Fred. Olsen Renewables

Chapter 9

Ecology

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Contents

9.1 STATEMENT OF CONFIDENCE 4

9.2 INTRODUCTION 4

Terminology 4

9.3 LEGISLATION, POLICY AND GUIDANCE 4

Legislation 4

National Policy Guidance 5

Other Guidance 5

9.4 METHOD OF ASSESSMENT 5

Desk Study 6

Statutory, National and Locally Designated Sites of Nature Conservation 6

Data search 6

Review of existing data 6

Field Surveys 6

Habitat Surveys 7

Bat Surveys 7

Other mammal species 9

Survey Limitations 9

Other Ecological Features for Which Surveys Were Not Undertaken 10

Approach to Impact Assessment 10

Determining Important Ecological Features (IEFs) 10

Valuing bats 10

Characterising Potential Effects on Features 11

Habitat Loss Calculations 11

Determining Significance of Ecological Effects 11

Trends and Predicted Future Baseline 12

9.5 CONSULTATION 12

9.6 BASELINE CONDITIONS 13

Desk Study 13

Statutory, National and Locally Designated Sites of Nature Conservation 13

Protected Mammals and Habitats 13

Fish 14

Field Surveys – Habitats 15

Overview 15

Habitat Phase 1 and NVC Results 15

Field Surveys – Species 16

Bats 16
Protected Mammal Species Walkover 20
Incidental Records 20
9.7 ASSESSMENT OF POTENTIAL EFFECTS 20
Predicted Impacts 20
Potential effects during decommissioning of Windy Standard I 20
Potential effects during construction 20
Habitats 20
Watercourses 21
GWDTE 21
Species 21
Potential effects during operation 21
Potential effects during decommissioning of Windy Standard Repower 21
Embedded mitigation 21
Decommissioning of Windy Standard I 22
Construction phase 22
Operational phase 22
Decommissioning 22
Features brought forward for assessment 22
Impact Assessment 26
Bats 26
Habitat Management Plan (HMP) 28
9.8 CONCLUSIONS 28
9.9 MITIGATION AND RESIDUAL EFFECTS 28
CUMULATIVE EFFECTS 28
9.10 STATEMENT OF SIGNIFICANCE 32

Glossary

Term	Definition
Baseline	The existing conditions that prevail against which the effects of the Proposed Development are compared.
Consultees	Those organisations and bodies, defined by statute, which local planning authorities are legally required to consult before reaching a decision on relevant planning applications. Likely to include (but not restricted to) the Local Planning Authority, NatureScot and SEPA.
Ecological Impact Assessment (EcIA)	Ecological Impact Assessment is a process of identifying, quantifying and evaluating potential effects of development-related or other proposed actions on habitats, species and ecosystems.
Effect	The outcome to an ecological feature from an impact. For example, the effects on a species population from loss of a hedgerow. See also impact.
Environment Impact Assessment (EIA)	Environmental Impact Assessment (EIA) is a means of drawing together by the developer, in a systematic way, a description of the development and information relating to of the likely significant environmental effects arising from a proposed development.
Environmental Impact Assessment Report (EIAR)	A document reporting the findings of the EIA and produced in accordance with the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 Regulation 5
Habitat	The area or environment where a species naturally occurs.
Impact	Actions resulting in changes to an ecological feature. For example, the construction activities of a development removing a hedgerow. See also effect.
Important Ecological Feature (IOF)	Species/habitat identified as being of importance in the context of the Proposed Development, assigned a geographical value level in accordance with CIEEM Guidelines and professional judgement.
Local Planning Authority	Dumfries and Galloway Council
Mitigation	Measures, including any process, activity or design to avoid, reduce, remedy or compensate for potential negative effects of a development.
Natural Power	The lead consultant EIA co-ordinator is Natural Power Consultants Limited.
Proposed access	The access route which leaves the public road to the west of the Proposed Development Area and approaches the site making use of existing tracks where possible. As described in chapter 12
Proposed Development	The Proposed Windy Standard I Repower Wind Farm
Proposed Development Area	The area shown delineated by the red line boundary shown on Figure 1.2.
Protected Species	Animals or plants protected by European and/or domestic legislation.
Scoping Report	Whilst not a statutory requirement, scoping is designed to ascertain which issues the EIA process should cover. This Scoping Report considers the potential issues relating to the proposal and discusses which issues are likely to be significant.
Scottish Biodiversity List (SBL)	A list of animals, plants and habitats that Scottish Ministers consider to be of principal importance for biodiversity conservation in Scotland.
Site of Special Scientific Interest (SSSI)	Sites of Special Scientific Interest are protected areas that represent the UK's most important wildlife and/or geological sites.
Special Area of Conservation Area (SAC)	Special Areas of Conservation (SACs) are protected areas in the UK.
The "Applicant"	The applicant is Fred. Olsen Renewables Limited.
Windy Standard Complex	Operational and consented wind farms, original Windy Standard I, Windy Standard II and Windy Standard III.

List of Abbreviations

Abbreviation	Description
AOD	Above Ordnance Datum (of height)
CEMP	Construction Environmental Management Plan
CIA	Cumulative Impact Assessment
CIEEM	Chartered Institute of Ecology and Environmental Management
CMS	Construction Method Statement
DEFRA	Department of Environment, Farming and Rural Affairs
DGC	Dumfries and Galloway Council
EcIA	Ecological Impact Assessment
ECoW	Environmental Clerk of Works
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EU	European Union
ES	Environmental Statement
FCS	Forestry Commission Scotland, now known as Forestry and Land Scotland (FLS)
FLS	Forestry and Land Scotland, formerly known as Forestry Commission Scotland (FCS)
FMS	Fisheries Management Scotland
GFT	Galloway Fisheries Trust
GPS	Global Positioning System
GWDTE	Ground Water Dependent Terrestrial Ecosystem
HMP	Habitat Management Plan
IEF	Important Ecological Feature
JNCC	Joint Nature Conservation Committee
LBAP	Local Biodiversity Action Plan
LBS	Local Biodiversity Site
MAGIC	Multi-Agency Geographic Information for the Countryside
MSS	Marine Scotland Science
Natural Power	Natural Power Consultants Limited, the lead EIA Co-Ordinator
NBWT	The National Bat Wind Turbine project
NHZ	Natural Heritage Zone
NNR	National Nature Reserve
NVC	National Vegetation Classification
PAN	Planning Advice Note
SAC	Special Area of Conservation
SBL	Scottish Biodiversity List
SEPA	Scottish Environmental Protection Agency
SE	Scottish Executive
SNH	Scottish Natural Heritage (former name of NatureScot)
SPP	Species Protection Plan
SR	Scottish Renewables
SSSI	Site of Special Scientific Interest
SWSEIC	South West Scotland Environmental Information Centre
SWT	Scottish Wildlife Trust
UNESCO	United Nations Educational Scientific and Cultural Organisation
WCA	Wildlife and Countryside Act 1981 (as amended)
WQMFMP	Water Quality, Macro-Invertebrate and Fish Monitoring Plan
WHS	World Heritage Site

9.1 STATEMENT OF CONFIDENCE

9.1.1 The author of this chapter has over 20 years of experience in the Ecology and Conservation sector and has been working as an Environmental Consultant in the renewable sector for over six years. During this time, they have been involved with the production of scoping reports, technical baseline reports, operational monitoring reports and assisting with Ecological Impact Assessment (EcIA) technical appendices, as well as client and consultee liaison. The author was assisted by a Senior Environmental Consultant who has been working as a consultant in renewable and non-renewable development sectors for over nine years, and Principal Environmental Consultant with over 12 years of experience in EcIA and Environmental Impact Assessment Reports (EIAR) compilation.

9.2 INTRODUCTION

9.2.1 This ecological chapter of the EIAR has been prepared by Natural Power Consultants Ltd (Natural Power) on behalf of Fred. Olsen Renewables Limited (the "Applicant") in respect of the proposed Windy Standard I Repower (hereafter referred to as the 'Proposed Development'). The Proposed Development comprises up to eight wind turbines and associated infrastructure and lies within the Stewartry District of Dumfries and Galloway, approximately 9 km northeast of the village of Carsphairn.

9.2.2 The Proposed Development forms part of the Windy Standard Complex, which has been subject to survey work and monitoring, for different phases, through the 25 years since the original Windy Standard I became operational in 1995. As such, the Windy Standard Complex has been extensively covered by various ecological surveys leading to an excellent understanding of the area and the species present to provide ecological context for the proposal. However, to provide updated data some baseline ecological surveys were undertaken as part of this application.

9.2.3 In line with the principles of proportionate Environmental Impact Assessment (EIA), embedded mitigation is considered at the outset of the assessment. Important Ecological Feature (IEF) status has only been assigned where there is considered to be the potential for significant effects on the identified feature arising from the Proposed Development after the application of embedded mitigation measures. Therefore, requirement for further assessment is 'scoped out' for some features in this EcIA chapter, where appropriate, with justification given (see Table 9.18).

