

Hare Hill Windfarm Repowering and Extension

Environmental Impact Assessment
Report

Volume 1

Chapter 7: Ecology and Biodiversity

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Glossary

Term	Definition
The Applicant	ScottishPower Renewables (UK) Limited
Application boundary	The red line planning boundary of the proposed Development site as shown on the site location plan. The application boundary encompasses the proposed wind turbines and associated infrastructure as part of the proposed Development.
Baseline	The existing conditions that prevail against which the effects of the proposed Development are compared.
Bat Activity Index	An index of the amount of use bats make of an area. Bat passes provide an index of bat activity rather than a measure of the actual number of individuals in a population.
Effects	Outcome to an ecological feature from an impact. For example, the effects on a bat population from loss of trees.
Embedded mitigation	Mitigation measures proposed at the outset of the proposed Development, to reduce impacts associated with construction, operation and decommissioning.
Environmental Impact Assessment	The process of identifying, quantifying and evaluating potential effects of development-related or other proposed actions on the environment.
Environmental Impact Assessment Report	A document reporting the findings of the EIA and produced in accordance with the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017.
Ecological Impact Assessment	The process of identifying, quantifying and evaluating potential effects of development-related or other proposed actions on habitats, species and ecosystems.
Habitat	The area or environment where a species naturally occurs.
Hare Hill	The original Hare Hill, consented in 1997, comprising 20 turbines.
Hare Hill Extension	The extension of Hare Hill, consented in 2015, comprising 35 turbines.
Hare Hill Windfarm	The current operational windfarm comprising Hare Hill and Hare Hill Extension.
Impacts	For example, the construction activities of a development removing trees.
Important Ecological Feature	Important Ecological Features are designated sites, habitats and non-avian species recorded at the proposed Development for which predicted effects of the proposed Development may cause significant impacts in the absence of mitigation. These species are selected for further Ecological Impact Assessment.
Infrastructure	This is used to describe all parts of the proposed Development that require construction activities, both

Term	Definition
	temporary and permanent; including turbines, hard standings and tracks (where new or existing road widened).
Mitigation	Measures, including any process, activity or design to avoid, reduce, remedy or compensate for potential negative effects of a development.
Previously proposed Developable Area	The application boundary used in the planning of ecological surveys prior to when the current application boundary was confirmed.
Proposed Development	The turbines and all associated infrastructure required for Hare Hill Windfarm Extension and Repowering.
Protected species	Animals or plants protected by European and/or domestic legislation.
Site	Area within the application boundary within which the proposed Development lies.
Site of Special Scientific Interest	Sites of Special Scientific Interest are protected areas that represent the UK's most important wildlife and/or geological sites.
Special Area of Conservation	Special Areas of Conservation are sites of international importance that have been adopted by the European Commission and formally designated by the UK government.
Study area	The area within which ecological baseline surveys were carried out. This generally refers to the proposed Development plus a surrounding buffer, the size of which is determined by the specific survey being described. Details of the area covered are described in the methodology provided for each field survey (See Section 6.2).
Zone of Influence	This is the area over which ecological features may be subject to significant effects as a result of the proposed project or associated activities.

Abbreviations

Abbreviation	Definition
ASPT	Average Score Per Taxa
BAI	Bat Activity Index
BMMP	Bat Mitigation and Monitoring Plan
CEMP	Construction and Environmental Management Plan
CIA	Cumulative Impact Assessment
CIEEM	Chartered Institute of Ecology and Environmental Management
DCEMP	Decommissioning and Construction Environment Management Plan
DEFRA	Department for Environment, Food and Rural Affairs
DGC	Dumfries and Galloway Council
EAC	East Ayrshire Council

ECoW	Environmental Clerk of Works
EcIA	Ecological Impact Assessment
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EU	European Union
FMS	Fisheries Management Scotland
GIS	Geographic Information System
GWDTE	Groundwater Dependent Terrestrial Ecosystems
ha	Hectare
HH	Hare Hill
HHE	Hare Hill Extension
HLC	Habitat Loss Calculation
HMA	Habitat Management Area
HMP	Habitat Management Plan
IEF	Important Ecological Feature
IUCN	International Union for Conservation of Nature
JNCC	Joint Nature Conservation Committee
km	Kilometres
LBAP	Local Biodiversity Action Plan
LNCS	Local Nature Conservation Site
LNR	Local Nature Reserve
LPA	Local Planning Authority
m	Meters
MAGIC	Multi-Agency Geographic Information for the Countryside
MSS	Marine Scotland Science
MYOsp	<i>Myotis</i> bat species
NDSFB	Nith District Salmon Fisheries Board
NHZ	Natural Heritage Zone
NNR	National Nature Reserve
NPF4	National Planning Framework 4
NVC	National Vegetation Classification
NYCLEI	Leisler's bat
NYCNOC	Noctule bat
NYCsp	<i>Nyctalus</i> bat species
PAN	Planning Advice Note
PIP NAT	Nathusius' pipistrelle bat
PIPPIP	Common pipistrelle bat
PIPPYG	Soprano pipistrelle bat
PIPsp	Pipistrelle bat species
PLEAUR	Brown long-eared bat
PRFs	Potential Roost Features
SAC	Special Area of Conservation
SBL	Scottish Biodiversity List

SEPA	Scottish Environment Protection Agency
SNH	Scottish Natural Heritage (now NatureScot)
SPP	Species Protection Plan
SPR	ScottishPower Renewables Limited
SSSI	Site of Special Scientific Interest
UKHab	UK Habitat Classification
UNESCO	United Nations Educational Scientific and Cultural Organisation
WCA	Wildlife and Countryside Act
ZoI	Zone of Influence

Figures

- Figure 7.1: Ecology survey areas;
- Figure 7.2: Designated sites;
- Figure 7.3: UKHab Survey Results;
- Figure 7.4: NVC Survey Results;
- Figure 7.5a: Bat survey locations;
- Figure 7.5b: Bat carcass results;
- Figure 7.6: Protected Mammal Survey Results; and
- Figures 7.7a and b: Areas of Peatland Habitat within Buffers of Infrastructure.

7. Ecology and Biodiversity

7.1. Statement of Competence

1. The author of this chapter has been working as an Environmental Consultant in the renewable sector for over five years. During this time, they have been involved with the production of scoping reports, technical baseline reports, operational monitoring reports and assisting with Environmental Impact Assessments (EIAs). They are an experienced ecologist and ornithologist, proficient in conducting various surveys, including habitats, protected mammals and bird surveys. The author was supported, and this document reviewed by an Associate Technical Director in Ecology who has been working in renewable and non-renewable development sectors and EIA Reports compilation for over 20 years. The report was approved by a Technical Director in Ecology with 18 years of experience in renewable projects and EIA Reports.

7.2. Introduction

7.2.1. Summary of Chapter

2. The proposed Hare Hill Windfarm Repowering and Extension (hereafter referred to as the 'proposed Development') is anticipated to comprise of up to 23 turbines, seven with a maximum height of 200 m, nine with a maximum height of 180 m and seven with a maximum height of 150 m, with associated infrastructure. The proposed Development will consist of two phases with Phase 1 commencing after the decommissioning of Hare Hill (HH) turbines with the construction of turbines T1 – T15, and Phase 2 after the decommissioning of Hare Hill Extension (HHE) turbines and the construction of turbines T16-T23.
3. In order to inform the EIA, a desk study and baseline ecology surveys were undertaken in 2023 and 2024. All surveys were undertaken following the most relevant industry guidelines and incorporated relevant scoping responses. The proposed Development is not located within any statutory sites designated for ecological interests.
4. The chapter evaluates both habitats and non-avian animal species and assesses the likely significant effects on habitats and species as well as the proposed benefits to biodiversity in line with the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 and the National Planning Framework 4 (NPF4) (updated 2024). An assessment has been made of the predicted significance of effects of the proposed Development on ecological interests. This assessment predicted no significant effects on any of the Important Ecological Features (IEFs) recorded and no significant cumulative effects on any IEFs.
5. Following survey and assessment, receptors considered to be IEFs in the context of the proposed Development, and subject to further impact assessment, following guidance, were bats. Following further assessment, no significant effects are anticipated upon this IEF. However, additional controls will be put in place during construction through creation of a site-specific Decommissioning and Construction Environment Management Plan (DCEMP), Species Protection Plan (SPP) and appointing an Environmental Clerk of

Works (ECoW) to monitor adherence to such plans. Further mitigation in the form of a Habitat Management Plan (HMP) and a Bat Mitigation and Monitoring Plan (BMMP) are proposed during the operational stage. The HMP includes recommendations to restore bog habitats whilst the BMMP includes operational acoustic monitoring and carcass surveys. It is considered that implementation of these mitigation and habitat enhancement measures will reduce the likelihood of impacts on IEFs at the appropriate biogeographical scale and provide a level of enhancements that are a requirement under policy direction within NPF4 Policy 3.

7.2.2. Contents of Chapter

6. This ecological chapter of the EIA Report has been prepared by Natural Power Consultants Limited (Natural Power) on behalf of ScottishPower Renewables (UK) Limited (SPR) (the Applicant) in respect of the proposed Development.
7. The proposed Development is located to the south east of New Cumnock, straddling the administrative boundaries of East Ayrshire Council (EAC) and Dumfries and Galloway Council (DGC).
8. The proposed Development comprises up to 23 wind turbines, seven with a maximum tip height of 200 metres (m), nine with a maximum tip height of 180 m and seven with a maximum tip height of 150 m, with associated ancillary infrastructure. The proposed Development will be constructed in two phases, Phase 1 consisting of turbines 1-15, and Phase 2 consisting of turbines 16-23.
9. This chapter provides details of the baseline ecological conditions within the application boundary and the immediate surrounding environment. These baseline ecological conditions are established through field surveys. In addition, a desk-based review was undertaken to obtain relevant ecological data. The identified habitats and species comprising the ecological baseline are described and assessed using recognised criteria, in accordance with industry guidelines (e.g. that produced by the Chartered Institute of Ecology and Environmental Management: CIEEM, 2018).
10. This EIA chapter has been prepared following a scoping process which led to a scoping report issued to consultees in November 2023 and scoping direction received in May 2024.
11. In line with the principles of proportionate EIA, embedded mitigation is considered at the outset of the assessment (see **Section 7.10.2 Embedded Mitigation** of this chapter). Furthermore, to ensure proportionality based on the likelihood of potential effects, only ecological features for which it is considered there may be significant effects in the absence of mitigation are identified as IEFs and are taken forward for a full Ecological Impact Assessment (EcIA).
12. This chapter is complemented by **Chapter 8: Ornithology** and **Chapter 9: Hydrology, Geology and Hydrogeology**, Volume 1 of the EIA.
13. This chapter is supported by the following figures:
 - **Figure 7.1: Ecology survey areas;**
 - **Figure 7.2: Designated sites;**

- Figure 7.3: UKHab Survey Results;
 - Figure 7.4: NVC Survey Results;
 - Figure 7.5a: Bat survey locations;
 - Figure 7.5b: Bat survey carcass results;
 - Figure 7.6: Protected mammals; and
 - Figures 7.7a and b: Areas of Peatland Habitat within Buffers of Infrastructure.
14. This chapter is also supported by the following Appendices:
- Technical Appendix 7.1: Ecology;
 - Technical Appendix 7.2: Confidential Ecology;
 - Technical Appendix 7.3: Aquatic Survey Report;
 - Technical Appendix 7.4: Draft Habitat Management Plan; and
 - Technical Appendix 7.5: Bat Mitigation & Monitoring Plan.
15. All Latin names for species mentioned in this chapter are listed in **Technical Appendix 7.1**. Details of surveys and dates are also given in **Technical Appendix 7.1**. Full survey data, including details of survey times and weather conditions, plus additional results data can be provided on request.

7.3. Legislation, Policy and Guidance

16. The following framework of international, national and local legislation and planning policy guidance, which exists to protect habitats and specific species, has been considered as part of the assessment. Ecological baseline surveys have been conducted following recognised guidelines, and the EclA takes account of the CIEEM guidelines (CIEEM, 2018).

Legislation

- Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the EC Habitats Directive);
- Environmental Impact Assessment Directive 85/337/EEC (the EIA Directive);
- The Conservation of Habitats and Species Regulations 2017 (the Habitats Regulations), which transposed the Habitats Directive into UK law;
- The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended);
- Wildlife and Countryside Act 1981 (as amended) (WCA 1981);
- The Nature Conservation (Scotland) Act 2004;
- The Wildlife and Natural Environment (Scotland) Act 2011;

- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017; Council Directive 2000/60/EC ('Water Framework Directive');
- Protection of Badgers Act 1992; and
- Salmon and Freshwater Fisheries Act 2003.

National Policy Guidance

17. Particular attention has also been given to the documents listed below, which include policy direction and cover the assessment of effects of windfarm developments on ecological features. Reference has also been made to these guidance documents across this chapter, where relevant:

- European Union (EU) Exit: The Habitats Regulations in Scotland (Scottish Government, 2020);
- Planning Advice Note (PAN) 51: Planning, Environmental Protection and Regulation (Scottish Government, 2006);
- PAN 60: Planning for Natural Heritage (Scottish Government, 2000);
- PAN 1/2013 – Environmental Impact Assessment (Scottish Government, 2013);
- Nature Conservation: Implementation in Scotland of the Habitats and Birds Directives: Scottish Executive Circular 6/1995 as amended (Scottish Executive, 2000);
- Scottish Planning Policy (Scottish Government, 2014);
- NPF4 (Scottish Government, 2024);
- UK Post 2010 UK biodiversity framework (Joint Nature Conservation Committee (JNCC), 2010);
- Dumfries and Galloway Local Development Plan 2 (Dumfries and Galloway Council, 2019);
- East Ayrshire Local Development Plan 2 (East Ayrshire Council, 2024);
- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2024);
- General Pre-application and Scoping Advice to Developers of Onshore Wind Farms (NatureScot, 2020);
- Decommissioning and Restoration Plans for Wind Farms (NatureScot, 2016);
- Good Practice During Wind Farm Construction (Scottish Renewables et al., 2024);
- Assessing the cumulative landscape and visual impact of onshore wind energy developments (NatureScot, 2021);
- Guidance on Assessing the Impacts of Developments on Groundwater Dependent Terrestrial Ecosystems (Scottish Environment Protection Agency (SEPA), 2024);
- Planning Guidance on Onshore Windfarm Developments (SEPA, 2017b);

- EU Biodiversity Strategy for 2030 (European Commission, 2020);
- Scottish Biodiversity Strategy to 2045 (Scottish Government, 2024); and
- International Union for Conservation of Nature (IUCN) Red List of Threatened Species (IUCN, 2025).

Other Guidance

18. Particular attention has also been given to the guidance documents listed below, that are applicable to assessing the effects of windfarm developments on ecology. Reference has also been made to guidance documents through the report where relevant:
 - European Protected Species, Development Sites and the Planning System: Interim guidance for local authorities on licensing arrangements (Scottish Executive, 2006);
 - Pre-application guidance for onshore wind farms (NatureScot, 2024);
 - Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation (NatureScot, 2021); and
 - Dumfries and Galloway Local Biodiversity Action Plan (LBAP) (Dumfries and Galloway Council, 2009).

7.4. Method of Assessment

7.4.1. Desk Study

19. A desk-based review which collated publicly available survey data and records of protected or notable species and habitats, from within the proposed Development boundary and surrounding environment has been undertaken. This provided background information on the ecological features that are potentially present; to help inform and guide the baseline ecological field surveys and it also provides context to their results. Combined with the results of the ecological field surveys, this information has been utilised to provide a comprehensive ecological baseline on which to base the EcIA.

Statutory, National and Locally Designated Sites of Nature Conservation

20. A web-based search was undertaken to identify and provide information on statutory designated sites of nature conservation with non-avian species and protected habitat as listed features. The search employed the online tools NatureScot Sitelink and the Department for Environment, Food and Rural Affairs (DEFRA) online Geographic Information System (GIS) tool Multi-Agency Geographic Information for the Countryside (MAGIC) Map application. The search focussed on identifying the following sites:
 - Special Areas of Conservation (SACs) – within 10 km of the proposed Development;
 - Sites of Special Scientific Interest (SSSIs) – within 5 km of the proposed Development;
 - National Nature Reserves (NNRs) – within 5 km of the proposed Development; and
 - Local Nature Reserves (LNRs) within 2 km of the proposed Development.

21. Sites designated solely for ornithological interests and of relevance to the proposed Development are considered separately in **Chapter 8: Ornithology**.

Review of existing data

22. In order to provide contextual data, a review was undertaken of past ecological surveys undertaken for the construction of HH (The Natural Resource Consultancy, 1994), HHE (SPR, 2007a and 2007b) and the proposed Eucharhead Renewable Energy Development (adjacent to Hare Hill Windfarm (HHW)) (SPR, 2020).
23. Surveys undertaken for both HH, HHE, and Eucharhead identified the presence of a number of sensitive habitats and protected species. Sensitive habitats present were:
 - Bog (modified and blanket bog);
 - Heath (dry and wet);
 - Flushes and springs;
 - Grassland (acid, marshy, calcareous and neutral);
 - Broadleaved woodland; and
 - Standing/running water.
24. Protected species present were:
 - Bat species;
 - Otter; and
 - Fish species.
25. Possible signs of badger, water vole, red squirrel, pine marten and reptiles/amphibians (not including great crested newt) were observed at Eucharhead only. Habitat suitable for freshwater pearl mussel was recorded at Eucharhead, although no freshwater pearl mussels were recorded during surveys. There were no records of either great crested newt or freshwater pearl mussel at HH or HHE.
26. In order to discharge Planning Condition 19 of the consent for HHE, a HMP was produced. The Habitat Management Area (HMA) is located at Dun Rig, immediately east of HHE. Management works proposed within the HMP that have since been undertaken include the creation and monitoring of new native woodland, removal of conifer regeneration to restore peatland and the creation of ten hibernacula for reptiles.

7.4.2. Baseline Surveys

27. A summary of the baseline ecology surveys undertaken at the proposed Development (dates and extent of the area surveyed) is provided in **Table 7.1**. Details of survey extents including areas where access was available can be found in **Figure 7.1**. Where access was not available visual surveys were conducted from the nearest location within the Site boundary. Surveys were undertaken following standard guidance, unless further details have been provided. Surveys were undertaken in a larger area than is now proposed for development, and this is referred to as the 'previously proposed Developable Area'.

