines Rules 1 and 2 are used as thresholds to determine road links within the study area which require a full assessment of effects in relation to an increase in traffic flows. Due to a number of sensitive receptors along the A75(T) and the small number of residencies on the A712, all counter locations have been considered to be subject to Rule 2 whereby an increase in total traffic of 10% or greater, or an increase in HGVs of 30% or greater triggers the requirement for a full assessment into the likely environmental effects.

11.6.19 **Table 11.11** indicates that at all Counter Locations on the A75(T) the construction traffic generated by the Proposed Development (staff movements and HGVs) would increase total traffic levels by between 1%-3%, and HGV levels by between 2%-7%. Given that both the predicted increases in total traffic and HGV only levels are both below the IEMA Guidelines threshold for roads with sensitive receptors, a full assessment of effects on the A75(T) is not required as the magnitude of traffic impact is negligible.

11.6.20 **Table 11.11** indicates that at Counter Location on the A712 total traffic levels would increase by 22% and HGV levels would increase by 40% during the worst-case month of the construction programme of the Proposed Development. The increase in total traffic would be considered as Negligible however, the increase in HGV levels at this Counter Location exceeds the 30% traffic increase threshold set by the IEMA Guidelines. A detailed assessment of effects along this section of the A712 is therefore required.

11.6.21 No traffic counts were gathered on Old Edinburgh Road, however it would be expected that any observed traffic flow along the road would be significantly lower than that of the A712. Therefore, a detailed assessment of effects along the approximate 150m section of Old Edinburgh Road is also required. For the purposes of the detailed assessment, it has been assumed that the magnitude of change in traffic volumes will be High (greater than a 90% increase) as a worst-case scenario

11.6.22 The environmental effects identified in the IEMA Guidelines for HGVs are addressed in the following section, for the road section of the A712 between Newton Stewart and the Site access, and the approximate 150m section of Old Edinburgh Road.

Severance

11.6.23 The IEMA Guidelines advise that "severance is the perceived division that can occur within a community when it becomes separated by major transport infrastructure". The IEMA Guidelines recognise that specific measurement or prediction of severance can be extremely difficult, given there is no simple formula to predict the relationship between traffic and severance.

11.6.24 The potential for construction traffic associated with the Proposed Development to cause severance is assessed on a case-by-case basis using professional judgement, whilst paying regards to the local conditions such as sensitivity of nearby land uses, prevalence of vulnerable users, and availability of crossing facilities.

11.6.25 Increased severance can result in the isolation of areas of a settlement or individual properties, caused by the increased difficulty of crossing a heavily trafficked road, or a physical barrier caused by the road itself.

A712

11.6.26 The sensitivity of the majority of the section of the A712 between the Site and Newton Stewart to changes in HGV levels would be considered as Medium for severance as there are approximately six identified properties along this section of road and a limited existing need to be able to cross the road. The NCN 7 also crosses the A712 immediately north of its junction with the A75(T).

11.6.27 With reference to **Table 11.3**, the magnitude of change in HGV traffic at the Counter Location on the A712 is considered to be Low, as the increase of HGVs is between 30% and 60%. With reference to the NCN 7 crossing of the A712, an additional 146 two-way construction vehicles would be expected daily, which equates to approximately 12 two-way vehicles per hour across a 12-hour working day, with an additional vehicle expected along the road every five minutes.

11.6.28 When the worst-case Medium sensitivity of receptor along the section of the A712 between the Site and Newton Stewart is combined with the Low magnitude of impact, in accordance with **Table 11.4**, it can be concluded that there would be a Minor severance effect along this section of road. This is considered **Not Significant** in accordance with EIA Regulations.

Old Edinburgh Road

11.6.29 The sensitivity of the section of Old Edinburgh Road to be used by construction related vehicles to changes in HGV levels would be considered as Negligible for severance as there are no properties identified along this section of road and a limited existing need to be able to cross the road.

11.6.30 With reference to **Table 11.3**, the magnitude of change in HGV traffic at the Counter Location on Old Edinburgh Road is considered to be High, as the increase of HGVs is assumed to be greater than 90%.

11.6.31 When the Negligible sensitivity of receptor along the section of Old Edinburgh Road is combined with the High magnitude of impact, in accordance with **Table 11.4**, it can be concluded that there would be a Minor severance effect along this section of road. This is considered **Not Significant** in accordance with EIA Regulations.

Driver Delay

11.6.32 Delays to non-development traffic can occur at several points on the surrounding network including:

- At the Site access from the A712 to private track where there would be additional turning movements; and
- At other locations where road geometry may require slower vehicle speeds.

11.6.33 The IEMA Guidelines suggest that "delays are only likely to be significant when the traffic on the network surrounding the development is already at, or close to, the capacity of the system". There are no known existing areas of congestion with the study area surrounding the Site.

A712

11.6.34 For a 'Rural single' road which this section of A712 would be considered as, DMRB states the approximate two-way capacity of such a link as 13,000 two-way vehicles in a 24-hour period. As referenced in **Table 11.11**, the AADT at the manual count on the A712 is 663 vehicles, with an additional 146 two-way construction related vehicles expected per day during the worst-case month of the construction programme. It would therefore be considered that the road link has significant residual capacity.

11.6.35 The sensitivity of the A712 between the Site and Newton Stewart would be considered to be Low for driver delay, as the majority of the road is rural in nature, and as demonstrated is not close to capacity.

11.6.36 With reference to **Table 11.3**, the magnitude of change in HGV traffic at the counter location on the A712 is considered to be Low, as the increase of HGVs is between 30% and 60%. It is also noted that this section of A712 is relatively light trafficked with regards to existing HGV levels (187 two-way HGVs per day). Assuming that the Proposed Development would generate an additional 75 two-way HGV movements along this section of road during the worst-case month of the construction programme, this would equate to approximately 6 HGVs per hour.

11.6.37 When the Medium sensitivity of receptor along the section of the A712 between the Site and Newton Stewart is combined with the Low magnitude of impact, in accordance with **Table 11.4**, it can be concluded that there will be a Minor driver delay effect along this section of road. This is considered **Not Significant** in accordance with EIA Regulations.

Old Edinburgh Road

11.6.38 DfT Traffic Advisory Leaflet (TAL) 2/04 suggests that to prevent excessive delay for vehicles, the recommended maximum two-way flow should not exceed 300 vehicles per hour. The existing volume of traffic on Old Edinburgh Road is expected to be significantly lower than that recorded on the A712, which is 663 two-way vehicles across a 24-hour period. It would therefore be assumed that the hourly traffic along Old Edinburgh Road would be significantly lower than the 300 vehicles per hour capacity. With an additional 12 two-way construction related vehicles expected per hour in a working day during the worst-case month of the construction programme. It would therefore be considered that the road link has significant residual capacity.

11.6.39 The sensitivity of Old Edinburgh Road would be considered to be Negligible for driver delay, as the road is rural in nature, and is assumed not close to capacity.

11.6.40 With reference to **Table 11.3**, the magnitude of change in HGV traffic at the Counter Location on Old Edinburgh Road is considered to be High, as the increase of HGVs is assumed to be greater than 90%. It is also noted that this section of Old Edinburgh Road is expected to be very lightly trafficked. Assuming that the Proposed Development would generate an additional 75 two-way HGV movements along this section of road during the worst-case month of the construction programme, this would equate to approximately 6 HGVs per hour.

11.6.41 When the Negligible sensitivity of receptor along the section of Old Edinburgh Road is combined with the High magnitude of impact, in accordance with **Table 11.4**, it can be concluded that there will be a Minor driver delay effect along this section of road. This is considered **Not Significant** in accordance with EIA Regulations.

Pedestrian Delay and Amenity

11.6.42 Pedestrian delay and severance can be considered as closely related, as in general, higher levels of traffic are likely to lead to greater increases in delay to cross the road. Delays can also depend on general level of pedestrian activity and visibility.

11.6.43 IEMA Guidelines suggest that "given the range of local factors and conditions that can influence pedestrian delay…it is not considered wise to set down definitive thresholds".

A712

11.6.44 Similarly, as discussed in regards to severance, the sensitivity of the majority of the section of the A712 between the Site and Newton Stewart to changes in HGV levels would be considered as Medium for pedestrian delay due to the few isolated properties along the road and limited requirement to cross the road.

11.6.45 With reference to **Table 11.3**, the magnitude of change in HGV traffic at the Counter Location on the A712 is considered to be Low, as the increase of HGVs is between 30% and 60%.

11.6.46 When the Medium sensitivity of receptor along the section of the A712 between the Site and Newton Stewart is combined with the Low magnitude of impact, in accordance with **Table 11.4**, it can be concluded that there will be a Minor pedestrian delay effect along this section of road. This is considered **Not Significant** in accordance with EIA Regulations.

Old Edinburgh Road

11.6.47 The sensitivity of Old Edinburgh Road to changes in HGV levels would be considered as Negligible for pedestrian delay due to the rural nature of the road, lack of properties and limited requirement to cross the road.

11.6.48 With reference to **Table 11.3**, the magnitude of change in HGV traffic at the Counter Location on Old Edinburgh Road is considered to be High, as the increase of HGVs is assumed to be greater than 90%.

11.6.49 When the Negligible sensitivity of receptor along Old Edinburgh Road is combined with the High magnitude of impact, in accordance with **Table 11.4**, it can be concluded that there will be a Minor pedestrian delay effect along this section of road. This is considered **Not Significant** in accordance with EIA Regulations.

Fear and Intimidation

11.6.50 The IEMA Guidelines suggest that the extent of fear and intimidation from construction vehicles towards members of the public includes:

- total volume of traffic;
- the heavy vehicle composition;
- the speed at which the vehicles are passing; and
- the proximity of traffic to people.

11.6.51 The Guidelines recognise that *"there are no commonly agreed thresholds for estimating these levels of danger"*. The Guidelines therefore suggest that a study (Crompton and Gilbert, 1976) which defines degree of hazard by average traffic flow, daily HGV traffic flow, and average speed in miles per hour. A 'Degree of Hazard' score is then assigned to each attribute. **Table 11.12** illustrates the methodology for this assessment.

Table 11.12 - Fear and Intimidation - Degree of Hazard

Degree of Hazard Score	Average Two-way Hourly Flow of All Traffic	Total 18-Hour HGV Traffic Flow	Average Vehicle Speed (mph)
30	>1,800	>3,000	>40
20	1,200-1,800	2,000-3,000	30-40
10	600-1,200	1,000-2,000	20-30
0	<600	<1,000	<20

11.6.52 The total score from each of the three elements is then combined to provide a "level" of fear and intimidation, which is then grouped into the following terms:

- >71 = Extreme;
- 41-70 = Great;
- 21-40 = Moderate; and
- <21 = Small.

11.6.53 In regards to EIA Regulations, the score/term attributed to the section of road before and after the Proposed Development's construction traffic has been considered is then compared. The determination of the magnitude of impact is then indicated by **Table 11.13**.

Table 11.13 - Fear and Intimidation – Magnitude of Impact

Magnitude of Impact	Change in step/level from Baseline Conditions
High	Two step change in level
Medium	One step change in level, but with either >400 vehicle hourly increase or >500 HGV daily increase.
Low	One step change in level, but with <400 vehicle hourly increase and <500 HGV daily increase.
Negligible	No step change in level

A712

11.6.54 In regards to this assessment, the section of the A712 between the Site and Newton Stewart can be summarised as the following:

- Average two-way flow of All Traffic – AADT of the section of road is 663 in projected baseline conditions and increases to 808 during the worst-case construction month. The average hourly flow of traffic would therefore be less than 600 in both scenarios, and would score 0;
- Total 18-Hour HGV Traffic Flow – The daily HGV flow of the section of road is 187 in baseline conditions, and increases to 262 during the worst-case construction month. This remains below 1,000 HGVs per day, and would score 0; and
- Average Vehicle Speed – Vehicle speed data is available from the Manual AADT Count taken on the A712. The 7-day average speed at the manual count location was recorded as 43 miles per hour. Therefore, a score of 30 is assigned.

11.6.55 A score of 30 (moderate degree of hazard) is assigned to this section of road, with no step change in level between baseline conditions and following the addition of construction vehicles generated by the Proposed Development. The magnitude of impact is therefore classified as Negligible.

11.6.56 The receptor sensitivity for fear and intimidation has been considered as Medium. When combined with the Negligible magnitude of impact, the effect can be classified as Negligible and **Not Significant** for this section of the A712.

Old Edinburgh Road

11.6.57 In regards to this assessment, the section of Old Edinburgh Road can be summarised as the following:

- Average two-way flow of All Traffic – The existing volume of traffic on Old Edinburgh Road is expected to be significantly lower than that recorded on the A712, which is 663 two-way vehicles across a 24 hour period. Approximately 12 two-way construction related vehicles would travel along the road per hour. The average hourly flow of traffic would therefore be less than 600 in both scenarios, and would score 0;
- Total 18 Hour HGV Traffic Flow – The daily HGV flow of the section of road is expected to be significantly lower than that recorded on the A712 which is 187 in baseline conditions, and increases to 262 during the worst-case construction month. This would remain below 1,000 HGVs per day, and would score 0; and
- Average Vehicle Speed – Vehicle speed data is not available for Old Edinburgh Road. Therefore, a worst-case score of 30 is assigned.

11.6.58 A score of 30 (moderate degree of hazard) is assigned to this section of road, with no step change in level between baseline conditions and following the addition of construction vehicles generated by the Proposed Development. The magnitude of impact is therefore classified as Negligible.

11.6.59 The receptor sensitivity for fear and intimidation has been considered as Medium. When combined with the Negligible magnitude of impact, the effect can be classified as Negligible and **Not Significant** for this section of Old Edinburgh Road.

Road Safety

11.6.60 For the purposes of this calculation it has been assumed that the 5.9 km length of the road that can be attributed to the Counter Location on the A712 is classified as a 'rural single carriageway' in accordance with criteria set out by DMRB.

A712

11.6.61 Expected accident rates from the DMRB for this standard of road are:

- Rural single carriageway: 0.190 Personal Injury Accidents (PIAs) per million vehicle kilometres.

11.6.62 A total of 9,677 HGVs would access the Site across the 24-month construction programme. As stated in **Table 11.10**, it has been assumed for the purposes of this assessment that 100 % of these vehicles would travel along this section of the A712. Applying the 5.9 km length of the road, this equates to a total 114,189 kms travelled by these vehicles across the construction programme.

11.6.63 Based on the PIA rate suggested by DMRB, this would suggest a total of 0.02 expected PIA to be generated by the construction vehicles during the construction programme. It is therefore considered that the magnitude of this effect is Negligible.

11.6.64 The receptor sensitivity for road safety is generally to be considered as Medium. When combined with the Negligible magnitude of impact, the effect can be classified as Negligible and **Not Significant** for this section of the A712.

Old Edinburgh Road

11.6.65 Expected accident rates from the DMRB for this standard of road are:

- Rural single carriageway: 0.190 Personal Injury Accidents (PIAs) per million vehicle kilometres.

11.6.66 A total of 9,677 HGVs would access the Site across the 24-month construction programme. As stated in **Table 11.10**, it has been assumed for the purposes of this assessment that 100 % of these vehicles would travel along this section of Old Edinburgh Road. Applying the 150m length of the road, this equates to a total 2,903 kms travelled by these vehicles across the construction programme.

11.6.67 Based on the PIA rate suggested by DMRB, this would suggest a total of 0.0006 expected PIA to be generated by the construction vehicles during the construction programme. It is therefore considered that the magnitude of this effect is Negligible.

11.6.68 The receptor sensitivity for road safety is generally to be considered as Medium. When combined with the Negligible magnitude of impact, the effect can be classified as Negligible and **Not Significant** for this section of Old Edinburgh Road.

Dust and Dirt

11.6.69 IEMA Guidelines acknowledge that it is not practical to quantify the level of dust and dirt that can be anticipated from construction traffic. Therefore, a quantitative description of the effect of dust and dirt is not provided here.

11.6.70 It is acknowledged that HGVs would have the potential to collect debris on their tyres when accessing the Site, which could then be transferred to the surrounding road network.

11.6.71 For the section of A712 between the Site and Newton Stewart, and Old Edinburgh Road, the magnitude of impact is considered to be Negligible, and the sensitivity of receptor to be Medium and Negligible respectively. When combined the effect can be classified as Negligible and **Not Significant** for both roads.

11.7 Mitigation

11.7.1 The assessment does not predict any significant adverse effects, and as a result no mitigation is required to address any predicted environmental effects associated with the increased traffic generated during the worst-case month of the construction programme.

Additional Good Practice Measures

11.7.2 While not necessary to address any environmental effects associated with increased traffic, the Applicant intends to implement industry standard 'good practice' measures to reduce traffic and transport effects during construction in the form of a Construction Traffic Management Plan (CTMP). These mitigation measures have been successfully implemented at other wind farms across Scotland.

Construction Traffic Management Plan

11.7.3 The CTMP will identify measures to potentially reduce the number of construction vehicles accessing the Site, as well as consider construction programming, routing and identification of an individual with responsibilities for managing traffic and transport impacts and effects.

11.7.4 The CTMP will include the following measures:

- development of a logistics plan highlighting access points, loading bays, welfare and storage on-site;
- approved haul routes to/from the Site, and protocols to ensure HGVs adhered to these routes;
- provision of a site induction pack to be given to all workers on-site, containing information of delivery routes, any route restrictions and maximum load capacities;
- temporary construction signage to be erected along identified construction routes;
- a construction traffic speed limit through sensitive areas along haulage routes;
- on-site wheel washing facilities;
- a construction material "lay down" area to allow for a staggered delivery schedule, and avoiding peak and/or unsociable hours; and
- roads to be maintained in a clean and safe condition, with wheel washing facilities made available on-site at the FLS track junction with the A712.

11.7.5 Abnormal loads are generally very large, slow-moving vehicles and the potential for conflict with other road users is greater when undertaking turning manoeuvres and travelling along narrow sections of road. A convoy escort will be required along the route identified in **Technical Appendix 11.1** document produced alongside this EIA. Measures relating to the movement of abnormal loads may include:

- advance warning signs on the affected road network;
- an advance escort may be required to warn oncoming vehicles ahead of the abnormal load vehicle;
- abnormal load convoys should normally be no more than three HGVs long, to permit safe transit along the delivery route and to allow limited overtaking opportunities for following traffic if permitted; and
- the times in which deliveries are scheduled should be agreed with Police Scotland and TS and avoid typical peak periods of traffic on the surrounding road network.

11.8 Assessment of Residual Effects

11.8.1 This section assesses the significance of residual effects following the implementation of 'good practice' measures.

Severance

11.8.2 The assessment identified that the severance effects of the Proposed Development are predicted to be **Not Significant** due to the Low magnitude of the increase in traffic, and Medium sensitivity of receptor of the A712, and High magnitude of the increase in traffic, and Negligible sensitivity of receptor of Old Edinburgh Road.

11.8.3 The CTMP will further manage the movement of construction traffic and avoid vehicle movements through sensitive areas during peak periods. The effect would be considered to remain as **Not Significant**.

Driver Delay

11.8.4 The assessment identified that the driver delay effects of the Proposed Development are predicted to be **Not Significant** due to the Low magnitude of the increase in traffic, and Medium sensitivity of receptor of the A712, and High magnitude of the increase in traffic, and Negligible sensitivity of receptor of Old Edinburgh Road.

11.8.5 The CTMP will further manage the movement of construction traffic and avoid vehicle movements through sensitive areas during peak periods. The effect would be considered to remain as **Not Significant**.

Pedestrian Delay and Amenity

11.8.6 The assessment identified that the pedestrian delay effects of the Proposed Development are predicted to be **Not Significant** due to the Low magnitude of the increase in traffic, and Medium sensitivity of receptor on the A712, and High magnitude of the increase in traffic, and Negligible sensitivity of receptor of Old Edinburgh Road.

11.8.7 The CTMP will further manage the movement of construction traffic and avoid vehicle movements through sensitive areas during peak periods. The effect would be considered to remain as **Not Significant**.

Fear and Intimidation

11.8.8 The assessment identified that the fear and intimidation effects of the Proposed Development are predicted to be **Not Significant** due to the Negligible magnitude of the increase in traffic, and Medium sensitivity of receptor of the A712, and Negligible magnitude of the increase in traffic, and Negligible sensitivity of receptor of Old Edinburgh Road.

11.8.9 The CTMP will further manage the movement of construction traffic and avoid vehicle movements through sensitive areas during peak periods. The effect would be considered to remain as **Not Significant**.

Road Safety

11.8.10 The assessment identified that the road safety effects of the Proposed Development are predicted to be **Not Significant** due to the Negligible magnitude of the increase in traffic, and Medium sensitivity of receptor of the A712 and Old Edinburgh Road.

11.8.11 The CTMP will further manage the movement of construction traffic and avoid vehicle movements through sensitive areas during peak periods, whilst the delivery of abnormal loads will be subject to an escort to neutralise any potential safety issues regarding these specific deliveries. The effect would be considered to remain as **Not Significant**.

Dust and Dirt

11.8.12 The assessment identified that the dust and dirt effects of the Proposed Development are predicted to be **Not Significant** due to the Negligible magnitude of the increase in traffic, and Medium and Negligible sensitivity of receptors of the A712 and Old Edinburgh Road respectively.

11.8.13 The introduction of wheel washing facilities on-site will minimise dust and dirt deposits on the surrounding road network. The effect would be considered to remain as **Not Significant**.

11.9 Assessment of Cumulative Effects

11.9.1 It is understood that there are a number of operational wind farm developments in Dumfries and Galloway, however cumulative traffic impacts associated with these developments are not considered separately as traffic associated with these will be included in the baseline traffic flows.

Consented Developments

11.9.2 For the purposes of this assessment, any nearby identified consented wind farm developments are not included in a cumulative assessment, as it is assumed that the construction of these developments would be underway before the Proposed Development's construction programme begins. On review there are no identified consented wind farm developments which utilise the A712 or Old Edinburgh Road for access.

In Planning

11.9.3 No wind farms have been identified which utilise the A712 or Old Edinburgh Road for construction access currently in planning. DGC and TS were invited to request the inclusion of any relevant cumulative developments currently in planning during scoping. Neither stakeholder identified any relevant developments. Therefore, no wind farms in planning are considered as cumulative developments in this assessment.

11.10 Summary

11.10.1 This Chapter considers traffic and transport impacts and potential significant environmental effects resulting from the construction of the Proposed Development in accordance with IEMA Guidelines for 'Environmental Assessment of Traffic and Movement July 2023' and the scope agreed with TS and DGC.