9.2.4 An overview of the baseline ecological conditions relating to the habitats and (non-avian) species present within the Proposed Development Area and surrounding environment is provided. Baseline ecological conditions have been established through combining the results of a data search, desk-based review including surveys undertaken as part of the wider Windy Standard Complex and updated ecological field surveys. These were undertaken to ascertain the status of habitats and protected species occurring within the Proposed Development Area and immediate surrounding environment. The identified habitats and species comprising the ecological baseline are described, evaluated and assessed using recognised criteria, in accordance with industry guidelines (Scottish Natural Heritage (SNH), 2013[1] & CIEEM, 2018[2]) (see Paragraphs 9.3.1 to 9.3.4).

9.2.5 The potential for ecological impacts as a result of the Proposed Development during the decommissioning of Windy Standard I, and the construction, operation and decommissioning phases of the Proposed Development have been identified and assessed, with particular attention paid to habitats and species of high vulnerability, conservation concern and those afforded a high level of legal protection. These impacts are then assessed in terms of their significance to each IEF. Where potentially adverse significant effects have been identified and/or predicted for an IEF, appropriate mitigation is proposed to avoid prevent or reduce those effects. For IEFs for which greater than negligible residual effects are predicted after the application of the proposed mitigation, cumulative impacts with other nearby developments have also been considered within this EcIA.

9.2.6 Several elements of this chapter relating to the identification and assessment of ecological features make reference to and are supported by the findings of the ornithological and hydrological assessments, reported in Chapter 8: Ornithology and Chapter 10: Hydrology, Geology and Hydrogeology.

9.2.7 The baseline studies referenced in this chapter are supported by the following Technical Appendices (Volume 4) and supporting figures (Volume 3) which provide detailed information regarding the ecological field survey methods and field data:

- Appendix 9.1: Ecology Technical Appendix
- Figure 9.1: Windy Standard Complex;
- Figure 9.2: Protected Species Walkover Results 2022;
- Figure 9.3: Bat Detector and Carcass Search Locations 2020; and
- Figure 9.4: Phase 1 Habitat and National Vegetation Classification (NVC) Survey Results 2019 -2022.

9.2.8 All scientific names for species recorded at the Proposed Development are given in Technical Appendix 9.1.

Terminology

9.2.9 The public bodies NatureScot and Forestry and Land Scotland (FLS) recently changed their names from Scottish Natural Heritage (SNH) and Forestry Commission Scotland (FCS) respectively. SNH officially changed to NatureScot in August 2020 and FCS officially changed to FLS in April 2019. References to documents published by these bodies are referred to using the name at the time that the relevant document was written, meaning that some document references within this chapter use the former names of these bodies (SNH or FCS).

9.3 LEGISLATION, POLICY AND GUIDANCE

9.3.1 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 EcIA takes account of the Chartered Institute of Ecology and Environmental Management (CIEEM) guidelines (CIEEM, 2018)[3].

Legislation

- European Union (EU) Exit: The Habitats Regulations in Scotland[3];
- Water Environment and Water Services (Scotland) Act 2003[4];
- Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the Habitats Directive)[5];
- The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) (the Habitats Regulations), which transposes the Habitats Directive into law in Scotland[6];

[1] SNH, (2013). A handbook on environmental impact assessment. Guidance for Competent Authorities, Consultees and others in involved in the Environmental Impact Assessment Process in Scotland. Natural Heritage Management. 4th Edition.

[2] Chartered Institute of Ecology and Environmental Management (CIEEM) (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester. Version 1.1 – Updated September 2019.

[3] Scottish Government. (2020). EU Exit: The Habitats Regulations in Scotland

[4] UK Government (2003) *Water Environment and Water Services (Scotland) Act 2003* [Online] available from - https://www.legislation.gov.uk/asp/2003/3/contents [Accessed February 2022]

[5] UK Government (2020) *Council Directive 92/43/EEC* [Online] available from- https://www.legislation.gov.uk/eudr/1992/43/contents [Accessed February 2022]

[6] NatureScot (2020) *The Habitats Directive* [Online] Available from - https://www.nature.scot/professional-advice/protected-areas-and-species/protected-species/legal-framework/habitats-directive-and-habitats-regulations [Accessed February 2022]

- The Conservation of Habitats and Species Regulations 2017 (as amended), relating to reserved matters in Scotland including the granting of consent under section 36 of the Electricity Act (together, "the Habitats Regulations")[7];
- Wildlife and Countryside Act 1981 (as amended) (WCA)[8];
- The Nature Conservation (Scotland) Act 2004[9];
- The Wildlife and Natural Environment (Scotland) Act 2011[10];
- Protection of Badgers Act 1992 (as amended)[11]; and
- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017[12].

National Policy Guidance

9.3.2 The following policies are relevant to this Chapter in a national context:

- Dumfries and Galloway Local Development Plan LDP2[13];
- UK Post 2010 UK biodiversity framework[14];
- The Scottish Biodiversity Strategy comprising:
  - Scotland's Biodiversity: It's in Your Hands (Scottish Executive (SE), 2004)[15]; and
  - The 2020 Challenge for Scotland's Biodiversity[16];
- Planning Advice Note 60: Planning for Natural Heritage (Scottish Government, 2000)[17]; and
- Nature Conservation: Implementation in Scotland of the Habitats and Birds Directives: SE Circular 6/1995 as amended (June 2000)[18].

9.3.3 In November 2021 the Scottish Government published its Draft Scotland 2045: Our Fourth National Planning Framework (Draft NPF4). Only limited weight can be given to the polices in Draft NPF4 at this stage, given it is a consultation document only. When adopted NPF4 will replace both NPF3 and Scottish Planning Policy and will form part of the statutory Development Plan.

Other Guidance

9.3.4 Particular attention has also been given to the guidance documents listed below, that are applicable to assessing the effects of wind farm developments on ecology. Reference has also been made to guidance documents through the report where relevant:

- CIEEM (2018) Guidelines for EcIA in the United Kingdom and Ireland[3];
- SE (2001) European Protected Species, Development Sites and the Planning System: Interim guidance for local authorities on licensing arrangements[19];
- Scottish Environment Protection Agency (SEPA) (2017 Land Use Planning System SEPA Guidance Note 4: Planning Guidance on Windfarm Developments[20];
- NatureScot (2021) Assessing the cumulative impact of onshore wind energy development[21]
- SNH (2016) General pre-application/scoping advice document[22];
- SNH *et al* (2019) Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation[23] superseded by NatureScot *et al* (2021) Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation[24] (both sets of guidance are relevant to this Chapter as surveys were undertaken following the 2019 guidance, and the assessment following the 2021 guidance); and
- Scottish Renewables (SR), NatureScot, SEPA, FCS (2019) Good Practice during Wind Farm Construction Version 4 [25];
- Scottish Biodiversity List (SBL)[26]; and
- Dumfries and Galloway Local Biodiversity Action Plan (LBAP)[27].

9.4 METHOD OF ASSESSMENT

9.4.1 Although a wide range of habitats and species are normally assessed when considering a new wind farm development, the Proposed Development is located within the footprint of an existing wind farm. Following removal of the current 36 turbines, seven larger turbines will be erected in different locations within the wind farm footprint. A further turbine is proposed to be located in an area with standing commercial forestry along an existing track to

[7] UK Government (2017) *The Conservation of Habitats and Species Regulations 2017* [Online] Available from - https://www.legislation.gov.uk/uksi/2017/1012 [Accessed February 2022]

[8] UK Government (2022) *Wildlife and Countryside Act 1981* [Online] Available from - https://www.legislation.gov.uk/ukpga/1981/69 [Accessed February 2022]

[9] UK Government (2004) *Nature Conservation (Scotland) Act 2004* [Online] Available from - https://www.legislation.gov.uk/asp/2004/6/contents [Accessed February 2022]

[10] UK Government (2011) Wildlife and Natural Environment (Scotland) Act 2011 [Online] Available from - https://www.legislation.gov.uk/asp/2011/6/contents/enacted [Accessed February 2022]

[11] UK Government (1992) *Protection of Badgers Act 1992* [Online] Available from - https://www.legislation.gov.uk/ukpga/1992/51/contents [Accessed February 2022]

[12] UK Government (2017) The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 [online] Available from - https://www.legislation.gov.uk/ssi/2017/101/contents/made [Accessed February 2022]

[13] Dumfries and Galloway Council (2019) *Local Development Plan 2* [Online] Available from - https://www.dumgal.gov.uk/ldp2 [Accessed February 2022]

[14] JNCC (2010) *UK Post 2012 Biodiversity Framework (2012-2019)* [Online] Available from - https://hub.jncc.gov.uk/assets/587024ff-864f-4d1d-a669-f38cb448abdc [Accessed February 2022]

[15] Scottish Executive (2004) Scotland's Biodiversity It's In Your Hands: A strategy for the conservation and enhancement of biodiversity in Scotland, Scottish Executive Edinburgh, ISBN 0 7559 4120 9

[16] The Scottish Government (2013) 2020 Challenge for Scotland's Biodiversity: A Strategy for the conservation and enhancement of biodiversity in Scotland, The Scottish Government, Edinburgh,

[17] Scottish Government (2000) Planning Advice Note 60: natural heritage [Online] Available from - https://www.gov.scot/publications/pan-60-natural-heritage/ Planning Advice Note (PAN) [Accessed February 2022]

[18] SE (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

[19] Scottish Government (2006) *European Protected Species – terms of guidance: Chief Planner letter* [Online] Available from - https://www.gov.scot/publications/european-protected-species-chief-planner-letter/ (Accessed February 2022)

[20] SEPA (2017) Land Use Planning System (LUPS), SEPA Guidance Note 4. Planning guidance on onshore windfarm developments. Version 9. LUPS-GU4.