Table 7.1: Summary of baseline ecological surveys undertaken at the proposed Development

Survey	Date	Survey Area	Notes
UK Habitat Classification (UKHab) Surveys	May – September 2024	Previously proposed Developable Area plus 250 m buffer	Habitats classified following standard methodology (Butcher et al., 2020).
National Vegetation Classification (NVC) survey	May – September 2024	Previously proposed Developable Area plus 250 m buffer	NVC surveys were undertaken following standard methodology (Rodwell, 2006) to define the vegetation of selected areas more precisely and identify key sensitive areas such as potential Groundwater Dependent Terrestrial Ecosystems (GWDTE).
Bat activity survey: static detectors	2023	Previously proposed Developable Area	Surveys undertaken following guidance (Collins, 2023), however data was recorded for 30 nights each season which is more than recommended guidance.
Preliminary bat roost assessment	2024	Previously proposed Developable Area plus 200 m buffer	Surveys undertaken following standard methodology (Collins, 2023).
Bat carcass surveys	July – September 2024	25m ² centred on each turbine to be searched	Weekly carcass surveys on 24 turbines of the 55 turbines present by trained dogs, in conjunction with efficiency and persistence trials.
Badger, red squirrel and pine marten	May – November 2024	Previously proposed Developable Area plus 250 m buffer	Protected species surveys were carried out following standard methodologies (Harris et al., 1989; Poyser, 1996; Sargent & Morris, 2003; Bang & Dahlstrøm, 2001).

Survey	Date	Survey Area	Notes
Otter and water vole	May – November 2024	Previously proposed Developable Area plus 250 m buffer of watercourses	Protected species surveys were carried out following standard methodologies (Chanin, 2003; Dean et al., 2016; Strachan et al., 2011).
Fish Surveys (habitat, electrofishing and macroinvertebrates)	2024	Watercourses within the proposed Development catchment (17 sites in total along Upper Nith, Afton Water and Kello Water)	Surveys undertaken by Nith District Salmon Fisheries Board (NDSFB) following standard methodologies (Hendry & Cragg-Hine, 1997; Scottish Fisheries Coordination Centre, 2007).

7.4.3. Modelling parameters: Habitat Loss Calculations

28. The construction of the infrastructure would result in some permanent habitat loss (e.g. access road/tracks, turbine bases, crane hardstandings, substation etc.) and habitat loss calculations (HLC) are used to quantify the extent of this loss. Some construction areas will be reinstated following construction (for example the construction compound) and therefore only represent temporary loss. Permanent and temporary habitat loss have been differentiated within these calculations. Habitat loss calculations are provided for all UKHab categories and are included in the impact assessment where relevant. The methods used and detailed results are provided in **Technical Appendix 7.1**.

7.4.4. Modelling parameters: Static Detector Parameters and Acoustic Analysis including Ecobat

29. Detectors were programmed to commence recording from half an hour before sunset and continue until half an hour after sunrise, to cover the active period for all bat species potentially encountered at the proposed Development. Detectors recorded data to a memory card which was downloaded and later analysed to identify species present. Activity levels can also be established from this data, based on the number of 'bat passes' recorded.
30. Acoustic data analysis was undertaken using Kaleidoscope automatic identification software. Signal parameters were 16-120 kHz, 2-500 ms, 500 ms maximum inter-syllable gap with a minimum of two pulses.
31. The Kaleidoscope software provides automatic identification to species level which were assumed to be correct for common pipistrelles, soprano pipistrelles and noise, and apart from quality assurance of a small noise subset (~20%), these records were not investigated further. Automatic identification of other bat species records is considered less reliable and manual checks were therefore performed on all other acoustic records.

32. *Myotis* species were not identified further than genus due to the overlap between species frequency calls. Pipistrelle, long-eared and *Nyctalus* bats were manually identified to species when possible but as genus when it was not possible to distinguish call types to species level.
33. Following call identification, acoustic results were uploaded to Ecobat, as required by guidance (NatureScot 2021). Ecobat provides a relative activity index, which compares data from the proposed Development with results obtained from other windfarms or projects on a regional and national basis. This generates a numerical indicator of how important survey results, such as a bat activity are for the proposed Development. For the proposed Development, the search area used for the relative activity analysis was by country (Scotland). The proposed Development was assessed as having a low site risk level (level 2) to bats as it is classified as a medium sized project (between 10 and 40 turbines with other wind developments within 5 km), with low habitat suitability (lack of PRFs and low quality foraging habitat).

Survey Limitations

34. There were limiting factors to survey methodologies, the details of which are provided in this section. It is not considered that these limitations would result in an incorrect assessment of effect or impact on the feature, the reasoning for this is provided below. The following survey limitations were experienced:
 - The location of the bat detectors was chosen before the proposed Development layout was finalised. However, as guidance (NatureScot, 2021) states that all detectors do not have to be at turbine locations and can be in representative habitat, this is not considered to be a constraint.
 - There were a small number of malfunctions during bat surveys, and data removed due to weather conditions. These are not considered to be a significant limitation due to the number of detectors used in this assessment, and because detectors were placed out on a minimum 30 day deployment which is considerably more than the minimum of ten days required by guidance (NatureScot, 2021). The limitations were:
 - During bat detector deployment, the start and end dates varied between detectors within a deployment due to the logistics of placing detectors on-site. Nights of effort have been removed where appropriate in order to include comparable data. There were five instances of detector malfunctions over the survey seasons where detectors did not record, these were: detectors 3 and 8 in spring, detectors 5 and 15 in summer, and detector 5 in autumn.
 - Weather thresholds recommend excluding any survey nights with a temperature below 8°C for Scotland and wind speed above 5m/s. This was amended for the proposed Development to survey nights below 5°C and/or wind speed above 8m/s due to the upland and exposed nature of the location. This resulted in removing 9 nights from spring (36 nights remaining), ten nights from summer deployment (24 nights remaining) and 14 nights from the autumn deployment (16 nights remaining).
 - During bat carcass surveys, every effort was made to search the same 24 turbines each survey. However, this was not always possible due to turbine maintenance or

other factors restricting access. This is not considered to be a limiting factor for the assessment as turbine-specific search schedules were used for the analysis. Details of all survey dates and locations are provided in **Technical Appendix 7.1**.

7.4.5. Approach to Impact Assessment

35. This section presents the approach taken to the EclA and provides an overview of how the potential for impact has been determined and the method by which impact significance has been ascertained. The approach to the EclA adopted within this assessment follows the CIEEM guidelines (CIEEM, 2018), and in line with these guidelines professional judgement has been applied where appropriate. The criteria used and the underlying rationale are described further within the following sections.

Determining Important Ecological Features (IEFs)

36. The assessment process involves identifying IEFs in accordance with CIEEM guidelines (CIEEM, 2018). These ecological features and their values are determined by the criteria defined in **Table 7.2**.

Table 7.2: Geographical context relating to the evaluation of an IEF

Level of Value	Example of IEF
International	<p>An internationally designated site (e.g. SAC), or site meeting criteria for international designations such as a World Heritage Site or United Nations Educational Scientific and Cultural Organisation (UNESCO) Biosphere Reserve.</p> <p>Species populations/habitat areas present with sufficient conservation importance to meet criteria for SAC selection.</p>
National	<p>A nationally designated site such as an SSSI or an NNR, or sites meeting the criteria for national designation (such as the JNCC guidelines).</p> <p>Species populations/habitat areas present with sufficient conservation importance to meet criteria for SSSI selection.</p>
Regional	<p>Sites designated as local nature reserves or Local Nature Conservation Sites (LNCSs).</p> <p>Species populations/habitat areas at present falling short of SSSI selection criteria but with sufficient conservation importance to likely meet criteria for selection as a local site e.g. important in the context of NatureScot Natural Heritage Zone (NHZ).</p>
Local	<p>Areas of semi-natural ancient woodland smaller than 0.25 ha.</p> <p>Areas of habitat or species populations considered to appreciably enrich the ecological resource within the local context, e.g. species-rich flushes or evidence of regular otter activity.</p>

Level of Value	Example of IEF
Negligible	Widespread and/or common habitats and species. Features falling below Local Importance are not normally considered in detail in the assessment process.

37. The proposed Development is located within Western Southern Uplands and Inner Solway NHZ 19 (Scottish Natural Heritage (SNH), 2002) and so this is the region against which impacts are assessed. Inland sections of NHZ 19 are generally comprised of a series of upland massifs of undulating, rounded, domed, conical and craggy hills separated by valleys and vegetated by coniferous plantation, rough grazing and agriculturally improved grazing (SNH, 2002).
38. Attributing geographical value to a feature is generally straightforward in the case of designated sites, as the designations themselves are normally indicative of level of value. For example, a SAC designated under the Habitats Directive is explicitly of European (International) importance. However occasionally a default level of value may not be appropriate in the specific context of the proposed Development. Where this is the case, professional judgement has been applied and rationale for decreasing or increasing the geographical level of value of a feature is given. An example of this might be bats, all of which are of international importance due to their protection under Annex IV of the Habitats Directive. However, if only very few foraging/commuting records of common and widespread bat species were made at a site, attributing international importance to the population present at the proposed Development would be disproportionate and the importance would be reduced accordingly (noting that this does not change the protection level from a legislative standpoint).
39. Certain ecological features may be assessed as not being subject to significant effects by a proposed Development. However, due to their high legal protection they must still be considered in the EclA within the context of legal and policy implications (for example otter, for which their resting places are legally protected from destruction or obstruction).
40. Part of the process of attributing importance to a species involves defining the population to be valued and requires professional judgment to identify an ecologically coherent population against which effects on integrity¹ can be assessed (see Paragraphs 45 'Determining Significance of Potential Ecological Effects'). For example, for wide-ranging species such as otter, it may be more appropriate to consider the otter population in a whole catchment, whereas for more localised species, such as water vole, importance may be attributed to groups of related colonies which function as a meta-population.
41. In line with the principles of proportionate EclA, embedded mitigation is considered at the outset of the assessment. IEF status has only been assigned where there is still

¹ Note that integrity in this context refers to ecological integrity of a habitat type or population of a species at a defined value level, i.e. the maintenance of the conservation status of a population of a species at a specific location or geographic scale. This should not be confused with the specific term 'Site Integrity' used in Appropriate Assessment for Natura 2000 sites.

considered to be the potential for significant effects to the integrity of the feature at the assigned value level arising from the proposed Development, after the application of embedded measures.

Valuing Bats

42. For the purposes of this assessment and of assigning value to bats, the guidance set out by NatureScot (2021) has been followed. Table 2 in this guidance identifies the population vulnerability of bat species based on the collision risk posed for individual bat species by wind turbines as determined by behavioural characteristics, and by bat population sensitivity based upon species rarity (adapted from Wray *et al.*, 2010). **Table 7.3** summarises the risk of turbine impact to bat species and the sensitivity of bat populations.

Table 7.3: Level of potential vulnerability of populations of Scottish bat species

Species	Low collision risk	Medium collision risk	High collision risk
Common species	N/A	N/A	Common pipistrelle Soprano pipistrelle
Rare species	Brown long-eared bat Daubenton's bat Natterer's bat	N/A	N/A
Rarest species	Whiskered bat Brandt's bat	N/A	Nathusius' pipistrelle Noctule bat Leisler's bat

43. The guidance provided by Wray *et al.* (2010) includes a framework for identifying the importance of bats in the landscapes through the evaluation of bat roosts and habitats. Applying this framework, bat roosts can be valued according to species rarity and roost status.

Characterising Potential Effects on Features

44. Impacts on IEFs are judged in terms of magnitude and duration. Magnitude refers to the size of an impact and is determined on a quantitative basis where possible. This may relate to the area of habitat lost to the development footprint in the case of a habitat feature or predicted loss of individuals in the case of a population of a particular species. Within this EclA, magnitude is assessed within six levels, as detailed in **Table 7.4**.

Table 7.4: Criteria used within this EclA to determine the magnitude of ecological impacts

Impact Magnitude	Description
Very highly negative	Total or almost complete loss of an ecological feature resulting in a permanent adverse effect on the integrity of the feature. The conservation status of the feature would be permanently affected.
Highly negative	Large-scale, permanent changes in an ecological feature, likely to change its ecological integrity. These impacts are therefore likely to result in overall changes in the conservation status of an ecological feature.

Impact Magnitude	Description
Moderately negative	This includes moderate-scale long-term changes in an ecological feature, or larger-scale temporary changes; however, the integrity of the ecological feature is not likely to be affected. This may result in temporary changes in the conservation status of the ecological feature, but these are reversible and unlikely to be permanent.
Minor negative	This includes small magnitude, long-term impacts, or moderate-scale temporary changes, and where integrity of the ecological feature is not affected. These effects are unlikely to result in overall changes in the conservation status of an ecological feature.
Negligible	No perceptible change in the ecological feature.
Positive	The changes in the ecological feature are considered to be beneficial to its ecological integrity and/or nature conservation status.

45. The assessment also considers whether the impact is positive or negative, short-term (for example only during construction) or long-term (throughout the lifetime of the proposed Development), temporary or permanent, as detailed in **Table 7.5**.

Table 7.5: Criteria for describing duration

Duration	Definition
Permanent	Effects continuing indefinitely beyond the span of one human generation (taken as approximately 25 years), except where there is likely to be substantial improvement after this period (e.g., the replacement of mature trees by young trees which need > 25 years to reach maturity, or restoration of ground after removal of a development. Such exceptions are termed “very long-term effects”).
Temporary	Long-term (15 - 25 years or longer; see above) Medium term (5 – 15 years) Short-term (up to 5 years)

46. When characterising ecological impacts, it is essential to consider the likelihood that a change/activity will occur as predicted, with a degree of confidence in the impact assessment (in relation to the impact on ecological structure and function). Where possible, the degree of confidence should be predicted quantitatively. However, where this is not possible, a more qualitative approach is taken; particularly where the confidence level can only be based on expert judgement.

Determining Significance of Potential Ecological Effects

47. Only features for which there is considered to be the potential for significant effects are identified as IEFs and taken forward for full impact assessment. Having followed the process of identifying an IEF, determining its sensitivity, and characterising potential

impacts, the significance of the effect is then determined. The CIEEM guidelines (CIEEM, 2018) use only two categories to classify effects: 'significant' or 'not significant'. A significant effect is defined, in ecological terms, as an effect on the integrity or conservation status of a defined site, habitat or species. The significance of an effect is determined by considering the value level of the feature and the magnitude of the impact and applying professional judgement as to whether the integrity/conservation status of the feature will be affected at the given value level. This concept can be applied to both designated and undesignated sites and to defined populations.

48. Where appropriate, mitigation and/or compensation measures, including the design process, are identified in order to avoid and reduce potentially significant effects. It is also good practice to propose mitigation measures to reduce negative effects that are not significant. The significance of residual effects on features after the effects of mitigation have been considered can then be determined, along with any monitoring requirements.

Cumulative Impact Assessment and Residual Impacts

49. The Cumulative Impact Assessment (CIA) identifies any other projects which, in combination with effects from the proposed Development, could give rise to a significant cumulative effect on ecological features. Cumulative effects are particularly important as ecological features may be already exposed to background levels of threat or pressure and may be close to critical thresholds where further impacts could cause irreversible decline. Cumulative effects can also make habitats and species more vulnerable or sensitive to change
50. Cumulative effects can either be additive / incremental (i.e. multiple activities/projects may give rise to a significant effect due to their proximity in time and space) and connected (i.e. different aspects of the same project which may be authorised under different consent processes).

Trends and Predicted Future Baseline

51. Although a wide range of habitats and species are normally assessed when considering a new windfarm development, the proposed Development is located within the footprint of two existing windfarms (HH and HHE). Following removal of the current 55 turbines, 23 larger turbines will be erected in different locations within the application boundary, in two phases. The removal of existing turbines and new turbine phasing will follow the programme detailed below:
 - 1st phase – remove 20 turbines from HH; install 15 new turbines
 - 2nd phase – remove 35 turbines from HHE and install 8 new turbines
52. Predicted future baseline is a tool to allow comparison of the proposal with the conditions that would be likely to occur on the site in the absence of the proposed Development. In the absence of the proposed Development, it is assumed that HH and HHE would be decommissioned following appropriate guidelines. Current habitat use within the application boundary is for sheep grazing, and there are large areas of blanket and modified bog habitats which have been subject to historic drainage, although some currently undergo management and monitoring as part of the existing windfarm HMAs. In

the absence of the proposed Development, management of existing HMAs would stop, and in the wider areas historic drainage would be likely to continue, leading to possible further modification impacts of drying and degradation of the bog habitat within the application boundary over the medium to long term. As a result, following decommissioning it is likely that the habitats present within the application boundary would be retained as they currently are, with the potential for an expansion in forestry depending on landowner priorities.

53. Based on the data collected for HH and HHE and the proposed Development, the proposed Development does not contain high levels of activity for ecological receptors, and it is considered likely that there would be the same level of use by similar species currently present over the long term.
54. It is more difficult to predict changes that may occur in the longer-term (i.e. up to 50 years). Climate change and the shift in species and habitat distributions that this may cause, as well as potential land management changes that this may bring about, cannot be predicted at this time. Baseline surveys carried out for the proposed Development represent a snapshot of the ecology community present at the time and cannot be extrapolated to predict future population trends in the event of climate change, or a future change in land use at the site.

7.5.Consultation

55. A Scoping Report for the proposed Development was issued to consultees in March 2023 (Natural Power, 2023). This document contained details of the proposed assessment methodology and ecological features proposed for full EclA and those to be scoped out of the EclA, following one year of baseline surveys. Most features were proposed to be scoped out on the basis that construction and operation of the proposed Development would not be likely to result in significant effects.
56. Following consultee responses, the following ecological features were scoped out and are not considered within the EclA:
 - Designated Sites;
 - Reptiles; and
 - Amphibians.
57. All consultation considered to be relevant to this chapter is summarised in **Table 7.6**. The table does not repeat scoping responses listed in **Chapter 8: Ornithology**.