11.10.2 **Table 11.14** summarises the assessment in respect of Significance of Effect concluding effects are **Not Significant**.

Table 11.14 - Summary of Residual Effects

Road Assessed	Environmental Impact	Potential Effect	Mitigation or Enhancement Measures	Residual Effects
A712	Severance	Minor – Not Significant	Not required however, CTMP implemented as "good practice"	Minor – Not Significant
	Driver Delay			
	Pedestrian Delay and Amenity			
	Fear and Intimidation	Negligible – Not Significant		Negligible – Not Significant
	Road Safety			
	Dust and Dirt			
Old Edinburgh Road	Severance	Minor – Not Significant		Minor – Not Significant
	Driver Delay			
	Pedestrian Delay and Amenity			
	Fear and Intimidation	Negligible – Not Significant		Negligible – Not Significant
	Road Safety			
	Dust and Dirt			

11.11 References

Davis, S., Hoare, D., Howard, R., Ross, A. (2023). Institute of Environmental Management and Assessment (IEMA) Guidelines: Environmental Assessment of Road Traffic and Movement. IEMA.

Brooks, A. et al. (1993). Guidelines for the Environmental Assessment of Road Traffic. Institute of Environmental Assessment.

DMRB. (2020). LA 104 – Environmental Assessment and Monitoring.

https://www.crashmap.co.uk/

12 Acoustic Assessment

12.1 Executive Summary

12.1.1. An assessment of the acoustic impact of the proposed Blair Hill Wind Farm in terms of operational impacts has been undertaken and the potential impacts associated with construction and decommissioning have been discussed taking into account the nearest identified residential properties.

12.1.2. The operational noise impact was assessed acc14ording to the guidance described in the '*The Assessment and Rating of Noise from Wind Farms*', referred to as 'ETSU-R-97', as recommended for use in relevant planning policy. ETSU-R-97 makes clear that any noise restrictions placed on a wind farm must balance the environmental impact of the wind farm against the national and global benefits that would arise through the development of renewable energy sources. The assessment also adopts the latest recommendations of the Institute of Acoustics *'Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise'*.

12.1.3. Representative baseline conditions (the "background noise level") at nearby residential properties were established via an appropriate background noise survey. The measured levels were used to infer the background noise levels at other nearby residential properties as the ETSU-R-97 document recommends. As background noise levels depend upon wind speed, as do wind turbine noise emissions, the measurement of background noise levels at the survey locations were made concurrent with measurements of the wind speed and wind direction at the development site.

12.1.4. The relevant noise limits were determined through analysis of baseline conditions and the criteria specified by the ETSU-R-97 guidelines. The general principle regarding the setting of noise criteria is that limits should be set relative to existing background noise levels, except in the case of relatively low levels, in which case fixed lower limits apply. This approach has the advantage that the limits can directly reflect the existing noise environment at the nearest residential properties and the relative impact that the wind farm may have on this environment. Different limits are applicable depending upon the time of day, with daytime limits intended to preserve outdoor amenity and night-time limits intended to prevent sleep disturbance.

12.1.5. A sound propagation model was used to predict the noise levels due to the proposed wind farm at nearby residential properties over a range of wind speeds, taking into account the position of the proposed wind turbines, the nearest residential properties, the candidate wind turbine type and the consideration of potential cumulative operational impacts from other potential wind farm development in the area. The model employed (which considered downwind conditions at all times) took account of attenuation due to geometric spreading, atmospheric absorption, ground effects and topographical barriers.

12.1.6. The predicted operational noise levels are within noise limits at nearby residential properties at all considered wind speeds in both isolative and cumulative terms. The Proposed Development therefore complies with the relevant guidance on wind farm noise and the impact on the amenity of all nearby properties would be regarded as **Not Significant** in EIA terms.

12.1.7. Sound associated with construction and decommissioning activities are discussed with reference to BS 5228 and it has been determined that on-site construction noise levels are highly unlikely to exceed typical limiting noise criteria at nearby properties, although appropriate mitigation measures will be adopted as a matter of due course. The impact can be considered as **Not Significant** in EIA terms.

12.2 Introduction

12.2.1. This chapter considers the acoustic effects associated with the construction, operation and decommissioning of the proposed Blair Hill Wind Farm (hereafter referred to as the Proposed Development) on residents of nearby properties. 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 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 measures.

12.2.2. This assessment has been undertaken by Renewable Energy Systems Ltd (RES) (hereafter referred to as the 'Applicant'), with two in-house Members of the Institute of Acoustics involved in its production. The Applicant has undertaken acoustic impact assessments for all its UK wind farm development applications since 2000. The Applicant has also carried out noise assessments and reported to several local planning authorities on operational wind energy projects, including taking measurements on newly constructed wind farms to ensure compliance with planning conditions.

12.2.3. The Chapter is supported by:

- Figure 12.1 – Predicted Sound Footprint;
- Technical Appendix 12.1 – Issues Scoped Out;
- Technical Appendix 12.2 – Calculating Standardised Wind Speed;
- Technical Appendix 12.3 – Background Sound Survey Photos;
- Technical Appendix 12.4 – Instrumentation Records;
- Technical Appendix 12.5 – Charts;
- Technical Appendix 12.6 – Suggested Planning Conditions.

12.3 Legislation, Policy and Guidance

Operation

12.3.1. In the context of other sources of environmental noise, the noise levels produced by wind turbines are generally low and have greater dependence upon wind speed. The combination of these two factors implies that a degree of masking would often be provided by background noise.

12.3.2. As described by Scottish Government Planning Advice for Onshore Wind Turbines [1]:

"Technically, there are two quite distinct types of noise sources within a wind turbine - the mechanical noise produced by the gearbox, generator and other parts of the drive train; and the aerodynamic noise produced by the passage of the blades through the air. There has been significant reduction in the mechanical noise generated by wind turbines through improved turbine design."

12.3.3. Within Scotland, noise is defined within the planning context by 'Planning Advice Note 1/2011: Planning and Noise' [2]. This Planning Advice Note provides advice on the role of the planning system in helping to prevent and limit the adverse effects of noise. The Planning Advice Note 1/2011 states that:

"Good acoustical design and siting of turbines is essential to minimise the potential to generate noise."

12.3.4. Planning Advice Note 1/2011 refers to the use of the Department of Trade and Industry's 'The Assessment and Rating of Noise from Wind Farms' (ETSU-R-97), noting that further guidance is provided in the web-based planning advice on renewable technologies for onshore wind turbines [3]. In relation to noise from wind farms the web-based onshore wind policy statement additionally 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… 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."

12.3.5. It is therefore considered that the use of ETSU-R-97, as criteria for the assessment of wind farm noise, fulfils the requirements of Planning Advice Note 1/2011.

12.3.6. The methodology described in ETSU-R-97 was developed by a working group comprised of a cross-section of interested persons including, amongst others, environmental health officers, wind farm operators and independent acoustic experts.

12.3.7. ETSU-R-97 makes it clear from the outset that any noise restrictions placed on a wind farm must balance the environmental impact of the wind farm against the national and global benefits that arise through the development of renewable energy resources. The principle of balancing development needs against protection of amenity may be considered common to any type of noise control guidance.

12.3.8. The basic aim of ETSU-R-97, in arriving at the recommendations contained within the report, is the intention to provide:

"Indicative noise levels thought to offer a reasonable degree of protection to wind farm neighbours, without placing unreasonable restrictions on wind farm development or adding unduly to the costs and administrative burdens on wind farm developers or local authorities."

12.3.9. An article published in the Institute of Acoustics (IOA) Bulletin Vol. 34 No. 2, March/April 2009 [4], recommends a methodology for addressing issues not made explicit by, or outside the scope of, ETSU-R-97, such as in relation to wind shear or noise propagation modelling. Whilst this article does not represent formal legislation or guidance it was authored by a group of independent acousticians experienced in wind farm noise issues who have undertaken work on behalf of wind farm developers, local planning authorities and third parties and as such is a good indicator of best practice techniques. The assessment presented herein adopts the recommendations made within this article.

12.3.10. A Good Practice Guide (GPG) to the application of ETSU-R-97 for the assessment and rating of wind turbine noise, issued by the Institute of Acoustics (IOA) in May 2013 and endorsed by the Scottish Government, along with the governments in England, Northern Ireland and Wales, provides guidance on all aspects of the use of ETSU-R-97 and reaffirms the recommendations of the Acoustics Bulletin article with regard to propagation modelling and wind shear. The assessment presented herein adopts the recommendations of the IOA GPG.

12.3.11. Supplementary guidance notes [5] were published by the IOA in July and September 2014, and these provide further details on specific areas of the IOA GPG. The assessment presented herein adopts the recommendations made within these supplementary guidance notes.

12.3.12. ETSU-R-97 has been applied at the vast majority of wind farms currently operating in the UK and provides a robust basis for assessing the noise impact of a wind farm when used in accordance with the IOA GPG. It is the only relevant guidance referenced in Scottish planning policy for rating and assessing operational wind farm noise. Based on planning

policy and guidance, as outlined above, a wind farm which can operate within noise limits derived according to ETSU-R-97 shall be considered not significant in EIA terms. This approach has been agreed with Dumfries and Galloway Council.

Construction & Decommissioning

12.3.13. In the web based Scottish Government technical advice on construction noise assessment in 'Appendix 1: Legislative Background, Technical Standards and Codes of Practice' [6] it is stated that:

"However, under Environmental Impact Assessments and for planning purposes i.e. not in regard to the Control of Pollution Act 1974, the 2009 version of BS 5228 is applicable."

12.3.14. Given that BS 5228-1:2009 'Code of practice for noise and vibration control on construction and open sites - Part 1: Noise' [7] is identified as being the appropriate source of guidance on appropriate methods for minimising noise from construction activities, it is adopted herein.

12.3.15. The Control of Pollution Act 1974 [8] provides information on the need for ensuring that the best practicable means are employed to minimise noise.

12.3.16. BS 5228-2:2009 'Code of practice for noise and vibration control on construction and open sites - Part 2: Vibration' [9], provides a method for predicting vibration levels which has been adopted in this assessment.

12.3.17. BS 6472-2:2008 'Guide to evaluation of human exposure to vibration in buildings - Part 2: Blast-induced vibration' [10] has been used to set criteria for satisfactory magnitudes of vibration at nearby residential properties to ensure compliance with respect to human response.

12.4 Consultation

12.4.1. Details of the consultation undertaken are outlined in **Table 12.1**.

Table 12.1: Acoustic Assessment Consultation

Consultees	Date of Consultation	Nature and Purpose of Consultation
Energy Consents Unit	26/07/2023	Scoping report submitted (ECU reference ECU00004878), detailing proposed assessment methodology.
	13/11/2023	Scoping response that noise assessment should be carried out in line with the legislation and standards outlined in the scoping report.
Dumfries and Galloway Council	14/12/2023	RES report (04991-6887708) "Planned Acoustic Assessment at the Proposed Blair Hill Wind Farm" sent to Dumfries and Galloway Council for environmental health officer (EHO) to review. Report details proposed assessment methodology along with suggested background noise survey locations. The email with the report also included proposed dates when the survey would start and invitation for the EHO to attend, if they wish to do so.
	15/12/2023	Email from the EHO confirming receipt of the report, stating that there are no objections to the proposed assessment methodology.

Consultees	Date of Consultation	Nature and Purpose of Consultation
Dumfries and Galloway Council	19/12/2023	Email to the EHO reiterating invitation to attend site during installation of equipment.
	20/12/2023	Email from the EHO requesting confirmation of survey dates. This is then followed by a number of emails regarding survey date.
	5/03/2024	Email to the EHO updating the proposed survey locations, setting out installation date and seeking confirmation of acceptability.
	3/04/2024	RES report (04991-7509158) "Background Sound Survey Locations for the Acoustic Assessment of the Proposed Blair Hill Wind Farm" sent to EHO providing details of installed survey locations.
	5/04/2024	Response from the EHO, confirming receipt of the report and thanking for the information provided.

12.5 Methodology

Scope of Assessment

12.5.1. Noise can have an effect on the environment and on the quality of life enjoyed by individuals and communities. The effect of noise, both in the construction and operational phase, is therefore a material consideration in the determination of planning applications.

Operation

12.5.2. To ensure adequate assessment of the potential impacts of the operational noise from the Proposed Development the following steps have been taken, in accordance with relevant guidance detailed above:

- The baseline noise conditions at each of the nearest residential properties to the Proposed Development are established by way of representative background sound surveys;
- The noise levels at the nearest residential properties from the operation of the Proposed Development are predicted using a sound propagation model considering: the locations of the wind turbines; the intervening terrain; and the likely noise emission characteristics of the wind turbines;
- The acoustic assessment criteria are derived appropriately; and
- The evaluation of the acoustic impact is undertaken by comparing the predicted noise levels with the assessment criteria. Significant effects would be identified if the predicted noise levels exceed limits derived in accordance with ETSU-R-97. Significant effects would not be expected should the predicted noise levels be less or equal than the ETSU-R-97 limits.

12.5.3. Aerodynamic and mechanical noise are scoped into the operational noise assessment. The main focus of the assessment of operational noise presented here is based on the most relevant type of noise emission for modern wind turbines: aerodynamic noise, which is broadband in nature. Mechanical noise, which can be tonal in nature, is also considered albeit less relevant to modern wind turbines whose improved design has led to significant reductions in mechanical noise. Implicitly incorporated within this assessment is the normal character of the noise associated with wind turbines (commonly referred to as 'blade swish') and consideration of a range of noise frequencies, including low frequencies.

12.5.4. Low frequency content of the noise from wind farms shall be considered through the use of octave band specific noise emission and propagation modelling, however it is considered that specific and targeted assessment on the low frequency content of noise emissions from the Proposed Development is unjustified. Details for scoping out low frequency noise from the operational noise assessment, as well as infrasound, sleep disturbance, vibration, amplitude modulation and wind turbine syndrome can be found in **Technical Appendix 12.1**.

12.5.5. A summary of the findings of a comprehensive study into wind turbine noise and associated health effects can be found in **Technical Appendix 12.1.**

Construction & Decommissioning

12.5.6. The construction of wind turbines, ancillary electrical equipment, compounds and the corresponding access tracks typically occurs at very large distances from neighbouring residential properties. The resultant noise and vibration, which would be temporary in nature, is only very rarely cause for concern in terms of the potential for disturbing the inhabitants of neighbouring residential properties. Whilst the noise associated with the construction of these aspects may well be audible to people residing in the area, the levels would be below established noise limits and planning requirements in this respect. Nevertheless, typical mitigation measures, including the use of 'best practicable means' would be incorporated into the construction practices for the Proposed Development with a view to reducing noise levels where possible and practical. As a result, this aspect is discussed in generalised terms with reference to standard noise limiting requirements; typical working practices; hours of work, and standard mitigation measures in this respect. A detailed assessment has not been undertaken and a similar rationale can be applied for noise impacts associated with decommissioning of the Proposed Development.

12.5.7. Construction relating to the provision of access to the site, including the upgrade of public roads and their use thereof, may well occur at locations near to residential properties. As a result, and in instances where this is likely to occur, consideration of enhanced mitigation measures which would be reasonably possible to implement, have been discussed. In any event, typical noise limiting requirements would apply and the contractor undertaking the works would be responsible for potential issues and taking appropriate and reasonable steps to address these should they occur. As a result, this aspect is also discussed in generalised terms and a detailed assessment has not been undertaken as this would require a detailed construction plan to provide confidence in the results, which is not available at this time. However, certain details as to construction practices would be provided within a Construction Environmental Management Plan (CEMP), with reference to potential noise and vibration impacts, where necessary. An outline CEMP has been provided in **Technical Appendix 17.1**.

12.5.8. Noise and vibration associated with the movement of additional vehicles, including heavy goods vehicles (HGVs) along public roads and access routes may well be noticeable to residents adjacent to these. However, this would essentially only result in a minor increase in the average noise levels from existing public roads, with the most noticeable noise and perceptible vibration effects resulting from the sporadic and increased number of HGV pass-bys at residential properties along the access routes, with resulting levels for individual events being similar to that created by existing HGV movements.

12.5.9. In order to release materials at proposed borrow-pit locations, the use of specifically designed explosives may be used, this is also known as blasting. The resultant noise, vibration and air overpressure from blasting cannot be reliably predicted. However, these aspects may well be perceptible to neighbouring residents. The vibration generated by each blast would be well below levels that would be expected to cause damage to the nearest housing and/or structures nearby. As a result, the impacts resulting from blasting are not considered in any detail other than the provision of discussion as to the steps to

limit any resulting impact through appropriate blast design and best practice, which also involves keeping residents informed as to planned blasting activities.

12.5.10. Whilst noise would also arise during decommissioning of the Proposed Development (through wind turbine deconstruction and breaking of the exposed part of the concrete bases) this is not discussed separately as noise levels resulting from it are expected to be lower than those during construction due to the number and type of activities involved.

Baseline Characterisation

12.5.11. Similar to other assessments of acoustic impacts (most notably BS 4142 [11], which ETSU-R-97 identifies as forming the basis of its recommendations), the ETSU-R-97 methodology requires the comparison of predicted noise levels due to wind turbine emissions (which vary with hub height wind speed) with noise limits based upon the noise levels already existing under those same conditions (i.e. the baseline conditions).

12.5.12. Since background sound levels depend upon wind speed, as indeed do wind turbine noise emissions, it is important when making reference measurements to put them in that context. Thus, the assessment of background sound levels requires the measurement of not only noise levels, but concurrent wind conditions, covering a representative range of wind speeds. These wind measurements are made at the site rather than at the residential properties, since it is this wind speed that would subsequently govern the Proposed Development's noise generation. Often the residential properties themselves will be sheltered from the wind and may consequently have relatively low background sound levels.

12.5.13. To establish the baseline conditions, sound level meters and associated apparatus are set-up to record the required acoustic information at a selection of the nearest residential properties geographically spread around the Proposed Development and which are likely to be representative of other residential properties in the locale. The monitoring locations are detailed in **Table 12.4**.

12.5.14. Wind speed and direction are recorded as 10-minute averages for the same period as for the sound measurements and are synchronised with the acoustic data to allow correlations to be established. The wind speed that is adopted for use is the same wind speed as that which drives the wind turbine noise levels.

12.5.15. The adoption of this wind speed was recommended within the IOA GPG. The methodology used to calculate standardised 10 m wind speed is described in **Technical Appendix 12.2.**

12.5.16. Prior to establishing the baseline conditions the acoustic data is filtered as follows:

- For each background sound measurement location, the measured noise data is divided into two sets, as specified by ETSU-R-97 and shown in **Table 12.2**.

Table 12.2: Definition of Time Periods

Time of Day	Definition
Quiet Daytime	18:00 - 23:00 every day 13:00 - 18:00 Saturday 07:00 - 18:00 Sunday
Night-time	23:00 - 07:00 every day

- Rainfall affected data is systematically removed from the acoustic data set. To facilitate this, Met Office weather radar is used to compute 10-minute rainfall data and identify potentially affected acoustic data. Both the 10-minute period containing rainfall and the preceding 10-minute period are removed from the dataset.
- Periods of measured background noise data thought to be affected by extraneous, i.e. non-typical, noise sources are identified and removed from the data set. Whilst

some 'extraneous' data may actually be real, it tends to bias any trend lines upwards so its removal is adopted as a conservative measure.
- In practice this means close inspection of the measured background noise levels, comparison with concurrent data measured at nearby locations and consideration of both directional and temporal variation.

Modelling Noise Propagation

12.5.17. Whilst there are several sound propagation models available, the ISO 9613 Part 2 model has been used [12], this being identified as most appropriate for use in such rural sites [13]. The specific interpretation of the ISO 9613 Part 2 propagation methodology recommended in the aforementioned IOA Bulletin and the subsequent IOA GPG has been employed.

12.5.18. To make noise predictions it is assumed that:
- the wind turbines have the Sound Power Level (SWL) specified in this chapter;
- each wind turbine can be modelled as a point source at hub-height; and
- each residential property is assigned a reference height to simulate the presence of an observer.

12.5.19. The sound propagation model takes account of attenuation due to geometric spreading and atmospheric absorption. The assumed temperature and relative humidity are 10 °C and 70 % respectively, as recommended in the IOA Bulletin and IOA GPG. Ground effects are also taken into account by the propagation model with a ground factor of 0.5 and a receiver height of 4 m used as recommended in the IOA Bulletin and IOA GPG.

12.5.20. The barrier attenuations predicted by ISO 9613 Part 2 have been shown to be significantly greater than those measured in practice under downwind conditions. Therefore, barrier attenuation according to the ISO 9613 Part 2 method has been discounted. In lieu of this, where there is no direct line of sight between the residential property in question and any part of the wind turbine, 2 dB attenuation is applied as recommended in the IOA Bulletin and the IOA GPG.

12.5.21. Additionally, verification studies have also shown that ISO 9613 Part 2 tends to slightly underestimate noise levels at nearby dwellings in certain exceptional cases, notably in a valley type environment where the ground drops off between source and receiver. In these instances, an addition of 3 dB has been applied to the resulting overall A-weighted noise level as recommended by the IOA GPG.

12.5.22. To generate the ground cross sections between each wind turbine and each dwelling necessary for reliable propagation modelling, ground contours at 5 m intervals for the area of interest have been generated from 50 m grid resolution digital terrain data.

12.5.23. The predicted noise levels are calculated as L_{Aeq} noise levels and changed to the L_{A90} descriptor (to allow comparisons to be made) by subtraction of 2 dB, as specified by ETSU-R-97.

12.5.24. It has been shown by measurement-based verification studies that the ISO 9613 Part 2 model tends to slightly overestimate noise levels at nearby dwellings [13]. Examples of additional conservative assumptions modelled are:
- properties are assumed to be downwind of all noise sources simultaneously and at all times. In reality, this is not the case and additional attenuation would be expected when a property is upwind or crosswind of the proposed wind turbines;
- although, in reality, the ground is predominantly porous (acoustically absorptive) it has been modelled as 'mixed', i.e. a combination of hard and porous, corresponding to a ground absorption coefficient of 0.5 as recommended by the IOA Bulletin and IOA GPG;
- receiver heights are modelled at 4 m above local ground level, which equates roughly to first floor window level, as recommended by the IOA Bulletin and IOA GPG. This

results in a predicted noise level anything up to 2 dB higher than at the typical human ear height of 1.2 m – 1.8 m;
- trees and other non-terrain shielding effects have not been considered;
- an allowance for measurement uncertainty has been included in the sound power levels for the presented candidate wind turbine.