[21] NatureScot Guidance - Assessing the cumulative landscape and visual impact of onshore wind energy developments. NatureScot, Scotland.

[22] SNH (2016). General pre-application/scoping advice document, SNH, Scotland.

[23] SNH et al. (2019). Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation.

[24] NatureScot et al. (2021). Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation.

[25] Scottish Renewables, NatureScot, SEPA, Forestry Commission Scotland (2019). Good practice during windfarm construction. 4th edition.

[26] NatureScot (2020) *Scottish Biodiversity List* [Online] Available from - https://www.nature.scot/doc/scottish-biodiversity-list (Accessed February 2022)

[27] Norman, P. (2009) Dumfries and Galloway Local Biodiversity Action Plan. Dumfries and Galloway Biodiversity Partnership

the north-west of the current wind farm. The site will be reinstated except where existing shared infrastructure (substation, control building, temporary borrow pits) will be used for the Proposed Development.

9.4.2 Based on the data collected as part of the Windy Standard Complex, the Proposed Development Area does not contain high levels of activity for ecological receptors, and the Proposed Development will result in minor physical changes to the site. Therefore, effects due to decommissioning and restoration of the existing Windy Standard I and construction, disturbance / displacement and operational effects of the larger turbines, on IEF are considered within this EIA Report (EIAR).

9.4.3 Embedded mitigation has been included at every stage of the project, from the decommissioning of the existing Windy Standard I, and the construction, operation and decommissioning phases of the Proposed Development.

Desk Study

9.4.4 A desk-based review which collated publicly available survey data and records of protected or notable species and habitats, from within the site 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 EcIA.

Statutory, National and Locally Designated Sites of Nature Conservation

9.4.5 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[28] and the Department for Environment, Food and Rural Affairs (DEFRA) online GIS tool Multi-Agency Geographical Information System (MAGIC) Map application.[29] The search focussed on identifying the following sites within the Proposed Development Area:

- 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 5 km of the Proposed Development.

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

Data search

9.4.7 On 15 February 2022 data was requested from The South West Scotland Environmental Information Centre (SWSEIC)[30] of all records of ecological (non-avian) species of conservation interest within 5 km of the Proposed Development, extended to 10 km for bat species. To date this data has not been received.

Review of existing data

9.4.8 The Windy Standard Complex has been subject to survey work and monitoring for different phases of development throughout the 25 years since the original Windy Standard I became operational. The EIA for the original Windy Standard I Wind Farm was completed in 1995 and due to differences in the guidance for onshore wind developments at that time, minimal surveys (by current standards) were undertaken then. However, there is a considerable amount of existing data for the Windy Standard Complex as a whole to provide ecological context for the proposal. Table 9.1 summarises ecological survey and monitoring work for all wind farms included in the Windy Standard Complex since baseline surveys for the original Windy Standard I Wind Farm commenced in 1993. A summary of all relevant records and results from these surveys is presented within the data review.

Table 9.1: Ecology survey work undertaken at the Windy Standard Complex between 1993 and 2015

Development Phase	Survey type	Wind Farm		
		Windy Standard I[31]	Windy Standard II[32]	Windy Standard III[33]
Baseline	Habitats	1993-1994	1995, 2000, 2001	2012, 2015
	Protected mammal	Ad hoc recording during other surveys	Ad hoc recording during other surveys	2012-2013
	Bats			2012
Pre-construction/ construction	Habitats	1995	2013	
	Protected mammal	Ad hoc recording during other surveys	2012-2017	
Operational	Habitats	1996-2000, 2019, 2020		
	Protected mammal	Ad hoc recording during other surveys. 2019, 2020, 2021*		

Source: Natural Power 2021[Error! Bookmark not defined.]

Field Surveys

9.4.9 A summary of the baseline ecology surveys undertaken within the Proposed Development Area (dates and relevant survey area) is provided in Table 9.2. Details of survey extents can be found in Figures 9.2, 9.3, 9.4 and 9.5. Further details are provided below with full details in Appendix 9.1: Ecology Technical Appendix.

[28] NatureScot (2020) *SiteLink* [Online] Available at - https://sitelink.nature.scot/home (Accessed February 2022)

[29] Magic (2022) *Magic Map* [Online] Available at - https://magic.defra.gov.uk/MagicMap.aspx (Accessed February 2022)

[30] Environmental Information Centre [Online] Available at - https://swseic.org.uk/ (Last accessed February 2022)

[31] Fred. Olsen Ltd. (1995) Environmental Statement. Proposed Wind Farm at Windy Standard, Carsphairn Forest, Dumfries and Galloway.

[32] Natural Power (2001) Planning Applications for the Proposed Wind Farm Extension at Windy Standard, Dumfries and Galloway.

[33] Natural Power (2015) Brockloch Rig III / Windy Standard III Environmental Statement.

Table 9.2: Summary of field surveys undertaken within the Proposed Development Area

Survey	Date	Survey Area
Phase 1 Habitat survey	August and September 2019 and July 2020	340 m buffer of proposed turbine locations and 100 m buffer of all additional new infrastructure
National Vegetation Classification (NVC) survey	August 2019 and July 2020	340 m buffer of proposed turbine locations and 100 m buffer of all additional new infrastructure
Bat activity survey – static detectors	Continuous nights from 27 May to 30 September 2020 inclusive	Six detectors were placed at five proposed turbine locations (four of which are located near to existing operational turbines) plus one control location in higher value bat habitat
Bat and bird carcass searches	Weekly from 7 July to 30 September 2020 inclusive	Surveys were conducted at 16 of the 36 turbine locations of the operational Windy Standard I Wind Farm.
Carcass persistence and searcher efficiency trials	4 August to 30 September 2020 inclusive	Surveys were conducted at 16 of the 36 turbine locations of the operational Windy Standard I Wind Farm.
Protected species walkover survey	January 2022	200 m buffer of turbines and all additional new infrastructure

Source: Natural Power

Habitat Surveys

Phase 1 Habitat Survey

9.4.10 The Phase 1 habitat survey methodology provides a standardised system for classifying and mapping semi-natural vegetation and wildlife habitats over large areas of countryside. Habitats across the survey area were identified and mapped using the standard Joint Nature Conservation Committee (JNCC) Phase 1 habitat classification[34].

9.4.11 A Phase 1 Habitat Survey covering proposed turbine locations plus a 340 m buffer was undertaken in August and September 2019 and updated in July 2020 and August 2021 to include changes in proposed turbine locations. A 340 m buffer would show any Groundwater Dependent Terrestrial Ecosystems (GWDTE) outside 250 m of all excavations deeper than 1 m plus an extra 90 m for micro-siting of the turbines.

9.4.12 Whilst Phase 1 surveys specifically identifies habitats present within a site, this survey was 'extended' to concurrently search for evidence of whether those habitats have the potential to support protected species, and records were made of this and any signs of legally protected or other notable species.

NVC Survey

9.4.13 The NVC is a detailed phytosociological classification system which assesses the full suite of vascular plant, bryophyte and macro-lichen species within a certain vegetation type. NVC surveys were carried out in conjunction with the Phase 1 habitat surveys described above within a 340 m buffer of turbine locations.

9.4.14 NVC community types were identified in the field (based on extensive surveyor experience) and delineated and mapped using Global Positioning System (GPS). Where areas were comprised of mosaics or complexes of different habitat communities, the proportion of each was estimated in percentage terms. Survey methods followed those described in Rodwell (2006)[35] with further guidance taken from Averis *et al*. (2004)[36].

Bat Surveys

Bat Activity Survey: static detectors

9.4.15 The Proposed Development includes replacement of the 36 turbines of 53.5 m tip height with eight turbines of up to 200 m tip height. Seven of these turbines will be within the footprint of the operational Windy Standard I Wind Farm, with a further turbine proposed to be located in an area with standing commercial forestry along an existing track to the north-west of the current wind farm. (see Figure 9.1).