Table 7.6: Summary of Consultation

Date	Consultee	Comments/issues raised/recommendations	Addressed responses/outcomes
9 Feb 2024	NatureScot	Agree that the proposed protected species surveys outlined in the scoping report as being appropriate for this site. Recommend the adoption of a SPP where mitigation is required.	Embedded mitigation is detailed in Section 7.10.2 which includes the recommendation for a SPP.

Date	Consultee	Comments/issues raised/recommendations	Addressed responses/outcomes
		Refer the applicant to updated advice on enhancing biodiversity that is contained in the latest (February 2024) version of pre-app guidance.	
	NatureScot	Requested that peat habitats should be assessed following the Peatland Action Peatland Condition Assessment and not the priority peatland assessment methodology.	Peatland Action Condition Assessment was undertaken, and information is presented in Chapter 9: Hydrology, Geology and Hydrogeology .
3 May 2024	NatureScot	Discussions were undertaken with NatureScot in relation to the proposed bat carcass search methodology, specifically the frequency and number of turbines. NatureScot were in agreement with the methodology proposed.	Carcass survey results are presented in Section 7.9.2 .
29 November 2023	Fisheries Management Scotland (FMS)	Advised to follow standard guidance produced by Fisheries Management Scotland (FMS) and Marine Scotland Science (MSS).	Fish surveys were undertaken by NDSFB to support this application, results are presented in Section 7.9.2 .
5 April 2024	NDSFB	Provided that all aquatic surveys are included in a water monitoring plan for the site, NDSFB have no objections to this proposed Development. For the avoidance of doubt those surveys need to be conducted prior to any development commencing, no later than 12 months prior to development commencing, during each year of construction and following completion for an agreed period.	Fish surveys were undertaken by NDSFB to support this application, results are presented in Section 7.9.2 . Embedded mitigation is detailed in Section 7.10.2 which includes the recommendation for a Water Quality Monitoring Plan
3 April 2024	Marine Directorate – Science Evidence Data and Digital	Advised to follow standard guidance produced by FMS and MSS.	Fish surveys were undertaken by NDSFB to support this application, results are presented in Section 7.9.2 .

7.6. Baseline

7.6.1. Desk Study

Statutory, National and Locally Designated Sites of Nature Conservation

58. A single designated site with an ecological interest (habitat or non-avian species) is located within 5 km (approximately 2 km) of the proposed Development boundary: Muirkirk Uplands SSSI. The Muirkirk Uplands SSSI is designated for blanket bog habitat. No other relevant statutory designated sites are located within 10 km of the proposed Development boundary. The location of this site can be found on **Figure 7.2: Statutory Designated Sites with Ecological Interest**.
59. Designated sites with an ornithological interest are discussed in **Chapter 8: Ornithology**.

Non-statutory Designated Sites

60. There are six non-statutory sites within 2 km of the Site boundary. These are:
- Afton Uplands LNCS;
 - Glen Afton LNCS;
 - Mansfield/Garclaugh/Garepool Burns LNCS;
 - Nith Floodplain LNCS;
 - Merkland Wood LNCS; and
 - Corsencon Hill LNCS.
61. Of these, only Afton Uplands LNCS lies within or adjacent to the application boundary. However, Glen Afton LNCS, Mansfield/Garclaugh/Garepool Burns LNCS and Nith Floodplain LNCS are hydrologically linked to the proposed Development.

7.6.2. Baseline Surveys

Habitat Surveys

62. The UKHab and NVC survey results are summarised on **Figure 7.3** and **Figure 7.4**. The NVC survey characterised habitats to community and sub-community level, primarily for habitats which have GWDTE potential. Due to the number of polygons, **Figure 7.3: UKHab Survey Results** shows primary habitat codes only. A summary of secondary habitat codes is presented in **Technical Appendix 7.1** and full details can be provided on request.
63. Habitats identified are similar to those previously noted as being present at the proposed Development. These are primarily degraded blanket bog and upland acid grassland.
64. Habitats recorded within the proposed Development boundary only are summarised in **Table 7.7**. HLC was undertaken for these habitats only, as they may be affected by direct habitat loss. All habitats recorded within the previously proposed Developable Area are summarised in **Technical Appendix 7.1**.

Table 7.7: UKHab and NVC communities present within the Site boundary

UKHab Habitat Type	Conservation Designation	Habitat in Site boundary (ha)	Permanent habitat loss to the proposed Development		NVC Community	GWDTE Potential ^{III}
			Area (ha)	%*		
Blanket bog (H7130)	Annex 1; Scottish Biodiversity List (SBL); LBAP	23.6	0.5	2.1		
					M1: <i>Sphagnum auriculatum</i> bog pool community	No
					M4: <i>Carex rostrata-Sphagnum recurvum</i> mire	No
					M19: <i>Calluna vulgaris-Eriophorum vaginatum</i> blanket mire	No
					M20: <i>Eriophorum vaginatum</i> blanket and raised mire	No
Degraded blanket bog	SBL; LBAP	487.6	20.3	4.2		
					M15: <i>Scirpus cespitosus-Erica tetralix</i> wet heath	Moderate
					M17: <i>Scirpus cespitosus-Eriophorum vaginatum</i> blanket mire	No
					M19: <i>Calluna vulgaris-Eriophorum vaginatum</i> blanket mire	No
					M20: <i>Eriophorum vaginatum</i> blanket and raised mire	No
					U4: <i>Festuca ovina-Agrostis capillaris-Galium saxatile</i> grassland	No
Other degraded raised bog	LBAP	0.3	0.0	0.0		
					M19: <i>Calluna vulgaris-Eriophorum vaginatum</i> blanket mire	No
					M25: <i>Molinia caerulea-Potentilla erecta</i> mire	Moderate
Purple moor- grass and rush pastures	SBL; LBAP	5.9	0.0	0.7		
					H12: <i>Calluna vulgaris-Vaccinium myrtillus</i> heath	No
					M2: <i>Sphagnum cuspidatum/recurvum</i> bog pool community	No
					M6: <i>Carex echinata-Sphagnum recurvum/auriculatum</i> mire	High
					U4: <i>Festuca ovina-Agrostis capillaris-Galium saxatile</i> grassland	No
					MG9: <i>Holcus lanatus-Deschampsia cespitosa</i> grassland	Moderate
Upland flushes fens and swamps	Annex 1; SBL; LBAP	63.1	1.5	2.4		
					H12: <i>Calluna vulgaris-Vaccinium myrtillus</i> heath	No
					M4: <i>Carex rostrata-Sphagnum recurvum</i> mire	No
					M6: <i>Carex echinata-Sphagnum recurvum/auriculatum</i> mire	High

UKHab Habitat Type	Conservation Designation	Habitat in Site boundary (ha)	Permanent habitat loss to the proposed Development		NVC Community	GWDTE Potential ^{III}
			Area (ha)	%*		
					M10: <i>Carex dioica</i> - <i>Pinguicula vulgaris</i> mire	High
					M15: <i>Scirpus cespitosus</i> - <i>Erica tetralix</i> wet heath	Moderate
					M19: <i>Calluna vulgaris</i> - <i>Eriophorum vaginatum</i> blanket mire	No
					M20: <i>Eriophorum vaginatum</i> blanket and raised mire	No
					M23: <i>Juncus effusus</i> / <i>acutiflorus</i> - <i>Galium palustre</i> rush-pasture	High
					S10: <i>Equisetum fluviatile</i> swamp	No
					MG9: <i>Holcus lanatus</i> - <i>Deschampsia cespitosa</i> grassland	Moderate
					CG10: <i>Festuca ovina</i> - <i>Agrostis capillaris</i> - <i>Thymus praecox</i> grassland	High
					U2: <i>Deschampsia flexuosa</i> grassland	No
					U4: <i>Festuca ovina</i> - <i>Agrostis capillaris</i> - <i>Galium saxatile</i> grassland	No
					U5: <i>Nardus stricta</i> - <i>Galium saxatile</i> grassland	No
Upland transition mires and quaking bogs (H7140)	Annex 1; SBL; LBAP	1.7	0.0	0.0		
					M4: <i>Carex rostrata</i> - <i>Sphagnum recurvum</i> mire	No
					M6: <i>Carex echinata</i> - <i>Sphagnum recurvum/auriculatum</i> mire	High
					M9: <i>Carex rostrata</i> - <i>Calliergon cuspidatum/giganteum</i> mire	High
Upland acid grassland	LBAP	0.4	0.0	0.0		
					U5: <i>Nardus stricta</i> - <i>Galium saxatile</i> grassland	No
Other upland acid grassland	LBAP	267.5	11.5	4.3		
					H12: <i>Calluna vulgaris</i> - <i>Vaccinium myrtillus</i> heath	No
					H18: <i>Vaccinium myrtillus</i> - <i>Deschampsia flexuosa</i> heath	No
					M6: <i>Carex echinata</i> - <i>Sphagnum recurvum/auriculatum</i> mire	High
					M15: <i>Scirpus cespitosus</i> - <i>Erica tetralix</i> wet heath	Moderate
					M19: <i>Calluna vulgaris</i> - <i>Eriophorum vaginatum</i> blanket mire	No
					M20: <i>Eriophorum vaginatum</i> blanket and raised mire	No
					M23: <i>Juncus effusus</i> / <i>acutiflorus</i> - <i>Galium palustre</i> rush-pasture	High

UKHab Habitat Type	Conservation Designation	Habitat in Site boundary (ha)	Permanent habitat loss to the proposed Development		NVC Community	GWDTE Potential ^{III}
			Area (ha)	%*		
					MG9: <i>Holcus lanatus</i> - <i>Deschampsia cespitosa</i> grassland	Moderate
					U2: <i>Deschampsia flexuosa</i> grassland	No
					U4: <i>Festuca ovina</i> - <i>Agrostis capillaris</i> - <i>Galium saxatile</i> grassland	No
					U5: <i>Nardus stricta</i> - <i>Galium saxatile</i> grassland	No
					U6: <i>Juncus squarrosus</i> - <i>Festuca ovina</i> grassland	Moderate
Other lowland meadows	None	0.6	0.0	0.0		
					MG5: <i>Cynosurus cristatus</i> - <i>Centaurea nigra</i> grassland	No
Mountain hay meadows (H6520)	Annex I; SBL	0.3	0.0	0.0		
					MG5: <i>Cynosurus cristatus</i> - <i>Centaurea nigra</i> grassland	No
<i>Lolium</i> - <i>Cynosurus</i> neutral grassland	LBAP	9.2	0.1	0.7		
					M23: <i>Juncus effusus</i> / <i>acutiflorus</i> - <i>Galium palustre</i> rush-pasture	High
					U4: <i>Festuca ovina</i> - <i>Agrostis capillaris</i> - <i>Galium saxatile</i> grassland	No
					MG6: <i>Lolium perenne</i> - <i>Cynosurus cristatus</i> grassland	No
<i>Deschampsia</i> neutral grassland	LBAP	3.9	0.1	2.1		
					M23: <i>Juncus effusus</i> / <i>acutiflorus</i> - <i>Galium palustre</i> rush-pasture	High
					MG9: <i>Holcus lanatus</i> - <i>Deschampsia cespitosa</i> grassland	Moderate
<i>Holcus</i> - <i>Juncus</i> neutral grassland	LBAP	6.1	0.0	0.0		
					MG10: <i>Holcus lanatus</i> - <i>Juncus effusus</i> rush-pasture	Moderate
Modified grassland	None	3.7	0.1	1.7		
					MG7: <i>Lolium perenne</i> leys and related grasslands	No
Upland heathland	SBL; LBAP	9.0	0.2	2.4		
					H18: <i>Vaccinium myrtillus</i> - <i>Deschampsia flexuosa</i> heath	No
					M15: <i>Scirpus cespitosus</i> - <i>Erica tetralix</i> wet heath	Moderate
					U2: <i>Deschampsia flexuosa</i> grassland	No
					U4: <i>Festuca ovina</i> - <i>Agrostis capillaris</i> - <i>Galium saxatile</i> grassland	No

UKHab Habitat Type	Conservation Designation	Habitat in Site boundary (ha)	Permanent habitat loss to the proposed Development		NVC Community	GWDTE Potential ^{III}
			Area (ha)	%*		
Dry heaths - upland (H4030)	Annex I; SBL; LBAP	35.2	2.5	7.0		
					H10: <i>Calluna vulgaris</i> - <i>Erica cinerea</i> heath	No
					H12: <i>Calluna vulgaris</i> - <i>Vaccinium myrtillus</i> heath	No
					H18: <i>Vaccinium myrtillus</i> - <i>Deschampsia flexuosa</i> heath	No
					M19: <i>Calluna vulgaris</i> - <i>Eriophorum vaginatum</i> blanket mire	No
					U4: <i>Festuca ovina</i> - <i>Agrostis capillaris</i> - <i>Galium saxatile</i> grassland	No
Wet heathland with cross- leaved heath - upland (H4010)	Annex I; SBL; LBAP	12.7	0.1	1.1		
					M15: <i>Scirpus cespitosus</i> - <i>Erica tetralix</i> wet heath	Moderate
					M19: <i>Calluna vulgaris</i> - <i>Eriophorum vaginatum</i> blanket mire	No
					U4: <i>Festuca ovina</i> - <i>Agrostis capillaris</i> - <i>Galium saxatile</i> grassland	No
Other broadleaved woodland	None	1.1	0.0	0.0	N/A	
Other coniferous woodland	None	10.3	0.0	0.2	N/A	

^{III} GWDTEs have protection under the Water Framework Directive, to prevent deterioration, protect and enhance the status of terrestrial ecosystems and wetlands and the aquatic ecosystems they depend on. Therefore, mitigation must be undertaken when carrying out any activities that may impact upon any of these ecosystems. The NVC survey results were used to identify potential GWDTEs.

Source: Natural Power

*All values in this table have been rounded to one decimal place. However, percentages are based on full area values and therefore calculations using area values shown may not entirely match those shown above.

Bat surveys

65. Full details of bat roost and bat activity surveys are presented in **Technical Appendix 7.1**.

Roost Assessment

66. No Potential Roost Features (PRFs) were identified within 200 m of the proposed turbine locations or 50 m of the proposed tracks.

Bat Activity Surveys – Static Detectors

67. **Table 7.8** provides the locations of the static detectors (also shown on **Figure 7.5**), details of the habitat, elevation of each detector and proximity to nearest proposed turbine and the habitats at the proposed turbine area to provide comparability with detector locations.
68. Six species were recorded as present at the proposed Development: common pipistrelle; soprano pipistrelle, Leisler's bat, noctule bat, Nathusius' pipistrelle and brown long-eared bat. Species groups recorded (recordings that could not be identified down to species due to overlapping parameters) were *Myotis* spp. *Pipistrellus* spp. and *Nyctalus* spp.
69. **Table 7.9** presents the bat activity index (BAI) for each bat species across the survey period at each detector location. A total of 28,745 bat passes were recorded during all surveys undertaken. The highest level of activity was associated with common pipistrelle, which accounted for 75.3% of all bat activity and a total BAI of 306.8 passes per night. Soprano pipistrelle and *Myotis* spp. had the next highest activity levels, equating to 14.9% (a BAI of 62.7 passes per night) and 6.1% (a BAI of 24.6 passes per night) respectively.

Table 7.8: Static bat detector deployment locations

Detector	X	Y	Habitat around Detector	Closest existing turbine (HH/HHE)	Distance to existing turbine (m)	Closest proposed turbine	Distance to proposed turbine (m)	Elevation (m)
1	272244	610009	Woodland and shrub; Heathland	D55	4970	T15	4787	255
2	271620	609649	Woodland and shrub; Grassland; Heathland	D55	4270	T15	4067	313
3	270962	609538	Woodland and shrub; Grassland; Heathland	D55	3606	T15	3439	360
4	270008	609021	Woodland and shrub; Grassland; Heathland	D55	2556	T15	2356	361
5	268599	607602	Heathland	D55	1439	T15	593	549
6	267441	607415	Heathland, adjacent to clearfell plantation.	C50	703	T14	172	502
7	266646	607432	Heathland	C45	406	T07	799	428
8	267044	607961	Heathland	C50	34	T23	178	490
9	267332	608734	Heathland, adjacent to clearfell plantation.	D53	165	T21	158	484
10	267539	609337	Moorland	D53	800	T05	581	419

Detector	X	Y	Habitat around Detector	Closest existing turbine (HH/HHE)	Distance to existing turbine (m)	Closest proposed turbine	Distance to proposed turbine (m)	Elevation (m)
11	267556	610327	In clearfell plantation, adjacent to woodland and shrub, and heathland	T19	524	T02	257	493
12	267752	611096	Woodland and shrub	T20	1086	T02	882	393
13	265582	609149	Heathland; Mire. Watercourse c.35 m away.	T22	102	T18	345	511
14	265606	609907	Heathland. Watercourse c.50 m to west.	T15	57	T16	378	593
15	266629	609980	Mire	T17	104	T04	114	531
16	266074	608415	Heathland; Mire	A28	115	T20	367	480
17	266043	607367	Heathland	B32	578	T22	465	460

Source: Natural Power

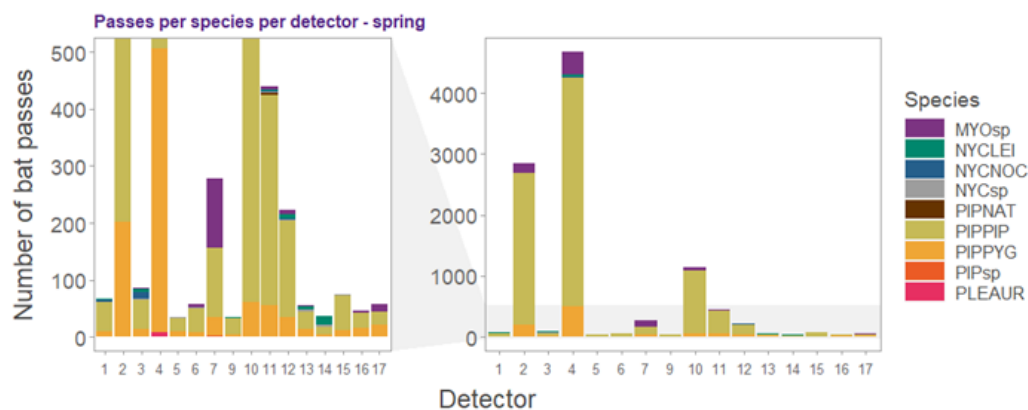
Table 7.9: BAI for each bat species across the survey period (May – September 2023) at each detector location