12.6 Acoustic Impact Criteria

Operation

12.6.1. Sound is measured in decibels (dB) which is a measure of the sound pressure level, i.e. the magnitude of the pressure variations in the air. Measurements of environmental noise are usually made in dB(A) which includes a correction for the sensitivity of the human ear.

12.6.2. ETSU-R-97 seeks to protect the internal and external amenity of wind farm neighbours by defining acceptable limits for operational noise from wind turbines. The test applied to operational noise is whether or not the noise levels produced by the combined operation of the wind turbines comply with noise limits derived in accordance with ETSU-R-97 at nearby residential properties.

12.6.3. Whilst ETSU-R-97 presents a comprehensive and detailed assessment methodology for wind farm noise, it also provides a simplified methodology:

"if the noise is limited to an $L_{A90,10min}$ of 35dB(A) up to wind speeds of 10m/s at 10m height, then these conditions alone would offer sufficient protection of amenity, and background noise surveys would be unnecessary".

12.6.4. In the detailed methodology, ETSU-R-97 states that different limits should be applied during daytime and night-time periods. The daytime limits, derived from the background noise levels measured during quiet daytime periods, are intended to preserve outdoor amenity, while the night-time limits are intended to prevent sleep disturbance. The general principle is that the noise limits should be based on existing background sound levels, except for very low background sound levels, in which case a fixed limit may be applied. The limits are given in **Table 12.3** below, where L_B is the background $L_{A90,10min}$ and is a function of wind speed. During daytime periods and at low background sound levels, a lower fixed limit of 35-40 dB(A) is applicable. The exact value is dependent upon a number of factors: the number of nearby dwellings, the effect of the noise limits on energy produced, and the duration and level of exposure.

Table 12.3: Applicable Noise Level Criteria

Time of Day	Definition
Daytime	35-40 dB(A) for L_B less than or equal to 30-35 dB(A) during quiet daytime periods. L_B + 5 dB, for L_B greater than 30-35 dB(A) during quiet daytime periods.
Night-time	43 dB(A) for L_B less than or equal to 38 dB(A) L_B + 5 dB, for L_B greater than 38 dB(A)

12.6.5. Note that ETSU-R-97 states that a higher noise level is applicable during the night than during the day as it is assumed that residents would be indoors. The night-time criterion is derived from sleep disturbance criterion referred to in ETSU-R-97, with an allowance of 10 dB for attenuation through an open window.

12.6.6. The wind speeds at which the acoustic impact is considered are less than or equal to 12 ms^{-1} at a height of 10 m and are likely to be the acoustically critical wind speeds. Above these wind speeds, as stated in ETSU-R-97, reliable measurements of background and wind

turbine noise are difficult to make. However, if a wind farm meets the acoustic criteria at the wind speeds presented, it is most unlikely that it would cause any greater loss of amenity at higher wind speeds due to increasing background sound levels masking wind farm generated sound.

12.6.7. It is important to note that, since reactions to noise are subjective, it is not possible to guarantee that a given development would not result in any adverse comment with regard to noise as the response to any given noise will vary from person to person. Consequently, standards and guidance that relate to environmental noise are typically presented in terms of criteria that would be expected to be considered acceptable by the majority of the population.

12.6.8. Where operational noise levels associated with the introduction of the Proposed Development are predicted to meet the above criteria, the resultant impact is considered not significant in EIA terms.

Construction & Decommissioning

12.6.9. Construction noise is discussed with reference to Annex E of BS 5228-1:2009 which provides guidance on setting environmental noise targets. Several methods of assessing the significance of noise levels are presented in Annex E and the most applicable to the construction of the Proposed Development is the ABC method.

12.6.10. The ABC method sets threshold noise levels for construction noise for specific periods based on the pre-existing ambient noise levels, subject to average lower Category A limiting values of 65, 55 and 45 dB L_{Aeq} for daytime (07:00 - 19:00 weekdays and Saturdays 07:00 – 13:00), evenings and weekends (19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays) and night-time (23:00 – 07:00) periods respectively, for instances where existing ambient noise levels are relatively low, which is the case here.

12.6.11. BS 5228-2:2009 provides guidance on the assessment of vibration due to blasting. A scaled distance graph is shown in Figure E.1 within Annex E which provides an indication of likely vibration magnitudes at various distances. This Figure can be used to determine the level of vibration which would not be expected to be exceeded in 95% of blasts for a given distance and charge size.

12.6.12. BS 6472-2:2008 details the maximum satisfactory magnitudes for vibration measured on a firm surface outside buildings with respect to human response. For up to three blast vibration events per day, the generally accepted maximum satisfactory magnitude at residential premises during daytime periods (08:00 – 18:00 Monday to Friday and 08:00 – 13:00 on Saturdays), is a peak particle velocity (ppv) of 6.0 to 10.0 $mm.s^{-1}$. In practice, the lower satisfactory magnitude should be used with the higher magnitude being justified on a case-by-case basis.

12.6.13. Where it is considered that the levels of construction noise and vibration, including that from blasting, can meet the relevant limits for each aspect or that appropriate controls or mitigation can be put in place, the resultant impact is considered not significant in EIA terms.

12.7 Baseline Conditions

12.7.1. The centre of the Proposed Development is approximately 2.7 km north of Newton Stewart, in Dumfries and Galloway. The surrounding area is predominantly rural in nature and used for grazing sheep, as well as forestry. The general acoustic character is typical of a rural environment with sound from farm machinery, sheep, cattle, and birds, rustle of trees and sound of nearby streams, with the occasional overhead aircraft.

12.7.2. Background sound measurements were undertaken at three residential property locations (Drannandow Farm, Glenmalloch Lodge and Glenshalloch) in accordance with ETSU-R-97. These three locations are detailed in **Table 12.4.**

Table 12.4 - Background Noise Survey Details

Survey Location	Measurement Period		
	Start	End	Duration (days)
Drannandow Farm (H6)	15/03/2024	30/05/2024	77
Glenmalloch Lodge (H20)	15/03/2024	30/05/2024	77
Glenshalloch (H22)	15/03/2024	7/05/2024	54

12.7.3. The background sound monitoring equipment was housed in weather-proof enclosures and powered by lead-acid batteries. The microphones were placed at a height of approximately 1.2 - 1.5m above ground and equipped with all-weather wind shields which also provide an element of water resistance.

12.7.4. The proprietary wind shields used are designed to reduce the effects of wind-generated noise at the microphone and accord with the recommendations of the IOA GPG in that they are the appropriate size and, in combination with the microphone, are certified by the manufacturer as meeting Type 1 / Class 1 precision standards.

12.7.5. Sound levels are monitored continuously, and summary statistics stored every 10 minutes in the internal memory of each meter. The relevant statistic measured is the $L_{A90,10min}$ (The A-weighted sound pressure level exceeded for 90% of the 10-minute interval).

12.7.6. The sound level meters were placed away from reflecting walls and vegetation. Photos of the equipment, in situ, may be seen in **Technical Appendix 12.3.** The apparatus was field calibrated before and after the survey period and the maximum detected calibration drift was 0.4 dB, which is within the required range recommended in the IOA GPG. All sound level meters have been subject to laboratory calibration traceable to national standards within the last 24 months and field calibrators within the last 12 months, as recommended in the IOA GPG. Details are provided in **Technical Appendix 12.4.**

12.7.7. **Chart 12.5.1** (see **Technical Appendix 12.5** for all charts) shows the measured wind rose over the background sound survey period, as measured by a LiDAR (Light Detection and Ranging) located on-site.

12.7.8. A LiDAR is a remote sensing device that measures conditions in the atmosphere by using pulses from a LASER by applying the principle of the Doppler Effect, detecting the movement of air in the atmospheric boundary layer to measure wind speed and direction. LiDAR provides measurements at several heights, and this enables wind speed data to be obtained that describe the wind profile across a range of heights.

12.7.9. LiDAR has been successfully tested, by independent third parties using suitable test sites, against conventional anemometry [14] [15]. From the technical reports, these tests have demonstrated that, over a range of relevant heights, the accuracy of the LIDAR is comparable to that of the conventional anemometry.

12.7.10. For illustrative purposes, **Chart 12.5.2** shows the predicted wind rose using meso-scale modelling over an extended period (one calendar year). As previously discussed, the noise prediction model employed is likely to overestimate the real noise immission levels for locations not downwind of the wind turbines. **Chart 12.5.2** therefore may aid the reader as to the likelihood of over-estimation due to this factor.

12.7.11. The acoustic data has been cross-referenced with rainfall data measured at the site using Met Office weather radar. Any acoustic data identified as having been affected by rainfall has been removed from the analysis as shown in **Charts 12.5.3 to 12.5.8**.

12.7.12. Short-term periods of increased noise levels considered to be atypical have been removed from the datasets. The excluded data is shown in **Charts 12.5.3 to 12.5.8**.

12.7.13. **Charts 12.5.3 to 12.5.5** show $L_{A90,10min}$ correlated against wind speed for quiet daytime periods at each survey location. In each case, a 'best fit' line has been fitted to the data and the noise limits added. The equation of the regression polynomial has been provided in the charts.

12.7.14. **Charts 12.5.6 to 12.5.8** show $L_{A90,10min}$ correlated against the wind speed for night-time periods at each survey location. In each case, a 'best fit' line has been fitted to the data and the noise limits added. The equation of the regression polynomial has been provided in the charts.

12.7.15. **Table 12.5** and **Table 12.6** detail the $L_{A90,10min}$ background noise levels calculated from the derived 'best fit' lines, as described above. They are provided as sound pressure levels in dB referenced to 20 micro Pascals (see Glossary for further detail):

Table 12.5 - Quiet Daytime Background Noise Levels (dB $L_{A90,\ 10min}$ re 20 µPa)

Survey Location	Standardised 10m Wind Speed (ms^{-1})											
	1	2	3	4	5	6	7	8	9	10	11	12
Drannandow Farm	32.8	33.4	34.0	34.7	35.6	36.6	37.7	39.1	40.8	42.8	45.2	47.9
Glenmalloch Lodge	32.8	32.8	33.1	33.7	34.5	35.5	36.7	38.1	39.6	41.3	43.0	44.8
Glenshalloch	31.8	31.8	32.1	32.6	33.5	34.7	36.2	38.2	40.4	43.1	46.3	49.8

Table 12.6 - Night-time Background Noise Levels (dB $L_{A90,\ 10min}$ re 20 µPa)

Survey Location	Standardised 10m Wind Speed (ms^{-1})											
	1	2	3	4	5	6	7	8	9	10	11	12
Drannandow Farm	34.4	34.4	34.6	34.9	35.3	35.9	36.6	37.3	38.1	38.8	39.5	40.1
Glenmalloch Lodge	35.7	35.8	35.9	36.1	36.3	36.6	36.9	37.4	38.0	38.8	39.7	40.8
Glenshalloch	32.9	32.9	32.9	32.9	33.2	33.9	34.9	36.3	38.2	40.4	43.2	46.4

Future Baseline

12.7.16. The existing baseline noise environment at dwellings neighbouring the Proposed Development is as described above and is not expected to change significantly in the future.

12.8 Embedded Mitigation

Operation

12.8.1. The Proposed Development has been designed on an iterative basis with a view to minimising projected operational sound levels via the use of appropriate set-back distances to neighbouring residential properties as detailed in **Table 12.8**, with a view to maintaining compliance with the limiting requirements of ETSU-R-97 whilst considering all other site constraints.

Construction & Decommissioning

12.8.2. Standard mitigation measures, such as those presented in Section 12.10, will be used during construction and decommissioning of the Proposed Development are per the general requirement of BS 5228-1:2009 to employ 'best practicable means' to reduce the levels of any resultant associated potential sound and vibration where necessary and proportionate.

12.9 Assessment of Potential Effects

Operation

Noise Propagation Modelling

12.9.1. The locations of the proposed wind turbines are provided in **Table 12.7** and shown in **Figure 12.1**. All coordinates are according to Ordnance Survey of Great Britain, 1936 (EPSG code 27700).

Table 12.7: Location of Proposed Wind Turbines

Wind Turbine	Co-ordinates		Wind Turbine	Co-ordinates		Wind Turbine	Co-ordinates	
	X (m)	Y (m)		X (m)	Y (m)		X (m)	Y (m)
T1	242473	574210	T6	241874	572364	T11	242327	570903
T2	242694	573636	T7	242455	572030	T12	241607	570626
T3	242305	573204	T8	241652	571803	T13	242166	570330
T4	241753	572981	T9	242193	571483	T14	241645	570030
T5	242474	572624	T10	241546	571218	-	-	-

12.9.2. The locations of the nearest residential properties to the wind turbines have been determined by inspection of relevant maps and through site visits. The study area for the background noise survey and assessment has been determined in accordance with guidance provided in the IOA GPG. More residential properties may have been identified but have not been considered relevant to this acoustic assessment or may be adequately represented by another residential property. The locations considered are listed in **Table 12.8** and are also shown in **Figure 12.1.**

12.9.3. The distances from each residential property to the nearest wind turbine are given in **Table 12.8**. It can be seen that the minimum house-to-wind turbine separation is 1193 m to H22 (Glenshalloch).

Table 12.8: Location of Residential Properties and Distances to Nearest Proposed Wind Turbine

House ID	House Name	Co-ordinates		Distance From Nearest Wind Turbine (m)	Nearest Wind Turbine
		X (m)	Y (m)		
H1	GLENHAPPLE FARM	237473	571302	4074	T10
H2	LUTRA HOLT	237946	570502	3663	T12
H3	CREE HALL	238431	569523	3254	T14
H4	CREE COTTAGE	238484	569310	3242	T14
H5	GALLOW HILL STABLES	238565	569253	3177	T14

House ID	House Name	Co-ordinates		Distance From Nearest Wind Turbine (m)	Nearest Wind Turbine
		X (m)	Y (m)		
H6	DRANANDOW FARM	238856	570221	2780	T12
H7	DRANANDOW COTTAGE	238878	570029	2767	T14
H8	CORDORCAN	238962	572062	2703	T8
H9	BARCLYE	239204	569423	2515	T14
H10	BORELAND FARM	239490	567649	3211	T14
H11	BORELAND FARM COTTAGE	239705	567731	3008	T14
H12	LINLOSGAN COTTAGE	240059	567395	3075	T14
H13	CRAG HOUSE	240367	567317	2999	T14
H14	BORELAND LODGE	240626	567136	3068	T14
H15	BEECHGROVE	240766	567173	2989	T14
H16	CLAUGHRIE LODGE	241583	567712	2319	T14
H17	CUMLODEN HOUSE	241755	567714	2319	T14
H18	CUMLODEN STABLE COTTAGE	241859	567716	2324	T14
H19	GARDEN COTTAGE	242166	567969	2126	T14
H20	GLENMALLOCH LODGE	242283	568247	1894	T14
H21	GLENHOISE COTTAGE	242998	568069	2382	T14
H22	GLENSHALLOCH	243335	570096	1193	T13
H23	AUCHENLECK LODGE	243495	569039	1853	T13
H24	AUCHENLECK	244976	570811	2650	T11

12.9.4. Although not finalised, the candidate wind turbine type used for the purposes of the acoustic assessment of the Proposed Development is the Siemens-Gamesa SG 6.6-170 6.6 MW machine. This report uses the acoustic data from the manufacturer's performance specification for this machine for all analysis [16]. The manufacturer has identified these values as warranted although no independent test reports are available to indicate whether any margin has been incorporated. A 2 dB allowance for uncertainty has therefore been added to the specification levels as a conservative measure as recommended by the IOA GPG. Details used in this analysis are as follows:

- hub height of 165 m, in reality 2 of the proposed turbines will have a lower hub-height and this assumption results in marginally higher predicted noise levels as a result;
- a rotor diameter of 170 m;
- sound power levels, L_{WA}, for standardised 10 m height wind speeds (v_{10}) as shown in **Table 12.9**;
- octave band sound power level data, at the applicable wind speed where it is available, as shown in **Table 12.10**; and
- tonal emission characteristics such that no clearly audible tones are present at any wind speed.

Table 12.9 – A-Weighted Sound Power Levels (dB(A) re 1 pW) for the Siemens-Gamesa SG 6.6-170 6.6 MW Wind Turbine, including 2 dB uncertainty

Standardised 10m Height Wind Speed, v_{10} (ms^{-1})	165 m Hub Height
1	95.5
2	95.5
3	95.5
4	100.8
5	105.7
6	108.0
7	108.0
8	108.0
9	108.0
10	108.0
11	108.0
12	108.0

Table 12.10 - Octave Band A-Weighted Sound Power Levels (dB(A) re 1 pW) at Standardised 10 m Height Wind Speed of 8 ms^{-1} for the Siemens-Gamesa SG 6.6-170 6.6 MW Wind Turbine, including 2 dB uncertainty

Octave Band (Hz)	8 ms^{-1}
63	89.0
125	95.4
250	98.1
500	99.9
1000	103.8
2000	101.9
4000	95.3
8000	85.0

Predictions of Noise Levels at Residential Properties

12.9.5. **Table 12.11** shows the predicted noise immission levels at the nearest residential properties at each wind speed considered, calculated from the operation of the Proposed Development. The property with the highest predicted noise immission level of 36.0 dB(A) is H22 (Glenshalloch).

12.9.6. **Figure 12.1** shows an isobel (i.e. noise contour) plot for the Proposed Development at a standardised 10 m height wind speed of 8 ms^{-1}. Such plots are useful for evaluating the noise 'footprint' of a given development.

Table 12.11: Predicted Noise Levels at Nearby Residential Properties, dB L_{A90}

House ID	Reference Wind Speed, Standardised v_{10} (ms^{-1})											
	1	2	3	4	5	6	7	8	9	10	11	12
H1	11.8	11.8	11.8	17.1	22.0	24.3	24.3	24.3	24.3	24.3	24.3	24.3
H2	12.7	12.7	12.7	18.0	22.9	25.2	25.2	25.2	25.2	25.2	25.2	25.2
H3	13.2	13.2	13.2	18.5	23.4	25.7	25.7	25.7	25.7	25.7	25.7	25.7
H4	13.1	13.1	13.1	18.4	23.3	25.6	25.6	25.6	25.6	25.6	25.6	25.6
H5	12.7	12.7	12.7	18.0	22.9	25.2	25.2	25.2	25.2	25.2	25.2	25.2
H6	15.6	15.6	15.6	20.9	25.8	28.1	28.1	28.1	28.1	28.1	28.1	28.1
H7	15.4	15.4	15.4	20.7	25.6	27.9	27.9	27.9	27.9	27.9	27.9	27.9
H8	16.9	16.9	16.9	22.2	27.1	29.4	29.4	29.4	29.4	29.4	29.4	29.4
H9	15.7	15.7	15.7	21.0	25.9	28.2	28.2	28.2	28.2	28.2	28.2	28.2
H10	12.1	12.1	12.1	17.4	22.3	24.6	24.6	24.6	24.6	24.6	24.6	24.6
H11	12.8	12.8	12.8	18.1	23.0	25.3	25.3	25.3	25.3	25.3	25.3	25.3
H12	12.4	12.4	12.4	17.7	22.6	24.9	24.9	24.9	24.9	24.9	24.9	24.9
H13	12.6	12.6	12.6	17.9	22.8	25.1	25.1	25.1	25.1	25.1	25.1	25.1
H14	12.4	12.4	12.4	17.7	22.6	24.9	24.9	24.9	24.9	24.9	24.9	24.9
H15	12.7	12.7	12.7	18.0	22.9	25.2	25.2	25.2	25.2	25.2	25.2	25.2
H16	15.4	15.4	15.4	20.7	25.6	27.9	27.9	27.9	27.9	27.9	27.9	27.9
H17	15.4	15.4	15.4	20.7	25.6	27.9	27.9	27.9	27.9	27.9	27.9	27.9
H18	15.4	15.4	15.4	20.7	25.6	27.9	27.9	27.9	27.9	27.9	27.9	27.9
H19	16.5	16.5	16.5	21.8	26.7	29.0	29.0	29.0	29.0	29.0	29.0	29.0
H20	17.8	17.8	17.8	23.1	28.0	30.3	30.3	30.3	30.3	30.3	30.3	30.3
H21	17.0	17.0	17.0	22.3	27.2	29.5	29.5	29.5	29.5	29.5	29.5	29.5
H22	23.5	23.5	23.5	28.8	33.7	36.0	36.0	36.0	36.0	36.0	36.0	36.0
H23	18.7	18.7	18.7	24.0	28.9	31.2	31.2	31.2	31.2	31.2	31.2	31.2
H24	16.6	16.6	16.6	21.9	26.8	29.1	29.1	29.1	29.1	29.1	29.1	29.1

12.9.7. Noise levels at 23 of the 24 nearest residential properties are below 35 dB L_{A90}, indicating that the noise immission levels would be regarded as **Not Significant** in EIA terms and the residents' amenity as receiving 'sufficient protection' without further assessment requiring to be undertaken in these instances in accordance with ETSU-R-97.

12.9.8. One property (H22) has predicted noise immission levels greater than this simplified noise criteria as indicated in **Table 12.15**. Therefore the 'full' acoustic assessment needs only to be considered at this one property. Nevertheless, a full acoustic assessment has been undertaken for all the properties as listed in **Table 12.8**.

Acoustic Assessment Criteria

12.9.9. As stated previously, during daytime periods and at low background noise levels, a lower fixed limit of 35-40 dB(A) is applicable with the exact value dependent upon a number of factors: the number of noise affected residential properties; the potential impact on the power output of the Proposed Development and the likely duration and level of exposure.

Through consideration of these factors, the applicant has adopted a 37.5 dB(A) daytime lower fixed limit. The justification being:

- Number of affected residential properties: only one of the considered residential properties is predicted to experience noise levels of greater than 35 dB(A). This is a small number of properties in relation to the scale of the Proposed Development, which would generate significant social, economic and environmental benefits, suggesting a limit towards the upper end of the range would be appropriate;
- Potential impact on the power output of the Proposed Development: The rated power would be approximately 92 MW should the wind turbine type considered in the acoustic assessment be installed, large in comparison with other wind farm developments in Scotland, suggesting that a limit towards the upper end of the range would be appropriate; and,
- The likely duration and level of exposure: The amount of time that noise levels of greater than 35 dB(A) are predicted is limited to periods of sufficiently high wind speed. Noise levels would also be reduced when properties are not located downwind of the wind turbines. Again, this does not suggest a high impact such that a limit towards the upper end of the range would be appropriate.