9.4.16 In relation to repowering, updated bat guidance[23,24] states that '*it cannot be assumed that changes to existing sites present lower risks to bats than the construction of new turbines at previously undeveloped locations, and so proposals to amend existing sites should be assessed before permission is given by the relevant body*' and that if no surveys or monitoring have been undertaken, the methods proposed for new developments should be used as the basis for assessing the risk.

9.4.17 For new developments, in order to characterise bat activity at the site, guidance[24] states that static detectors should be placed on site for ten nights each season, on the first 10 turbines, and one third thereafter. Based on this, this would require eight static detectors for the Proposed Development (eight turbine scheme). However, the activity index derived from this survey method may be greatly influenced by factors related to which 10-day periods are chosen for each deployment. From our experience working on wind farms with continual static monitoring during operation[37], and from recent research[38], there is valid justification to reduce the number of detectors while increasing the time period over which they are deployed. This approach was outlined to consultees during the scoping process and agreed with NatureScot.

9.4.18 Evidence from these cases has shown that one of the most important factors in quantifying the bat activity on a site is to significantly increase the temporal rather than spatial coverage while surveying. More relevant and robust results are obtained by putting fewer detectors out for longer as this increases the likelihood of picking up any nights or periods of time where activity is high. This is particularly important in the autumn when there is typically the largest peak of activity between mid-August and mid-September[39] when adult and juvenile bats leave maternity and summer roosts and move to swarming and/or hibernation sites[40]. If deploying more detectors but for only a set 10-day period, there is a significant chance of missing this activity peak in the captured data, which is crucial for understanding levels of bat activity at the site.

9.4.19 A total of six full spectrum static detectors (Wildlife Acoustics SM4 with SMM-U2 Ultrasonic Microphone) were placed at six locations within the Proposed Development Area (existing turbines G01, G15, P08, P18, proposed new turbine NT1, and a control location in higher value bat habitat; see Figure 9.3). Following guidelines[23] turbines used for survey locations were chosen to allow a representation of all habitats on site rather than selected solely due to their proximity to bat features only in order to prevent an overestimation of site activity. Habitat quality for bats was assessed as either low, moderate or high following guidance[24].

9.4.20 The detectors ran continuously from 27 May to 30 September 2020 inclusive. Data was downloaded, and batteries changed every two weeks.

[34] JNCC (2010) Handbook for Phase 1 habitat survey – a technique for environmental audit, Revised 2016 JNCC, Peterborough.

[35] Rodwell J. S. (2006). *National Vegetation Classification: Users' handbook*. JNCC, Peterborough.

[36] Averis, A. *et al.* (2004). An Illustrated Guide to British Upland Vegetation. JNCC. Peterborough.

[37] Operational monitoring at an undisclosed Wind Farm, Northumberland. Natural Power 2017-2021

[38] CIEEM Webinar, 16th June 2020 Patterns of Bat Activity at Upland Windfarms: Implications for Sampling and Mitigation. Peter Robson (Scottish Power)

[39] Rydell, Jens; Bach, Lothar; Dubourg-Savage, Marie-Jo; Green, Martin; Rodrigues, Luisa; Hedenström, Anders (2010). Bat mortality at wind turbines in northwestern Europe, Acta Chiropterologica, Volume 12(2), December 2010, pp. 261-274 (14).

[40] Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London

9.4.21 The locations of the static detectors are listed in Table 9.2 and are shown on Figure 9.3. Details of the habitat, elevation of each detector and proximity to nearest proposed turbine location are also given in Table 9.3. The habitats of the proposed turbines is also provided within Table 9.2, to highlight comparability with detector locations. Turbines T6, T7 and T8 will also be sited within grassland as per turbines T3 and T5.

Table 9.3: Static bat detector deployment locations

Detector	X	Y	Habitat around detector	Location description	Closest existing turbine	Closest proposed turbine (habitat present around turbine turbine)	Elevation (m) (AOD)
Control	260548	602860	Grassland Woodland Stream	Near to Fingland Burn along a woodland edge.	G3 (520 m)	T2 (610 m) at the edge of clearfell / grassland	515
G01	260905	603261	Grassland	Near G01 turbine of operational Windy Standard I.	G1 (4 m)	T2 (130 m)	550
G15	261821	601865	Grassland	Near G15 turbine of operational Windy Standard I.	G15 (10 m)	T3 (283 m) – within grassland	620
P08	261156	601453	Grassland	Near P08 turbine of operational Windy Standard I.	P8 (6 m)	T5 (250 m) grassland	600
P18	260245	602339	Grassland	Near P18 turbine of operational Windy Standard I.	P18 (5 m)	T4 (356 m) – within grassland / heathland	620
NT1	260308	604088	Woodland; Grassland	Along a woodland edge near a forestry track with a grass verge.	G1 (1020 m)	T1 (250 m) within standing conifer plantation	490

Source: Natural Power

9.4.22 Site-specific weather data was collected from nacelle height from one of the turbines within the operational Windy Standard I Wind Farm for the duration of the deployment to help in the interpretation of the bat activity data. Following NatureScot[35] guidance, suitable weather conditions for recording bats are considered to be nights that have a temperature above 8°C and a maximum ground level wind speed of 5 m/s, along with very low rainfall. It should be noted, however, that the recorded wind speeds taken by the anemometer within the turbine's nacelle will exceed wind speeds at ground level. Examination of the weather data allowed those nights of each deployment with the least favourable conditions (those in which bat activity was likely to be compromised) to be removed from the analysis (see Survey Limitations, Section 9.4).

9.4.23 Detectors were programmed to commence recording from 0.5 hour before sunset and continue until 0.5 hour after sunrise, to cover the active period for all species potentially encountered on site. 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.

9.4.24 Bat calls were analysed using Kaleidoscope automatic identification software. The software provides automatic identifications which are assumed to be correct for common pipistrelle and soprano pipistrelle bats (and for identifying noise). Identification of other bat species records is considered less reliable and manual identification was therefore performed on all other acoustic records. The analysis of the bat survey data was undertaken following the methodology outlined in guidance[34]. A bat pass was defined as a sequence of bat pulses captured on a 15 second sound file. One sound file was counted as one bat pass. Different species within the same 15 second sound file were counted as separate bat passes.

9.4.25 An individual bat can pass a particular feature on several occasions while foraging. It is therefore important to acknowledge that a bat pass is an index of bat activity that describes the amount of use bats make of an area, rather than a measure of the number of individuals in a population.

9.4.26 Following guidance[24], survey data was entered into the online resource Ecobat[41]. Ecobat allows a user to compare bat data for a specific site with other sites for which data has been uploaded, within a given geographical area and time period. All data submitted to Ecobat is pooled, allowing a statistical comparison to be made regarding relative bat activity and allowing an assessment to be made as to the importance of a particular site in a regional context. Data was obtained from within 100 km radius of the survey location and using records obtained within 30 days of the survey date and from any make of bat detector.

Carcass Searches

9.4.27 The section on repowering and life extension in the guidance[23] also states that casualty searches around existing turbines will add to the evidence base and so is strongly recommended at such sites.

9.4.28 Weekly carcass searches for bat and bird carcasses using trained sniffer dogs and skilled handler[42] were undertaken for 13 weeks between 7 July and 30 September 2020. Searches of a 50 m radius area were undertaken at 16 of the 36 turbines (44%) each week; the locations of carcass searches are shown on Figure 9.3.

9.4.29 Locations for carcass searches were chosen to give representative cover of the habitat features present throughout the Proposed Development, and to coincide with locations of static detectors in order to be able to assess activity levels with potential carcass finds.

9.4.30 The proportion of carcasses expected to fall within the search area is potentially one of the most important factors when determining detection probability, however, the majority of the literature based upon carcass searching is available for birds rather than bats. Ballistic theory[43] has been used to produce carcass distributions for both insectivorous bats and birds at turbines with a hub height of 65 m and 95 m. Results indicate that 99% of bat carcasses will fall within 57 m of the turbine, with half of all carcasses found within the first 35 m of turbines with those hub heights. Other studies[44] have used an empirical estimate to determine that between 93% and 98% of bat carcasses fall within 50 m of a turbine with hub heights of 65 – 80 m.

[41] ECOBAT (2017) Available at - www.ecobat.org.uk [Accessed 18/02/2022]

[42] Wag Tail [Online] Available at - https://www.wagtailuk.com/ [Accessed February 2022]

[43] Hull, C. L., Muir, S. (2010). Search areas for monitoring bird and bat carcasses at wind farms using a Monte-Carlo model. Australasian Journal of Environmental Management. 17. 77-87

[44] Korner-Nievergelt F, Behr O, Brinkmann R, Etterson MA, Huso MM, Dalthorp D, Korner-Nievergelt P, Roth T and Niermann I (2015). Mortality estimation from carcass searches using the R-package carcass - a tutorial. Wildlife Biology. 30-43.

9.4.31 Given that the hub height at the current Windy Standard I is 35 m, with a rotor diameter of 37 m and a tip height 53.5 m and based on previously published research it is considered that 100% of carcasses would be expected to fall within the searched radius of 50 m from the base of the Windy Standard I turbines as they are of considerably smaller dimensions than those for which the guidance was designed.