Species	Detectors																	Total BAI	Total number of passes	Percentage of total no passes
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17			
Brown long-eared bat	0.0	0.1	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.9	63	0.2
Common pipistrelle	88.8	80.6	17.5	72.9	0.7	1.2	7.7	1.9	0.7	16.4	6.3	6.9	1.2	0.6	1.5	1.1	0.9	306.8	21638	75.3
Leisler's bat	0.5	0.9	1.2	1.1	0.0	0.1	0.1	0.6	0.1	0.4	0.1	0.5	0.3	0.3	0.1	0.3	0.0	6.5	418	1.5
<i>Myotis</i> spp.	0.5	5.0	0.8	14.2	0.0	0.1	1.9	0.1	0.1	1.0	0.1	0.3	0.2	0.0	0.0	0.2	0.2	24.6	1762	6.1
Nathusius pipistrelle	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.5	32	0.1
Noctule	0.2	0.2	0.6	0.2	0.0	0.1	0.0	0.5	0.1	0.0	0.1	0.2	0.1	0.0	0.0	0.1	0.0	2.5	152	0.5
Soprano pipistrelle	5.6	12.9	9.4	15.7	0.3	0.6	3.5	1.0	0.4	2.8	1.6	4.9	1.3	0.5	0.5	1.0	0.8	62.7	4271	14.9
Unknown <i>nyctalus</i> spp.	0.3	0.2	0.3	0.2	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.2	0.1	0.1	0.0	0.1	0.0	1.6	102	0.4
Unknown <i>Pipistrellus</i> spp.	1.5	0.9	0.7	0.8	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.0	4.5	307	1.1
Total BAI	97.4	100.8	30.7	105.7	1.0	2.1	13.4	4.2	1.2	20.7	8.4	13.1	3.2	1.4	2.2	2.8	2.0	410.5		
Total no passes	7012	7258	1503	7610	35	154	1020	167	92	1512	627	933	242	101	113	211	155		28745	
Percentage of total	24.4	25.3	5.2	26.5	0.1	0.5	3.6	0.6	0.3	5.3	2.2	3.3	0.8	0.4	0.4	0.7	0.5			100.0

Source: Natural Power

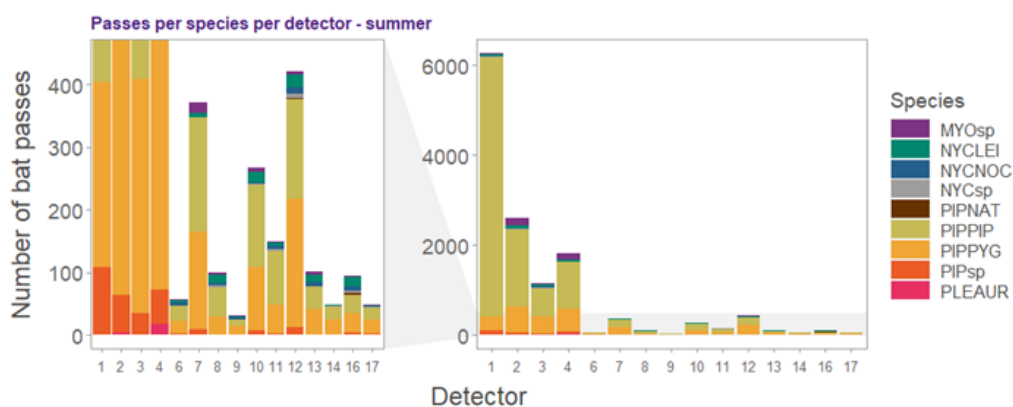
70. The highest bat activity levels across all seasons were recorded at Detectors 1, 2 and 4, with common pipistrelle being the most active species at these locations (see **Table 7.9**). All three detectors were located in woodland/shrub and heathland habitats, with 2 and 4 also having some grassland habitats. Detector 4 was also located near to a steep ravine, with water running close by. There were three other detectors located in similar habitats, Detectors 3, 11 and 12 and of these Detector 3 had higher bat activity. The remaining detectors were located in open upland habitats, and aside from Detectors 7 and 10, have significantly less bat activity. Detector 7 was located in open habitat along Bottom Burn, near Kello Water, and Detector 10 was at the edge of forestry along Polstacher Burn.
71. The summary of active survey nights in each season and the data collated for analysis is provided in **Technical Appendix 7.1**.
72. Bat passes per detector per season are shown in **Graphs 7.1 to 7.3**. Species referred to in these figures are *Myotis* species (MYOsp), Leisler's bat (NYCLEI), noctule bat (NYCNOC), *Nyctalus* species (NYCsp), Nathusius' pipistrelle (PIPNAT), common pipistrelle (PIPPIP), soprano pipistrelle (PIPPYG), pipistrelle species (PIPsp) and brown long-eared (PLEAUR).

Source: Natural Power



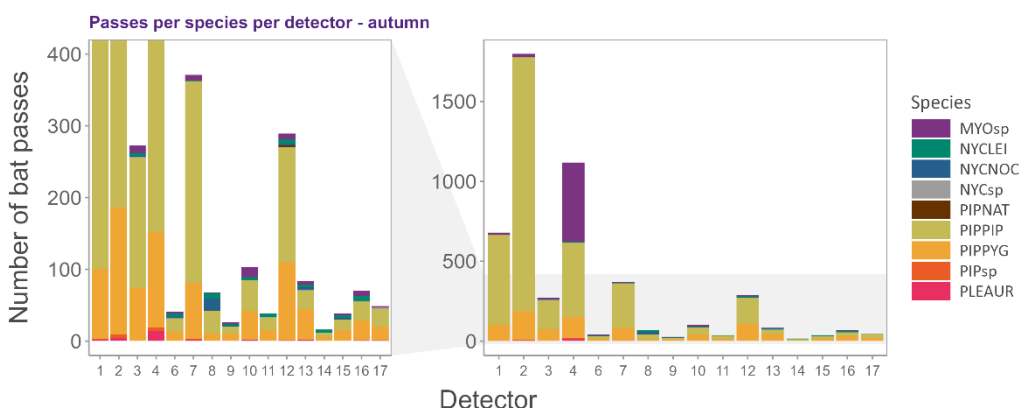
Graph 7.1: Bat passes per species per detector for the spring deployment (not standardised for effort). The plot on the left is scaled to enable better visualization of less busy detectors.

Source: Natural Power



Graph 7.2: Bat passes per species per detector for the summer deployment (not standardised for effort). The plot on the left is scaled to enable better visualization of less busy detectors.

Source: Natural Power



Graph 7.3: Bat passes per species per detector for the autumn deployment (not standardised for effort). The plot on the left is scaled to enable better visualization of less busy detectors.

73. In relation to season, activity was highest in summer (47.1% of total calls), followed by spring (35.3% of total calls) and autumn (17.6% of total calls). Detector activity varied over the seasons, although the highest activity detectors all showed similar overall activity levels. Activity was highest at Detectors 2 and 4 in spring, Detector 1 in summer (followed by Detectors 2 and 4) and Detector 2 in autumn (followed by Detectors 4 and 1). Overall BAI per detector per season is provided in **Technical Appendix 7.1**

Emergence times

74. In order to inform the likelihood of nearby roost locations, and so the potential for significant effects on bat roosts arising as a result of construction of the proposed Development, analysis was carried out to determine how many of the bat calls recorded were within half an hour after sunset or before sunrise, categorised by detector location as shown in **Technical Appendix 7.1**. Emergence times (the time at which bats are detected on site in relation to sunset and/or sunrise), coupled with contextual behaviour

information, gives a good indication for the likely distance travelled from or to (and so the proximity of) roosts; the closer to sunset activity is detected, the higher the likelihood that the bats may be roosting nearby.

75. In total 28,745 bat passes recorded, across all seasons. In spring, of 10,157 passes recorded, 65 were recorded within 30 minutes either side of sunrise or sunset in the spring deployment, which represents 0.6% of the total calls. In summer, of the total 13,529 passes which were recorded, 363 passes were recorded within 30 minutes either side of sunrise or sunset, representing 2.7% of the total calls. In Autumn, of 5,059 total calls recorded, none were recorded at sunrise and 133 passes were recorded within 30 mins before or after sunset, representing 2.6% of the total calls. There were very few calls recorded before sunset, with five calls in total across all seasons. The low levels of bat activity around sunrise and before sunset indicate that there are unlikely to be any significant roosts located nearby.
76. Analysis was also undertaken in relation to bat activity at different wind speeds. Further details on the number of calls are provided in **Technical Appendix 7.1**. The number of calls shows a large cluster when temperatures are above 5 °C and when winds are below 8 m/s.

Overall Risk Assessment

77. Using information provided within NatureScot guidance (NatureScot, 2021), data was submitted to Ecobat in order to provide the overall risk assessment in relation to the proposed Development and relative activity. The risk level of the site (2), combined with the level of bat activity identified from the percentile of relative activity provided in Ecobat provides a classification of overall risk to species or species group and is provided in **Table 7.10**, **Table 7.11** and **Table 7.12** by season. The overall risk assessment was calculated based on criteria given in guidance and is classed as low [0 – 4] (green), medium [5 – 12] (amber) and high [15 – 25] (red).

Table 7.10: Ecobat relative activity and risk assessment – spring

Species	Overall risk median	Overall risk maximum
Myotis spp.	2	10
Leisler's bat	4	10
Noctule bat	8	10
Nyctalus spp.	2	2
Nathusius' pipistrelle	8	10
Common pipistrelle	2	8
Soprano pipistrelle	2	4
Pipistrellus spp.	4	4
Brown long eared bat	2	6

Source: Ecobat

Table 7.11: Ecobat relative activity and risk assessment – summer

Species	Overall risk median	Overall risk maximum
Myotis spp.	2	8
Leisler's bat	4	10
Noctule bat	4	10
Nyctalus spp.	2	4
Nathusius' pipistrelle	4	10
Common pipistrelle	2	8
Soprano pipistrelle	2	4
Pipistrellus spp.	2	6
Brown long eared bat	4	10

Source: Ecobat

Table 7.12: Ecobat relative activity and risk assessment – autumn

Species	Overall risk median	Overall risk maximum
Myotis spp.	2	10
Leisler's bat	6	10
Noctule bat	4	10
Nyctalus spp.	2	2
Nathusius' pipistrelle	6	6
Common pipistrelle	2	4
Soprano pipistrelle	2	2
Pipistrellus spp.	2	2
Brown long eared bat	4	10

Source: Ecobat

78. The Ecobat relative activity index has identified that the comparison of records for Leisler's bat, noctule bat, Nathusius' pipistrelle and brown-long eared bat was considerably below the minimum 200 nights recommended in order to be confident in the activity level. This means that the relative activity index for these species may have been overestimated and is therefore higher than is likely. As such, it is considered that the median relative activity index is a more proportionate value to use within the EcIA.

Full details of reference ranges for each species and season are provided in **Technical Appendix 7.1**.

79. Across the survey period and based on the median risk assessment, Noctule bat and Nathusius' pipistrelle were assessed as being at medium risk in spring, with Nathusius' pipistrelle also at medium risk in autumn. Leisler's bat was assessed as being at medium risk in autumn only, and brown long-eared bat was assessed as being at low risk in all seasons. Across the survey period and based on the maximum risk assessment, common pipistrelle was assessed as being at medium risk in spring and summer, and *Myotis* species was assessed as being at medium risk in all seasons. Soprano pipistrelle was assessed as being at low risk in all seasons.

Carcass Surveys

80. Dates and weather conditions for bat carcass searches are provided in **Technical Appendix 7.1**.
81. Three bat carcasses were recovered during the carcass searches, details are provided in **Table 7.13**. HHE Turbine B39 was nearest the location of Detector 13, which recorded 0.8% of total bat passes and accounted for a BAI of 0.3 passes per night for Leisler's bat. HH Turbine 13 was nearest Detector 14, which recorded 0.4% of total bat passes and accounted for a BAI of 0.6 passes per night for common pipistrelle.

Table 7.13: Bat carcass search results

Date	Survey number	HH/HHE turbine	Bat species
17/08/2024	7	T13	Leisler's bat
06/09/2024	10	T13	Common pipistrelle
19/09/2024	12	B39	Common pipistrelle

82. Using the NatureScot carcass estimator (NatureScot, 2021), the three carcasses found equates to a predicted total of 9 bats over the 85 day survey period. The active season for bats is considered to run from the 1 April to the 31 October. The predicted total of 9 bat fatalities across 85 days can therefore be extrapolated up to give an estimate of 22.7 bat fatalities across the 55 turbines at Hare Hill Windfarm during the active season, equating to a mean of 0.4 fatalities per currently operational turbine.

Protected Mammals Surveys

83. Results of the protected mammals surveys are provided below and on **Figure 7.6**.

Badger, pine marten and red squirrel

84. There were three badger signs recorded during the protected mammal surveys undertaken within the previously proposed Developable Area. These consisted of one old latrine, snuffle holes and one inactive sett. The sett was significantly outside of the disturbance buffer required for a badger sett from infrastructure (see **Technical Appendix 7.2: Confidential Ecology** for further details).

85. One potential old pine marten scat was recorded at the southern edge of a block of plantation forestry, outside of the application boundary.

86. No evidence of red squirrel was found.

Otter and Water Vole

87. There were three otter signs recorded during the protected mammal surveys undertaken within the previously proposed Developable Area: two records of old spraints and one of a potential holt. Details on holt location are provided in **Technical Appendix 7.2: Confidential Ecology**.

88. No evidence of water vole was found.

Fish Surveys

89. Electrofishing, fish habitat and aquatic invertebrate sampling surveys were conducted at a total of 17 sites at the proposed Development in spring and summer 2024 by NDSFB. Full results are provided in **Technical Appendix 7.3**, and a summary is provided below.

Fish Surveys

90. All 17 sites surveyed at the proposed Development contained salmonid fish species. Six of those sites also contained non-salmonid species of fish. Of note was the presence of eels in the March Burn which is a tributary of the Afton Water.

91. It is considered that the presence and densities of salmonid fish species in many of the surveyed sites indicates that salmon and trout were utilising these areas as spawning habitats.

Fish Habitat Surveys

92. The flow characteristics were largely uniform between sites, and principally comprised runs interspersed with riffles and shallow glides, with occasional pools. Sediment types were primarily gravel, pebble, cobble or boulders. In some areas, bedrock and sand were present in low percentages (5-20%).

93. Suitable spawning habitat for salmonid species incorporating riffle with gravel and pebble was evident within watercourses surveyed to support the proposed Development. In addition, boulder and cobble areas providing good juvenile salmonid habitat were also identified.

94. Instream vegetation cover was good or excellent at 14 of the 17 surveyed sites. Bankside vegetation was present at all surveyed sites, providing stabilisation, preventing bank erosion and giving additional cover for fish species.

95. Areas with pools and high flow rates suitable for adult fish were present to the south and east of the proposed Development. Kello Water showed these features most prominently. Clear visibility was reported at all surveyed sites. Water depth ranged from 5 cm to 70 cm.

Aquatic Invertebrate Surveys

96. The results from the aquatic invertebrate surveys indicated that the majority of watercourses sampled at the proposed Development have good to high water quality.

97. One site surveyed on the Polneul Burn was classified as having moderate ecological status due to the lower number of taxa found to be present. However, the taxa found had an average score per taxa (ASPT) of 7.3 which represents a high score. The lower score at this site does not reflect historic aquatic invertebrate surveys conducted in this burn and highlights the benefits from collecting two samples annually.
98. Overall, the abundance and diversity of the aquatic invertebrate communities at the proposed Development indicate that most of the watercourses surveyed are healthy and that the results are consistent when compared to the two control sites on the Mennoch and Scaur Waters.

7.7. Assessment of Potential Effects

99. The EclA has been undertaken in accordance with CIEEM guidelines with establishment of baseline ecological conditions within the proposed Development and identification of IEFs through a combination of ecological field surveys and a desk-based review. Each identified IEF is assessed separately, with consideration of impact extent, magnitude, duration, timing, frequency and reversibility, along with assessment of the level of confidence in the impact assessment for the determination of significance of effect.

7.7.1. General Impacts

100. The main ways in which a windfarm may affect ecological receptors are via:
 - The potential to adversely affect defined populations of protected species. Such an effect may arise directly through habitat loss, disturbance or displacement or death during construction or operation, or collisions with turbines, or indirectly through cumulative effects;
 - The potential to adversely affect defined sensitive habitats, such as direct impacts through loss of area and those associated with dust, siltation, leaks and spillages, or indirectly through hydrological flow and connectivity or cumulative effects; and
 - The potential to have an adverse effect on the integrity of a statutory site designated for its ecological features, particularly those with an international designation such as SACs, either as a direct result of the proposed Development or in combination with other projects.
101. In line with the principles of proportionate EclA, embedded mitigation is considered from the outset and is presented in the following section. Features have only been taken on for further impact assessment if no significant effect cannot be concluded following the implementation of this embedded mitigation.

7.7.2. Embedded Mitigation

102. A minimum distance of 50 m has been maintained between the proposed Development and watercourses, with the exception of locations where tracks cross watercourses. See **Chapter 9: Hydrology, Geology and Hydrogeology** for further information regarding watercourse crossings.

103. The layout of the proposed Development has avoided impacts to sensitive habitats (e.g. wet heath) and areas of peat, where possible taking into account other constraints. Where possible, infrastructure has been located on pre-existing tracks and footpaths in order to minimise impact. Where avoidance has not been possible, the infrastructure will be constructed in such a way as to maintain the integrity and connectivity of the hydrology of hydrologically sensitive habitats. New access tracks would be designed in keeping with NatureScot good practice guidance. Further detail on hydrology is provided in **Chapter 9: Hydrology, Geology and Hydrogeology**.