12.9.10. A 37.5 and 43 dB L_{A90} lower fixed limit have been adopted for daytime and night-time periods respectively, in accordance with ETSU-R-97. The resulting criteria are shown in **Table 12.12** and, where predicted operational noise levels are shown to be below these levels, the resultant impact can be considered not significant.

Table 12.12: Applicable Noise Level Criteria

Time of Day	Applicable Criteria for Noise Levels
Daytime	37.5 dB(A) for L_B less than or equal to 32.5 dB(A) during quiet daytime periods L_B + 5 dB, for L_B greater than 32.5 dB(A) during quiet daytime periods
Night-time	43dB(A) for L_B less than or equal to 38 dB(A) L_B + 5 dB, for L_B greater than 38 dB(A)

Calculation of Appropriate Noise Limits from Baseline Conditions

12.9.11. The 'best-fit' lines as shown in **Technical Appendix 12.5 - Charts 12.5.3-12.5.8** have been used to calculate the appropriate noise limits at the background noise measurement locations in line with the applicable noise level criteria set out in **Table 12.12. Table 12.13** shows the appropriate daytime noise limits and **Table 12.14** the night-time noise limits.

Table 12.13 - Appropriate Daytime Noise Limits, dB L_{A90}

Survey Location	Standardised 10m Wind Speed (ms^{-1})											
	1	2	3	4	5	6	7	8	9	10	11	12
Drannandow Farm	37.8	38.4	39.0	39.7	40.6	41.6	42.7	44.1	45.8	47.8	50.2	52.9
Glenmalloch Lodge	37.8	37.8	38.1	38.7	39.5	40.5	41.7	43.1	44.6	46.3	48.0	49.8
Glenshalloch	37.5	37.5	37.5	37.6	38.5	39.7	41.2	43.2	45.4	48.1	51.3	54.8

Table 12.14 - Appropriate Night-time Noise Limits, dB L_{A90}

Survey Location	Standardised 10m Wind Speed (ms^{-1})											
	1	2	3	4	5	6	7	8	9	10	11	12
Drannandow Farm	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.1	43.8	44.5	45.1
Glenmalloch Lodge	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.8	44.7	45.8
Glenshalloch	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.2	45.4	48.2	51.4

12.9.12. The recommendations of ETSU-R-97 state that where there are groups of properties that are likely to have a similar background noise environment, it is appropriate to use data from one representative location as the basis for assessment at the other properties. The survey results inferred to be representative for each property are shown in **Table 12.15**.

12.9.13. In accordance with the applied lower limits stated in **Table 12.12**, the quiet daytime noise limits are set at 37.5 dB L_{A90} and night-time noise limits are set at 43 dB L_{A90} at all standardised 10 m wind speeds up to and including 12 ms^{-1}, with exception of the properties listed in **Table 12.15,** where the limits have been inferred from the results of the background sound survey. The noise limits at each nearby property at each wind speed are set out in **Technical Appendix 12.6** for daytime and night-time respectively.

12.9.14. The specific choice of noise survey location chosen has been made considering the distance to the nearest survey location and the likelihood of experiencing a broadly similar acoustic environment as the survey location.

Table 12.15 - Assumed Representative Background Noise Survey Locations

House ID	House Name	Survey Location
H6	Drannandow Farm	Drannandow Farm
H19	Garden Cottage	Glenmalloch Lodge
H20	Glenmalloch Lodge	Glenmalloch Lodge
H22	Glenshalloch	Glenshalloch

Acoustic Assessment

12.9.15. **Table 12.16** and **12.17** show the daytime and night-time margins by which the predicted operational noise levels resulting from operation of the Proposed Development meet the noise limits set out in **Technical Appendix 12.6** for daytime and night-time respectively. A negative number shows that predicted levels are below the relevant noise limits at each property.

Table 12.16: Daytime Predicted Margin of Compliance, dB

House ID	Standardised 10 m height Wind Speed, ms^{-1}											
	1	2	3	4	5	6	7	8	9	10	11	12
H1	-25.7	-25.7	-25.7	-20.4	-15.5	-13.2	-13.2	-13.2	-13.2	-13.2	-13.2	-13.2
H2	-24.8	-24.8	-24.8	-19.5	-14.6	-12.3	-12.3	-12.3	-12.3	-12.3	-12.3	-12.3
H3	-24.3	-24.3	-24.3	-19.0	-14.1	-11.8	-11.8	-11.8	-11.8	-11.8	-11.8	-11.8
H4	-24.4	-24.4	-24.4	-19.1	-14.2	-11.9	-11.9	-11.9	-11.9	-11.9	-11.9	-11.9
H5	-24.8	-24.8	-24.8	-19.5	-14.6	-12.3	-12.3	-12.3	-12.3	-12.3	-12.3	-12.3

House ID	Standardised 10 m height Wind Speed, ms^{-1}											
	1	2	3	4	5	6	7	8	9	10	11	12
H6	-22.2	-22.8	-23.4	-18.8	-14.8	-13.5	-14.6	-16.0	-17.7	-19.7	-22.1	-24.8
H7	-22.1	-22.1	-22.1	-16.8	-11.9	-9.6	-9.6	-9.6	-9.6	-9.6	-9.6	-9.6
H8	-20.6	-20.6	-20.6	-15.3	-10.4	-8.1	-8.1	-8.1	-8.1	-8.1	-8.1	-8.1
H9	-21.8	-21.8	-21.8	-16.5	-11.6	-9.3	-9.3	-9.3	-9.3	-9.3	-9.3	-9.3
H10	-25.4	-25.4	-25.4	-20.1	-15.2	-12.9	-12.9	-12.9	-12.9	-12.9	-12.9	-12.9
H11	-24.7	-24.7	-24.7	-19.4	-14.5	-12.2	-12.2	-12.2	-12.2	-12.2	-12.2	-12.2
H12	-25.1	-25.1	-25.1	-19.8	-14.9	-12.6	-12.6	-12.6	-12.6	-12.6	-12.6	-12.6
H13	-24.9	-24.9	-24.9	-19.6	-14.7	-12.4	-12.4	-12.4	-12.4	-12.4	-12.4	-12.4
H14	-25.1	-25.1	-25.1	-19.8	-14.9	-12.6	-12.6	-12.6	-12.6	-12.6	-12.6	-12.6
H15	-24.8	-24.8	-24.8	-19.5	-14.6	-12.3	-12.3	-12.3	-12.3	-12.3	-12.3	-12.3
H16	-22.1	-22.1	-22.1	-16.8	-11.9	-9.6	-9.6	-9.6	-9.6	-9.6	-9.6	-9.6
H17	-22.1	-22.1	-22.1	-16.8	-11.9	-9.6	-9.6	-9.6	-9.6	-9.6	-9.6	-9.6
H18	-22.1	-22.1	-22.1	-16.8	-11.9	-9.6	-9.6	-9.6	-9.6	-9.6	-9.6	-9.6
H19	-21.3	-21.3	-21.6	-16.9	-12.8	-11.5	-12.7	-14.1	-15.6	-17.3	-19.0	-20.8
H20	-20.0	-20.0	-20.3	-15.6	-11.5	-10.2	-11.4	-12.8	-14.3	-16.0	-17.7	-19.5
H21	-20.5	-20.5	-20.5	-15.2	-10.3	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0
H22	-14.0	-14.0	-14.0	-8.8	-4.8	-3.7	-5.2	-7.2	-9.4	-12.1	-15.3	-18.8
H23	-18.8	-18.8	-18.8	-13.5	-8.6	-6.3	-6.3	-6.3	-6.3	-6.3	-6.3	-6.3
H24	-20.9	-20.9	-20.9	-15.6	-10.7	-8.4	-8.4	-8.4	-8.4	-8.4	-8.4	-8.4

Table 12.17: Night-time Predicted Margin of Compliance, dB

House ID	Standardised 10 m height Wind Speed, ms^{-1}											
	1	2	3	4	5	6	7	8	9	10	11	12
H1	-31.2	-31.2	-31.2	-25.9	-21.0	-18.7	-18.7	-18.7	-18.7	-18.7	-18.7	-18.7
H2	-30.3	-30.3	-30.3	-25.0	-20.1	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8
H3	-29.8	-29.8	-29.8	-24.5	-19.6	-17.3	-17.3	-17.3	-17.3	-17.3	-17.3	-17.3
H4	-29.9	-29.9	-29.9	-24.6	-19.7	-17.4	-17.4	-17.4	-17.4	-17.4	-17.4	-17.4
H5	-30.3	-30.3	-30.3	-25.0	-20.1	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8
H6	-27.4	-27.4	-27.4	-22.1	-17.2	-14.9	-14.9	-14.9	-15.0	-15.7	-16.4	-17.0
H7	-27.6	-27.6	-27.6	-22.3	-17.4	-15.1	-15.1	-15.1	-15.1	-15.1	-15.1	-15.1
H8	-26.1	-26.1	-26.1	-20.8	-15.9	-13.6	-13.6	-13.6	-13.6	-13.6	-13.6	-13.6
H9	-27.3	-27.3	-27.3	-22.0	-17.1	-14.8	-14.8	-14.8	-14.8	-14.8	-14.8	-14.8
H10	-30.9	-30.9	-30.9	-25.6	-20.7	-18.4	-18.4	-18.4	-18.4	-18.4	-18.4	-18.4
H11	-30.2	-30.2	-30.2	-24.9	-20.0	-17.7	-17.7	-17.7	-17.7	-17.7	-17.7	-17.7
H12	-30.6	-30.6	-30.6	-25.3	-20.4	-18.1	-18.1	-18.1	-18.1	-18.1	-18.1	-18.1
H13	-30.4	-30.4	-30.4	-25.1	-20.2	-17.9	-17.9	-17.9	-17.9	-17.9	-17.9	-17.9

House ID	Standardised 10 m height Wind Speed, ms^{-1}											
	1	2	3	4	5	6	7	8	9	10	11	12
H14	-30.6	-30.6	-30.6	-25.3	-20.4	-18.1	-18.1	-18.1	-18.1	-18.1	-18.1	-18.1
H15	-30.3	-30.3	-30.3	-25.0	-20.1	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8
H16	-27.6	-27.6	-27.6	-22.3	-17.4	-15.1	-15.1	-15.1	-15.1	-15.1	-15.1	-15.1
H17	-27.6	-27.6	-27.6	-22.3	-17.4	-15.1	-15.1	-15.1	-15.1	-15.1	-15.1	-15.1
H18	-27.6	-27.6	-27.6	-22.3	-17.4	-15.1	-15.1	-15.1	-15.1	-15.1	-15.1	-15.1
H19	-26.5	-26.5	-26.5	-21.2	-16.3	-14.0	-14.0	-14.0	-14.0	-14.8	-15.7	-16.8
H20	-25.2	-25.2	-25.2	-19.9	-15.0	-12.7	-12.7	-12.7	-12.7	-13.5	-14.4	-15.5
H21	-26.0	-26.0	-26.0	-20.7	-15.8	-13.5	-13.5	-13.5	-13.5	-13.5	-13.5	-13.5
H22	-19.5	-19.5	-19.5	-14.2	-9.3	-7.0	-7.0	-7.0	-7.2	-9.4	-12.2	-15.4
H23	-24.3	-24.3	-24.3	-19.0	-14.1	-11.8	-11.8	-11.8	-11.8	-11.8	-11.8	-11.8
H24	-26.4	-26.4	-26.4	-21.1	-16.2	-13.9	-13.9	-13.9	-13.9	-13.9	-13.9	-13.9

12.9.16. Noise levels at all properties are within the daytime noise limits at all wind speeds considered with a minimum margin of -3.7 dB(A). Noise levels at all properties are within the night-time noise limits at all wind speeds considered with a minimum margin of -7.0 dB(A). In all instances the predicted operational noise levels meet the limiting requirements of ETSU-R-97 and can be considered **Not Significant** as a result.

Construction & Decommissioning

12.9.17. Primary activities creating noise during the temporary and short-term construction period include the construction of the wind turbine bases, the erection of the wind turbines, the excavation of trenches for cables, and the construction of associated hardstands, access tracks and compounds. Noise from vehicles on public roads and access tracks would also arise due to the delivery of wind turbine components and construction materials, notably aggregates, concrete and steel reinforcement.

12.9.18. The exact methodology and timing of construction activities have not yet been defined and a reliable assessment of expected construction noise levels is not possible as a result. However, as discussed in the **Methodology** section of this chapter, works expected to be undertaken at or around the proposed wind turbine locations would occur at distances that are unlikely to result in noise levels that would breach typical criteria at neighbouring residential properties in this regard.

12.9.19. The access route for the Proposed Development is expected to pass reasonably close to some residential properties and with some upgrade works to existing access tracks and public roads also expected to occur in close proximity to these residential properties. In these instances, the level of noise generated by construction works could be close to the limits defined as part of the 'ABC method' discussed earlier. As a result, typical construction noise mitigation measures are provided in the **Mitigation** section which aim to minimise noise as far as reasonably practicable and/or reasonable.

12.9.20. The movement of additional vehicles, including heavy goods vehicles (HGVs), along public roads and access routes may well be noticeable to residents adjacent to these in terms of the noise and vibration generated by them. The resultant impacts on public roads, that are already well used by local traffic and existing HGV movements, would be relatively minor in terms of the increase in average noise levels resulting from the additional vehicles on the public roads. However, the individual events may well be noticeable to residents, with resulting levels for individual events being similar to that created by existing HGV movements. The resultant noise levels on parts of the route that are less well used by

existing traffic would be noticeable to residents located along the route. However, the resultant noise and vibration levels from vehicles passing the dwellings would be unlikely to breach the adopted construction noise limits and accepted vibration thresholds.

12.9.21. The noise associated with blasting at 'borrow pit' locations may well be audible to neighbouring residents. However, the level of noise, overpressure and vibration generated by each blast would be well below levels that would be expected to cause damage to the nearest housing and/or structures. The **Mitigation** section below provides details as to standard mitigation measures to be incorporated into the blasting processes and may also be included within the CEMP.

12.9.22. Overall, the resultant levels of noise and vibration associated with the temporary construction of decommissioning of the Proposed Development, provided that appropriate and proportionate mitigation measures are put in place, are unlikely to breach typical noise and vibration limits and are considered **Not Significant** in EIA terms as a result.

12.10 Mitigation

Operation

12.10.1. One of the key constraints and considerations in designing the layout of the wind turbines was the minimisation of potential noise impacts at the nearest residential receptors. As such the wind turbine layout was designed to ensure that there is an adequate separation distance between any of the proposed turbines and the nearest residential property.

12.10.2. Due to this consideration of the noise impacts in the design of the Proposed Development, by embedding mitigation measures in the wind turbine layout, when a conservative candidate machine is modelled this meets the noise limits derived in accordance with ETSU-R-97.

12.10.3. If planning permission is granted for the Proposed Development, planning conditions can be proposed to provide a degree of protection to nearby residents in the form of limits relating to noise level and tonality.

12.10.4. **Technical Appendix 12.6** contains a set of draft planning conditions relating to noise that the applicant considers appropriate.

Construction & Decommissioning

12.10.5. For all activities, measures would be taken to reduce noise levels with due regard to practicality and cost as per the concept of 'best practicable means' as defined in Section 72 of the Control of Pollution Act 1974 [8].

12.10.6. BS 5228-1:2009 states that the 'attitude of the contractor' is important in minimising the likelihood of complaints and therefore consultation with the local authority is recommended along with steps to inform residents of intended activity. Non-acoustic factors, which influence the overall level of complaints such as mud on public roads and dust generation, would also be controlled through construction practices adopted on-site and managed via a Construction Environmental Management Plan (CEMP).

12.10.7. Furthermore, the following noise mitigation options will be implemented where appropriate:

- Consideration would be given to noise emissions when selecting plant and equipment to be used on-site;
- All equipment will be maintained in good working order and fitted with the appropriate silencers, mufflers or acoustic covers where applicable;

- Stationary noise sources would be sited as far away as reasonably possible from residential properties and where necessary and appropriate, acoustic barriers could be used to screen them;
- The movement of vehicles to and from the Proposed Development would be controlled and employees instructed to ensure compliance with the noise control measures adopted; and
- Site operations would be limited to 07:00-19:00 Monday to Saturday except during wind turbine erection and commissioning or during periods of emergency work.

12.10.8. Should it be considered necessary to reduce noise levels further to adhere to the more stringent target level of 55 dB L_{Aeq} for Saturdays 13:00-19:00 as detailed in Section 12.6, the following mitigation measures would be considered:

- Reduce the number of construction activities occurring simultaneously;
- Restrict the distance of construction activity from nearby properties during these times; and
- Reduce construction traffic as appropriate.

12.10.9. There are many strategies to reduce construction noise by the limitation of activities that would result in predicted noise levels being lower than the threshold noise levels detailed in Section **12.6**. Any such measures should be considered adequate and the mitigation adopted should not be limited to the proposed measures.

12.10.10. With specific regard to blasting, it is proposed that the following mitigation measures are implemented:

- Good practice on blasting, as recommended by Planning Advice Note (PAN) 50 'Controlling the environmental effects of surface mineral workings' [17] shall be followed;
- The vibration and air overpressure reduction methods outlined in Section 8.6.9.2 of BS 5228-2:2009 shall be adhered to where appropriate;
- Advance warning shall be given to nearby residents;
- Blasting shall only occur between the hours of 08:00-18:00 on Mondays-Fridays and between the hours of 08:00-13:00 on Saturdays; and
- No more than three blasts per day should occur.

12.10.11. Depending upon the charge sizes required it may be prudent to perform trial blasts with smaller amounts of explosive and measure vibration magnitudes at various distances to more accurately determine how vibration propagates at the Proposed Development.

12.10.12. As with operational noise, if planning permission is granted for the Proposed Development, planning conditions can be proposed so that details of the mitigation methods to be adopted to reduce the effects of noise occurring during the construction period in accordance with BS 5228 are included within a CEMP.

12.11 Assessment of Residual Effects

Operation

12.11.1. The acoustic assessment demonstrates that predicted noise levels at residential properties do not exceed the derived noise limits. This should not be interpreted to mean that wind farm operational noise would be inaudible (or masked by background noise) under all conditions, but that the levels of noise are acceptable under ETSU-R-97 and associated guidance. Therefore, the resultant effect is considered to be **Not Significant**.

Construction & Decommissioning

12.11.2. Noise and vibration during the construction and decommissioning of the Proposed Development may well be audible and/or perceptible to people residing in the area, but

the levels would be below established noise limits and planning requirements in this respect due to the large distances between the site and the surrounding residential properties. Where construction noise relating to the provision of access to the site, including the upgrade of public roads and their use thereof, is expected to occur in close proximity to residential properties, enhanced mitigation measures would be adopted to reduce noise and vibration where necessary. The impacts resulting from blasting at borrow pits are only considered in terms of the steps to limit any resulting impact through appropriate blast design and best practice, which also involves keeping residents informed as to planned blasting activities, with no significant impacts being expected.

12.11.3. Overall, the resultant levels of noise and vibration associated with the temporary construction of decommissioning of the Proposed Development, provided that appropriate and proportionate mitigation measures are put in place, are unlikely to breach typical noise and vibration limits are considered **Not Significant** as a result.

12.12 Assessment of Cumulative Effects

12.12.1. Cumulative noise impact from nearby wind farms that are operational, consented or in planning has been considered.

12.12.2. The proposed Glenvernoch Wind Farm (ECU ref: ECU00004892) is located approximately 7 km west of the Proposed Development. The proposed wind farm was still in Scoping at the time of this assessment, and as such, insufficient information was available to inform a cumulative assessment.

12.12.3. At the time this acoustic assessment was undertaken no operational wind farms, consented wind farms or wind farms in planning were identified according to sections 5.1.4 and 5.1.5 of the IOA GPG to create a potential for operational cumulative effect on nearby properties to the Proposed Development.

12.12.4. As a result, no cumulative operational or construction noise impacts have been identified.

12.13 Summary

12.13.1. The acoustic impact for the operation of the Proposed Development on nearby residential properties has been assessed in accordance with the guidance on wind farm noise as issued in the DTI publication 'The Assessment and Rating of Noise from Wind Farms', otherwise known as ETSU-R-97, and the Institute of Acoustics Good Practice Guide (IOA GPG), as recommended for use by relevant planning policy.

12.13.2. To establish baseline conditions, background sound surveys were carried out at three nearby properties and the measured background sound levels used to determine appropriate noise limits, as specified by ETSU-R-97 and the IOA GPG.

12.13.3. Operational noise levels were predicted using the recommended noise propagation model. The predicted noise levels for the Proposed Development are within the derived noise limits at all considered wind speeds. The Proposed Development therefore complies with the relevant guidance on wind farm noise and the impact on the amenity of all nearby residential properties would be regarded as acceptable and not significant as a result.

12.13.4. Construction noise has been discussed with reference to BS 5228 and it has been determined that on-site construction noise levels are highly unlikely to exceed typical limiting noise criteria at nearby residential properties although appropriate mitigation measures will be adopted as a matter of due course. The access route for the Proposed Development is expected to pass reasonably close to residential properties and with some upgrade works to existing access tracks and public roads potentially occurring in close proximity to some of these residential properties. In these instances, the level of noise generated by construction works could be close to typical limits for relatively brief periods. As a result, typical and enhanced construction noise mitigation measures are provided within the chapter which aim to minimise noise as far as reasonably practicable and/or reasonable. Overall, the resultant levels of noise and vibration associated with the temporary construction or decommissioning of the Proposed Development, provided that appropriate and proportionate mitigation measures are put in place, are unlikely to breach typical noise and vibration limits are considered not significant as a result.

12.13.5. Vibration and air overpressure due to blasting are not expected to have a significant impact on nearby residents should the mitigation measures described within the chapter be adopted.

12.13.6. The potential impact of the Proposed Development, along with the mitigation proposed and any residual impact, is summarised in **Table 12.18**.