Carcass and searcher efficiency trials

9.4.32 In addition to the searches with dogs, carcass persistence trials and searcher efficiency trials were run to allow analysis to be undertaken on the carcass search results for the purposes of impact assessment.

9.4.33 Carcass persistence trials using a combination of bat carcasses (provided by Wagtail UK) and fresh mouse carcasses were conducted between the 4 August and 30 September 2020. Mouse carcasses are regularly used as substitute for bats given the difficulty in obtaining bat carcasses.

9.4.34 Carcasses were placed out and monitored by trail camera which allowed an accurate estimate for the length of time carcasses remain on site before either decomposing or being removed by scavengers.

9.4.35 Searcher efficiency trials involved a second surveyor placing out bat carcasses at locations unknown by both the dog and dog handler one to two hours prior to the start of dog searches. This allows the identification of a percentage searcher efficiency rate, which will then be used within the analysis of the baseline results in the EIA.

9.4.36 Results were analysed using appropriate analysis methods and are presented in Section 9.6 to give a realistic estimate of the likely collision risk posed to bats by the Proposed Development.

Other mammal species

Protected mammal species walkover

9.4.37 A protected mammal species survey was carried out by experienced ecologist during January 2022. The main focus of the survey was to record signs of badger, otter, water vole, pine marten and red squirrel.

9.4.38 The survey was informed by the methods described in Bang and Dahlstrøm (2001)[45], Sargent & Morris (2003)[46], Harris et al. (1989)[47], Neal & Cheeseman (1996)[48], Cresswell et al. (2012)[49] and Chanin (2003)[50].

9.4.39 The survey was undertaken in favourable weather conditions when water levels were not prohibitively high (i.e. signs not potentially submerged).

9.4.40 The survey area covered the Proposed Development Area plus 250 m buffer (see Figure 9.2). The surveyor walked all linear features within the survey area such as tracks, rides, forest edges and streams as well as revisiting sites of historical records from surveys of the Windy Standard Complex.

9.4.41 Any evidence of presence of otter (e.g., spraints, footprints, couches, potential holts), badger (e.g., latrines, feeding signs, runs), red squirrel (e.g., feeding signs, drays) and pine marten (e.g., scats, footprints) were recorded and mapped using a handheld GPS. Any badger runs were followed to determine the presence of any setts. Any potential pine marten den sites encountered in suitable habitat were also examined.

9.4.42 Any signs were photographed to visually catalogue each record.

Survey Limitations

9.4.43 The following survey limitations were experienced.

Bat Activity Surveys: Equipment

9.4.44 During the static bat detector deployment, several of the detectors malfunctioned and did not collect useable data at various times in the deployment (see Table 9.11), however, two of the detectors (P18 and Control) operated for the full 127-night deployment. With the exception of a two-week period from mid-August to the beginning of September, when only G01, P18 and Control collected data, either four or five detectors were operating at any given time throughout the deployment. In total 518 nights of data was collected. Detector deployment in line with guidance[34] for baseline developments would have yielded 240 nights of data (eight detectors placed out for 10 nights per season in spring, summer and autumn). As such the malfunction of some of the static bat detectors at the Proposed Development is not considered to represent a significant constraint to the data collected.

Bat Activity Surveys: Ecobat

9.4.45 The recommended reference range is for each species to have more than 200 records within the set radius. This was achieved for all species by using the recommended 100 km radius except the locally rare Nathusius' pipistrelle. The fact that there are fewer than 200 records for Nathusius' pipistrelle is due to its rarity in the region, rather than due to the search radius being too small. The radius required to achieve more than 200 records of these species would be disproportionally large relative to the risks posed to these species. Therefore, comparison on Ecobat was made using a 100 km radius for all species.

9.4.46 Using data from 100 km of the Proposed Development Area, not all data shall come from sites of similar habitat, altitude and geography as the Proposed Development and so may represent data that is only partly comparable.

9.4.47 It should be noted that Ecobat does not allow for the removal of data from nights where bad weather or technical issues were encountered. For data uploaded to the platform, it therefore assumes the first and last date in a set in which a bat call is detected define the date range for analysis. If a bat call is not detected on the first and/or last nights of effort then there is an overestimation of bat activity, as recorded activity is averaged across fewer nights. In contrast if there are issues associated with weather or technical problems part-way through a deployment, then bat activity is underestimated, as recorded activity is averaged over more nights than were actually conducted.

9.4.48 Another limitation in the Ecobat data is the use of genus level records. Although the 2020 data submitted for the Proposed Development was able to include genus level records, there is a fault in the Ecobat code that means in most cases this is not possible. If a species has been logged, a record of a bat that has not been identified to species level cannot be submitted for the same night if it belongs to the same genus. So, for example, records of *Pipistrellus* sp. cannot be submitted if common pipistrelle is recorded on the same night. The result of genus level records not being submitted, is to show a lower level of activity than is actually the case. As a result of this issue it is believed that reference data for genus level records is unreliable and, therefore, only species level records are used in the risk assessment that uses Ecobat data (Section 9.6). Natural Power have reported this fault to Ecobat who have acknowledged it and will provide an update in due course. In relation to the results presented within this document, this is not considered to result in any significant difference in how bat species would be assessed.

Carcass searches

9.4.49 Carcass searches carried out for the Proposed Development in 2020 were undertaken at 16 of the 36 turbines (44%) of the turbines on site. Whilst carcass searches were only carried out on 44% of all turbines present, the search locations chosen were selected in order to provide a representation of all habitats present within the site. The statistical modelling of potential collisions accounts for the percentage of turbines searched in addition to the searcher efficiency and carcass persistence rate to provide an indication of the predicted number of carcasses for the whole wind farm.

[45] Bang, P. & Dahlstrøm, P. (2001). *Animal Tracks and Signs*. Oxford University Press, Oxford.

[46] Sargent G. & Morris P. (2003). *How to Find and Identify Mammals*. The Mammal Society, London.

[47] Harris S. Cresswell P & Jefferies D., (1989). *Surveying Badgers*. The Mammal Society, London.

[48] Neal, E. and Cheeseman, C. (1996). *Badgers*. T & A D Poyser, London, p271 pp.

[49] Cresswell, W. J., Birks, J. D. S., Dean, M., Pacheco, M., Trewhalla, W. J., Wells, D. and Wray, S. (2012). *UK BAP Mammals Interim Guidance for Survey Methodologies, Impact Assessment and Mitigation.* Published by The Mammal Society.

[50] Chanin, P. (2003). *Monitoring the Otter Lutra*. Conserving Natura 2000 Rivers: Monitoring Series No. 10. English Nature, Peterborough.

Other Ecological Features for Which Surveys Were Not Undertaken

Reptiles and Invertebrates

Specific surveys were not undertaken for either reptiles or invertebrate species.

Fish

9.4.50 Baseline fish surveys have not been undertaken as part of this assessment at this stage. An assessment on the impacts of fish have been made using existing desk study information and contextual information gained from the public domain and where available from the Windy Standard Complex. Baseline fish surveys are proposed to be undertaken in 2022, the results of which will be provided once available.

Approach to Impact Assessment

9.4.51 This section presents the approach taken to the EcIA within this chapter and provides an overview of how the potential for impact has been determined and the method by which the significance of this impact has been ascertained by determining the effect that it may have upon a feature. The approach to the EcIA adopted within this assessment follows the CIEEM guidelines[3], 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)

9.4.52 In accordance with CIEEM guidelines[3], the importance of an ecological feature is determined based upon its respective elements relating to biodiversity and ecosystem services within a geographical frame of reference as detailed in Table 9.4.

Table 9.4: Geographical context relating to the evaluation of an IEF

Level of value	Example of IEF
International	An internationally designated site (e.g. Special Area of Conservation (SAC)), or site meeting criteria for international designations such as a World Heritage Site (WHS) or United Nations Educational Scientific and Cultural Organisation (UNESCO) Biosphere Reserve.
	Species populations/habitat areas present with sufficient conservation importance to meet criteria for SAC selection.
National	A nationally designated site such as a SSSI or a National Nature Reserve (NNR), or sites that have not been designated but that do meet the criteria for national designation (as outlined in JNCC guidelines[51]).
	Species populations/habitat areas present with sufficient conservation importance to meet criteria for SSSI selection[51].
Regional	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) populations/habitat extents.
	Sites designated as local nature reserves such as Scottish Wildlife Trust (SWT) Reserves or Local Biodiversity Sites (LBS).
Local	Areas of habitat or species populations considered to appreciably enrich the ecological resource within the local context, e.g. species-rich flushes or hedgerows or evidence of regular otter activity.
Negligible	Usually widespread and common habitats and species. Features falling below Local importance are not normally considered in detail in the assessment process.