104. Current NatureScot guidance (2021) states that proposed turbine locations should give a 50 m buffer from key habitat features for bats (such as areas of woodland or scrub). The required buffer distance is estimated by the equation:

$$\sqrt{(50 + bl)^2 - (hh - fh)^2}$$

105. Where bl = blade length; hh = hub height; and fh = feature (tree) height.

106. As detailed in **Table 7.14**, three sizes of candidate turbine are proposed, with dimensions set out in **Chapter 5: Development Description** of the EIA Report. As only forest habitat within and surrounding the proposed Development is a key bat habitat feature, feature height has been assumed as the existing forestry plantation, which will reach a height of approximately 20 m during the operational phase of the windfarm. Based on this calculation, appropriate buffers have been calculated and are also shown in **Table 7.14**. Should micro-siting of turbine location be required, this distance will be maintained and overseen at the construction stage by the ECoW.

Table 7.14: Bat buffer based on proposed turbine dimensions

Turbine number	Turbine height (m)	Turbine hub height (m)	Turbine blade length (m)	Bat buffer (m)
T03, T04, T06, T07, T08, T12, T16	150	82	68	100
T01, T02, T09, T11, T13, T14, T15, T17, T18	180	99	81	105
T05, T10, T19, T20, T21, T22, T23	200	119	81	86

Construction Phase

107. A DCEMP will be produced prior to construction works commencing in consultation with the Local Planning Authority (LPA) (see **Chapter 5: Development Description**). The document will be a live document and will be updated throughout the pre-construction and construction and will:

- Include measures to safeguard habitats and species to be implemented prior to construction and during construction; and
- Provide details of all pre-construction surveys required including methods and timings.

108. An ECoW will be present during enabling works and throughout the construction period of the proposed Development. They will be a suitably experienced individual, whose role would be to provide advice so that that works are carried out in accordance with environmental measures detailed in the DCEMP, and to monitor compliance with relevant legislation and good practice (see **Section 7.4.** Legislation of this chapter). The ECoW would contribute to all relevant DCEMP documents. Once work has commenced, their role will be to provide ecological and pollution control advice and monitor compliance of all relevant mitigation measures and legislation (see also **Chapter 9: Hydrology, Geology and Hydrogeology**). The ECoW will also give regular toolbox talks to make site personnel aware of the ecological sensitivities on site. The ECoW would have the authority to stop any construction activity that is having or likely to have a significant environmental impact or be in breach of legislation.

Construction Phase: Habitats

109. Detailed mitigation measures will be provided in the DCEMP for the protection of sensitive habitats during the pre-construction, construction and post-construction phases and will consist of:

- Toolbox talks to inform contractors of the sensitive habitats at the proposed Development;
- Marking of sensitive areas of habitat close to construction areas, to prevent accidental encroachment;
- No storage of materials or machinery permitted within exclusion zones;
- Supervised vegetation clearance by the ECoW in sensitive areas prior to construction; and
- Where possible (and where other constraints allow) an allowance of 50 m micro-siting of infrastructure will be undertaken to ensure construction does not impact on the most sensitive habitats and any other identified ecological constraints and will be completed in consultation with the ECoW. This is particularly important when working in close proximity to waterbodies and sensitive habitats. Where micro-siting cannot avoid areas of sensitive habitats or features, the ECoW would discuss and agree additional required mitigation to ensure impacts are minimised.

110. Any land degraded by construction and not required for the operation of the proposed Development, such as construction compounds and around areas of tracks, would be restored as soon as possible after construction is completed. Turves would be carefully removed during construction as far as practicable and stored following good practice for re-use in the restoration of areas not required for the operation of the proposed Development. As such, any vegetation removed for the construction phase would be reinstated within the area of the proposed Development, facilitating natural re-colonisation of vegetation communities. Permanent habitat loss would be limited to that required for the footprint of infrastructure and good site management practices would be implemented to minimise the risk of encroachment of the construction corridor into adjacent habitats. As far as is reasonably practicable, any notable floral species encountered will be marked with an exclusion zone or translocated to other suitable areas of habitat or stored for reuse in reinstatement of temporary infrastructure. The

implementation of these measures will reduce the potential for impacts on sensitive habitats.

111. Site activities have the potential to cause pollution through dust, siltation, leaks and spillages associated with plant and materials during the construction and operational phases. If such incidents were to occur, then these pollutants may reach waterbodies and surrounding vegetation. Therefore, these activities may directly or indirectly affect habitats and species, especially where they are hydrologically connected.
112. Pollution incidents may occur during construction as well as within the operational phase during maintenance works. Pollution prevention measures will be detailed in the DCEMP and overseen by the ECoW. Pollution with regards to waterbodies is further discussed in **Chapter 9: Hydrology, Geology and Hydrogeology**. Measures to control the impact of dust on sensitive habitats would be implemented during the preparation and construction phase. These measures will be adopted, when necessary, in dry weather, in areas of active development, and will most likely involve the controlled dampening of tracks when utilised by construction vehicles. Material for construction will be taken from local borrow pit sources where possible, which will have similar chemical properties to stone found within the area of the proposed Development to ensure no alteration in soil chemistry. Further detail on the mitigation of potential dust impacts will be detailed within the DCEMP.

Construction Phase: Watercourses and Ground Water Dependant Terrestrial Ecosystems

113. The pre-construction quality of watercourses and waterbodies would be maintained during construction (see **Chapter 9: Hydrology, Geology and Hydrogeology**). Watercourse protection measures would be adopted within the CMS/DCEMP and include protection against siltation and sedimentation, and pollution incidents such as the implementation of a pollution response plan and the safe storage of chemicals in bunded containers. Robust mitigation measures will be installed prior to works commencing to ensure the impacts on watercourses are minimised. Mitigation measures throughout construction of the proposed Development will be regularly monitored and maintained/replaced as required. Maintenance and refuelling of machinery and vehicles would be undertaken off-site or within designated areas of temporary hardstanding. In these designated areas contingency plans would be implemented to ensure that the risk of spillages is minimised. Placing a drip tray beneath a plant and machinery during refuelling and maintenance would contain small spillages. Monitoring of water quality would be carried out before and during construction. The implementation of these measures would minimise impacts on protected species, such as otter and fish species.
114. Details of how impacts upon groundwater flow are minimised and mitigated are detailed in **Chapter 9: Hydrology, Geology and Hydrogeology**.

Construction Phase: Protected Species

115. A SPP will be produced as part of the DCEMP and agreed by consultees prior to the commencement of development, detailing measures to be implemented before and during construction to protect species present in the area of the proposed Development. This will include good practice measures to prevent accidental mortality of protected species during construction, such as:

- A suitable vehicle speed limit to be enforced within the proposed Development;
- Warning signs installed, where appropriate, to reduce risk of collision with protected species;
- Covering of deep excavations, foundations and pipe openings (or a ramp suitable to allow a mammal to escape installed) when not active to prevent entrapment of animals;
- Pre-construction surveys undertaken for protected species, including bats, badger and otter within set buffer areas of the proposed Development;
- If a potential resting place (e.g. bat roost) of a protected species is found within set buffer areas of construction activities, then work will cease within appropriate (species-specific) buffers until it can be established whether it is in active use by a protected animal. If presence is confirmed, then NatureScot will be consulted to discuss possible mitigation measures and/or seek an appropriate licence;
- Lighting design will ensure watercourses and woodland remain unlit at night. Security lighting and lighting associated with the temporary compound will be low lux² and directed away from watercourses and woodland to reduce disturbance; and
- All site personnel will be made aware of the presence of protected species through toolbox talks.

Operational Phase

116. With the exception of the operation of the wind turbines and general maintenance of the turbines, there will be little on-site activity during the operational phase, and therefore levels of disturbance will be considerably reduced relative to the construction period.
117. Where potential effects exist, control measures will be incorporated into an Operational Environmental Management Plan (EMP). In particular, the potential for pollution incidents during routine maintenance activities will be minimised by adoption of SEPA good practice guidance (SEPA, 2010).
118. Any routine maintenance works will take place during the day where practicable to minimise the potential for disturbance to protected species within the proposed Development (since these are mostly nocturnal/crepuscular) and a speed limit of 15 mph will be enforced for any vehicles going onto the proposed Development, in order to reduce the risk of collision with protected species.
119. The EMP will detail mitigation measures required during the operational phase relating to protected species to ensure ongoing compliance with relevant environmental legislation.

Decommissioning

120. Embedded mitigation of decommissioning activities will follow that proposed for the embedded mitigation of construction activities, including pre-decommissioning surveys and ecological supervision of activities.

² A standardised unit of measurement of light level intensity (illuminance).

Feature Assessment

121. On the basis of the description of the ecological baseline, together with the legislation and guidance, a summary of the habitats and species within the proposed Development is provided in **Table 7.15** below. Similar habitats with comparable impacts and conservation interest have been grouped together as the outcomes are expected to be equivalent.
122. Following consultee responses, the following ecological features were scoped out and are not considered within the EclA:
- Designated Sites;
 - Reptiles; and
 - Amphibians.
123. As no or little evidence of either water vole, red squirrel, or pine marten were recorded during surveys, these have also been scoped out from further assessment.
124. In addition, surveyed habitats which hold little to no conservation interest and with negligible geographical value or will not be permanently lost as part of the proposed Development have been scoped out of this assessment. These habitats are:
- Fen marsh and swamp (0.4 ha);
 - Other wetlands (0.7 ha);
 - Bracken (10.6 ha);
 - Mountain hay meadows (H6520; 0.3 ha);
 - Other lowland meadows (0.6 ha);
 - Other neutral grassland (1.1 ha);
 - Modified grassland (3.7 ha);
 - Hawthorn scrub (1.6 ha);
 - Willow scrub (0.2 ha);
 - Eutrophic standing waters (<0.1 ha);
 - Mesotrophic lakes (0.1 ha);
 - Sparsely vegetated land (0.4 ha);
 - Suburban mosaic of developed and natural surface (0.5 ha);
 - Other mixed woodland - mainly broadleaved (2.7 ha); and
 - Upland birch woodlands (6.3 ha).
125. Where no significant effects are likely with the application of embedded mitigation as outlined in **Section 7.10.2** above this is specified, and the feature is not considered an IEF requiring EclA.

Table 7.15: Summary of designated sites, habitats and species and their conservation importance. IEFs are shown as bold

Feature	Covering legislation	Geographical level of value	IEF	Justification
Afton Uplands LNCS	None	Local	No	Bog and heath habitats within the LNCS will be directly impacted by the proposed Development through permanent habitat loss. However, the outline HMP includes measures for compensating and enhancing bog habitats which will result in a net biodiversity gain in line with requirements of NPF4. Embedded mitigation includes a pollution prevention plan and measures to control dust, which will be included in the DCEMP and monitored by the ECoW. As such, no significant effects of the proposed Development on the condition of this feature are likely. Therefore, Afton Uplands LNCS is not considered to be an IEF.
Glen Afton LNCS, Mansfield/Garclaugh/Garepool Burns LNCS and Nith Floodplain LNCS	None	Local	No	No habitat within these LNCSs will be directly impacted by the proposed Development. However, given the proximity of the LNCSs to the proposed Development and the hydrological connectivity there is potential for an indirect impact through pollution or sedimentation caused by construction works. However, embedded mitigation includes a pollution prevention plan, which will be included in the DCEMP and monitored by the ECoW. As such, no significant effects of the proposed Development on the condition of this feature are likely. Therefore these LNCS are not considered to be IEFs.
Blanket bog (H7130) and degraded blanket bog	Annex 1; SBL; LBAP	Regional	Yes	<p>Blanket bog (H7130) covers 23.6 ha of the total area within the application boundary and will experience a permanent loss of 2.1% of habitat in relation to the proposed Development. Degraded blanket bog covers 487.6 ha of the total area within the application boundary and will experience a permanent loss of 4.2% in relation to the proposed Development.</p> <p>Blanket bog (H7130) corresponds to the Annex 1 and SBL priority habitat 'blanket bog'. The blanket and degraded blanket bog habitats found within the application boundary represent 6.7% of the NHZ 19 blanket/degraded blanket bog habitat estimate, of which 0.3% will be lost as part of the proposed Development. Blanket/degraded blanket bog is therefore considered to be important in regional terms.</p> <p>Due to the conservation status and the extent of habitat loss, the proposed Development has potential to cause a significant effect on these habitats. In addition, there are statutory requirements in relation to compensation where impacts to bog habitats will occur as a result of a development. As such, additional discussion is required in relation to blanket bog and degraded blanket bog and they have both been considered to be an IEF.</p>

Feature	Covering legislation	Geographical level of value	IEF	Justification
				The NVC habitat M15 has moderate potential to be a GWDTE. Given that some infrastructure will be located within 250 m of this habitat, the proposed Development could have an impact on the hydrology of this habitat. Further discussion of GWDTEs is presented in Chapter 9: Hydrology, Geology and Hydrogeology Assessment.
Other degraded raised bog		Local	No	<p>This habitat covers 0.3 ha of the total area within the application boundary. None of this habitat will be permanently lost as part of the proposed Development.</p> <p>There is the potential for an indirect impact from dust created during construction works, or from accidental pollution. A pollution prevention plan and measures to control dust will be included in the DCEMP and monitored by the ECoW, and so it is considered that embedded mitigation is sufficient to prevent adverse effects to this habitat. As such, no significant effects of the proposed Development on the condition of this feature are likely. Therefore, this habitat is not considered to be an IEF. In addition, the outline HMP includes measures for compensating and enhancing bog habitats which will result in a net biodiversity gain in line with requirements of NPF4.</p>
Purple moor-grass and rush pastures	Annex I; SBL; LBAP	Local	No	<p>This habitat covers 5.9 ha of the total area within the application boundary and will experience a permanent loss of 0.7% in relation to the proposed Development.</p> <p>There is the potential for an indirect impact from accidental pollution. A pollution prevention plan will be included in the DCEMP and monitored by the ECoW, and so it is considered that embedded mitigation is sufficient to prevent adverse effects to this habitat. As such, no significant effects of the proposed Development on the condition of this feature are likely. Therefore, this habitat is not considered to be an IEF.</p> <p>The NVC habitat M6 has high potential for being a GWDTE, and MG9 has moderate potential for being a GWDTE. Given that some infrastructure will be located within 250 m of these habitats, the proposed Development could impact on the hydrology of this habitat. Further discussion of GWDTEs is presented in Chapter 9: Hydrology, Geology and Hydrogeology.</p>
Upland flushes fens and swamps	Annex I; SBL; LBAP	Local	No	<p>This habitat covers 63.1 ha of the total area within the application boundary. This habitat will experience a permanent loss of 2.4% in relation to the proposed Development.</p> <p>Upland flush habitats are included in the SBL as a 'watching brief only'. This means that the habitat has only low conservation value despite the LBAP and Annex I status. Areas subject to unavoidable temporary impacts will be</p>

Feature	Covering legislation	Geographical level of value	IEF	Justification
				<p>monitored for restoration as soon as practicable following completion of construction.</p> <p>There is also the potential for an indirect impact from dust created during construction works, or from accidental pollution. A pollution prevention plan and measures to control dust will be included in the DCEMP and monitored by the ECoW and so it is considered that embedded mitigation is sufficient to prevent long-term adverse effects on this habitat. As such, no significant effects on the integrity of this feature are likely as a result of the proposed Development. Therefore, this habitat is not considered to be an IEF.</p> <p>The NVC habitats M6, M10 and M23 have high potential for being GWDTEs, and M15 has moderate potential for being a GWDTE. Given that some infrastructure will be located within 250 m of these habitats, the proposed Development could impact on the hydrology of this habitat. Further discussion of GWDTEs is presented in Chapter 9: Hydrology, Geology and Hydrogeology.</p>
Upland transition mires and quaking bogs (H7140)	Annex I; SBL; LBAP	Local	No	<p>This habitat covers 1.7 ha of the total area within the application boundary and none of it will be permanently lost as part of the proposed Development. There is the potential for an indirect impact from dust created during construction works, or from accidental pollution. A pollution prevention plan and measures to control dust will be included in the DCEMP and monitored by the ECoW, and so it is considered that embedded mitigation is sufficient to prevent adverse effects to this habitat. As such, no significant effects of the proposed Development on the condition of this feature are likely. Therefore, this habitat is not considered to be an IEF. In addition, the outline HMP includes measures for compensating and enhancing bog habitats which will result in a net biodiversity gain in line with requirements of NPF4.</p> <p>The NVC habitats M6 and M9 have high potential for being GWDTEs. Given that some infrastructure will be located within 250 m of these habitats, the proposed Development could impact on the hydrology of this habitat. Further discussion of GWDTEs is presented in Chapter 9: Hydrology, Geology and Hydrogeology.</p>
Upland acid grassland and other acid grassland	SBL; LBAP	Local	No	<p>Upland acid grassland covers 0.4 ha of the total area within the application boundary. Other acid grassland covers an additional 267.5 ha of the total area within the application boundary. There will be no loss of upland acid grassland as part of the proposed Development. However, other acid grassland will experience a permanent loss of 4.3% in relation to the proposed Development. These habitats are widespread throughout Scotland on well-drained acid soils and in the uplands of Scotland. Additionally,</p>

Feature	Covering legislation	Geographical level of value	IEF	Justification
				upland acid grassland is included in the SBL as a 'watching brief only', requiring monitoring to prevent decline and it is included within the LBAP. There is the potential for an indirect impact from dust created during construction works, or from accidental pollution. A pollution prevention plan and measures to control dust will be included in the DCEMP and monitored by the ECoW, and so it is considered that embedded mitigation is sufficient to prevent adverse effects to this habitat. Given the relatively small area of habitat loss from the proposed Development and the low conservation value, this habitat is not considered to be an IEF in the context of the proposed Development.
<i>Lolium-Cynosurus</i> neutral grassland, <i>Deschampsia</i> neutral grassland and <i>Holcus-Juncus</i> neutral grassland.	LBAP	Local	No	<p><i>Lolium-Cynosurus</i> neutral grassland covers 9.2 ha of the total area within the application boundary. <i>Deschampsia</i> neutral grassland covers an additional 3.9 ha of the total area within the application boundary. <i>Holcus-Juncus</i> neutral grassland covers 6.1 ha of the total area within the Site boundary. Neutral grassland habitats will experience a permanent loss of 2.8% in relation to the proposed Development.</p> <p>There is potential for an indirect impact from dust created during construction works, or from accidental pollution. A pollution prevention plan and measures to control dust will be included in the DCEMP and monitored by the ECoW, so it is considered that embedded mitigation is sufficient to prevent adverse effects to this habitat and as such no significant effects of the proposed Development on the integrity of this feature are likely. Therefore, this habitat is not considered to be an IEF.</p> <p>M23 habitat has high potential for being a GWDTE, while MG9 and MG 10 have moderate potential for being GWDTEs. The proposed Development could impact on the hydrology of these habitats. Further discussion of GWDTEs is presented in Chapter 9: Hydrology, Geology and Hydrogeology.</p>
Upland heathland	SBL; LBAP	Local	No	<p>This habitat covers 9.0 ha of the total area within the application boundary and will experience a permanent loss of 2.4% in relation to the proposed Development.</p> <p>There is potential for an indirect impact from dust created during construction works, or from accidental pollution. A pollution prevention plan and measures to control dust will be included in the DCEMP and monitored by the ECoW, and so it is considered that embedded mitigation is sufficient to prevent adverse effects to this habitat arising from construction. Therefore, this habitat is not considered to be an IEF.</p>