Table 12.18: Summary of Potential Impacts, Mitigation and Residual Impacts

Potential Impact	Mitigation Proposed	Means of Implementation	Outcome/ Residual Impact
Operation			
Potential impact on residential amenity due to operational noise	The Proposed Development operating in isolation, and cumulatively with other existing operational wind farms and wind farm developments in planning, meet the limiting requirements of ETSU-R-97. As a result, no mitigation is required.	Not applicable	Not Significant
Construction and Decommissioning			
Potential for noise and vibration to be created during general construction activities and by construction traffic	Due regard for 'best practicable means' (defined by Section 72 of the Control of Pollution Act 1974). A range of noise mitigation measures are proposed for the construction phase in accordance with measures outlined in BS 5228-1:2009. Site operations to be limited to 07:00 – 19:00 Mondays to Saturdays (except during wind turbine delivery/erection and commissioning/periods of emergency work). Additional noise mitigation measures are proposed to reduce the acoustic impact of construction further during Saturdays 13:00-19:00. Good practice on blasting shall be followed along with guidance on blast frequency and timing.	Noise mitigation measures would be implemented as part of the CEMP which would be required to be agreed as a condition of consent.	Not Significant

12.14 Glossary

Word	Definition
A-weighting	A frequency-response function providing good correlation with the sensitivity of the human ear.
Broadband Noise	Noise which covers a wide range of frequencies (see Frequency).
Decibel dB(A)	The decibel (dB) is a logarithmic unit used in acoustics to quantify sound levels relative to a 0 dB reference (e.g. a sound pressure level of $2*10^{-5}$ Pa). The 'A' signifies A-weighting.
Equivalent Continuous Sound Level (L_{eq})	The equivalent continuous sound level is a notional steady noise level, which over a given time would provide the same energy as the intermittent noise.
Frequency	Refers to how quickly the air vibrates, or how close the sound waves are to each other and is measured in cycles per second, or Hertz (Hz). The lowest frequency audible to humans is 20 Hz and the highest is 20,000 Hz. The human ear is most sensitive to the 1 kHz, 2 kHz and 4 kHz octave bands and much less sensitive at lower audible frequencies.
Frequency Spectrum	Description of the sound pressure level of a source as a function of frequency.
Percentile Sound Level (L_{90})	Sound pressure level exceeded for 90% of the time for any given time interval. For example, $L_{(A)90,10min}$ means the A-weighted level that is exceeded for 90% of a ten-minute interval. This indicates the noise levels during quieter periods, or the background noise level. It represents the lower estimate of the prevailing noise level and is useful for excluding such effects as aircraft or dogs barking on background noise levels.
Noise Emission	The noise energy emitted by a source (e.g. a wind turbine).
Noise Immission	The sound pressure level detected at a given location (e.g. nearest dwelling).
Octave Band	Range of frequencies between one frequency ($f_0*2^{-1/2}$) and a second frequency ($f_0*2^{+1/2}$). The quoted centre frequency of the octave band is f_0.
Sound Power Level	Sound power level is the acoustic power radiated from a sound source and is independent of the surroundings. It is a logarithmic measure in comparison to a reference level (10^{-12} watts).
Sound Pressure Level	A logarithmic measure of the effective sound pressure of a sound relative to a reference value which is for minimum audible field conditions ($20*10^{-6}$Pa).
Third Octave Band	The range of frequencies between one frequency ($f_0*2^{-1/6}$) and a second frequency equal to ($f_0*2^{+1/6}$). The quoted centre frequency of the third octave band is f_0.
Tonal Noise	A noise that contains a noticeable or discrete, continuous note and includes noises such as hums, hisses, screeches.

12.15 References

[1] 'Onshore wind turbines: planning advice', Scottish Government, May 2014. Available at: https://www.gov.scot/publications/onshore-wind-turbines-planning-advice/

[2] 'Planning Advice Note 1/2011: Planning and Noise', Scottish Government, March 2011. Available at: https://www.gov.scot/publications/planning-advice-note-1-2011-planning-noise/

[3] 'Onshore wind: policy statement', Scottish Government, December 2022. Available at: https://www.gov.scot/publications/onshore-wind-policy-statement-2022/

[4] 'Prediction and Assessment of Wind Turbine Noise', Bowdler et al, Acoustics Bulletin Vol 34 No 2 March/April 2009

[5] 'A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise - Supplementary Guidance Notes', Institute of Acoustics, July & September 2014. Available at https://www.ioa.org.uk/publications/wind-turbine-noise

[6] 'Assessment of noise: technical advice note', Scottish Government, March 2011. Available at: http://www.gov.scot/publications/technical-advice-note-assessment-noise/

[7] 'Code of Practice for Noise and vibration control on construction and open sites - Part 1: Noise', BS 5228-1:2009, British Standards Institution, January 2009

[8] 'Control of Pollution Act', published by Her Majesty's Stationary Office, July 1974. Available at: https://www.legislation.gov.uk/ukpga/1974/40

[9] 'Code of Practice for Noise and vibration control on construction and open sites - Part 2: Vibration', BS 5228-2:2009, British Standards Institution, January 2009

[10] 'Guide to evaluation of human exposure to vibration in buildings - Blast-induced vibration', BS 6472-2:2008, British Standards Institution, June 2008

[11] 'Method for Rating Industrial Noise affecting Mixed Residential and Industrial Areas', BS 4142:1990, British Standards Institution, November 1990

[12] 'Acoustics - Attenuation of Sound During Propagation Outdoors - Part 2: General Method of Calculation', ISO 9613-2:1996, International Organisation for Standardisation, December 1996

[13] 'A Critical Appraisal of Wind Farm Noise Propagation', ETSU Report W/13/00385/REP, January 2000

[14] "Evaluation of WINDCUBE", Albers et al, Deutsche WindGuard Consulting GmbH, Report PP 08007, 16 March 2008

[15] "Verification test for three WindCubeTM WLS7 LiDARs at the Høvsøre test site", Gottschall et al, DTU Report Risø-R-1732, May 2010

[16] 'Product Customer Documentation, Developer package, SG 6.6-170' Document ref D2830475/23, Siemens Gamesa Renewable Energy, 9 August 2023

[17] 'Planning Advice Note 50: Controlling the environmental effects of surface mineral workings', Scottish Government, October 1996. Available at: https://www.gov.scot/publications/planning-advice-note-pan-50-controlling-environmental-effects-surface-mineral/

13 Climate Change Assessment

13.1 Introduction

13.1.1 Increasing atmospheric concentrations of greenhouse gases (GHGs), including carbon dioxide (CO_2), also referred to as carbon emissions are resulting in climate change. A major contributor to this increase in GHG emissions is the burning of fossil fuels. With concern growing over climate change, reducing its cause is of upmost importance. The replacement of traditional fossil fuel power generation with renewable energy sources provides high potential for the reduction of GHG emissions. This is reflected in UK and Scottish Governments' climate change and renewable energy policy and commitments. The relevant aspects of such policies are summarised in **Chapter 5: Statutory and Policy Framework**. A detailed examination of how the proposed development responds to legislation and policy is provided in the Planning Statement which is submitted separately as part of the application for consent under Section 36 of the Electricity Act 1989.

13.1.2 Whilst the Proposed Development will reduce carbon emissions by replacing the need to burn fossil fuels for power, no form of electricity generation is completely carbon free; for onshore wind farms, there will be emissions resulting from component manufacturing, transportation and installation processes associated with the Proposed Development.

13.1.3 In addition to the lifecycle emissions from the wind turbines and associated wind farm infrastructure, where a wind farm is located on carbon rich soils such as peat, there are potential emissions resulting from direct action of excavating peat for construction and also the indirect changes to hydrology that can result in losses of soil carbon. The footprint of a wind farm's infrastructure will also decrease the area covered by carbon-fixing vegetation.

13.1.4 Conversely, restoration activities undertaken post-construction or post-decommissioning could have a beneficial effect on carbon uptake through the restoration of modified bog habitat. Carbon losses and gains during the construction and lifetime of a wind farm, and the long-term impacts on the peatlands on which they are sited, need to be evaluated to understand the consequences of permitting such developments.

13.1.5 A technical review of energy displacement by the UK Energy Research Centre (UKERC) considered over two hundred studies and papers from all round the world for the UK Government and concluded that *"it is unambiguously the case that wind energy can displace fossil fuel-based generation, reducing both fuel use and carbon dioxide emissions"* (UKERC, 2006). Whilst the wind turbines will reduce carbon emissions by replacing the need to burn fossil fuels for power, there is the potential for carbon fixers and sinks to be lost through the clearing of vegetation and materials for construction. There must therefore be a sufficient balance between the carbon reduced and that which is produced and lost through associated processes.

13.2 Methodology

13.2.1 All applications that are over 50 MW are dealt with through the Scottish Government's Energy Consents Unit (ECU) in accordance with Section 36 of the Electricity Act 1989 and require a carbon balance assessment using the Scottish Government's online 'Carbon Calculator' tool, that can be used to calculate the greenhouse gas emissions and carbon payback times for wind farm developments on Scottish peatlands. This online tool is supported by two documents published by the Scottish Government and Scottish Renewables, and Scottish Environment Protection Agency (SEPA) to aid in calculating the potential carbon losses and savings.

13.2.2 The Carbon Calculator compares an estimate of the carbon emissions from the construction, operation, and decommissioning of the Proposed Development to those emissions estimated from other electricity generation sources. Input parameters are based on the proposed site design, infrastructure dimensions, results from peat depth surveys and laboratory testing of peat, and other information gained from site survey work, desk study and, where applicable, assumptions relating to groundwater, drainage, and habitat regeneration. As no infrastructure is yet to be constructed for the Proposed Development, the assumptions relating to infrastructure have been based on information for the Proposed Development or from standard, default representative information.

13.2.3 This report and assessment should be read in conjunction with the online carbon calculator inputs and outputs (**Technical Appendix 13.1**), and the project description contained in **Chapter 2: Proposed Development.**

13.3 Input Parameters

13.3.1 The carbon calculator submitted allows a range of data to be input to utilise expected, minimum and maximum values, where relevant and applicable. If several parameters are varied together, however, this can have the effect of 'cancelling out' a single parameter change. For this reason, the approach for this assessment, has been to include '*maximum values*' as those values which would result in longest (maximum) payback period; and '*minimum values*' as those values which would result in the shortest (minimum) payback period. The expected value is based on the most realistic option for the site.

13.3.2 Information relating to the Proposed Development (including consideration of design, operation, and construction) has been collated, and includes details of the proposed infrastructure, local ecology, and restoration proposals associated with the Proposed Development. This collated information has been entered into the online carbon calculator and is outlined below.

Wind Farm Characteristics

13.3.3 The Proposed Development will comprise 14 turbines with an expected power rating of 6.6 MW. The operational life of the Proposed Development is expected to be 50 years.

Capacity Factor

13.3.4 The capacity factor is 46.1 % from energy yield assessments undertaken by the Applicant, with a minimum of 44.1 % and a maximum of 48.4 % (calculated from +/- 5 %).

Back Up

13.3.5 The Carbon Calculator indicates that if over 20 % of national electricity is generated by wind energy, the extra capacity required for backup is 5 % of the rated capacity of the wind plant. The values for 'fraction of output to backup' are therefore input as expected 5 % and maximum 5 % to represent full requirement for backup, and a minimum of 0 % to represent no backup required (Nayak et al., 2008). SEPA indicates that for this parameter, the electricity generation capacity of Scotland, rather than the UK, should be considered. In 2022, Scotland generated about 66 % of gross electricity consumption via onshore wind (Scottish Renewables Statistics, 2023). Where the balancing capacity is obtained from fossil fuel generating stations, emissions will increase by 10 % due to reduced thermal efficiency of the reserve generation stations (Dale et al., 2004). This value is fixed in the Carbon Calculator.

CO_2 Emissions from Turbine Life (tCO_2/MW)

13.3.6 CO_2 emissions during the life of a wind turbine include emissions that occur during the manufacturing, transportation, erection, operation, dismantling and removal of the

structures. As there is no direct Life Cycle Assessment for the Proposed Development available at this point in time, the inbuilt Carbon Calculator option which allows for emissions to be calculated according to wind turbine capacity has been selected.

Characteristics of Peatland Before Wind Farm Development

Type of Peatland

13.3.7 The most appropriate habitat description available on the Carbon Calculator is Acid bog (refer to **Chapter 8: Ecology** and **Technical Appendix 8.1** for further information on habitats found within the site boundary).

Average Annual Air Temperature at Site

13.3.8 The average annual air temperature of 8.8°C is based on average annual temperature data from the Met Office UK climate averages (Met Office, 2024). The nearest climate station to the Proposed Development is located at Glenlee, St John's Town of Dalry, approximately 20 km north east of the Proposed Development site.

Average Depth of Peat at Site

13.3.9 The average peat depth of 0.36 m was calculated based on peat probe data from within the site boundary of the Proposed Development (refer to **Technical Appendix 10.4 and 10.5**).

13.3.10 The assessment is based on a series of average soil depths taken from peat surveys undertaken at the site. Probe locations sited on mineral/organic soils (<0.5 m) are conservatively included within the averages.

Carbon Content of Dry Peat

13.3.11 Site specific values are not available, so the standard values from the 'Windfarm Carbon Calculator Web Tool, User Guidance' have been used. The carbon content ranges from 49 % to 62 % with an expected value of 55 % used. This reflects a range of values typical of the carbon content anticipated from Scottish Peatlands (Birnie et al 1991 and Lindsay 2010).

Average Extent of Drainage around Drainage Features at Site

13.3.12 Site specific values are not available, so the standard values from the 'Windfarm Carbon Calculator Web Tool, User Guidance' have been used. The expected value is 10 m, with a minimum of 5 m and maximum of 50 m.

Average Water Table Depth at Site

13.3.13 Site specific values are not available, so the values for 'intact peat' from 'Windfarm Carbon Calculator Web Tool, User Guidance' have been used as a worst-case scenario. The expected value is 0.3 m, with a minimum 0.1 m, and a maximum 0.5 m.

Dry Soil Bulk Density

13.3.14 Given the difficulty of collecting sufficient samples to derive a representative site-specific value for this parameter, Scottish generic values for peat from 'Windfarm Carbon Calculator Web Tool, User Guidance' have been used. The expected value is 0.132 g/cm^3, with a minimum of 0.072 g/cm^3 and a maximum of 0.293 g/cm^3.

Characteristics of Bog Plants

Regeneration of Bog Plants

13.3.15 This can vary widely depending on the location of the site and the target bog plants for restoration, and whether the ground was previously afforested or open moorland. The

speed of regeneration will also depend on species present and their colonising ability and traits, as well as the methods of restoration and maintenance of hydrology. Typical bog plants may take longer to establish where suitable conditions exist. The values stated take this into account considering available literature and anectodical observations of wind farms in Scotland.

13.3.16 As such, five years has been stated as a reasonable precautionary estimate for the regeneration time needed for most bog species, with a minimum of two years and a longer establishment time of 15 years.

Carbon Accumulation

13.3.17 The Carbon Calculator Guidance (Technical Note, Version 2.10.0, Scottish Government) suggests a mid-range value of 0.25 tC ha-1 yr^{-1} and a range of 0.12 to 0.31 t C ha-1yr^{-1}.

Forestry Plantation Characteristics

Area of Forestry Plantation to be Felled

13.3.18 There is no net loss of forestry plantation from felling. Any crops that are cleared will be replanted back on the Site or on a compensatory planting site so that the overall area of forestry is maintained (see also **Chapter 14: Forestry**).

Counterfactual Emission Factors

13.3.19 The counterfactual emission factors for three methods of energy generation are fixed in the carbon calculator. Values for both coal-fired and fossil fuel-mix emission factors are updated from Diget of UK Energy Statistics (DUKES) data for the UK which is published annually. The source for the grid-mix emission factor is the list of emission factors used to report on greenhouse gas emissions by UK organisations published by the Department for Business, Energy & Industrial Strategy (BEIS).

Borrow Pits

13.3.20 Five borrow pit search areas have been included for the Proposed Development (refer to **Chapter 2: Proposed Development**). Although not all proposed borrow pit search areas are sited on peatland or likely to be used for extraction, conservatively, each location has been included in the assessment. The final dimensions of each borrow pit have yet to be defined however initial calculations, based on a series of assumptions (including suitable aggregate being located close to surface), indicate that 60 m x 60 m would provide sufficient yield. These dimensions have been included for each borrow pit.

13.3.21 The average peat depth in the borrow pit search areas is 0.3 m, with a minimum of 0 m and a maximum of 0.5 m. Conservatively, organic soils (<0.5 m) have also been used in the calculation of averages.

Foundations and Hardstand Areas

13.3.22 The wind turbine foundations for the Proposed Development are expected to be 25 m in diameter, with hardstands expected to be 60 m x 50 m.

13.3.23 The average peat depth in the turbine foundation areas is 0.4 m, with a minimum of 0.21 m and a maximum of 0.73 m, and the average peat depth in the hardstand areas is 0.42 m, with a minimum of 0.12 m and a maximum of 0.85 m. Conservatively, organic soils (<0.5 m) have also been used in the calculation of averages.

Volume of Concrete

13.3.24 It is expected that the Proposed Development would require a total of 17,150 m^3 of concrete.

Access Tracks

13.3.25 There is 2,973 m of existing tracks within the Proposed Development site. The total length of new access tracks proposed is approximately 8.5 km. Small changes to the access track layout may occur post consent (e.g., as a result of micrositing) leading to minor variations to the overall track length. There are no floating tracks proposed.

13.3.26 The average peat depth on the route of the proposed access track is 0.36 m. Conservatively, organic soils (<0.5 m) have also been used in the calculation of averages.

Cable Trenches

13.3.27 The wind farm array cables on site will be laid in trenches, laid on a sand bed and backfilled using suitably graded material, and will mainly be located adjacent to the access tracks within the Proposed Development. See also **Chapter 2: Proposed Development**.

Additional Peat Excavated

13.3.28 The volume of additional peat predicted to be excavated is 3,447 m^3. Further information can be found in **Technical Appendix 10.4 Outline Peat Management Plan**.

Peat Landslide Hazard

13.3.29 The peat landslide hazard is a fixed value automatically defined by the Carbon Calculator, and is shown to be 'negligible'.

Improvement of Carbon Sequestration at the Site

Improvement of Degraded Bog

13.3.30 The outline Biodiversity Enhancement Management Plan (oBEMP) (**Technical Appendix8.6**) outlines the objective to deliver peatland restoration within the site boundary. The area of degraded bog to be improved is 83.7 ha.

Improvement of Felled Plantation Land

13.3.31 The felled areas will not be improved for peatland.

Restoration of Peat Removed from Borrow Pits

13.3.32 **Technical Appendix 10.4** outlines that all borrow pits will be restored following the completion of construction. This is a total area of 2.11 ha.

Restoration of Site after Decommissioning

Hydrology & Habitats

13.3.33 The oBEMP (**Technical Appendix 8.6**) outlines the proposed habitat and conservation management measures in relation to the Proposed Development. The management recommendations include the aim of drain blocking to promote restoration of the hydrological conditions within the site and managing areas to favour the reintroduction of species. It is also proposed that controlled grazing will be implemented to facilitate grassland management. It has been assumed that this will continue to form part of a decommissioning and restoration plan for the Proposed Development in the future.

Methodology for Calculating Emission Factors

13.3.34 Site-specific values have been used as required for a planning or S36 application.

13.4 Carbon Calculator Output

13.4.1 The output from the Carbon Calculator indicates the expected total carbon dioxide loss for the Proposed Development (from manufacture of turbines, construction, decommissioning, and carbon sink losses, also taking account of gains due to restoration of borrow bits) is 173.651, tonnes of carbon dioxide (tCO_2 eq). Input and output parameters are detailed in **Technical Appendix 13.1**.

13.4.2 Scottish Government guidance on wind farm carbon savings (Scottish Government, 2018), states: "carbon emission savings from wind farms should be calculated using the fossil fuel sourced grid mix as the counterfactual, rather than the grid mix." Taking account of the expected total CO_2 loss from the Carbon Calculator result, the Proposed Development would be expected to result in a saving of approximately 161,198 tonnes of carbon dioxide (tCO_2) per annum, meaning a total of over 8 million tonnes over the 50-year operational lifetime of the Proposed Development, through displacement of carbon-emitting generation.

13.4.3 The carbon payback time of the Proposed Development is between 0.1 and 1.6 years, with an expected payback period of 0.9 years (approximately 11 months). This is the period of time for which a wind farm needs to be in operation before it has, by displacing generation from fossil-fuelled power stations, avoided as much carbon dioxide as was released in its lifecycle.

13.4.4 As recommended in current guidance estimated savings are for replacement of fossil fuel electricity generation but, while this could be the case in the short term, it is not the most probable scenario in the longer-term. The grid-mix of electricity generation represents the overall carbon emissions from the grid per unit of electricity and includes nuclear and renewables as well as fossil fuels. Based on the grid-mix results, the Proposed Development is expected to result in a saving of approximately 72,159 tCO_2 per annum with an expected carbon payback time of 2 years.

13.5 References

Dale, L, Millborrow, D, Slark, R and Strbac, G (2004) Total Cost Estimates for Large-Scale Wind Scenarios in UK, Energy Policy, 32, 1949-56

Birnie R.V., Clayton P., Griffiths P., Hulme P.D., Robertson, R.A., Sloane B.D., and S.A. Ward. (1991). Scottish peat resources and their energy potential. Department of Energy

Lindsay, R. (2010). Peatbogs and Carbon: a critical synthesis. RSPB

Meteorological Office (2024). UK Climate Averages. Available at: https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages. Accessed 30/09/2024

Nayak D.R., Miller D., Nolan A., Smith P., Smith J.U. (2008). Calculating Carbon Savings from Windfarms on Scottish Peatlands - Revision of Guidelines. October 2007 to January 2008. Final Report

Nayak D.R., Miller D., Nolan A., Smith P., Smith J.U. (2010) Mires and Peat., Article 09 4, 1-23 http://www.mires-and-peat.net/, ISSN 1819-754X.

Rochefort, Quinty, Campeau, Johnson & Malterer (2003). North American approach to the restoration of Sphagnum dominated peatlands. Wetlands Ecology and Management 11: 3–20

Smith J.U., Graves P., Nayak D.R., Smith P., Perks M., Gardiner B., Miller D., Nolan A., Morrice J., Xenakis S., Waldron S., Drew S. (2011) Carbon implications of windfarms located

on peatlands – update of the Scottish Government Carbon Calculator tool. Final Report, RERAD Report CR/2010/05.