Source: CIEEM, 2018[5]

9.4.53 The Proposed Development Area is located within Western Southern Uplands and Inner Solway NHZ19 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[52].

9.4.54 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 formally identified level of value may not be appropriate in the specific context of the proposed development following site specific survey work. 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). For non-designated features, the use of guidelines such as the national guidelines for the selection of SSSIs can be helpful in providing a context for determining a feature's importance and level of value.

9.4.55 It should be acknowledged that some features, including certain legally protected species such as badger, may be of insufficient ecological and/or nature conservation importance at a given site to warrant impact assessment within the EcIA, as there are unlikely to be significant effects to their population arising from a proposed development. However, due to the protected status offered to these features, they are considered in the EcIA within the context of legal and policy implications.

9.4.56 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 integrity[53] can be assessed (see Paragraphs 9.4.60 – 9.4.62). 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.

9.4.57 In line with the principles of proportionate EcIA, embedded mitigation is considered at the outset of the assessment. IEF status has only been assigned where there is still considered to be the potential for significant effects to integrity of the feature at the assigned value level arising from the Proposed Development, after the application of embedded measures.

Valuing bats

9.4.58 For the purposes of this assessment and of assigning value to bats guidance[24] 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

[51] JNCC (2022) *SSSI Guidelines* [Online] Available at -https://jncc.gov.uk/our-work/guidelines-for-selection-of-sssis/ [Accessed February 2022]

[52] SNH. (2002). Natural Heritage Zones: A National Assessment of Scotland's Landscapes. SNH, Edinburgh.

[53] 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.

upon species rarity (adapted from Wray *et al.* (2010)[54]). Table 9.5 summarises the risk of turbine impact to bat species and the sensitivity of bat populations.

Table 9.5: Level of potential vulnerability of populations of Scottish bat species[54]

	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

Source: NatureScot 2021[24])

9.4.59 The guidance provided by Wray *et al.*[54] 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

9.4.60 The criteria used in this assessment for describing the overall magnitude of a potential impact are summarised in Table 9.6.

9.4.61 After the impact is identified, the assessment then considers whether the effect of that impact is positive or negative, short-term (for example only during construction) or long-term (throughout the lifetime of the Proposed Development), reversible or permanent.

Table 9.6: Criteria used 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 impact on the integrity of the feature. The conservation status of the feature would be permanently affected.
Highly negative	Result in 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.
Moderately negative	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.
Low negative	Includes impacts that are small in magnitude, with small- 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 or nature conservation status.

Source: CIEEM, 2018[3]

9.4.62 When characterising the level of effect of 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.

9.4.63 In the case of designated sites, spatial magnitude is assessed in respect of the area within the designated site boundary. For non-designated sites, spatial magnitude is assessed at an appropriate scale depending on the feature's importance.

9.4.64 Duration is defined as the time for which the effect of the impact is expected to last on the feature before recovery, i.e., return to pre-construction baseline conditions. This is summarised in Table 9.7 below.

Table 9.7: 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 more than 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 to 25 years or longer; see above) Medium term (five to 15 years) Short-term (up to five years)

9.4.65 Knowledge of how rapidly the population or performance of a species is likely to recover following loss or disturbance (e.g., by individuals being recruited from other populations elsewhere) is used to assess duration, where such information is available.

Habitat Loss Calculations

9.4.66 The construction of the Proposed Development would result in some permanent habitat loss to the infrastructure footprint (e.g. access tracks, turbine bases and crane hardstandings), habitat loss calculations are used to quantify the extent of this loss. Some construction areas will be reinstated following construction (for example the construction compound and borrow pits) and therefore only represent a temporary loss; as such these areas are not included in calculations. In addition, where possible, infrastructure for Windy Standard Repower has been combined with that which is already present (substation), has already received consent to be constructed as part of Windy Standard III (batching plant and some laydown areas) or will be located on historic sites that were used during the construction of Windy Standard II (such as temporary car parks, gate house and borrow pits). Only infrastructure which is located on habitats where no current consent exists have been included in the area to be lost. Habitat loss is based on the total area of each Phase 1 habitat type within the surveyed area buffer around infrastructure rather than all habitats within the whole site boundary.

9.4.67 Habitat loss calculations are provided for all Phase 1 habitats (see Table 9.10) are included in the impact assessment. The methods used and detailed results are provided in the Technical Appendix 9.1.

Determining Significance of Ecological Effects

9.4.68 Only features for which there is considered to be the potential for significant effects are identified as IEFs and taken forward for EcIA. 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[3] use only

[54] Wray, S., Wells, D., Long, E. & Mitchell-Jones, T. (2010) Valuing Bats in Ecological Impact Assessment. IEEM In-Practice p. 23-25.

two categories to classify effects: "significant" or "not significant". In this EIA chapter, significance of effects is assessed following an assumption of the application of embedded mitigation measures (see paragraphs 9.7.4 – 9.7.24). The significance of an effect is determined by considering the importance of the feature, the magnitude of the impact and applying professional judgement as to whether the integrity of the feature will be affected. The assessment includes potential impacts on each IEF from all relevant phases of the development, e.g., construction and operation, and considers direct, indirect, secondary and cumulative impacts and whether the impacts and their effects are short, medium, long-term, permanent, temporary, reversible, irreversible, positive and/or adverse.

9.4.69 Effects are more likely to be considered significant where the feature affected is of higher conservation importance or where the magnitude of the impact is high. Effects not considered to be significant would be those where the integrity of the feature is not threatened, effects on features of lower conservation importance, or where the magnitude of the impact is low.

9.4.70 With reference to CIEEM Guidelines[3], paragraph 5.25 provides "*A significant effect is simply an effect that is sufficiently important to require assessment and reporting so that the decision maker is adequately informed of the environmental consequences of permitting a project. A significant effect is a beneficial or adverse ecological effect that should be given weight in judging whether to authorise a project*".

9.4.71 Where potential effects on an IEF of the Proposed Development are assessed as significant, specific mitigation measures are identified following the recognised hierarchy of 'avoid, minimise, off-set' in order to avoid, reduce and/or compensate' for potentially significant effects.

9.4.72 The level of significance of residual effects on features after the implementation of mitigation measures can then be determined, along with any monitoring requirements.

Trends and Predicted Future Baseline

9.4.73 In the absence of the Proposed Development, Windy Standard I Wind Farm would be decommissioned following appropriate guidelines as approved by Dumfries and Galloway Council in accordance with the life extension planning consent.

9.4.74 Current habitat use within the Proposed Development Area is primarily for forestry plantation, and sheep and cattle grazing. Should there be no repowering, following the decommissioning of the existing Windy Standard I it is likely that the habitats present within the Proposed Development would be retained as they currently are, having been under relatively similar management since before the Environmental Statement (ES) for Windy Standard I Wind Farm was submitted in 1995. The open areas of moorland habitats such as unimproved acid grassland and modified mire have been subject to long -term grazing by sheep, however no sheep were regularly present during surveys undertaken in 2021-2022, and the fencing is not stock proof. Deer also graze within the Proposed Development and deer management is ongoing. In the absence of the Proposed Development, forestry management would be likely to continue in the medium to long term. It would be difficult to predict the management of the open moorland as this would depend on landowner's preferences and resources. The existing Windy Standard I turbines will be removed, and the site will be reinstated except where infrastructure (such as tracks, cables and foundations underground) will be used for the Proposed Development if granted. The Proposed Development will make use of existing shared infrastructure (for example, substation, control building and existing onsite temporary borrow pits) and their use will be extended for the lifetime of the Proposed Development. As a repowering of an existing wind farm site, it is considered that the requirement for new site tracks will be greatly reduced, however some additional upgrades of site tracks will be required to transport the new larger turbines to the site. The majority of the new turbines will be within the footprint of the original Windy Standard I Wind Farm turbines, though they will not be located in exactly the same locations. As such, there will be some loss of habitat for new turbine locations, but also some habitat-gain from restoration of the existing infrastructure which will be decommissioned, in line with the decommissioning plan to be approved in accordance with the life extension consent for Windy Standard I. Embedded mitigation to prevent any adverse effects associated with this is provided in Section 9.7.

9.4.75 It is more difficult to predict changes that that may occur in the longer-term (i.e. up to 35 years), especially in the wake of climate change, which is predicted to cause range shifts in some species. In addition, climate change may alter habitat types by impacting on the composition and health of the plant communities present, thereby affecting the suitability of the Proposed Development Area for some of the species which currently occupy the site. 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.

9.5 CONSULTATION

9.5.1 The Windy Standard I Repower Scoping Report[1] was submitted by the Applicant and considered by a range of Consultees in August 2021. Those responses considered relevant to this chapter are summarised in Table 9.8.