Feature	Covering legislation	Geographical level of value	IEF	Justification
Upland dry heath (H4030)	Annex I; SBL; LBAP	Regional	No	<p>Upland dry heath (H4030) is a priority habitat on Annex I, SBL and LBAP. This habitat covers 35.2 ha of the total area within the application boundary and will experience a permanent loss of 7.0% in relation to the proposed Development. The dry heath habitat found within the application boundary represents 1.1% of the total dry heath habitat present in NHZ 19 (3064.5 ha), of which the amount of dry heath permanently lost to the proposed Development represents less than 0.1% of the NHZ 19 habitat estimate. This is not seen to be a significant impact given the amount of habitat present in the wider area.</p> <p>An additional 1.8 ha of dry heath will be temporarily lost to the proposed Development. This includes habitat which will be disturbed for earthworks during construction only. Dry heath is known to restore well, and it is anticipated that the areas of temporary habitat loss will restore within 5-10 years of operation.</p> <p>There is potential for an indirect impact from dust created during construction works, or from accidental pollution. A pollution prevention plan and measures to control dust will be included in the DCEMP and monitored by the ECoW, and so it is considered that embedded mitigation is sufficient to prevent adverse effects to this habitat arising from construction.</p> <p>Given the low proportion of habitat loss from the proposed Development within the NHZ, no significant effects on the integrity of this feature are likely. As such, no significant effects of the proposed Development on the condition of this feature are likely. Therefore, this habitat is not considered to be an IEF.</p>
Upland wet heathland with cross-leaved heath (H4010)	Annex I; SBL; LBAP	Local	No	<p>Upland wet heath is a priority habitat on Annex I, SBL and LBAP. This habitat covers 12.7 ha of the total area within the application boundary and will experience a permanent loss of 1.1% in relation to the proposed Development. The wet heath habitat found within the application boundary represents 0.2% of the NHZ 19 wet heath estimate (6593 ha), meaning the amount of wet heath permanently lost to the proposed Development will be negligible in relation to the NHZ 19 habitat estimate.</p> <p>There is potential for an indirect impact from dust created during construction works, or from accidental pollution. A pollution prevention plan and measures to control dust will be included in the DCEMP and monitored by the ECoW, and so it is considered that embedded mitigation is sufficient to prevent adverse effects to this habitat arising from construction.</p> <p>Given the low proportion of habitat loss from the proposed Development (both within the NHZ), no significant effects on the integrity of this feature are likely.</p>

Feature	Covering legislation	Geographical level of value	IEF	Justification
Other broadleaved woodland and other coniferous woodland		Negligible	No	These habitats consist largely of plantation woodland and covers 11.5 ha of the total area within the application boundary. These habitats will experience a permanent loss of 0.2% in relation to the proposed Development. These habitats at the proposed Development hold little to no conservation interest and are widespread throughout Scotland. A pollution prevention plan will be included in the DCEMP and monitored by the ECoW. It is therefore considered that embedded mitigation is sufficient to prevent adverse effects to this habitat and as such no significant effects on the integrity of this feature are likely as a result of the proposed Development. These habitats are therefore not considered to be an IEF.
Bats (Leisler's bat, noctule bat, Nathusius' pipistrelle, common pipistrelle, soprano pipistrelle)	Habitat Regulations; WCA 1981; SBL; LBAP	Local	Yes	The proposed Development offers some limited foraging and commuting corridors along the Kello Water and several smaller burns. The open bog, grassland and coniferous plantation habitat within the proposed Development is considered low quality for foraging bats. The overall collision risk for bats at the proposed Development is considered to be low. Three carcasses were retrieved during targeted carcass searches, and statistical modelling using this and results from the efficiency and persistence trials has predicted this equates to 23 carcasses per year. Many windfarms adopt a European model where an appropriate threshold is two bats per turbine per year (Behr. 2015; Behr <i>et al.</i>, 2017). The results of the surveys undertaken at the operational turbines are significantly below this value. Due to the levels of activity of some bat species at the proposed Development, the risk levels to these species, and the rarity of some species recorded, the proposed Development has potential to cause a significant effect on bats. Therefore, they are considered an IEF.
Bats (<i>Myotis</i> species and brown long-eared)	Habitat Regulations; WCA 1981; SBL; LBAP	Local	No	A low collision risk was predicted for <i>Myotis</i> species and brown long-eared bat in all seasons. Due to low levels of activity at the proposed Development and low species vulnerability in Scotland (NatureScot, 2021), the proposed Development is considered not to cause a likely significant effect on these species. Therefore, they are not considered to be an IEF.
Protected mammals	Conservation Regulations; WCA 1981; SBL; LBAP (water vole, red squirrel, otter)	Local	No	Signs of badger, otter and pine marten were found within the proposed Development. No signs of other protected mammal species were found. All species recorded are widespread across Scotland. The levels of activity recorded indicate that while some species of protected mammal are present within the proposed Development this is unlikely to be in sufficient numbers to consider the populations to be of greater than Local value.

Feature	Covering legislation	Geographical level of value	IEF	Justification
				<p>Pre-construction mammal surveys included in the embedded mitigation will confirm signs and/or resting places such as badger setts, otter couches and pine marten dens. Works will not be carried out within specific buffers of protected mammal resting places unless done so under licence from NatureScot.</p> <p>Following the implementation of embedded mitigation, effects are considered to be 'Negligible' and 'Not-Significant', and protected mammals are therefore not considered to be an IEF.</p>
Fish	Conservation Regulations; WCA 1981; SBL (brown/sea trout only); LBAP	Local	No	<p>Salmonid species were present in all seventeen of the sites surveyed for the proposed Development, meaning they are present in all watercourses draining the Site. Non-salmonid species were present in six of the seventeen sites surveyed, including eels at one site. Aquatic invertebrate surveys indicated good to high ecological status of all except one watercourse at the proposed Development.</p> <p>New watercourse crossings and upgrades of existing watercourse crossings are proposed within the proposed Development and hence, there is the potential for direct impacts to fish.</p> <p>Additionally, there is potential for indirect impacts to fish through pollution or sedimentation caused by construction works. Watercourses within the proposed Development are primarily uppermost tributaries of burns and so are unlikely to support large fish populations, though good spawning habitat for migratory and non-migratory fish species may exist further downstream. Further information on watercourses can be found in Chapter 9: Hydrology, Geology and Hydrogeology.</p> <p>As such, a pollution prevention plan and measures to control dust will be included in the DCEMP and monitored by the ECoW. It is therefore considered that embedded mitigation is sufficient to prevent adverse effects to fish and as such no significant effects of the proposed Development on this feature are likely.</p> <p>A Fish Monitoring Plan covering the pre-construction, construction and post-construction periods will be recommended. Therefore, fish are not considered to be an IEF and are not discussed further in this chapter.</p>

7.7.3. Impact Assessment

126. Two features have been identified as IEFs, requiring EclA following the application of embedded mitigation (see **Section 7.10.2**). These are:

- Blanket bog/degraded blanket bog; and
- Bats (excluding *Myotis* species and brown long-eared bat).

127. An impact assessment for each of these ecological features is provided below for the construction and operation periods. For all habitats and species, decommissioning effects are predicted to be of similar or lower magnitude to the effects during construction.

Blanket Bog/Degraded Blanket Bog: Decommissioning and Construction

128. Construction activities have the potential to create dust. Dust particles have the potential to interfere with peat forming species such as *Sphagnum* spp. and other sensitive plants. There is also a risk of water pollution incidents occurring during the construction phase of the proposed Development, potentially impacting on the plant species present. However, application of embedded mitigation implemented via construction phase plans such as the DCEMP reduces the likelihood and level of these indirect effects.

129. The principal impact of the proposed Development to blanket and degraded blanket bog is via permanent habitat loss. **Table 7.16** highlights the anticipated habitat loss, comparing between permanent loss and temporary loss. The total extent of blanket and degraded blanket bog habitats lost to the infrastructure of the proposed Development is 20.8 ha, which comprises 4.1% of the habitat within the application boundary.

130. The estimated area of blanket bog/degraded bog habitat in NHZ 19 is 7,652 ha. Blanket bog and degraded bog habitats found within the application boundary represent 6.7% of the NHZ 19 blanket bog/degraded blanket bog habitat estimate. Of these habitats present on site, 0.5 ha of blanket bog and 20.3 ha of degraded blanket bog is anticipated to be lost to the proposed Development, totalling 0.3% of the estimate of all blanket and degraded bog habitat within NHZ 19.

131. In addition, construction activities also have the potential to indirectly impact the hydrological flow and connectivity affecting the integrity of the habitat type. As identified within guidance (NatureScot 2023), following construction of permanent infrastructure it is anticipated that blanket bog and dry modified bog may undergo potential hydrological changes. The majority of the bog habitats located within the boundary of the proposed Development are in very poor condition and are considered to be degraded, and **Chapter 9** has identified that the majority of peat present is less than 0.5 m, see **Figure 9.4**. In addition, the proposed Development is a repower of an already developed location, which is already utilising as much of the existing infrastructure (such as tracks) as possible. As a result of these points, NatureScot did not consider that it was necessary to undertake a priority peatland assessment on the peat habitats present and as such, it is considered that a proportionate approach is taken to providing suitable compensation and enhancement habitats. Therefore, habitats that may undergo potential hydrological change have been identified as bog habitats within a 15 m buffer of permanent infrastructure locations where peat is greater than 0.5 m (see **Figures 7.7a** and **7.7b** for locations).

132. Guidance requires that for all habitat to be permanently lost as a result of infrastructure, compensation for this loss should be on a 1:10 ratio plus 10% for enhancement. For habitat with a buffer of the permanent infrastructure that may be subject to change, compensation should be on a 1:9 ratio plus 10% for enhancement. **Table 7.16** provides the estimated calculations and total area to where compensation and enhancement will be undertaken where possible.

Table 7.16: Summary of blanket bog and degraded blanket bog habitat compensation and enhancement estimates

Anticipated Impact	Area of habitat (ha)	Compensation at 1:10 (ha)	Compensation at 1:9 (ha)	10% enhancement	Total habitat (ha)
Direct habitat loss from permanent infrastructure	20.8	208	N/A	2.1	210.1
Indirect habitat change within 15 m buffer	31.6	N/A	284.4	3.2	287.6
Total	52.4	208	284.4	5.3	497.7

133. Blanket bog and degraded bog communities that will be lost to the proposed Development are M4, M15, M17, M19 and M20, with the majority being M19 degraded bog. As described in **Section 7.10.2 Embedded Mitigation**, the layout of the proposed Development has avoided bog habitats where possible, taking into account other constraints. As such, areas of the highest quality bog habitat at the proposed Development have been avoided as part of the design process. Furthermore, the extent of this habitat affected by the proposed Development is a small proportion of the habitat available both within the Site and NHZ 19. Without additional mitigation it is considered that impacts associated with loss of blanket bog and degraded blanket bog at the proposed Development will be **'Minor Negative'** resulting in an effect which is **'Not-Significant'**. No impacts are anticipated to blanket bog and degraded blanket bog habitats during operation.

Bats: Decommissioning and Construction

134. The open bog, grassland, moorland and coniferous plantation habitats within and surrounding the proposed Development are considered low quality for roosting bats. Static detector data highlighted low activity around sunrise and sunset, with only 561 of the total 28,745 calls being recorded within 30 minutes of sunrise or sunset, representing 2.0% of calls. Therefore, it is considered unlikely that there are any significant roost locations nearby (see **Figure 7.5** for detector locations). Pre-construction surveys of any locations with the potential bat roosts will be carried out on any trees or structures with potential to support roosting bats within 30 m of working areas, as part of the SPP.
135. The loss of habitat to the proposed Development will not significantly reduce the foraging opportunities available to bat species. Although, a low level of foraging and

commuting behaviour may be altered as a result of construction, this will be temporary. Furthermore, the implementation of lighting mitigation as specifically included within the SPP and outlined within embedded mitigation (see **Section 7.10.2**) means that any disruption caused by construction works will be minimised. Thus, the likelihood of significant effects of displacement or disturbance to foraging or commuting bats during construction is considered **'Negligible'**.

136. Bats are considered to be of Local nature conservation importance and after application of embedded mitigation the likely effect of displacement or disturbance to bats during construction is considered to be **'Negligible'** and **'Not-Significant'**.

Operation

137. During the operational phase, rotating turbines present a risk to flying bats resulting in potential collision when flying in close proximity to turbines. Research work by Exeter University (DEFRA, 2016) found that most bat fatalities at UK windfarms were common pipistrelle, soprano pipistrelle and noctule bats. The study also found that the percentage casualty rates for soprano pipistrelle, common pipistrelle and noctule bats were higher than the relative proportions of their calls recorded from ground level acoustic surveys.
138. No bat roosts were identified within the study area, although the habitat within the Site offers some foraging and commuting corridors along the forestry edge and burns. The majority of bat passes (76.2% of total passes) were recorded at Detectors 1, 2 and 4 which were all located in woodland/shrub, heathland and grassland habitats, between 2 km and 5 km from the nearest proposed turbine location. The overall bat activity level at the proposed Development is considered to be low. The proposed Development is therefore considered of Local conservation importance for all occurring species of bats.
139. Bat activity levels are classified according to the guidance provided by NatureScot (2021) and relative activity levels based on the output provided by Ecobat, with results shown in **Table 7.10, Table 7.11 and Table 7.12**.

Common and Soprano Pipistrelle

140. Common and soprano pipistrelle were both recorded at the proposed Development, accounting for 90.1% of all recorded bat passes. Of the two, common pipistrelle was recorded much more frequently than soprano pipistrelle, accounting for 75.3% of total bat passes. *Pipistrellus* species accounted for 1.1% of total bat passes. Both common and soprano pipistrelle were assessed as being at a low-medium collision risk during the survey period at the proposed Development. These species are assessed as having a high collision risk with wind turbines (NatureScot, 2021), but due to the species being common and widespread across Scotland they have only a medium population vulnerability to wind turbines.
141. The highest number of passes for common and soprano pipistrelle were recorded at Detector 1 and Detector 4 respectively, representing 29.5% and 26.5% of all passes for each of those species respectively. Detector 1 was located 4.8 km from the nearest proposed turbine (T15) and Detector 4 was located 2.4 km from the nearest proposed turbine (T15). Detector 1 was located along a track within plantation forestry, while Detector 4 was located near to the edge of forestry plantation adjacent to open areas of grassland, scrub and heath.

142. As the overall population vulnerability of these two species to wind turbines is medium, it is considered that operational effects of the proposed Development on common and soprano pipistrelle due to collisions would not affect the integrity of the local populations and are therefore considered to be **'Minor Negative'** and **'Not-Significant'**.

Nathusius' Pipistrelle

143. Nathusius' pipistrelle bats are assessed by NatureScot guidance (2021) to be of high risk in terms of collision and threat to national populations. This species was assessed as having a medium collision risk during the survey period at the proposed Development during spring and autumn, and low – medium in summer. Nathusius' pipistrelle activity was the lowest of all bat species at the proposed Development, and accounted for 0.1% of total bat passes throughout the survey period (a total of 32 passes over the whole season). The majority of Nathusius' pipistrelle passes (19 passes) were at Detectors 1, 3, 12 and 16. Detectors 1 and 3 were located between 5.2 km and 2.9 km within or adjacent to plantation forestry. Detector 12 was located 0.9 km from the nearest proposed turbine location (T02), in coniferous woodland along an existing track and burn. Detector 16 was located 0.4 km away from the nearest proposed turbine location (T20), in open moorland along Polhigh Burn.
144. Overall, very low activity levels were recorded for Nathusius' pipistrelle at the proposed Development. Detector locations in open habitat around proposed turbine locations were not used by this species, and they are most likely to be using the linear features of the burns within the proposed Development, which proposed turbines are not near. It is therefore considered that operational effects of the proposed Development on Nathusius' pipistrelle due to collisions would not affect the integrity of the local populations and are considered to be **'Minor Negative'** and **'Not-Significant'**.

Nyctalus Species (Noctule and Leisler's bat)

145. Leisler's bat and noctule bats are assessed as having high population sensitivity in NatureScot guidance (2021). For the survey period, noctule were assessed as having medium collision risk at the proposed Development in spring, and low-medium in summer and autumn, Leisler's were low – medium for all seasons. Noctule, Leisler's bat and *Nyctalus* species accounted for 0.5%, 1.5% and 0.4% of all recorded bat passes respectively. The areas where the highest number of passes occurred were within and on the edge of conifer plantation. Almost half of all Leisler's passes (47.6%) and noctule passes (48.7%) were recorded at Detectors 2, 3 and 4.
146. Overall, the activity levels and collision risk assessment indicate that the proposed Development was used by *Nyctalus* bats species during the survey period and the risk to these species was medium. It is therefore considered that operational effects of the Proposed Development on *Nyctalus* bats due to collisions would not affect the integrity of the local populations of these species and is therefore considered to be **'Minor Negative'** and **'Not-Significant'**.