Scottish Government (2016). Calculating Potential carbon losses and savings from wind farms on Scottish peatlands. Technical Note – Version 2.10.0. Available at: https://www.gov.scot/publications/carbon-calculator-for-wind-farms-on-scottish-peatlandsfactsheet/

Scottish Government Online Carbon Calculator Tool V1.7.0. Available at: https://informatics.sepa.org.uk/CarbonCalculator/

Scottish Government (2018). Carbon Calculator: Technical Guidance. Available at: https://www.gov.scot/publications/carboncalculator-technical-guidance/

SEPA. Windfarm Carbon Calculator Web Tool, User Guidance.

Scottish Renewable (2023). Statistics. Available at: https://www.scottishrenewables.com/our-industry/statistics Accessed on 30/10/2023

UKERC – United Kingdom Energy Research Council (2006). The Costs and Impacts of Intermittency: An assessment of the evidence on the costs and impacts of intermittent generation on the British electricity network. Available at: http://www.ukerc.ac.uk/support/Intermittency

14 Forestry

14.1 Executive Summary

14.1.1 This chapter considers the potential effects of the Proposed Development on forestry crops present within the Site. It outlines the effect that the Proposed Development will have on the existing forestry resource and identifies mitigation measures to be implemented to minimise the impact of the loss of tree cover.

14.2 Introduction

14.2.1 This chapter provides an assessment on the potential impacts of the Proposed Development on the forestry resource and the likely significant effects resulting from the construction and operation of the proposed wind turbines and associated infrastructure.

14.2.2 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 effects, including direct, indirect and cumulative effects;
- describe the mitigation measures proposed to address the likely significant effects;
- assess the residual effects remaining following the implementation of mitigation measures.

14.2.3 The chapter is supported by:

- Technical Appendix 14.1
- Figures 14.1 – 14.10.

14.3 Legislation, Policy and Guidance

14.3.1 This assessment is carried out in accordance with the principles contained within the following legislation:

- The Forestry and Land Management (Scotland) Act 2018; and

14.3.2 This assessment is carried out in accordance with the principles set out in the following documents:

- The UK Forestry Standard 2017;
- Scotland's Forestry Strategy 2019;
- The Scottish Government's Policy on the Control of Woodland Removal 2009 (CoWRP); and
- Scottish Government's policy on control of woodland removal: Implementation guidance 2019.

14.4 Consultation

14.4.1 Consultees were consulted during environmental impact assessment (EIA) Scoping. Scottish Forestry provided a response relating to Forestry. No further consultation was undertaken or required.

Table 14.1 Consultation responses

Consultee	Consultation Response	Applicant Action
Scottish Forestry (SF) (August 2023)	Agreement on the suggested matters to be addressed within the Foresty chapter.	The format outlined in the scoping document has been used for the Forestry chapter.

14.5 Assessment Methods and Significance Criteria

Methodology

Study Area

14.5.1 The study area for the forestry assessment included the compartments of Drannandow Forest within the Site and the areas of forestry within Lamachan and Queensway Forests adjoining the Site along the access corridor. The Forestry Study Area is shown on **Figure 14.1**.

Desk Study / Field Survey

14.5.2 Forestry plans provided by the forest managers and landowners, Forestry and Land Scotland (FLS), were studied and used to inform design and impact assessment and to identify any mitigation and compensatory measures that may be required.

14.5.3 A walkover survey was undertaken on 8th July 2024 to inspect forest compartments which could be impacted by the Proposed Development including the proposed locations of infrastructure.

Sensitivity

14.5.4 Sensitivity of forestry as a receptor has been determined by the criteria set out in Table 14.2

Table 14.2 Sensitivity Criteria

Degree of Sensitivity	Description
Highly Sensitive	High value due to rare or distinctive characteristics; National conservation designations in place; Considered susceptible to small changes.
Moderately Sensitive	Of more local value possibly with local level designations; Tolerant of moderate levels of change.
Low Sensitivity	Common composition and features; Potentially tolerant of moderate levels of change; No conservation or landscape designations; Undergoing significant development such that their character is one of change.
None	Tolerant of major change e.g. Conifer plantation crops under regular cycles of felling and replanting; Minimal ecological or landscape value.

Magnitude of Impact

14.5.5 The magnitude of change to forestry resource has been determined with reference to the criteria set out in Table 14.3.

Table 14.3 Magnitude Criteria

Magnitude of Change	Description
Major	The loss of over 30% of the crops within a commercial conifer woodland or the loss of any ancient woodland associated with a conservation designation for a site or feature of international, national or regional importance which creates a damaging impact or loss of resource integrity. However, a serious change in a site or feature of district importance may also enter this category.
Moderate	The loss of 10-30% of the crops within a commercial conifer woodland or the loss of any ancient woodland associated with a conservation designation of district importance.
Minor	The loss of less than 10% of the crops within a commercial conifer woodland and no loss of any ancient woodland.
Negligible	The loss of less than 1% of the crops within a commercial conifer woodland and no loss of any ancient woodland.

Significance Criteria

14.5.6 The predicted significance of the effect of tree removal can be considered both in terms of the area of the crops removed (magnitude of change) and the sensitivity of those crops. Commercial plantation forestry can usually be replanted to replace the lost resource quite quickly but if designated ancient woodland is affected, though replanting can be implemented, it may take decades for an ecosystem of similar quality and variety to re-establish.

14.5.7 There is no particular industry standard to be applied in respect of the impact of woodland removal so the sensitivity and magnitude criteria derived in Tables 14.2 and 14.3 above are based on professional judgement. The sensitivity and magnitude criteria have been combined to assess the significance of the effect of the Proposed Development on the forestry resource, as shown in Table 14.4. Major and Moderate effects are considered Significant and require mitigation to resolve. Any combination which results in a significance of Minor or negligible is considered to be Not Significant and does not require any mitigation.

Table 14.4 Significance Criteria

Magnitude	Sensitivity			
	High	Moderate	Low	None
Major	Major	Major	Moderate	None
Moderate	Major	Moderate	Minor	None
Minor	Moderate	Minor	None	None
Negligible	Minor	None	None	None

14.6 Baseline

14.6.1 The Site identified for the Proposed Development includes the majority of Drannandow Forest and adjoining farmland lying 2.7 kilometres (km) north of Newton Stewart in Dumfries and Galloway.

14.6.2 The access for the Proposed Development will be taken over the existing forest road through the adjoining forest properties of Lamachan and Queensway lying to the east.

Current Baseline

14.6.3 Drannandow Forest is a commercial, conifer-dominated forest property and compartments 5-9 (which lie within the Site) extend to 287.60 hectares (ha). The property was initially planted in the 1980's and harvesting and replanting work was started in 2016. The property now comprises a mix of mature stands of timber and young second rotation restock crops. Sitka spruce predominates the species mix and generally the compartments are all well stocked and exhibiting good growth rates. Some windblow damage is evident along the edges of the remaining mature crops which may develop further over the next few years.

14.6.4 Lamachan and Queensway are extensive forest properties with a combined area of almost 4,000 ha within which 2,763.20 ha comprises of stocked forest crops which are dominated by commercial conifer stands. Felling and replanting is ongoing, with the majority of the crops adjoining the forest road within the Site being young to mid-age second rotation crops. Many sections along the roadside within the Site exhibit ingress by secondary species including spruce, birch and willow and some mature stands include elements of wind blow damage.

14.6.5 All three forest properties are undergoing ongoing felling and replanting work. Restructuring within Drannandow is following the Long Term Forest Plan (LTFP) which was approved in 2016. Lamach and Queensway are managed under Land Management Plans (LMP) approved in 2020 and 2018, respectively.

14.6.6 These plans show no further felling or planting within the Site in Lamachan or Queensway Forests before the intended construction date for the Proposed Development in 2029. There will be further felling and restocking in Drannandow and for the purpose of the forestry analysis presented it has been assumed that any further felling and restocking will be in line with the design and timeframes presented in the approved LTFP. Effectively all of the mature crops will have been felled and replanted by 2029. Refer to **Figure 4.2**.

14.6.7 A small area of woodland within the Site is designated as ancient woodland of semi-natural origin (ASNW) or native woodland (NW). These areas relate to the crossing point over the Penkiln Burn close to the on the boundary between Lamachan and Queensway Forests as illustrated on the map presented at **Figure 14.4**.

Future Baseline

14.6.8 The Site for the Proposed Development extends in total to 681.5 ha and the projected composition of the forestry crops within that area in 2029 is presented in **Technical Appendix 14.1,** illustrated in **Figure 14.3** and summarised in **Table 14.5**.

Table 14.5 Projected baseline forest crop composition within the Site at start of construction of the Proposed Development in 2029.

Forest &Species	Hectares per Planting Year								
	0	1930's	1950's	1980's	1990's	2000's	2010's	2020's	Total
Drannandow-									
MB							0.20	11.94	12.14
MC							11.51	25.38	37.77
OG	40.81								40.81
SS				5.12			59.78	135.06	196.55
Lamachan-									
DF			0.02		0.15	0.22			0.39
JL						0.47			0.47
LP							0.38		0.38
MB			0.24		0.72	2.55		1.84	5.35
NS			1.98			0.21	0.20		2.39
OG	6.50								6.50
SS					1.62	8.77	0.15	0.27	10.81
WH			0.58						0.58
Queensway-									
MB		3.23	1.50			0.73	1.15		6.61
MC				1.87		0.19			2.06
OG	7.60								7.60
SS		1.91		8.14		0.49	0.20	1.14	11.80
Total	**54.91**	**55.14**	**4.32**	**15.13**	**2.49**	**13.63**	**73.57**	**173.10**	**342.29**

(DF = Douglas fir, JL = Japanese larch, LP = Lodgepole pine, MB = Mixed broadleaves, MC = Mixed conifers, NS = Norway spruce, OG = Open ground, SS = Sitka spruce).

14.7 Assessment of Potential Effects

Construction Effects

14.7.1 Construction of the permanent infrastructure required for the Proposed Development (including, but not limited to, the, substation and battery storage compounds, access tracks, borrow pits, turbine foundations, and crane pads) would require the removal of trees from the Site and for most of these areas to be subsequently maintained free of trees to ensure access for maintenance during the lifetime of the Proposed Development.

14.7.2 The main areas of tree removal will be in Drannandow Forest to accommodate on-site track construction and maintenance, and the construction of wind turbines 6-13. Much smaller areas of trees will be removed to extend and widen the existing forestry access track between the A712 and the main infrastructure area within the Site boundary. Access tracks

will potentially require a 30 m wide clearance corridor to create the track and allow a suitable working width either side to facilitate construction operations and to create cable runs. Other infrastructure elements have provision for a 10 m boundary buffer to aid construction and clearance around the turbine positions will comprise 85 m radii in order to comply with the standard bat mitigation measure of ensuring a minimum 50 m buffer from turbine blade-tip to woodland edge feature, in line with NatureScot *et al*. (2021) guidance.

14.7.3 It is unlikely that the full extent of all of these clearance parameters will be implemented as not all of the borrow pit areas may be used or used to their full extent and many sections of the existing forest roads are already wide enough to accommodate construction and turbine component delivery traffic without clearing further adjoining tree crops. Even if they are, some cut areas would not need to be maintained free of tree cover over the life of the Proposed Development as the construction compound and sections of the borrow pits could subsequently be replanted. Therefore, the figures presented for the loss of tree cover during construction can be viewed as a worst-case projection.

14.7.4 **Figures 14.5 and 14.6** illustrate the expected impact of infrastructure construction on the woodland compartments within the Site. In total, the infrastructure footprint will occupy 98.96 ha within which 42.24 ha represents stocked areas of woodland crops with the balance of 56.72 ha representing existing open ground within the forest blocks and open farmland surrounding Drannandow Forest. 42.24 ha represents 16.40% of the stocked crops within the Site and the breakdown of these crops is provided in **Table 14.6.**

Table 14.6: Summary of the areas impacted by infrastructure construction in 2029.

Planting Year	Hectares per Species						
	Farmland	MB	MC	NS	OG	SS	Total
0	29.56				23.22		52.78
1936						0.57	0.57
1950		0.19					0.19
1952			0.02	0.14			0.02
1955			0.03				0.16
1983							3.36
1984						0.29	0.29
1996		0.56	0.11			0.82	1.49
2000		0.17				0.10	0.27
2001		0.10				0.20	0.30
2004		0.43	0.19				0.62
2005		0.60	0.52			1.27	2.39
2009		1.68	0.03	0.21			1.93
2011		0.17				0.05	0.17
2012						0.15	0.05
2016		0.28				3.70	0.43
2017		0.06	0.38	0.20		3.29	4.34

Planting Year	Hectares per Species						
	Farmland	MB	MC	NS	OG	SS	Total
2019			0.33				3.62
2020		0.45	0.07				0.52
2021						2.22	0.11
2022			1.66			1.24	3.88
2023						9.81	1.24
2024						1.96	9.81
2026		0.01					1.97
2027		0.17	1.80				1.97
2029						5.88	5.88
Total	**29.56**	**4.87**	**5.12**	**0.56**	**23.22**	**31.68**	**95.02**

(MB = Mixed broadleaves, MC = Mixed conifers, NS = Norway spruce, OG = Open ground, SS = Sitka spruce).

14.7.5 The projected tree removal for infrastructure construction is currently calculated to include 1.30 ha of native woodland as identified in Figure 14.7. There is an existing forest road through the section in Lamachan Forest which accommodates the majority of the wind farm access road but additional widening may be required. Although the area of stocked woodland recorded in the compartment database is 1.30 ha not all of this will need to be removed and Figure 14.8 illustrates that stocking densities are very low in several of the stocked areas.

14.7.6 Compartment 3190 south of the existing forest road is designated as ASNW although much of the compartment was cleared 5 years ago and the woodland management database records the planting year of the current, sporadically spaced, crop as 2020 and the older areas as 2004 so, although the crops may now include native broadleaf species, the extent of the ASNW designation mapping differs from what is currently present within this area.

14.7.7 Some crops adjoining the areas to be felled for infrastructure construction will require further tree clearance due to the predicted instability of these adjacent crops. It is anticipated that windblow damage would develop in some cut faces left in these areas and therefore it would be safer and more productive to clear these surrounding trees to wind-firm edges along existing roads, rides and drains at the same time that trees are cut to facilitate infrastructure construction. The areas proposed as management felling for windblow mitigation extend to 20.23 ha as illustrated in Figure 14.9 and summarised in Tables 14.7 and 14.8.

Table 14.7: Forest crops removed as management felling

Planting Year	Hectares per Species			
	MC	NS	SS	Total
1934			1.34	1.34
1954	0.16			0.16
1955	0.56	1.65		2.22

	Hectares per Species			
Planting Year	MC	NS	SS	Total
1987			8.13	8.13
1996			0.81	0.81
2005	0.14		7.44	7.58
Total	**0.87**	**1.65**	**17.71**	**20.23**

MC = Mixed conifers, NS = Norway spruce, SS = Sitka spruce).

Table 14.8: Management felling within each forest property

Property	Area(ha)
Drannandow Forest	0.00
Lamachan Forest	10.77
Queensway Forest	9.47
Total	**20.23**

14.7.8 The young age of the re-stocked crops in Drannandow Forest in 2029 suggest that no management felling will be necessary as the crops will not have reached sufficient height to be at risk of windblow damage.

14.7.9 The management felling areas proposed in Lamachan and Queensway are relatively small areas at 10.7 ha and 9.47 ha, respectively. The LMP for Lamachan records a felling area of 66 ha in the plan period to 2030. If the required management felling area cannot be substituted within the existing designated felling area in the LMP then the addition of the 10.7 ha to the approved 66 ha would still only represent 5.44 % of the plantation area which would be a tolerable revision. The Queensway LMP records 63 ha of felling between 2028 and 2032 and again, if the required management felling area cannot be substituted within the designated felling area, the increased felling area would still only represent 3.56 % of the plantation area which would be a tolerable revision.

14.7.10 The felling of 62.48 ha of commercial forestry across the three forest properties represents a moderate magnitude of change for each. For Drannandow the change within the property is less than 30 % of the total crop area and for the others the area change is minimal given the size of the management units but it involves the removal of small areas of native woodland in each property. According to the significance criteria set out in **Table 14.4**, an overall effect of Moderate significance is predicted for the forestry resource within the Site during construction, and is therefore considered to be **Significant** in terms of the EIA Regulations in the absence of any mitigation measures.

Operational & Decommissioning Effects

14.7.11 There will be no additional impact on the woodland areas during the operational and decommissioning phases as it is envisaged that the proposed infrastructure could be operated and subsequently removed and the ground re-instated without removing further trees from the woodland areas.

14.8 Mitigation

14.8.1 It is proposed that trees removed from the management felling zones, cleared to create wind-firm boundaries in crops adjoining the infrastructure construction areas, will be restocked immediately in the same location (with possible minor adjustments to improve landscape design if required). The majority of the land encompassed within the management felling areas are currently stocked with Sitka spruce but the LMPs for Lamachan and Queensway illustrate a more diverse restocking regime for the second rotation and the post-construction restocking would mirror these agreed restocking designs as illustrated in Figure 14.10.

14.8.2 Under the CoWRP any tree crops permanently removed for the Proposed Development would require to be replanted on a like-for-like area basis either within the Site or at a suitable substitute location.

14.8.3 42.24 ha of crops will be permanently removed for infrastructure construction and will be replaced by an appropriately designed new planting scheme on a substitute site in order to satisfy the requirements of the CoWRP. The location of that substitute site has yet to be identified and would be subject to detailed agreement with Scottish Forestry to include location, design, planting timescale and appropriate post-planting monitoring and maintenance schedules in advance of construction commencing for the Proposed Development.

14.8.4 The substitute site would replicate the total area of trees felled for infrastructure construction (42.24 ha) but to achieve the species proportions under the UK Forestry Standard (UKFS) the site would also include a 10 % designed open ground component accompanying the areas of replanted crops. The proposed areas are illustrated in **Table 14.9** which confirms that the substitute site will require to be at least 46.94 ha in size.

Table 14.9 Proposed composition of the compensatory planting site.

Species	Area(ha)	%
Mixed broadleaves	4.87	10.38%
Mixed conifers	6.87	14.63%
Open ground	4.70	10.0%
Sitka spruce	30.50	64.97%
Total	**46.94**	

14.9 Assessment of Residual Effects

14.9.1 The proposed on-site restocking of management felling areas, combined with any substitute site planting required to satisfy the terms of the CoWRP to compensate for crops lost to infrastructure construction, would ensure that the gross areas of forest crops existing within the Site would effectively be maintained once the proposed mitigation planting work had been completed as illustrated in Table 14.10 below i.e. there will be no net-loss of forestry resource. Overall, a residual effect of negligible significance is therefore predicted.

Table 14.10 Proposed composition of the compensatory planting site.

Event	Mixed Broadleaves	Mixed conifers	Sitka spruce	Total
Baseline woodland stocking within the Site	24.10	44.04	219.24	287.38
Felling for infrastructure construction	-4.87	-5.68	-31.69	-42.24
Management felling around infrastructure	0	-2.52	-17.71	-20.23
Restocking in management felling areas	10.50	1.75	7.98	20.23
Compensatory planting	4.87	6.87	30.50	42.24
Post-construction woodland stocking	34.60	44.46	208.32	287.38

14.9.2 The widening and realignment of the access road may involve the removal of up to 1.30 ha of native woodland crops close to the boundary of Lamachan and Queensway forest as shown in detail in Figure 14.8. The connectivity of these crops is already broken by the existing forest road and as only thin sections of crops parallel to the road might potentially be removed the impact is likely to be relatively low level. Additionally, replanting of native broadleaves on a compensatory site would be at a density of 1,600/ha and as this is a much higher density than exists in the compartments at present this would provide a suitable degree of enhancement.

14.10 Assessment of Cumulative Effects

14.10.1 There are no predicted cumulative effects of tree removal linked to other wind farm projects in the area due to the compensatory planting mitigation which will be implemented in respect of the Proposed Development.

14.10.2 The compensatory planting area will be subject to regular inspection, monitoring and remedial management inputs when required, covering replacing dead trees, weeding and vermin control, to ensure the initial stocking density of the crops is maintained until the trees are fully established.

14.11 Summary

14.11.1 There will be no net loss of forestry resource as a result of the construction of the Proposed Development. The areas of management felling required to create windfirm edges (totalling 20.23 ha) will be replanted post-construction within the Site and the areas of trees removed for infrastructure construction (extending to 42.15 ha) will be replicated by an off-site compensatory planting scheme in full compliance of the CoWRP. The residual effects are summarised in Table 14.11.

Table 10.11: Summary of Residual Effects

Likely Significant Effect	Mitigatio	Means of Implementation	Residual Effect
Tree removal for infrastructure felling	Replanting	Suitable compensatory planting on a like-for-like basis on a substitute site.	Negligible significance
Removal of native woodland crops	Replanting	Suitable compensatory planting on a substitute site. Increased planting densities over current crop stocking densities will provide enhancement.	Negligible significance
Tree removal under management felling to mitigate wind blow damage	Replanting	In-situ replanting after felling	Negligible significance

14.12 References

UK Legislation (2018). Forestry and Land Management (Scotland) Act 2018. Available at https://www.legislation.gov.uk/asp/2018/8/contents/enacted

The Scottish Government (2017). The Forestry (Environmental Impact Assessment) (Scotland) Regulations 2017. Available at: https://www.legislation.gov.uk/ssi/2017/113/contents/made

Forestry Commission (2017). The UK Forestry Standard. Edinburgh. Available at: https://www.gov.uk/government/publications/the-uk-forestry-standard

The Scottish Government (2019). Scotland's Forestry Strategy. Edinburgh. Available at: https://www.gov.scot/publications/scotlands-forestry-strategy-20192029/

Forestry Commission Scotland (2009). The Scottish Government's Policy on the Control of Woodland Removal. Edinburgh. Available at: https://forestry.gov.scot/publications/285-the-scottish-government-s-policy-on-control-of-woodland-removal

Forestry Commission Scotland (2019). The Scottish Government's Policy on the Control of Woodland Removal. Edinburgh. Available at: https://forestry.gov.scot/publications/349-scottish-government-s-policy-on-control-of-woodland-removal-implementation-guidance

15 Aviation, Radar and Defence

15.1 Introduction

15.1.1 This chapter considers the likely significant effects on aviation, radar and defence associated with the construction, operation and decommissioning of the Proposed Development.