Table 9.8: Summary of consultation responses to the Scoping Report

Consultee	Date	Issues raised and recommendations	Scoping response addressed
NatureScot	Dec 2021	Advised that the results of recent, site specific survey work covering otter, pine marten, red squirrel and badger is provided in the application.	Protected mammal species walkover survey undertaken January 2022 of the Proposed Development Area plus 200 m buffer – see Figure 9.2 and Section 9.6.
		Content with bat survey work and post-construction bat monitoring (carcass searches) undertaken.	Noted
		Bat activity data at the application stage should follow format as described in the guidance and be entered into online tool (Ecobat) to gain measure of the level of bat activity relative to other locations in the region.	Ecobat analysis had followed guidance. See Section 9.6
		Encourage at application stage that reduced rotation speed while idling is included as additional mitigation alongside a minimum 50 m distance between blade tips and high value bat habitats such as forestry edge.	A minimum of 50 m distance between blade tips and forestry edge will be maintained. The turbines will be capable of feathering when idling. See Embedded Mitigation in Section 9.7.
		Advise all areas directly (watercourse crossings) or indirectly (e.g. sediment run off) affected by the development and appropriate buffers and downstream of the Proposed Development should have a fish habitat survey following Scottish Fisheries Coordination Centre method.	In lieu of conducting a fish habitat survey prior to submission of the EIAR, it is considered appropriate for a fish monitoring plan (as detailed within paragraph 9.7.20) to be a planning condition for the Proposed Development.
		Encourage an Outline Habitat Management Plan (outline HMP) be submitted with the EIA that includes restoration of wet and dry modified bog habitat.	Due to the low quality of habitats present, with only a thin layer of peat and limited amount of blocked ditches, there are limited froe opportunities for active

Consultee	Date	Issues raised and recommendations	Scoping response addressed
			management work such as ditch blocking within the Proposed Development Area. Suitable offsite projects for bog restoration are being identified in discussion with the Applicant and suitable local parties in order to develop a HMP in offsite locations which will provide a more significant positive impact to the local environment that would be possible on the limited features present within the Proposed Development Area.
Fisheries Management Scotland (FMS)	Oct 2021	The Proposed Development falls within the Dee District Salmon Fishery Board district and the catchment relating to the Galloway Fisheries Trust (GFT). It is important that the proposals are conducted in full consultation with these organisations.	GFT is an organisation which was formed by a number of neighbouring District Salmon Fishery Boards in Dumfries and Galloway. FMS informed us that they had copied their response to the relevant organisations. Marine Scotland Science (MSS) were also consulted – see below.
Galloway Fisheries Trust (GFT)	Oct 2021	GFT do not agree with that previously collected data within the Windy Standard Complex is adequate and that there is no need for new baseline surveys. New baseline surveys would help to understand measures required when considering instream and allow a well-designed fish monitoring survey during the construction phase.	Fish species are considered in the impact assessment (see Section 9.7), and surveys are proposed to be carried out pre-, during- and post-construction with the methodology being finalised in consultation with GFT.
		The upper Dee system has an important brown trout population which is considered sensitive and potentially at risk from the construction / re-powering of the windfarm. Hence, it is considered that the Proposed Development may be important to fish and that fish surveys are required.	Fish species are considered in the impact assessment (see Section 9.7), and surveys are proposed to be carried out pre-, during- and post-construction.
		Clarified that SEPA has given this part of the upper catchment “Poor” status because migratory fish are not able to access this part of the river due to a man-made dam further downstream, not that it is poor quality for non-migratory fish species.	Noted
		Do not agree that adverse impacts to watercourses and the species they support will be readily prevented by embedded mitigation. For example, human error, adverse weather conditions, equipment failure during construction of windfarms have caused water quality problems and impacted on surrounding fish populations even when various mitigation was in place.	Fish species are considered in the impact assessment (see Section 9.7), and surveys are proposed to be carried out pre-, during- and post-construction.
		Pleased that no turbine bases with be located within 50 m of a watercourse.	Noted
SEPA		A map should be provided showing that all Groundwater Dependent Terrestrial Ecosystems (GWDTE) are outside a 100 m radius of all excavations shallower that 1 m and outside 250 m of all excavations deeper than 1 m. If micro-siting is to be considered as a mitigation measure the distance of survey needs to extend beyond the site boundary where the distances require it.	See Figures 9.4 and Chapter 10: Hydrology, Geology and Hydrogeological Assessment.
Marine Scotland Science (MSS)	Dec 2021	Advise to carry out baseline fish population surveys and/or obtain up to date information on the presence and abundance of fish. populations within and downstream of the Proposed Development Area.	Fish species are considered in the assessment (Section 9.7), and surveys are proposed to be carried out pre-, during- and post-construction.
		An integrated water quality and fish population monitoring programme should be drawn up following MSS generic monitoring programme guidelines.	Water Quality and Fish Monitoring Programme will follow guidelines and be drafted in consultation with the GFT.

Source: Natural Power

9.6 BASELINE CONDITIONS

9.6.1 This section presents the baseline results for desk-based review and field surveys in relation to the Proposed Development.

Desk Study

Statutory, National and Locally Designated Sites of Nature Conservation

9.6.2 A web-based search employing online data bases (MAGIC[29] and NatureScot[28]) did not identify any sites of international importance located within 10 km of the Proposed Development. However, the search did identify one nationally important Sites of Special Scientific Interest (SSSIs):

- Loch Doon SSSI designated for the last ‘naturally occurring’ population of Arctic charr in south-west Scotland lies 3.1 km west of the Proposed Development at its closest point - the entrance to the access track from the A713 road.

9.6.3 Statutory sites designated solely for ornithological features are presented in Chapter 8: Ornithology.

Protected Mammals and Habitats

9.6.4 The Windy Standard Complex (see Figure 9.1) has been subject to regular survey and monitoring work since baseline surveys for the original Windy Standard I Wind Farm commenced in 1993 as outlined in Table 9.1. Key

results of these surveys are provided in the Technical Appendix 9.1 and have been summarised as follows. The ES' for Windy Standard I[31] and II[32] assessed the faunal interest in the Proposed Development Area to be restricted to deer species, fox, mountain hare, field vole, herptiles and invertebrates with no evidence of these species using the tops of the ridges where the turbines are located.

9.6.5 During the pre-construction and construction phase surveys for Windy Standard II evidence was recorded of otter, potential pine marten (and suitable habitat for this species), badger and red squirrel with no evidence of these species using the tops of the ridges where the turbines are located. These included:

- A pre-construction protected mammal survey was undertaken by Natural Power in August 2013[55] to inform the construction phase of the adjacent Windy Standard II. The survey identified the presence of otter in the upper tributaries of the Shalloch Burn and in the Polwhat Burn, both of which are tributaries of the Water of Deugh, Signs included a potential otter holt and above ground couch, otter path, prints and three spraints.
- Regular checks were undertaken of the potential otter holt and couch by an experienced Ecologist during enabling works for Windy Standard II from May to November 2014, however no evidence of use was observed. During an inspection visit of the holt and couch in January 2014, it was noted by the Ecological Clerk of Works (ECoW) that both the otter holt and above ground couch had been washed out by spate flows during the preceding months[56].
- There were also records from ecological field surveys undertaken by Natural Power in 2010, of two otter spraints on the Water of Deugh and three spraints on the Fingland Burn.
- The pre-construction protected mammal survey also confirmed the presence of badger in the local environment, with badger dung, prints and path recorded to the south of Brockloch Rig at Sware Brae; however no setts were identified[53].
- Squirrel feeding signs were observed throughout the survey area, with suitability of woodland habitats varying throughout[53]. A visual observation of a red squirrel by the ECoW for Windy Standard II in the Sware Brae area in September 2014[57] (at NS58798 00964), confirms the presence of red squirrel in the local environment.
- During the protected mammal survey the potential for pine marten was also acknowledged, with identification of potential denning sites and potential scats (inconclusive) in the Craignane area[53]. Further targeted pine marten scat searches in the Craignane area were undertaken by the ECoW for Windy Standard II throughout 2014, including use of a baited camera trap overlooking suitable habitat at the Water of Deugh; however no evidence of pine marten presence was recorded[58].

9.6.6 The Windy Standard III ES[33] (see Figure 9.1) describes limited evidence of otter, badger and red squirrel recorded during the baseline surveys These include:

- Three records of otter (three spraints plus one feeding sign) were recorded along Polwhat Burn. In 2012, during an extended Phase 1 habitat survey, the suitability of the Water of Deugh to provide high quality habitat for otter was confirmed.
- A single badger print was identified during dedicated protected mammal surveys conducted in 2012. No setts were identified. Incidental field evidence of badger (feeding signs) was observed in 2012 and again in 2014 during updated protected mammal surveys.
- No squirrel dreys were recorded during dedicated protected species surveys undertaken in 2012. However incidental records of squirrel feeding activity plus a sighting of red squirrel on a forestry track were recorded during other surveys within the area in 2012. During protected mammal surveys of the proposed access track in 2014, survey findings noted very low numbers of eaten cones along walked transect routes. It was considered that the habitat was broadly suitable for red squirrel, both for foraging and drey construction, however there was no new cone crop in 2014 and the signs were considered to be from pre-2013.