7.8. Further Mitigation and residual effects

147. Further mitigation is proposed for bog habitats at the proposed Development, as detailed below in **Section 7.11.1 Additional Mitigation**. With the application of these measures the magnitude of residual impact is expected to be **'Minor Positive'**, resulting in an effect which is **'Not-Significant'** at the Regional level (see **Table 7.17**).

148. For bats, although no species-specific mitigation is required, various embedded measures (described in **Section 7.10.2**) will be implemented to ensure compliance with legislation, and to follow good practice guidance. Furthermore, due to the industry-wide issue of pre-construction bat activity surveys accurately forecasting the risk to bats during windfarm operation, and due to the presence of species that are of relatively high risk of wind turbine mortality (i.e. common and soprano pipistrelles) it is proposed that the following measures will be undertaken during the operation of the proposed Development:

- Bat activity monitoring would be completed for two years after the proposed Development becomes operational, in order to inform the need for a wind turbine bat management protocol (see below); and
- A bat carcass search programme for two years after the proposed Development becomes operational would be implemented. It would include trials to determine values for site-specific biases that affect estimates of bat mortality from carcass searches, such as scavenger removal rates and search accuracy.

149. If the monitoring identifies a level of bat mortality occurring above an 'incidental' level, a wind turbine bat mitigation protocol would be developed and implemented. The aim of the protocol would be to minimise the risk of fatalities occurring during periods of elevated risk to bats. This would be achieved via the curtailment of wind turbine operations under specific weather conditions.

150. Further details of these measures are provided in a Bat Monitoring and Mitigation Plan (**Technical Appendix 7.5**).

151. The proposed Development will have a '**Minor Negative**' impact on bats. These impacts are considered to result in effects that are '**Not-Significant**'.

7.8.1. Additional Mitigation

Habitat Management Plan

152. An outline HMP for the proposed Development will be provided, subject to consultation with the landowner, NatureScot, EAC and DGC.

153. The main aim of the outline HMP will be to improve and restore areas of blanket bog and degraded bog within the application boundary where possible.

154. As outlined in Table 7.16 and paragraph 130, current NatureScot guidance (NatureScot, 2023) requires a 1:10 ratio of compensation for degraded bog habitat directly lost to infrastructure (208 ha as compensation), while a 1:9 ration of compensation for bog habitat undergoing permanent change within 15 m of infrastructure has been proposed (284.4 ha as compensation). The approach to indirect impacts is considered precautionary as it does not account for the topography or other factors that would influence the extent of impact, and it is therefore unlikely that the maximum estimate will be fully realised as such the ratio of compensation has been slightly reduced. The total direct and indirect habitat compensation required based on the outlined ratios, plus an additional 10% of the baseline habitat extent to be provided as enhancement (5.3 ha), totals 497.71 ha of habitat. This will account for any potential hydrological changes following construction of the infrastructure.

155. Approximately 160 ha has been identified within the site which will be suitable for peatland restoration, which will contribute to the 497.71 ha of compensation and enhancement of bog habitat. The remaining bog habitat compensation and enhancement will be located outside of the application boundary, options for which are discussed within the HMP.
156. As described in the Trends and Future Baseline section, much of the bog habitat within the application boundary has experienced extensive drainage and so has potential for peatland restoration. Restoration will focus on drain blocking to rewet drained areas of peatland as well as peat hag reprofiling and surface bunding. The most appropriate methods to be used are dependent on a number of factors, including peat depth, topography, and extent of degradation/ modification. It is proposed that specific methods to be employed and options for offsite bog habitat compensation and enhancement will be decided and agreed with consultees post-consent, as part of the planning condition discharge.
157. A monitoring regime will be included as part of this plan in order to assess the effectiveness of management measures implemented as part of the HMP.

Table 7.17: Summary of pre-mitigation impacts and residual effects on each IEF, and the residual significance

IEF	Conservation importance	Nature of potential pre-mitigation impact	Magnitude of potential pre-mitigation impact	Significance of pre-mitigation effect	Specific mitigation/compensation measure	Magnitude of residual impact	Residual significance
Blanket bog	Regional	Direct and indirect habitat loss or possible degradation from pollution or other hydrological impacts.	'Minor Negative'	'Not-Significant'	Embedded mitigation implemented via construction phase plans such as the CEMP. Outline HMP to restore blanket bog.	'Positive'	'Minor'
Bats	Local	Displacement or disturbance to foraging or commuting bats from construction activity and/or through habitat loss.	'Negligible'	'Not-Significant'	Embedded mitigation implemented via construction phase plans such as the CEMP.	'Negligible'	'Not-Significant'
Common and soprano pipistrelle	Local	Collision risk	'Minor Negative'	'Not-Significant'	Outline BMMP to include removal of tree/scrub regeneration within 83 m, 99 m and 102 m of turbines, depending on hub height.	'Minor Negative'	'Not-Significant'
Nathusius' pipistrelle	Local	Collision risk	'Minor Negative'	'Not-Significant'		'Minor Negative'	'Not-Significant'
Noctule and Leisler's bat	Local	Collision risk	'Minor Negative'	'Not-Significant'		'Minor Negative'	'Not-Significant'

7.9. Cumulative Impacts

158. The following section assesses the predicted cumulative impacts and potential effects on IEFs from the proposed Development along with all other plans or projects within an appropriate Zone of Influence (Zoi) following guidance.
159. The context in which cumulative impacts are considered depends upon the ecology of the species or habitat in question. Of all the protected mammal species observed, bats are most likely to be affected by additional windfarm development because of the distances travelled by some species of foraging bat and the cumulative risks to bat populations as a result of collision with wind turbines during operation. The implementation of good practice measures regarding buffer distances of turbines from forestry edges to reduce impacts on commuting and foraging bats reduces likelihood of cumulative impact. Although the assessment has not identified any significant effects, as they are an IEF, common, soprano and Nathusius' pipistrelle, Leisler's bat and noctule bat have been retained for cumulative assessment. Blanket bog habitats, which have minor positive residual effects predicted after the implementation of embedded mitigation and compensation/enhancement measures, have also been retained for cumulative assessment.
160. All existing, consented and submitted developments (of three or more turbines) within 10 km of the proposed Development, were considered as part of the assessment of cumulative impacts. Projects of three or less turbines were excluded due to the lack of publicly available data for developments of this size. Only IEFs for which a greater than negligible residual impact is predicted are considered, as negligible impacts will not result in a detectable increase in cumulative impacts.
161. Within this search area there are a total of 32 developments that have been included in the Cumulative Impact Assessment (CIA):
- Ten operational windfarms;
 - Ten consented windfarms;
 - Four windfarms at construction stage; and
 - Eight windfarms at application stage.
162. It should be noted that cumulative assessments may be complicated by the lack of availability of EcIA/EIA Report chapters and appraisals for consented developments and, where this information is available, survey periods and methods may differ between sites. Furthermore, some windfarms may have been in existence for many years, and thus contemporary data may not be available (see **Table 7.18**).

Table 7.18: Cumulative impact assessment

Site	No. Turbines	Distance to proposed Development (km)	Site status	Baseline surveys undertaken	Assessment	
					Blanket bog	Bats
Hare Hill Extension and Repowering	23	0 km	EclA	2023, 2024	Permanent loss of up to 20.8 ha and permanent habitat change of up to 31.6 ha. Enhancement of retained bog is planned, resulting in an overall minor benefit.	Effects predicted to be ' Minor Negative ' and ' Not-Significant '. Bats considered to be of Local value. Relative activity levels of common pipistrelle and soprano pipistrelle were assessed as being at low-medium overall risk. Relative activity levels of Nathusius' pipistrelle, noctule bat, Leisler's bat were assessed as being at medium overall risk.
Hare Hill	20	0 km	Operational	N/A	Permanent loss of up to 1.5 ha. Not assessed further as not considered an IEF.	Residual impacts considered ' Low ' adverse and ' Not-Significant '. No likely roosts identified and an absence of suitable habitat for bats.
Hare Hill Extension	35	0 km	Operational	2006, 2007	Up to 4.1 ha impacted during construction. Assessed as overall ' Minor Negative ' impact and ' Not-Significant '.	' Minor Negative ' magnitude of impact predicted. Bats were considered to be of medium to high (regional to national) value. The Site was assessed as being of low value for bat potential.

Site	No. Turbines	Distance to proposed Development (km)	Site status	Baseline surveys undertaken	Assessment	
					Blanket bog	Bats
						No detailed bat surveys were undertaken, but bats were considered unlikely to be using the Site in any significant numbers due to the habitats present.
Euchanhead	21	0 km	Submitted	2018, 2019, 2020	Permanent loss of up to 13 ha. Enhancement of 23 ha of peatland planned which would result in an overall positive impact.	No potential identified for significant negative residual effects. The site was assessed as being of Local value to all bat species. Two structures used by roosting pipistrelle bats were identified within the Site, including a pipistrelle maternity roost.
Sandy Knowe Extension	6	0 km	Submitted	2020, 2021	Permanent loss of up to 8.5 ha. An HMP aims to restore and enhance sensitive habitats. Residual effects considered to be 'Not-Significant' .	Effects on local bat populations predicted to be 'Not-Significant' . Overall bat activity levels were reported as low and dominated by pipistrelle species and open habitats at the site were considered to be sub-optimal for bats. No potential roost sites were identified within the survey area.

Site	No. Turbines	Distance to proposed Development (km)	Site status	Baseline surveys undertaken	Assessment	
					Blanket bog	Bats
Sanquhar	9	0 km	Operational	N/A	No data available.	
Sanquhar II	44	0 km	Consented	2015, 2016, 2017, 2018, 2020	Permanent loss of up to 4.5 ha assessed as ' Moderately negative '. An HMP aims to restore and enhance bog habitats.	' Low ' magnitude and ' Minor Significance ', with the potential for some positive impact. No bat roosts were located at the site. Bats were recorded foraging and commuting in low numbers, largely along woodland edges. The majority of bats recorded were common and soprano pipistrelle, with low numbers of Myotis and Nyctalus species being recorded.
Lorg	15	2.0 km	Consented	2012, 2013, 2020, 2021	Permanent loss of up to 5.8 ha. Overall, effects are predicted to be ' Not-Significant ' once mitigation measures are implemented.	Impacts predicted to be or ' Low ' magnitude and ' Not-Significant ' Bats were considered to be of Local value. Common and soprano pipistrelle were the most frequently recorded species. One potential bat roost for common pipistrelle and Daubenton's bat was recorded. It was assessed as offering only limited opportunity for small numbers

Site	No. Turbines	Distance to proposed Development (km)	Site status	Baseline surveys undertaken	Assessment	
					Blanket bog	Bats
						of bats and was not considered suitable for larger maternity colonies.
Afton	25	2.3 km	Operational	ES submitted 2004	Permanent loss of up to 5 ha. Assessed as overall ' Minor Negative ' impact and ' Not-Significant '.	A bat roost assessment was undertaken during baseline surveys with no roosts being identified and much of the habitat in the vicinity considered poor quality for roosting. Pipistrelle bats were considered likely to be present in the general area and likely to use the adjacent forested habitats in low densities. However, the 2024 report stated that there was no evidence that bats were present in the study area, which did not contain any forested areas and is considered unlikely to support an important foraging resource for bats.
Whiteside Hill	10	2.5 km	Operational	N/A	No data available.	
Lethans	22	2.6 km	Under construction	2012, 2013, 2015	Permanent loss of up to 30 ha (plus 57 ha of indirect habitat loss).	Residual effects assessed as ' Negligible ' to ' Low ' and ' Not-Significant '.

Site	No. Turbines	Distance to proposed Development (km)	Site status	Baseline surveys undertaken	Assessment	
					Blanket bog	Bats
					Assessed as overall ' Low Negative ' impact and ' Not-Significant '.	The site was assessed as being of Local value to all bat species. One tree roost was identified and considered to indicate sporadic use by low/single numbers of roosting individuals. One Daubenton's bat was recorded roosting in a former lime kiln on three visits. There was no evidence of maternity roosts. Low bat activity was recorded, with soprano and common pipistrelle being the most frequently recorded species. Myotis and Nyctalus species were also recorded in low numbers.
Glenmuckloch	8	2.7 km	Submitted	2013, 2014	Permanent loss of up to 5.1 ha. Impacts predicted to be ' Low ' magnitude and ' Not-Significant '.	Impacts considered to be ' Negligible ' and ' Not-Significant '. The bat population was considered to be of county value overall. Common pipistrelle accounted for the majority of bat activity, with soprano pipistrelle having low to

Site	No. Turbines	Distance to proposed Development (km)	Site status	Baseline surveys undertaken	Assessment	
					Blanket bog	Bats
						moderate activity levels. Nathusius pipistrelle, Nyctalus species and Myotis species were all recorded at very low levels. Activity was predominantly associated with woodland habitats and burns. Due to activity around sunset and the presence of suitable roost features, it was thought to be likely that noctule, common pipistrelle, soprano pipistrelle and Myotis species all had roosts in close vicinity to the survey area.
Pencloe	19	3.0 km	Under construction	2013	Permanent loss of up to 1.5 ha. An HMP aims to restore blanket bog habitat, resulting in an overall benefit.	Impacts predicted to be ' Low ' magnitude and ' Not-Significant '. Bats considered to be of Local value. No likely roost sites identified. Very low levels of bat activity were recorded on the site. Absence of suitable roosting habitat suggests that individual bats are only using the site for commuting or foraging.

Site	No. Turbines	Distance to proposed Development (km)	Site status	Baseline surveys undertaken	Assessment	
					Blanket bog	Bats
Windy Standard I Repower	8	4.0 km	Submitted	2020	Assessed as no impact so not considered an IEF.	Impacts predicted to be ' Low ' to ' Moderate ' magnitude and ' Not-Significant '. Bat species considered to be of Local value. Habitat within the site considered to be of low suitability for foraging and commuting bats. Soprano pipistrelle was the most recorded species. Assessment of relative activity determined low to moderate bat activity.
Enoch Hill	15	4.3 km	Under construction	2012, 2013, 2014	Permanent loss of up to 11.7 ha (plus 26.6 ha of temporary loss and habitat disturbance). Effects considered to be ' Negligible ' to ' Slight ' and ' Not-Significant '.	Residual effects on bats were considered to be ' Negligible ' to ' Low ' and ' Not-Significant '. The site was assessed as being of Local value to all bat species. Overall bat activity levels were reported as low. No bat roosts were identified within the site and the habitat was considered generally unsuitable for roosting, Bat activity recorded during transect surveys was generally low and

Site	No. Turbines	Distance to proposed Development (km)	Site status	Baseline surveys undertaken	Assessment	
					Blanket bog	Bats
						concentrated near the boundaries, along sheltered valleys and along watercourses within the site.
Herds Hill	3	4.2 km	Consented	2022, 2023	Permanent loss of up to 0.3 ha. An HMP aims to restore mire habitats. Impacts predicted to be ' Low ' magnitude and ' Not-Significant '.	' Low ' magnitude and ' Minor Significance '. The site was assessed as being of low value to bats. No bat roosts were identified, and bat activity was low, with majority pipistrelle species recorded.
Windy Standard II	30	4.3 km	Operational	ES submitted 2001	Impacts predicted to be ' Low ' to ' Moderate ' magnitude and ' Not-Significant '. Some benefit expected as a result of habitat regeneration after felling.	There has been no systematic survey of the fauna of the study area. Data collection has been undertaken routinely during other surveys with information gathered from other parties. No mention of bats or other species discussed in this impact assessment.
Windy Standard I	36	4.4 km	Operational	1993, 1994, 1995	Windy Standard I was submitted prior to the current assessment requirements for EIA however no greater than low magnitude non-significant effects have been predicted for any ecological feature as a result of the construction and operation of any of the Windy Standard Complex windfarms. These turbines will be decommissioned and replaced by Windy Standard I Repower if consent is granted.	

Site	No. Turbines	Distance to proposed Development (km)	Site status	Baseline surveys undertaken	Assessment	
					Blanket bog	Bats
Rowancraig	6	4.6 km	Submitted	2022, 2023	Assessed as no impacts so not considered an IEF.	Effects considered to be ' Negligible ' to ' Low ' magnitude and ' Not-Significant '. Bat species considered to be of Regional value. No potential bat roost features were identified. Common and soprano pipistrelle were most frequently recorded species during surveys, although noctule was also recorded. Bat activity was low across site.
Windy Rig	12	5.2 km	Operational	2014	Permanent loss of up to 0.8 ha of bog habitats. Impacts predicted to be ' Minor ' and ' Not-Significant '.	Residual impacts identified as ' Low ' and ' Not-Significant ', with bat activity assessed as of ' Negligible ' ecological value at a cumulative scale. Bats considered to be of less than Local ecological value. The baseline surveys indicated low to very low activity levels and low species diversity of common/widespread species in overall sub-optimal habitat.

Site	No. Turbines	Distance to proposed Development (km)	Site status	Baseline surveys undertaken	Assessment	
					Blanket bog	Bats
Cloud Hill	10	5.3 km	Submitted	2020, 2021, 2022, 2023	Permanent loss of up to 2.5 ha. Effect considered to be 'Minor adverse' and 'Not-Significant'.	Effects considered to be 'Minor adverse' and 'Not-Significant'. Bats considered to be Local value. No features with moderate of high suitability for roosting bats recorded within 200 m plus rotor radius of proposed turbine locations. Common and soprano pipistrelle and Nyctalus species all considered to be at low risk of collision.
Kype Muir	26	5.5 km	Operational	2013	Permanent loss of up to 2.5 ha of bog habitats. An HMP aims to restore and enhance bog habitats, resulting in an overall benefit at site level.	Residual effects considered to be 'Not-Significant'. Bats considered to be of Local value. Bat activity levels found to be low, with common pipistrelle, soprano pipistrelle, Daubenton's and Leisler's recorded. The habitat within the study area was considered to be unsuitable for roosting.
Lethans Extension	10	6.2 km	Consented	N/A	Permanent loss of up to 3.8 ha.	Impacts predicted to be 'Negligible' and 'Not-Significant'.