15.1.2 The assessment of potential effects on aviation, radar and defence considers technical acceptability, based on air navigation safety, rather than following a strict EIA process of assessing the significance of effects. Such effects often require the implementation of technical mitigation solutions to ensure continued safe operation in the presence of a wind farm. The assessment of effects on these receptors is therefore one of technical analysis and consultation and seeks to identify whether the effect is likely to be 'acceptable' or 'not acceptable' to air navigation services provision. This chapter therefore follows a slightly different structure and uses different assessment terminology from the other technical chapters in this EIA Report.

Guidance

15.1.3 This assessment has been prepared with reference to Civil Aviation Authority (CAA) Publication (CAP) 764, Policy and Guidelines on Wind turbines (CAA, 2016). This is the primary guidance in relation to the assessment of wind turbines on aviation in the UK.

Scope of Assessment

Effects Scoped Out

15.1.4 Interference with surveillance systems and radar can occur when wind turbine blades are moving, therefore potential effects during construction are not assessed.

15.1.5 Upon decommissioning, the Defence Geographic Centre (DGC) will be informed of the removal of wind turbines. Following this, no decommissioning effects are expected and are not considered further.

Effects Assessed in Full

15.1.6 The assessment identifies and considers the potential effects that the Proposed Development may have on civilian and military aviation, air safeguarding and, if required, the mitigation measures proposed to prevent, reduce or offset any potential adverse effects where possible.

15.1.7 In relation to civil radar aviation assets, it considers potential impacts on the NATS En Route Ltd (NERL) radars at Lowther Hill and Great Dun Fell that impact operations at Prestwick Air Traffic Control (ATC) Centre. The potential mitigation measures identified to address these will be considered.

15.1.8 The assessment is based on an evaluation of existing data sources and desk studies, and consultation with key stakeholders.

15.1.9 The effects of wind turbines on aviation interests are well known but the primary concern is one of safety. The two principal scenarios that can lead to effects on the operations of aviation stakeholders are:

- physical obstruction: wind turbines can present a physical obstruction at or close to an aerodrome or in the military low flying environment, which itself presents a health and safety risk or otherwise requires changes to flight routes in the area which brings about other operational effects; and

- radar/air traffic services (ATS): wind turbine clutter appearing on a radar display can affect the safe provision of ATS as it can mask unidentified aircraft from the air traffic controller and/or prevent them from accurately identifying aircraft under control. In some cases, radar reflections from wind turbines can affect the performance of the radar system itself.

15.1.10 In this context the scope of the assessment is to consider the impact of the Proposed Development on aviation stakeholders, including military, en route, airports and other airfields, radar systems and air space users. This assessment also considers civil and military stakeholder aviation obstruction lighting requirements.

15.1.11 Should the Proposed Development be consented, Dumfries and Galloway Council (DGC) will be provided, as standard, with the following information for incorporation on to aeronautical charts and documentation:

- the date of commencement of the Proposed Development.
- the exact position of the wind turbine towers in latitude and longitude;
- a description of all structures over 300 feet high;
- the maximum extension height of all construction equipment;
- the height above ground level of the tallest structure; and
- details of a visible and/or infrared aviation lighting scheme.

15.2 Consultation

Table 15.1: Consultation Responses relating to Aviation

Consultee and Date	Scoping / Other Consultation	Issue Raised	Response / Action
Defence Infrastructure Organisation (14.09.23)	Scoping	In this case the development falls within Tactical Training Area 20T (TTA 20T), an area within which fixed wing aircraft may operate as low as 100 feet or 30.5 metres above ground level to conduct low level flight training. The addition of turbines in this location has the potential to introduce a physical obstruction to low flying aircraft operating in the area. To address the impact up on low flying given the location and scale of the development, the MOD would require that conditions are added to any consent issued requiring that the development is fitted with aviation safety lighting and that sufficient data is submitted to ensure that structures can be accurately charted to allow deconfliction. As a minimum the MOD would require that the development be fitted with MOD accredited aviation	A suspensive condition will be put in place to ensure a scheme of infrared lighting is agreed with the MOD before any turbines are erected.

Consultee and Date	Scoping / Other Consultation	Issue Raised	Response / Action
		safety lighting in accordance with the Air Navigation Order 2016. It is likely that the CAA specified lighting will exceed that required by the MOD but to ensure the safeguarding of any low flying/rotary military aircraft, the MOD would request the wind farm is lit with no less than 25cd visible/IR Combi lighting on perimeter turbines.	
NATS (01.09.23) (06.06.24)	Scoping and Other Consultation	At Scoping NATS indicated visibility of some turbines in the Proposed Development to the NATS (En Route) Ltd (NERL) Lowther Hill and Great Dun Fell radars, which in turn would impact operations at Prestwick ATC Centre.	Following further dialogue, NERL identified a potential mitigation scheme, which will formally be agreed in due course.
CAA (23.07.24)	Other Consultation	A scheme of visible aviation lighting is required due the turbine tip heights being above 150 metres.	A lighting scheme has been agreed with the CAA (see **Technical Appendix 15.1** and **Figure 15.1**).
Glasgow International Airport (04.09.23)	Scoping	At Scoping, Glasgow International Airport stated that the proposal is located outwith their consultation area and they therefore have no objection.	No further action required.
Edinburgh Airport (24.08.23)	Scoping	At Scoping, Edinburgh Airport confirmed the location of the development falls outwith their Aerodrome Safeguarding zone and, therefore, they have no objection.	No further action required.
Glasgow Prestwick Airport (GPA) (22.08.23)	Scoping	At Scoping, GPA confirmed there is terrain shielding between the development and the Primary Surveillance Radar and the development is clear of the Instrument Landing System, all Instrument Flight Procedures and protected surfaces. Therefore, they have no objection to the proposal.	No further action required.

15.3 Methodology

Scope of Assessment

Study Area

15.3.1 Consideration is given to aviation infrastructure that is within operational range of the Proposed Development. Operational range varies with the type of infrastructure but broadly includes regional airports operating radar up to 50km of the Proposed Development, non-radar aerodromes within 17km, parachute drops zones within 3km, and military radar and en route radar systems up to 100km from the Proposed Development (dependent on operational range).

Desk Study

15.3.2 The applicant has a dedicated aviation manager who has provided input to the Proposed Development since its inception. This has included:

- civil and military radar line of sight (LoS) analysis;
- initial Instrument Flight Procedure (IFP) assessment;
- review of relevant aviation charts;
- review of military low flying charts;
- review of aviation obstacle lighting requirements; and
- general aviation advice based on prevailing civil and aviation issues.

Significance Criteria

15.3.3 Significance criteria for aviation impacts are typically difficult to establish; they are not strictly based on the sensitivity of the receptor or magnitude of change but on whether the industry regulations for safe obstacle avoidance or radar separation (from radar clutter) can be maintained in the presence of the wind turbines.

15.3.4 Any anticipated impact on aviation stakeholders which results in restricted operations is therefore considered to be of significance.

Assessment Limitations

15.3.5 No limitations have been identified that would affect the findings of the assessment, based on the information available at the time of writing.

15.4 Baseline

Civil Aviation

15.4.1 Edinburgh Airport, Glasgow International Airport and Glasgow Prestwick Airport all responded to Scoping. None of them had concerns about potential impacts from the Proposed Development.

15.4.2 The Civil Aviation Authority will require visible obstacle aviation lighting at the Proposed Development to assist with air safety.

NERL

15.4.3 The Proposed Development is approximately 59.1 km south-west of the Lowther Hill radar and 134.8 km north-west-west of the Great Dun Fell radar.

15.4.4 NATS indicated that some of the turbines in the Proposed Development are visible to both the Lowther Hill and Great Dun Fell en route radars and will therefore have an unacceptable impact on operations at Prestwick ATC Centre.

Military Aviation

15.4.5 The Proposed Development is not close to any military radars or infrastructure.

15.4.6 The MOD has a requirement for the Proposed Development to agree a suitable scheme of visible and/or infrared lighting to assist military aircraft in avoiding the Proposed Development.

15.5 Potential Effects

15.5.1 Wind turbines have the potential to impact the performance of ATC radars. These impacts include:

- The creation of "false" targets, whereby the wind turbines present on the radar display. Multiple false targets can lead to the radar initiating false aircraft tracks.
- False returns can also cause track seduction, i.e. real aircraft tracks are 'seduced' away from the true position as the radar updates the aircraft track with the false return. This can lead to actual aircraft not being detected.
- Shadowing whereby the aircraft is not detected by the radar as it is flying within the physical 'shadow' of the wind turbine.

15.5.2 Prior to mitigation, it is considered that some of the turbines in the Proposed Development would affect the NERL Lowther Hill and Great Dun Fell radars and thus operations at the Prestwick ATC Centre.

15.6 Proposed Mitigation

15.6.1 There are a number of mitigation options available to alleviate problems caused by wind turbines to aviation and radar. Mitigation solutions are highly specific to the effect in questions. Consultation with relevant consultees is key to establishing the appropriate method of mitigation.

15.6.2 NERL has identified that a Radar Mitigation Scheme (RMS) will remove or reduce the impact on the NERL Lowther Hill and Great Dun Fell radars. The RMS will be agreed prior to the Proposed Development becoming fully operational.

15.6.3 A reduced visible aviation lighting scheme has been agreed with the CAA. The reduced scheme means that not every perimeter wind turbine needs to be lit and no tower lights are required provided an infrared scheme is agreed with the MOD. A copy of the correspondence from the CAA can be seen in **Technical Appendix 15.1**. **Figure 15.1** identifies the wind turbines that are agreed as needing aviation lighting in accordance with this correspondence. The results of the landscape and visual assessment for night-time lighting are contained in **Chapter 6: Landscape & Visual Impact Assessment**. An infrared lighting scheme will be agreed with the Defence Infrastructure Organisation (DIO) prior to the Proposed Development becoming fully operational.

15.7 Residual Effects

15.7.1 With the implementation of the proposed mitigation measures, no significant adverse effects are predicted.

15.8 Summary

15.8.1 In the absence of appropriate mitigation, the Proposed Development will potentially impact the NERL radars at Lowther Hill and Great Dun Fell and the operations at Prestwick ATC Centre. Suitable mitigation measures have been identified and it is expected that an

RMS agreement will be agreed. Infrared lighting will be agreed with the DIO for the MOD low flying requirements and a visible lighting scheme has been agreed with the CAA. With the implementation of these mitigation measures, no significant adverse effects to aviation, radar and defence infrastructure are predicted as a result of the operation of the Proposed Development.

16 Other Issues

16.1 Introduction

16.1.1 This chapter assesses the potential effects of the Proposed Development in relation to:

- Telecommunications; and
- Shadow Flicker.

16.1.2 The assessments relating to Television and Telecommunications; and Shadow Flicker have been undertaken by the Applicant.

16.2 Television, Telecommunications and Fixed Links

Introduction

16.2.1 This section of the chapter summarises the potential effects on television, telecommunications and fixed links associated with the proposed development.

Guidance

16.2.2 Tall structures such as wind turbines may cause interference of nearby television signal or telecommunications links. As such, any links in the vicinity of the proposed development must be identified and operators must be consulted.

16.2.3 The Ofcom Spectrum Information Portal was used in the first instance to identify fixed telecommunications crossing or adjacent to the site.

16.2.4 A number of other telecommunications services in addition to fixed links may be present, however most of these services are generally only affected if wind turbines are located in immediate vicinity. Furthermore, where other services are present, there is usually a supporting fixed link to allow onward signal transmission, which would be identified in this assessment. It is therefore considered that the search for fixed microwave links, and discussion with identified operators, also covers all other services.

Scope of Assessment

Effects Scoped Out

16.2.5 Effects on television and telecommunications have been scoped out of detailed assessment because digital television is less likely to be affected by the atmospheric conditions that rendered analogue television unwatchable and does not suffer from reflection effects or ghosted image generation.

Microwave Fixed Links and Scanning Telemetry

16.2.6 Fixed links are direct line-of-sight communication links between transmitting and receiving dishes placed on masts generally located on hilltops that vary in length from a few kilometres to over 70 km. They are used for the transmission of information to broadcasting masts for television and radio and for the mobile telephone networks and other use-cases.

16.2.7 Telecommunications and broadcasting network operators were consulted during the scoping exercise. Table 16.1 summarises the responses from link operators contacted.

Table 16.1: Link Operators' responses

Link Operator	Response/Issue Raised	Actions
BT	No concerns raised	No actions required
JRC	No concerns raised	No actions required
Atkins	No concerns raised	No actions required
Mobile Broadband Network Limited	No concerns raised	No actions required
Vodafone	No concerns raised	No actions required
Airwave Solutions Limited	No concerns raised	No actions required

16.2.8 BT responded on 7th of December 2023, to confirm that the proposed development should not cause interference to their current and presently planned radio network and maintained this position on 12th of June 2024 with sight of the final layout of the proposed development.

16.2.9 The Joint Radio Company (JRC) Limited responded on the 31st of May 2023, to confirm that the proposed development should not cause interference to JRC's current and presently planned radio network and maintained this position on 17th June 2024 with sight of the final layout of the Proposed Development.

16.2.10 Atkins responded on the 6th of June 2023, to confirm that the Proposed Development should not cause interference to their current and presently planned radio network and maintained this position on 14th of June 2024 with sight of the final layout of the Proposed Development.

16.2.11 Mobile Broadband Network Limited responded on the 8th of June 2023, to confirm that the Proposed Development should not cause interference to their current and presently planned radio network and maintained this position on 11th of June 2024 with sight of the final layout of the Proposed Development.

16.2.12 Vodafone responded on the 5th of June 2023, to confirm that the Proposed Development should not cause interference to their current and presently planned radio network and maintained this position on 19th of June 2024 with sight of the final layout of the proposed development.

16.2.13 Airwaves Solutions responded on the 29th of August 2023, to confirm that the Proposed Development should not cause interference to their current and presently planned radio network and maintained this position on 7th of June 2024 with sight of the final layout of the Proposed Development.

16.2.14 With the information available to the applicant, the Proposed Development does not directly affect fixed links.

Summary

16.2.15 The Proposed Development does not directly affect fixed links.

16.2.16 The potential effect of the Proposed Development is considered to be not significant with respect to other television or radio communication networks.

16.3 Shadow Flicker & Reflected Light

Background Information

16.3.1 In sunny conditions, any shadow cast by a wind turbine will mirror the movement of the rotor. When the sun is high, any shadows will be confined to the wind farm area but when the sun sinks to a lower azimuth moving shadows can be cast further afield and potentially over adjacent properties. Shadow flicker is generally not a disturbance in the open as light outdoors is reflected from all directions. The possibility of disturbance is greater for occupants of buildings when the moving shadow is cast over an open door or window, since the light source is more directional.

16.3.2 Whether shadow flicker is a disturbance depends upon the observer's distance from the turbine, the direction of the dwelling and the orientation of its windows and doors from the wind farm, the frequency of the flicker and the duration of the effect, either on any one occasion or averaged over a year.

16.3.3 In any event and irrespective of distance from the turbines, the flickering frequency will depend upon the rate of rotation and the number of blades. It has been recommended (Clarke, 1991) that the critical frequency should not be above 2.5 Hz, which for a three-bladed turbine is equivalent to a rotational speed of 50 rpm (revolutions per minute). The proposed turbines at Blair Hill Wind Farm would rotate at a maximum of approximately 8.8 rpm, well below this threshold.

Policy and Guidance

16.3.4 The update to Shadow Flicker Evidence Base, published by the then Department for Energy and Climate Change (DECC) (Brinckeroff, Parsons, 2011), states that assessing shadow flicker effects within ten times the rotor diameter of wind turbines has been widely accepted across different European countries, and is deemed to be an appropriate area.

Consultation

16.3.5 The intention to undertake shadow flicker assessment was outlined within the EIA Scoping Report in August 2023. No comments relating to shadow flicker were received from consultees in the EIA Scoping Opinion.

Assessment Methodology

16.3.6 Analysis was performed on all properties within ten rotor diameters of any turbine.

16.3.7 This shadow flicker assessment is based on wind turbines with a 170 m rotor diameter, and the planning application includes a request for a 75 m micro-siting allowance for infrastructure. As such, this 75 m distance is added to the ten-rotor diameter (1,700 = 10 * 170) m distance to give a total distance of (1,775 = 1,700 + 75) m from any wind turbine.

16.3.8 Analysis was undertaken for shadow flicker at all properties within 1,775 m from any wind turbine.

16.3.9 This analysis takes into account the motion of the Earth around the Sun, the local topography and the turbine locations and dimensions. The analysis was performed using the Final Layout, a layout of 14 turbines, each with maximum tip heights of 250 m. While two of the wind turbines will have a maximum height of 210 m, a worst-case scenario of 250 m to tip was used for all wind turbines considered in the shadow flicker assessment.

Assessment of Potential Effects

16.3.10 **Figure 16.1** details the locations of affected properties relative to the Proposed Development.

16.3.11 With due reference to the DECC report, and allowance for 75 m micro-siting, the potential shadow flicker is given in **Table 16.2**.

Table 16.2: Shadow Flicker Assessment Summary of Results

RES Property ID	Property Address	Total hours per year
H29	Glenshalloch, Minnigaff, Newton Stewart, Dumfries and Galloway DG8 7AA	41.5

16.3.12 The above impacts represent a worst-case scenario for the following reasons:

- The analysis assumes that the wind turbines' rotors are always turning (in reality this only occurs when there is sufficient wind to turn the rotor blades and the wind turbines are not undergoing maintenance);
- The analysis assumes that the orientation of the wind turbines is always aligned so as to cast a sufficient shadow towards the property (in reality the wind turbines automatically turn to face the prevailing wind which may, or may not, create this condition)
- The analysis assumes that sunshine is always of sufficient intensity to cause shadow flicker (in cloudy skies it is unlikely to do so);
- The analysis assumes that all receptors have relevantly orientated windows (in reality this may not be true); and
- The analysis assumes that no trees or walls obscure the view of the wind turbines and hence block any potential shadow flicker (in reality many properties have trees or bushes near to the property that may obscure the view to the Proposed Development).

Mitigation

16.3.13 Mitigation measures can be incorporated into the operation of the Wind Farm to reduce the instance of shadow flicker. Mitigation measures include planting tree belts between the affected dwelling and the responsible turbine(s), and shutting down individual turbines during periods when shadow flicker could theoretically occur.

16.4 References

Clarke A.D (1991), A case of shadow flicker/flashing: assessment and solution, Open University, Milton Keynes.

Brinckeroff, Parsons (2011) 'Update of UK Shadow Flicker Evidence Base', Department of Energy and Climate Change, UK Government.

17 Schedule of Commitments

17.1 Introduction

17.1.1 Best practice in Environmental Impact Assessment (EIA) recommends the use of a Draft Scheme of Mitigation, which can act as a quick reference for anyone interested in the mitigation measures which the Applicant has committed to implementing and upon which the assessment of residual effects presented within the EIA Report has been based. It will be utilised by the Applicant throughout development of the detailed design, and the appointed contactors will be required to allow for, and ultimately implement, each of the measures in the schedule as a minimum.

17.1.2 **Table 17.1** presents a Schedule of Commitments for the Proposed Development, listed according to the relevant environmental topic area. Individual EIA Report chapters should be referred to for full details of the commitments.

17.2 Outline Construction Environmental Management Plan

17.2.1 An outline Construction Environmental Management Plan (oCEMP) has been prepared as part of this EIA Report and is attached as **Technical Appendix 17.1**. The oCEMP will be refined with more detail prior to the commencement of construction once more detailed information becomes available such as detailed designs and pre-construction surveys, for instance. The CEMP will be agreed with the key consultee (Dumfries and Galloway Council (DGC) and relevant parts of the CEMP e.g. Bird Disturbance Management Plan and Pollution Prevention Plan would be agreed with the relevant consultees e.g. NatureScot and SEPA.

17.3 Outline Pollution Prevention Plan

17.3.1 An outline Pollution Prevention Plan (oPPP) for the Proposed Development is attached as **Technical Appendix 17.2.** A more detailed PPP, based on the oPPP, will be developed for the Proposed Development prior to the commencement of construction and will form part of the CEMP.

Table 17.1: Schedule of Commitments

Subject Area	Commitment	Timing
Chapter 2: Proposed Development		
Micrositing	A micro-siting allowance of up to 75 m in all directions is being sought in respect of each turbine and its associated infrastructure in order to address any potential difficulties which may arise in the event that pre-construction surveys identify unsuitable ground conditions or environmental constraints that could be avoided by slight relocation.	Construction
Turbines, Turbine Foundations and Crane Hardstandings	Detailed ground investigations will be completed prior to construction. This will inform final foundation and crane hardstanding design.	Pre-construction
	Detailed construction drawings with final dimensions will be available prior to the commencement of construction once the final turbine model has been selected.	Pre-construction
	The wind turbines will be of a typical modern, three-blade, horizontal axis design in semi-matt white or light grey. Turbines will have no external advertising or lettering except for statutory notices.	Construction & Operation
Access Tracks	Existing onsite access tracks, where possible, will be retained, re-used and upgraded (where necessary).	Construction
	New access tracks will have a preference to be constructed using locally sourced material such as aggregate from on-site borrow pits.	Construction
	The Applicant will ensure that the vehicles will be routed as agreed with DGC, Transport Scotland and Police Scotland, to minimise disruption and disturbance to local residents and road users.	Pre-construction
Watercourse Crossings	The final detailed design for all watercourse crossings will be developed in accordance with the requirements of the *Water Environment (Controlled Activities) (Scotland) Regulations 2011* (CAR).	Pre-construction
Drainage Design	A detailed drainage management plan (DMP) design will be developed and submitted to the Scottish Ministers and DGC, in consultation with Scottish Environment Protection Agency (SEPA), for approval prior to construction.	Pre-construction
Construction Compounds	Prior to commencing construction work, a detailed appraisal of the construction compound areas will be undertaken, including an assessment by the project ecologist and also trial pits and/or boreholes to confirm the nature of the sub-strata.	Pre-construction
	The detailed location, size and engineering properties of the construction compound will be confirmed prior to the start of construction, after the turbine supplier and model have been confirmed.	Pre-construction
	On completion of construction works, all temporary structures will be removed.	Pre-construction
Substation, Energy Storage & Cabling	The substation will be constructed in keeping with the local environment. The final designs for the substation and operation control buildings will incorporate sustainable design features such as a living green roof and will be agreed with DGC.	Construction
	Lighting will be kept to a minimum and will be limited to working areas only and will comply with health and safety requirements. Lighting will be down lit and linked to timers and movement sensors so that light pollution is kept to a minimum.	Construction
	Details of the final design of all components of the substation, energy storage and cabling compound will be agreed with the relevant consultees prior to construction.	Pre-construction
Borrow Pit Management	Borrow Pits will also be investigated to determine the suitability of stone for use as concrete aggregate, removing the need to import to the batching plant from off site. A detailed Borrow Pit Management Plan will be agreed with Scottish Environment Protection Agency (SEPA) and DGC prior to the commencement of construction.	Pre-construction
Construction Hours	Normal construction hours will be between 07:00 and 19:00 Monday to Friday and 07:00 and 13:00 on Saturdays and bank holidays. These times have been chosen to minimise disturbance to local residents. It must, however, be noted that out of necessity due to weather conditions and health and safety requirements, some generally quiet activities, for example AIL deliveries (which are controlled by Police Scotland) and the lifting of the turbine components, may occur outside the specified hours stated. Any construction outwith these hours will be in line with the applicable noise limits and advance warning of any works outwith the agreed working hours will be provided to DGC and local residents.	Construction
Construction Environmental Management Plan (CEMP)	The Contractor will produce and adhere to a CEMP, which will be based on the Outline CEMP attached in **Technical Appendix 17.1** of this EIA Report. This shall be developed in more detail in consultation with the Scottish Ministers, NatureScot, SEPA, Historic Environment Scotland (HES) and DGC. The Contractor shall amend and update the CEMP as required throughout the construction period.	Develop during Pre-construction, Implement during Construction.
	The CEMP shall describe how the Applicant will ensure suitable management of the following environmental issues during construction of the Proposed Development: • noise and vibration; • dust and air pollution; • surface and ground water; • ecology (including protection of habitats and species); • cultural heritage; • waste (construction and domestic);	Pre-construction

Subject Area	Commitment	Timing
	• pollution incidence response (for both land and water); and • site operations (including maintenance of the construction compound, working hours and safety of the public).	
Pollution Prevention Plan (PPP)	Prior to commencement of construction, a pollution prevention strategy, contained within the CEMP, will be agreed with the SEPA to ensure that appropriate measures are put in place to protect watercourses and the surrounding environment.	Pre-construction
OEMP	The Applicant will implement an Operation Environmental Management Plan (OEMP). Similar to the CEMP, the OEMP will set out the mitigation measures described in the EIA Report, and how the Applicant will manage and monitor environmental effects throughout the operation of the Proposed Development. The OEMP will also be developed in consultation with DGC, SEPA, NatureScot and HES where relevant.	Pre-Operation
Outdoor Access Management Plan	Prior to construction of the Proposed Development, an Outdoor Access Management Plan (OAMP) will be prepared in consultation with DGC. It will detail the maintenance of safe public access routes within and around the Site during construction and long-term public access during operation of the Proposed Development. Public access to the site after construction has been completed would be returned, although with some specific improvements to footpath infrastructure to facilitate public access which have been proposed as part of the Proposed Development. Appropriate warning, directional and identification signs for the purposes of health & safety would be installed on the turbines, transformers and at the substation compound. Access to these would be restricted to wind farm personnel. At all times these facilities will be locked. Additionally, safety and/or directional signs will be placed at strategic points across the site, particularly on the public routes to inform members of the public that they are entering a wind farm, to make them aware of potential hazards and provide direction for emergency services should the need arise. Any signage would be agreed with the relevant authorities prior to installation. It is proposed that further details would be provided in an Outdoor Access Management Plan post consent.	Pre-construction, Operational
Chapter 6: Landscape & Visual Impact Assessment		
Design	The turbines themselves will be painted an off-white colour with a low reflectivity semi-matt finish.	Pre-Construction
Chapter 7: Cultural Heritage Assessment		
Cultural Heritage Assets	An archaeological watching brief will be implemented at Clearance Cairn (SLR97) and in all areas where groundbreaking works will be undertaken outside of forested areas.	Pre-Construction
	A photographic record will be made of Boundary bank (SLR52) ahead of construction in the surrounding area.	Pre-Construction
Enhancing public access and appreciation of the historic environment	Proposed Cultural Heritage off-setting and enhancement measures that will be implemented include the following (refer also to **Technical Appendix 7.3**): • Creation of designated pathways to access monuments and limit foot erosion; • Install an information board to the east of the monument to raise its profile and enhance the public understanding of the prehistoric landscape in the area; • Provision of increased parking availability to provide more access to appreciate the monuments; • Outreach to local communities in the form of presentation by industry leaders for furthering understanding of the history in the area; • Excavation and publication of results of any archaeological investigations within site with local groups/Student Summer Schools in conjunction with Local Universities or Colleges. This would be subject to agreement with the local authority; • Removal of intrusive vegetation upon Garlies Castle (SM) as agreed by HES under Scheduled Monument Consent; • A LiDAR survey of the site to assist local groups in visually understanding their history; and • Appointment of a Heritage Ranger to oversee and implement the measures outlined above.	Pre-Construction, Construction, Operation
Chapter 8: Ecology Assessment		
ECoW	A suitably qualified Ecological Clerk of Works (ECoW) will be appointed prior to the commencement of construction to advise the Applicant and the Contractor on all ecological matters. The ECoW will 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 sensitivities on the Site to the relevant staff of the Contractor and sub-contractors.	Pre-Construction
Protected Species	A Species Protection Plan (SPP) will be implemented during the construction phase. The SPP details measures to safeguard protected species known or likely to be in the area. The SPP includes pre-construction surveys and good practice measures during construction. Pre-construction surveys will be undertaken to check for any new protected species or features in the vicinity of the construction works. The results of the pre-construction surveys will be used to update the outline SPP ahead of construction starting. The SPP will remain a live document to be updated as required and in agreement with the ECoW where changes to the distribution and status of protected species and features are recorded.	Pre-Construction
Micrositing	Any micrositing of infrastructure will be based on a review of existing ecological data and the completion of pre-construction surveys, to take into consideration the potential for direct encroachment onto protected species features, sensitive habitats or GWDTEs, or indirect alteration of hydrological flows supporting sensitive habitats or GWDTEs. Any micrositing will also take into consideration any buffer distances on protected features identified, as detailed within the SPP.	Pre-Construction and Construction

Subject Area	Commitment	Timing
BEMP	A detailed and final Biodiversity Enhancement Management Plan (BEMP), based on the Outline Biodiversity Enhancement Management Plan, will be agreed with the DGC and NatureScot in advance of construction and would ensure the Proposed Development secures significant biodiversity enhancements through restoring degraded habitats and strengthening nature networks.	Agreement on BEMP – Pre-construction / Construction. Implementation of BEMP - Post-construction and Operation
Chapter 9: Ornithology Assessment		
Bird Disturbance	A Bird Disturbance Management Plan (BDMP) will be implemented during construction of the Proposed Development and will form part of the Construction Environmental Management Plan (CEMP). The BDMP will detail measures to ensure legal compliance and safeguard breeding birds known to be in the area and will include species-specific guidance. The BDMP shall include pre-construction surveys and good practice measures during construction. Pre-construction surveys will be undertaken to check for any new breeding bird activity in the vicinity of the construction works. The ECoW will oversee the implementation of the above measures.	Pre-construction & Construction
Black Grouse Leks	To avoid a significant disturbance effect occurring during construction, the BDMP will also extend to protection of black grouse leks (as well as nest sites). Specific pre-construction surveys for lekking black grouse will be undertaken during the main black grouse lekking season (March to May, following methodology provided by Gilbert *et al.* (1998) and NatureScot (SNH 2017) to provide an up to date understanding of where black grouse are lekking within 750 m of the Proposed Development. Should pre-construction surveys record lekking black grouse within 750 m of any proposed works (or should lekking black grouse be identified on the site by any site personnel), all construction activities would be prohibited within the 750 m disturbance zone until a risk assessment is undertaken. The risk assessment would consider the likelihood and possible implications of the associated construction activities on the lek and set out necessary measures to ensure that no disturbance occurs. Restrictions to construction activity within the 750 m disturbance zone will include (but are not limited to) the following: • No construction activity (including vehicle movements) before 09:00 hours in the months of April and May. • Furthermore, given the presence of Lek 2 along the access track (**Figure 9.8**), the BDMP will include the following mitigation for implementation along the section of the proposed access track identified to be within 750 m of lek 2 (**Figure 9.8**). • A maximum speed limit of 15 mph will be enforced at all times of day on the track throughout the breeding season; • Personnel will be required to remain within vehicles and will not be permitted on foot within this zone; • Gates within this zone will remain open after first arrival, therefore avoiding the need for every subsequent entry to open and close the gate and the associated potential disturbance to the lek due to pedestrian activity. • Any deviations to the proposed timing restrictions and/or extent of any disturbance-free zone would be agreed with NatureScot.	Pre-construction, Construction
Important Ornithological Features	The only identified effect during the operational phase of the Proposed Development for any Important Ornithological Features (IOFs) was disturbance to lekking black grouse, specifically Lek 2. To avoid a significant disturbance effect occurring during the operational phase of the Proposed Development it is proposed to extend the BDMP to cover the operational phase with the provisions detailed to protect lek 2 during the construction phase to be extended within 750 m of lek 2 (**Figure 9.8**) for the operational phase as following: • Planned access to the wind farm will be restricted to after 09:00 hours in the months of April and May (it is noted that should emergency access be required, this would not be restricted); • A maximum speed limit of 15 mph will be enforced at all times of day on the track throughout the breeding season; • Personnel will be required to remain within vehicles and will not be permitted on foot within this zone; • Gates within this zone will remain open after first arrival, therefore avoiding the need for every subsequent entry to open and close the gate and the associated potential disturbance to the lek due to pedestrian activity.	Operational
Black Grouse Collisions	To minimise risk of black grouse collisions with fencing/met mast guy lines the following will be implemented: • Fencing related to the Proposed Development will be kept to a minimum and any fencing used will be 'marked' using suitable materials to reduce the likelihood of black grouse collisions with fences (Trout and Kortland 2012); • Any wires/guy-lines (e.g., those associated with met masts) will also be marked with suitable bird flight diverters/line markers to reduce collision likelihood (SNH 2016d); and • Consideration of marking the turbine towers/railings associated with the steps leading to the tower access point to increase their visibility to black grouse.	Operational

Subject Area	Commitment	Timing
Chapter 10: Geology, Hydrology & Hydrogeological Assessment		
Baseline Water Quality Monitoring	If there are assessed to be potential effects to surface watercourses or groundwater, baseline water quality monitoring will be undertaken as required. A Water Quality Monitoring Plan will be prepared and agreed with DGC, in consultation with SEPA, prior to commencement of construction. It is anticipated that this will include a programme of pre-construction monitoring, over a period to be set out in the plan.	Pre-Construction
CEMP	A CEMP, including surface water management and pollution prevention measures (e.g. Pollution Prevention Plan), will be produced. The CEMP will remain a live document and will be continually updated as the work progresses. Mitigation measures will be incorporated into the CEMP, which will include a Construction Method Statement (CMS). The CEMP will be submitted prior to commencement of the Proposed Development for approval by Dumfries and Galloway Council (DGC), in consultation with SEPA and other agencies such as NatureScot. During and following construction the drainage measures deployed at the site (temporary and permanent), the works would be subject to routine inspection by the dedicated site Environmental Clerk of Works (EnvCoW) on behalf of the developer. This would be specified in a site-specific CEMP and would be secured by an appropriately worded predevelopment condition of consent.	Construction, Post-construction
Sedimentation Pollution and Erosion	Best practice measures to prevent sedimentation pollution and erosion, including: • All earthworks would be carried out in accordance with BSI Code of Practice for Earth Works BS6031:2009; • Stockpiles will be placed at least 50 m from watercourses. The height and maximum slope angle will be in accordance with BSI guidance. Where there are stockpiles of peat, re-wetting will occur to prevent peat drying out. Sediment pollution mitigation measures, including drains will be implemented at the base of stockpiles. • Sediment pollution mitigation measures will be emplaced across the proposed development, this may include: drainage; silt fencing; settlement lagoons; and check dams. • Plant movements will be minimised through management measures. Measures to prevent sediment on public roads may include wheel washing or road sweeping at the Site entrance. • Any CAR licences required for Site discharges or watercourse crossings will be applied to from SEPA prior to construction. • A 'wet weather policy' will be in place where the Principal Contractor would reduce or suspend works during periods of significant rainfall at the Site. The policy will include that Site management checks local weather forecast daily, regularly checks and maintains pollution control system and suspends work during adverse conditions. • Where topography dictates that working platforms are needed, these would be formed to ensure that surface water drains away from watercourses. • To avoid unnecessary compaction and disturbance to Site soils, working areas and corridors would be established and demarcated, with construction operatives appropriately inducted and trained to avoid work outside the designated work areas.	Construction
Chemical Pollution	Best practice measures will be implemented to prevent chemical pollution include: • Sufficient and continued dewatering at the turbine foundation excavation until the concrete is cured, to prevent leaching. • Dewatering at the turbine will be minimised through careful management and reducing the time the excavation is open, including concrete pouring. • A method statement to address the transport, transfer, handling and pouring of liquid concrete at foundations will be undertaken by the Principal Contractor. • Cement, grout and unset concrete will not be allowed to enter the water environment. No operations involving concrete transfer will take place within 50 m of watercourses. • There will be no washing out of vehicles used for concrete delivery or washing of vehicles within 50 m of watercourses. • Fuel and chemicals will be stored in impermeable bunded containers at least 110% of the volume stored. All fuelling on-Site will occur in a designated location, at least 50 m from watercourses. • Spill kits will be stored across the Site and within all vehicles and plant. On-site toolbox talks with construction staff will include to report all on-site spills and the correct implementation of spill kits. • All vehicles and plant will be checked regularly with regular maintenance undertaken as required.	Construction
Surface Water Drainage	Best practice measures will be implemented to enable surface water drainage management, including: • A suitable surface water drainage strategy with detailed drainage design will be prepared and agreed prior to construction, but the following outline measures will be included. • Identified watercourse crossings in **Technical Appendix 10.1** will be designed to convey flows of 0.5%AEP (1:200yr) plus climate change, to prevent exacerbating downstream flood risk. • Trackside drainage ditches will be designed to ensure separation of clean water drainage from potentially contaminated drainage. • Check dams will be employed to slow down the flow of water and decrease erosion within drainage ditches. • Sumps and settlement lagoons will be used to treat and slow down the flow of water during periods of high rainfall. This will be employed at drainage outlets prior to reaching watercourses. • Areas of excavation and earthworks will have drainage designed to drain to a sump to prevent pollution and increase surface water run-off.	Construction

Subject Area	Commitment	Timing
	• Hydrological connectivity between upslope and downslope will be maintained through cross-drainage and culverts.	
Ground Water Quality	Where necessary, sufficient and continued dewatering will be undertaken at turbine foundation excavations until the concrete is cured, to prevent leaching. To prevent pollution to groundwater, other standard mitigation will include appropriate management measures for transfer of concrete and minimising the duration of concrete pouring. Other measures will include appropriate storage of fuels and chemicals, refuelling of plant and vehicles at designated locations and distributing spill kits throughout the Site and within all plant and vehicles.	Construction
Water Quality Monitoring Plan (WQMP)	A Water Quality Monitoring Plan (WQMP) will be prepared and agreed with DGC, in consultation with SEPA, prior to commencement of construction. The following sampling frequency is proposed and will be fully outlined within the CEMP: • Monthly for 12 months prior to construction, following this a baseline monitoring report will be produced and maximum and minimum thresholds for parameters agreed with DGC and SEPA; • Monthly throughout the construction phase; and • Monthly for 12 months post-construction. The WQMP will also include for water quality monitoring at hydrologically connected PWS Craigdistant, Dallash, Glenshalloch, and River Cree Hatchery.	Pre-Construction, Construction, Operational
Chapter 11: Access Traffic & Transport Assessment		
Construction Traffic Management Plan	A Construction Traffic Management Plan (CTMP) will be developed prior to the construction commencing. The CTMP will identify measures to potentially reduce the number of construction vehicles accessing the Site, as well as consider construction programming, routing and identification of an individual with responsibilities for managing traffic and transport impacts and effects. The CTMP will include the following measures: • development of a logistics plan highlighting access points, loading bays, welfare and storage on-site; • approved haul routes to/from the Site, and protocols to ensure HGVs adhered to these routes; • provision of a site induction pack to be given to all workers on-site, containing information of delivery routes, any route restrictions and maximum load capacities; • temporary construction signage to be erected along identified construction routes; • a construction traffic speed limit through sensitive areas along haulage routes; • on-site wheel washing facilities; • a construction material “lay down” area to allow for a staggered delivery schedule, and avoiding peak and/or unsociable hours; and • roads to be maintained in a clean and safe condition, with wheel washing facilities made available on-site.	Pre-construction and Construction
Abnormal Loads Routes Assessment (ALRA)	Informed by the ALR, measures relating to the movement of abnormal loads will include: • A convoy escort will be required along the route identified in Technical Appendix 11.1; • advance warning signs on the affected road network; • an advance escort may be required to warn oncoming vehicles ahead of the abnormal load vehicle; • abnormal load convoys should normally be no more than three HGVs long, to permit safe transit along the delivery route and to allow limited overtaking opportunities for following traffic if permitted; and • the times in which deliveries are scheduled should be agreed with Police Scotland and TS and avoid typical peak periods of traffic on the surrounding road network. • The mitigation works proposed on the turbine delivery route ensure that the largest vehicles are able to negotiate the various junctions and other constraints safely and without undue delay. Street furniture will be temporarily removed to enable the vehicles to over-sail the verges and footways as required.	Construction
Damage	Damage to road infrastructure caused directly by construction traffic would be made good and street furniture that is removed on a temporary basis would be fully reinstated. There would be a regular road review and any debris and mud would be removed from the carriageway using an on-site road sweeper to ensure road safety for all road users.	Construction
HGVs	The CTMP, prepared in agreement with each road authority, will include a package of measures to ensure that HGV traffic does not cause undue disruption to other road users. This will include routeing agreements and confirmation of times of operation and delivery schedules.	Construction
Chapter 12: Acoustic Assessment		
Construction Noise	The following noise mitigation options will be implemented where appropriate: • Consideration would be given to noise emissions when selecting plant and equipment to be used on-site; • All equipment will be maintained in good working order and fitted with the appropriate silencers, mufflers or acoustic covers where applicable;	Construction

Subject Area	Commitment	Timing
	• Stationary noise sources would be sited as far away as reasonably possible from residential properties and where necessary and appropriate, acoustic barriers could be used to screen them; • The movement of vehicles to and from the Proposed Development would be controlled and employees instructed to ensure compliance with the noise control measures adopted; and • Site operations would be limited to 07:00-19:00 Monday to Saturday except during wind turbine erection and commissioning or during periods of emergency work. Should it be considered necessary to reduce noise levels further to adhere to the more stringent target level for Saturdays 13:00-19:00, the following mitigation measures would be considered: • Reduce the number of construction activities occurring simultaneously; • Restrict the distance of construction activity from nearby properties during these times; and • Reduce construction traffic as appropriate.	
Construction Blasting	With specific regard to blasting, it is proposed that the following mitigation measures are implemented: • Good practice on blasting, as recommended by Planning Advice Note (PAN) 50 'Controlling the environmental effects of surface mineral workings'1 shall be followed; • The vibration and air overpressure reduction methods outlined in Section 8.6.9.2 of BS 5228-2:2009 shall be adhered to where appropriate; • Advance warning shall be given to nearby residents; • Blasting shall only occur between the hours of 08:00-18:00 on Mondays-Fridays and between the hours of 08:00-13:00 on Saturdays; and • No more than three blasts per day should occur. • Depending upon the charge sizes required it may be prudent to perform trial blasts with smaller amounts of explosive and measure vibration magnitudes at various distances to more accurately determine how vibration propagates at the Proposed Development.	Construction
Chapter 14: Forestry		
Restocking	Trees removed from the management felling zones, cleared to create wind-firm boundaries in crops adjoining the infrastructure construction areas, will be restocked immediately in the same location (with possible minor adjustments to improve landscape design if required). The majority of the land encompassed within the management felling areas are currently stocked with Sitka spruce but the LMPs for Lamachan and Queensway illustrate a more diverse restocking regime for the second rotation and the post-construction restocking would mirror these agreed restocking designs as illustrated in Figure 14.9. The compensatory planting area will be subject to regular inspection, monitoring and remedial management inputs when required, covering replacing dead trees, weeding and vermin control, to ensure the initial stocking density of the crops is maintained until the trees are fully established.	Post-Construction
Control of Woodland Removal Plan (CoWRP)	Under the CoWRP any tree crops permanently removed for the Proposed Development will be replanted on a like-for-like area basis either within the Site or at a suitable substitute location. The 42.24 ha of crops to be permanently removed for infrastructure construction will be replaced by an appropriately designed new planting scheme on a substitute site in order to satisfy the requirements of the CoWRP. The location of that substitute site has yet to be identified and would be subject to detailed agreement with Scottish Forestry to include location, design, planting timescale and appropriate post-planting monitoring and maintenance schedules in advance of construction commencing for the Proposed Development. The substitute site would replicate the total area of trees felled for infrastructure construction (42.24 ha) but to achieve the species proportions under the UK Forestry Standard (UKFS) the site would also include a 10 % designed open ground component accompanying the areas of replanted crops. The proposed areas are illustrated in **Table 14.9** which confirms that the substitute site will require to be at least 46.94 ha in size.	Construction, Operation
Chapter 15: Aviation, Radar and Defence		
Aviation and Defence	The reduced visible aviation lighting scheme agreed with the Civil Aviation Authority (CAA) will be implemented. An infrared lighting scheme will be agreed with the DIO prior to the Proposed Development becoming fully operational.	Construction, Operation
Radar	NATS En Route Ltd (NERL) has identified that a Radar Mitigation Scheme (RMS) that will remove or reduce the impact on the NERL Lowther Hill and Great Dun Fell radars. The RMS will be agreed prior to the Proposed Development becoming fully operational.	Construction
Chapter 16: Other Issues		
Shadow Flicker	Should incidences of shadow flicker be reported, they will be investigated and, if required, mitigation applied. Mitigation measures could include planting tree belts between the affected dwelling and the responsible turbine(s), and shutting down individual turbines during periods when shadow flicker could theoretically occur.	Operation

[1] 'Planning Advice Note 50: Controlling the environmental effects of surface mineral workings', Scottish Government, October 1996. Available at: https://www.gov.scot/publications/planning-advice-note-pan-50-controlling-environmental-effects-surface-mineral/