Site	No. Turbines	Distance to proposed Development (km)	Site status	Baseline surveys undertaken	Assessment	
					Blanket bog	Bats
					Impacts predicted to be 'Low' and 'Not-Significant'.	Bats considered to be Local value. Study area considered to be of no value for roosting bats and bat activity considered to be low. Common and soprano pipistrelle the most frequently recorded species, extremely low number of registrations of Leisler's bat.
Twentyshilling	9	6.3 km	Operational	2012	Permanent loss of up to 6.3 ha. Residual effects considered to be 'Low' and 'Not-Significant'.	Residual effects considered to be 'Negligible' and 'Not-Significant'. Bats considered to be of Local value. No trees or structures on Site with the potential for roosting bats, and bat activity on Site considered to be low.
Windy Standard III	20	6.8 km	Consented	2012	Permanent loss of up to 6.3 ha. Overall, effects are predicted to be 'Not-Significant' once mitigation measures are implemented.	Effects on local bat populations predicted to be 'Not-Significant'. Common and soprano pipistrelle, Daubenton's bat and brown long-ear bats considered to be of Local value. No trees or buildings with potential bat roost features recorded. Very low

Site	No. Turbines	Distance to proposed Development (km)	Site status	Baseline surveys undertaken	Assessment	
					Blanket bog	Bats
						levels of bat activity were identified during the transect and static detector surveys.
South Kyle II	11	7.2 km	Submitted	2022	Permanent loss of up to 0.3 ha. Not assessed further as not considered an IEF.	Effects considered to be 'Minor negative' and 'Not-Significant' . Bats considered to be of Local value. Relative activity levels of both soprano and common pipistrelle were assessed as being at medium overall risk, for Leisler's bat and Nyctalus species to be low to medium and the risk to noctule bat was low.
Greenburn	14	7.5 km	Consented	2017, 2018, 2019	Permanent loss of up to 2.5 ha. An HMP aims to restore and enhance blanket bog habitats, resulting in an overall benefit.	Effects after implementing mitigation considered to be 'Negligible'/'Minor' and 'Not-Significant' . Bat species considered to be of Regional value. No bat roosts were recorded, but common pipistrelle activity indicated that there may have been a roost present in the local area. Common and soprano pipistrelle were most

Site	No. Turbines	Distance to proposed Development (km)	Site status	Baseline surveys undertaken	Assessment	
					Blanket bog	Bats
						frequently recorded, with Nathusius' pipistrelle, Leisler's and noctule being recorded at a much lower incidence.
Manquhill	8	8.0 km	Consented	2018, 2019, 2022	Assessed as no impact so not considered an IEF.	Effects considered to be ' Negligible ' to ' Minor ' and ' Not-Significant '. The site is considered to be of Moderate value for foraging and commuting bats and Low value for roosting bats. One structure and three trees were identified with potential for supporting roosting bats. Based on relative activity levels, pipistrelle species were assessed as being at medium potential risk, with Nyctalus and Myotis species assessed as being at low potential risk.
Penbreck and Carmacoup	9	8.7 km	Consented	2008	Permanent loss of up to 1.1 ha. Overall impact considered to be ' Negligible ' to ' Moderate ' and ' Not-Significant '.	Impacts on all fauna predicted to be ' Not-Significant '.
Shepherd's Rig	17	8.9 km	Consented	2018	Assessed as no impact so not considered an IEF.	Impacts predicted to be ' Negligible ' and ' Not-Significant '.

Site	No. Turbines	Distance to proposed Development (km)	Site status	Baseline surveys undertaken	Assessment	
					Blanket bog	Bats
						Bats considered to be of Regional value. No bat roosts were recorded within the site or surrounding area. Bat activity across the site was generally low, likely due to lack of optimal foraging habitat. Foraging and commuting activity consisted predominantly of common and widespread species.
North Kyle	49	9.0 km	Under construction	2017, 2018	Permanent loss of up to 3.8 ha of bog habitats. Effect considered to be 'Minor' and 'Not-Significant'.	Impacts predicted to be ' Minor ' and ' Not-Significant '. Regional importance for Nyctalus species, and Nathusius' pipistrelle. Local for all other bat species recorded on-site. Six trees and two structures with bat roost potential were recorded during surveys. One tree was found to have high bat roost potential. Four trees showed moderate bat roost potential and one tree low potential. The two structures were assessed to have low bat roost potential.

Site	No. Turbines	Distance to proposed Development (km)	Site status	Baseline surveys undertaken	Assessment	
					Blanket bog	Bats
Drum	8	9.3 km	Submitted	2020, 2021, 2022	Permanent loss of up to 0.5 ha. Effects considered to be 'Negligible' and 'Not-Significant'. An OHMP aims to restore a 6.5 ha area of peatland.	Impacts predicted to be 'Low' magnitude and 'Not-Significant'. Bats considered to be of Regional value, but the site was considered to be low risk for bats. No potential bat roosts were identified. Bat activity was very low due to a lack of high-quality foraging areas, with mainly soprano and common pipistrelle recorded.
Cornharrow	8	9.6 km	Consented	2016, 2017	Assessed as no impact so not considered an IEF.	Effects considered to be 'Not-Significant'. Common and soprano pipistrelle considered to be of Local value. Myotis species, brown long-eared and Nyctalus species considered to be of less than local value. There was no evidence of roosting bats within the infrastructure buffers. Pipistrelle species were the most commonly recorded, but at low levels of activity.

Site	No. Turbines	Distance to proposed Development (km)	Site status	Baseline surveys undertaken	Assessment	
					Blanket bog	Bats
Cumulative residual assessment					<p>Up to a total of 142.2 ha of bog habitat permanently lost from all developments considered within the CIA.</p> <p>A minimum of 29.5 ha total of bog habitat restored at all developments considered within the CIA (excluding the proposed Development).</p> <p>A total of c. 160 ha restored at the proposed Development.</p> <p>Overall minor beneficial cumulative impact.</p>	<p>The CIA considered developments within 10 km of the proposed Development, but not all of these sites lie within the foraging distance of the bat species recorded at the proposed Development. For example, of the 32 plans and projects (including the proposed Development), eight (173 turbines) lie within the core foraging distance (2 km) of common pipistrelle (the species that accounted for the large majority of records at the Proposed Development). Therefore, there is no route for the majority of the aforementioned plans/projects to impact upon the bat populations that utilise the proposed Development.</p> <p>For all windfarm sites included in the CIA, potential bat roosting sites, where present, should be protected through embedded mitigation</p>

Site	No. Turbines	Distance to proposed Development (km)	Site status	Baseline surveys undertaken	Assessment	
					Blanket bog	Bats
						<p>measures and so no significant effects on roosting sites was concluded. During the operation stage of the projects assessed, one project (Windy Standard Repower) identified 'Moderate Negative' but 'Not-Significant' effects on Nyctalus species only, the remaining projects were all assessed as having 'Negligible' to 'Low'/'Minor' adverse impacts. Therefore, when looked at cumulatively, it is considered unlikely that the low impact of collision predicted at each windfarm site would result in an overall change in the status to the local bat populations. Therefore, no significant cumulative effect on bats is predicted.</p> <p>However, it is acknowledged that there is a level of uncertainty in this prediction due to the lack of data and shared results of any monitoring on bats once</p>

Site	No. Turbines	Distance to proposed Development (km)	Site status	Baseline surveys undertaken	Assessment	
					Blanket bog	Bats
						projects become operational, as there is no definitive relationship between the level of bat activity on a site and the number of actual collisions.

163. No significant cumulative effects are predicted to result from the proposed Development along with other projects and plans due to the lack of additional impacts of the other cumulative developments within 10 km.

7.10. Conclusions

164. An assessment has been made of the predicted significance of effects of the proposed Development on ecological interests. This assessment predicted no significant effects on all of the IEFs recorded and no significant cumulative effects on any IEFs.
165. Habitat enhancement measures targeted at blanket bog/degraded blanket bog are proposed. Embedded mitigation measures to minimise impacts of the construction and operation of the proposed Development on IEFs, and to prevent a breach of legislation under the WCA 1981 as amended by the Nature Conservation (Scotland) Act 2004 are outlined. A SPP is proposed and good practice guidance regarding protected species and pollution prevention will be followed, with an ECoW employed during construction. Further mitigation in the form of a EMP to restore blanket bog habitats is proposed. It is considered that implementation of these mitigation and habitat enhancement measures will reduce the likelihood of impacts on IEFs at the appropriate biogeographical scale.

References

- Bang, P. and Dahlstrøm, P. (2001) *Animal Tracks and Signs*. Oxford: Oxford University Press.
- Behr, O. (2015) 'Bat-friendly' operation of wind turbines – the current status of knowledge and planning procedures in Germany. Presentation at Wind Power and Wildlife Symposium, Stirling University.
- Behr, O., Brinkmann, R., Hochradel, K., Mages, J., Korner-Nievergelt, F., Niermann, I., Reich, M., Simon, R., Weber, N. and Nagy, M. (2017) *Mitigating Bat Mortality with Turbine-Specific Curtailment Algorithms: A Model Based Approach*. In: Wind Energy and Wildlife Interactions.
- Butcher, B., Carey, P., Edmonds, R., Norton, L. and Treweek, J. (2023) *The UK Habitat Classification Manual Version 2.01*.
- Chanin, P. (2003) *Monitoring the Otter Lutra lutra*. Conserving Natura 2000 Rivers: Monitoring Series No. 10. English Nature.
- Collins, J. (2023, updated 2024) *Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th edition)*. The Bat Conservation Trust.
- Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016) *The Water Vole Mitigation Handbook*. The Mammal Society.
- Defra (2025) *Magic*. Available at: <https://magic.defra.gov.uk/MagicMap.aspx> (Accessed: January 2025)
- 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) *Dumfries and Galloway Local Biodiversity Action Plan (LBAP)*. Available at: https://www.dumgal.gov.uk/media/19945/Local-Biodiversity-Action-Plan/pdf/Local_Biodiversity_Action_Plan.pdf (Accessed: January 2025)
- Dumfries and Galloway Council (2019) *Dumfries and Galloway Local Development Plan 2*. Available at: https://www.dumfriesandgalloway.gov.uk/sites/default/files/2024-07/Adopted_LDP2_OCTOBER_2019_web_version.pdf (Accessed: January 2025)
- East Ayrshire Council (2024) *East Ayrshire Local Development Plan 2*. Available at: <https://www.east-ayrshire.gov.uk/PlanningAndTheEnvironment/development-plans-and-policies/ldp2/ldp2-information.aspx> (Accessed: January 2025)
- European Commission (2020) *European Union (EU) Biodiversity Strategy for 2030 – Bringing nature back into our lives (COM/2020/380)*. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52020DC0380> (Accessed: January 2025)
- Harris, S., Cresswell, P. and Jefferies, D. (1989) *Surveying Badgers*. The Mammal Society.
- Hendry and Cragg-Hine (1997) *Restoration of Riverine Salmon Habitats: A Guidance Manual*.
- Highland Council (2012) *Highland-wide Local Development Plan*. Available at: https://www.highland.gov.uk/info/178/development_plans/199/highlandwide_local_development_plan (Accessed: January 2025)

IUCN (2025) *International Union for Conservation of Nature (IUCN) Red List*. Available at: <https://www.iucnredlist.org/> (Accessed: January 2025)

JNCC (2010) *UK Post 2012 Biodiversity Framework (2012-2019)*. Available at: <https://hub.jncc.gov.uk/assets/587024ff-864f-4d1d-a669-f38cb448abdc> (Accessed: January 2025)

Natural Power (2023) *Hare Hill Repower Scoping Report*.

NatureScot (2021) *Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation*. Available at: https://www.nature.scot/sites/default/files/2021-08/Bats%20and%20onshore%20wind%20turbines%20-%20survey%2C%20assessment%20and%20mitigation_0.pdf (Accessed: January 2025)

Scottish Natural Heritage (2016) *Decommissioning and Restoration Plans for Wind Farms*. Available at: <https://www.nature.scot/sites/default/files/2019-10/Guidance%20-%20Decommissioning%20and%20restoration%20plans%20for%20wind%20farms%20-%20Feb%202016.pdf> (Accessed: January 2025)

NatureScot (2023) *Advising on peatland, carbon-rich soils and priority peatland habitats in development management*. Available at: <https://www.nature.scot/doc/advising-peatland-carbon-rich-soils-and-priority-peatland-habitats-development-management> (Accessed: February 2025)

NatureScot (2021) *Assessing the cumulative landscape and visual impact of onshore wind energy developments*. Available at: <https://www.nature.scot/doc/guidance-assessing-cumulative-landscape-and-visual-impact-onshore-wind-energy-developments> (Accessed: January 2025)

NatureScot (2020) *General Pre-application and Scoping Advice for Onshore Wind Farms*. Available at: <https://www.nature.scot/sites/default/files/2020-10/General%20pre-application%20and%20scoping%20advice%20for%20onshore%20wind%20farms.pdf> (Accessed: January 2025)

NatureScot (2024) *NatureScot pre-application guidance for onshore wind farms*. Available at: <https://www.nature.scot/doc/naturescot-pre-application-guidance-onshore-wind-farms> (Accessed: January 2025)

NatureScot (n.d.) NatureScot Sitelink. Available at: <https://sitelink.nature.scot/home> (Accessed: January 2025)

NatureScot (2022) *Scottish Biodiversity List*. Available at: <https://www.nature.scot/scotlands-biodiversity/scottish-biodiversity-strategy/scottish-biodiversity-list> (Accessed: January 2025)

NatureScot (2025) SiteLink. Available at: <https://sitelink.nature.scot/home> (Accessed: January 2025)

Neal, E. and Cheeseman, C. (1996) *Badgers*. T & A D Poyser.

Rodwell, J.S. (2006) *National Vegetation Classification Users' Handbook*. JNCC.

Sargent, G. and Morris, P. (2003) *How to Find and Identify Mammals*. The Mammal Society.

Scottish Executive (2006) *European Protected Species - terms of guidance: Chief Planner letter*. Available at: <https://www.gov.scot/publications/european-protected-species-chief-planner-letter/> (Accessed: January 2025)

Scottish Executive (2000) *Nature Conservation: Implementation in Scotland of EC Directives on the Conservation of Natural Habitats and of Wild Flora and Fauna and the Conservation of Wild Birds* ('The Habitats and Birds Directives'): Revised Guidance Updating Scottish Office Circular No. 6/1995. Available at: <https://www.gov.scot/binaries/content/documents/govscot/publications/foi-eir-release/2020/01/foi-201900008726/documents/foi-201900008726-information-released-a/foi-201900008726-information-released-a/govscot%3Adocument/FOI%2B-%2B201900008726%2B-%2BInformation%2BReleased%2B-%2BCircular%2B6-1995%2BNature%2BConservation%2B-%2B%2527The%2BHabitats%2Band%2BBirds%2BDirectives%2527%2B%2528Updated%2BJune%2B2000%2529..PDF> (Accessed: January 2025)

Scottish Fisheries Coordination Centre (2007) *Habitat Surveys Training Course Manual*.

Scottish Government (2024) *National Planning Policy Framework 4*. Available at: <https://assets.publishing.service.gov.uk/media/675abd214cbda57cacd3476e/NPPF-December-2024.pdf> (Accessed: January 2025)

Scottish Government (2013) *PAN 1/2013 – Environmental Impact Assessment*. Available at: <https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2013/08/planning-advice-note-1-2013-environmental-impact-assessment/documents/00521028.pdf/00521028.pdf/govscot%3Adocument/00521028.pdf> (Accessed: January 2025)

Scottish Government (2000, updated 2008) *PAN 60: Scotland's Natural Heritage*. Available at: <https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2000/01/pan-60-natural-heritage/documents/planning-advice-note-60-planning-natural-heritage-pdf/planning-advice-note-60-planning-natural-heritage-pdf/govscot%3Adocument/Planning%2BAdvice%2BNote%2B60%2BPlanning%2Bfor%2BNatural%2BHeritage.pdf> (Accessed: January 2025)

Scottish Government (2015) *Scotland's Biodiversity, a Route Map to 2020*. Available at: <https://www.gov.scot/publications/scotlands-biodiversity-route-map-2020/> (Accessed: January 2025)

Scottish Government (2024) *Scottish Biodiversity Strategy to 2045*. Available at: <https://www.gov.scot/publications/scottish-biodiversity-strategy-2045/> (Accessed: January 2025)

Scottish Government (2014) *Scottish Planning Policy*. Available at: <https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2014/06/scottish-planning-policy/documents/scottish-planning-policy/scottish-planning-policy/govscot%3Adocument/scottish-planning-policy.pdf> (Accessed: January 2025)

ScottishPower Renewables (2007a) *Hare Hill Windfarm Extension Environmental Statement Chapter 7.0 Ecology and Nature Conservation*.

ScottishPower Renewables (2007b) *Hare Hill Windfarm Extension Environmental Statement Technical Appendices*.

ScottishPower Renewables (2020) *Euchanhead Renewable Energy Development Environmental Impact Assessment Report*.

ScottishPower Renewables (2022) *Hare Hill Windfarm Extension Habitat Management Plan (Version 2)*.

Scottish Renewables et al. (2024) *Good practice during windfarm construction*. Available at: <https://www.nature.scot/doc/good-practice-during-wind-farm-construction> (Accessed: January 2025)

SEPA (2012) *Engineering in the water environment: good practice guide - river crossings*. Available at: <https://www.sepa.org.uk/media/151036/wat-sg-25.pdf> (Accessed: January 2025)

SEPA (2017a) Land Use Planning System Guidance Note 31: *Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems*. Available at: https://www.sepa.org.uk/media/143868/lupsgu31_planning_guidance_on_groundwater_abstractions.pdf (Accessed: January 2025)

SEPA (2017b) Land Use Planning System Guidance Note 4: *Planning guidance on windfarm developments*. Available at: <https://www.dpea.scotland.gov.uk/Document.aspx?id=954215> (Accessed: January 2025)

SNH (2002) *Natural Heritage Zones - A National Assessment of Scotland's Landscapes*.

Strachan, R., Moorhouse, T. and Gelling, M. (2011) *The Water Vole Conservation Handbook*. University of Oxford.

The Natural Resource Consultancy (1994) *Environmental Statement for a Windfarm at Hare Hill, New Cumnock, Ayrshire*.

Wray, S., Wells, D., Long, E. and Mitchell-Jones, T. (2010) *Valuing Bats in Ecological Impact Assessment*. IEEM In-Practice.