9.6.7 Records were requested in February 2022 from SWSEIC of all protected or notable species occurring within 5 km of the Proposed Development Area, extended to 10 km for bat species. However, these have not yet been received. Given the number of years that surveys have been carried out within the Windy Standard Complex, it is not considered that a data search would have provided any species not currently considered within this assessment.

Fish

9.6.8 The Proposed Development lies within the main catchment of the Water of Deugh, with several small headwater catchments of the Water of Deugh; Fingland Burn; Polwhat Burn and Clennoch Burn (a small headwater tributary of Bow Burn) within the site boundary. For further details of these watercourses see Chapter 10: Hydrology.

9.6.9 Information available from the River Basin Management Plan (RBMP) for Scotland[59] summarises both the current, short term and long term condition and objectives of both of these waterbodies as shown in Table 9.9 below.

Table 9.9: Current condition and future objectives of the Water of Deugh and the Bow Burn as assessed by SEPA[59] (colour coding and condition assessment are as shown in the RBMP)

Criteria for assessment (as identified in the RBMP)	Water of Deugh			Bow Burn		
	Current	2027	Long Term	Current	2027	Long Term
Access for fish migration	Poor	Good	Good	Poor	Good	Good
Freedom from invasive species	High	High	High	High	High	High
Overall	Poor	Good	Good	Poor	Good	Good
Physical condition	Good	Good	Good	Good	Good	Good
Water flows and levels	Moderate	Good	Good	Good	Good	Good
Water quality	Good	Good	Good	Good	Good	Good

Source: SEPA 2022

9.6.10 Both the Water of Deugh and the Bow Burn (which is a tributary of the Water of Deugh) have been classified by SEPA as currently having 'Poor' status due to hydroelectric generation providing a barrier for fish migration. It is noted that this status is proposed to be changed by 2027, which is within the life of the wind farm, and this is likely to be due to an installation of a fish pass in a suitable location to allow migratory fish upstream. In addition, the 'Poor' status does not refer the physical condition or quality of either river for non-migratory fish. Indeed, both of these features are currently assessed as 'Good'. The EIAR for Windy Standard III[33] stated that the upper reaches of the Water of Deugh have been identified as important fisheries, supporting good populations of wild brown trout and coarse fish. However, the watercourses within the Proposed Development are the very uppermost tributaries and so are unlikely to support large non-migratory fish populations. Good spawning habitat for salmonids and other fish species may exist further downstream of the Proposed Development.

[55] Natural Power, 2013. Windy Standard II Wind Farm. Protected Mammal Survey Report. Document reference: 1033787

[56] Natural Power, 2015. Windy Standard II Monthly ECoW Report May 2014. Document reference: 1076056

[57] Natural Power, 2015. Windy Standard II Monthly ECoW Report September 2014. Document reference: 1084398

[58] Natural Power, 2015. Windy Standard II Monthly ECoW Report November 2014. Document reference: 1084403

[59] SEPA (2021) *2021 update to the Water Environment Hub* [Online] Available from - https://informatics.sepa.org.uk/RBMP3/ [Accessed 08/03/2022]

Field Surveys – Habitats

Overview

9.6.11 Habitat surveys in 2019 and 2020 identified similar habitats to those previously noted as being present at the Proposed Development and in the wider Windy Standard Complex (primarily conifer plantation, recently felled conifer plantation, unimproved acid grassland and modified bog).

9.6.12 Unimproved acid grassland is the PDA main habitat found in the open areas around the turbines of the operational Windy Standard I Wind Farm. There are patches of mire habitat such as marshy grassland along seepage lines and shallow gullies cutting down the hill sides and wet modified bog in damp hollows near the highest elevations of the site.

9.6.13 Several header streams originate within the Proposed Development Area and ultimately flow into Fingland Burn, Polwhat Burn, Water of Deugh and Clennoch Burn.

Habitat Phase 1 and NVC Results

9.6.14 An overview of the Phase 1 Habitat survey results, showing the area of recorded habitat occurring within 250 m of the Proposed Development infrastructure is provided in Table 9.10 and illustrated in Figure 9.4. Further details defining each habitat type along with target notes are provided within the Technical Appendix 9.1. The NVC survey characterised the habitats further and results are included in Table 9.10 and illustrated on Figure 9.5. The survey identified a range of typical upland habitat types within the Proposed Development Area to community and sub-community level where possible.

9.6.15 GWDTEs have protection under the Water Environment and Water Services (Scotland) Act 2003, to prevent deterioration, protect and enhance the status of terrestrial ecosystems, 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. Altogether four NVC communities were present which are classed in SEPA guidance[20] as indicative of potential GWDTEs, meaning that they have moderate or high dependency on groundwater in certain hydrological settings. Classification as a GWDTE does not necessarily confer any additional conservation importance to habitats present, but implies that any GWTDE habitats will be subject to further assessment in relation to impacts associated with construction of the Proposed Development. Further details on GWDTE assessment can be found in Chapter 10: Hydrology, Geology and Hydrogeology Assessment.

Table 9.10: Phase 1 and NVC communities present within a 250 m buffer of the Proposed Development infrastructure with conservation designations, GWDTE potential and percentage of habitat lost to Proposed Development.

Phase 1 Habitat type	NVC Community	Conservation Designation	GWDTE potential	Surveyed area in Proposed Development Area (ha)	Area lost to Proposed Development (ha)[60]
A1.1.2 Broadleaved woodland - plantation	N/A	Habitats present within the site boundary are limited to small areas where recent native tree species replanting has occurred, and therefore habitats do not meet any criteria for SBL.	No	2.05	0
A1.2.2 Coniferous woodland - plantation	N/A	N/A	No	193.58	2.08
A4.2 Recently felled coniferous woodland	N/A	N/A	No	45.46	0.87
B1.1 Unimproved acid grassland				305.95	4.12
	U2b: *Deschampsia flexuosa* grassland	N/A	No		
	U5: *Nardus stricta-Galium saxatile* grassland	SBL: *Nardus stricta-Galium saxatile* grassland	No		
	U13: *Deschampsia cespitosa - Galium saxatile* grassland		No		
B1.2 Semi-improved acid grassland				0.6	0
	U4*: Festuca ovina-Agrostis capillaris-Galium saxatile*; MG6 *Lolium perenne-Cynosurus cristatus* grasslands	N/A	No		
	U6: *Juncus squarrosus - Festuca ovina* grassland	N/A	No		
B2.1 Unimproved neutral grassland				0.05	0
	MG9: *Holcus lanatus-Deschampsia cespitosa* grassland	N/A	Moderate		
B5 Marshy grassland				6.62	0.03
	M23: *Juncus effusus/ acutiflorus-Galium palustre* mire	SBL: Purple moor-grass and rush pastures	High		
	M25: *Molinia caerulea-Potentilla erecta* mire	N/A	Moderate		
D1/D4 Dry/ Wet dwarf shrub heath mosaic		Annex 1: European dry heaths; SBL: Upland heathland	No	<0	

[60] Where possible, infrastructure for Windy Standard Repower has been combined with that which has either already received consent to be constructed as part of Windy Standard III (including the batching plant and some laydown areas) or will be located on historic sites that were used during the construction of Windy Standard II (such as temporary car parks, gate house and borrow pits). Only infrastructure which is located on habitats where no current consent exists have been included within the column providing the results of the HLC as area to be lost.

Phase 1 Habitat type	NVC Community	Conservation Designation	GWDTE potential	Surveyed area in Proposed Development Area (ha)	Area lost to Proposed Development (ha)[60]
D1.1 Dry dwarf shrub heath - acid		Annex 1: European dry heaths; SBL: Upland heathland	No	0.83	0
D2 Montane heath/dwarf herb		Annex 1: European dry heaths; SBL: Upland heathland	No	0.02	
D5 Dry heath/acid grassland mosaic			No	19.23	0.37
	U5: *Nardus stricta-Galium saxatile* grassland	SBL: Nardus stricta-Galium saxatile grassland	No		
	H9: *Calluna vulgaris-Deschampsia flexuosa*	Annex 1: European dry heaths; SBL: Upland heathland	No		
	H12 *Calluna vulgaris - Vaccinium myrtillus* heath	Annex 1: European dry heaths; SBL: Upland heathland	No		
D6 Wet heath/acid grassland				3.62	0.33
	M15 *Scirpus cespitosus – Erica tetralix* wet heath	Annex 1: European wet heaths; SBL: Upland heathland	Moderate		
E1.2 Bog		Annex 1 and SBL: Blanket bog		0.7	0
E.1.6.1 Blanket bog				8.99	0
E1.7 Wet modified bog				8.55	0.01
	M19: *Calluna vulgaris- Eriophorum vaginatum* blanket mire	Annex 1 and SBL: Blanket bog	No		
	M20b: *Eriophorum vaginatum* blanket mire	Annex 1 and SBL: Blanket bog	No		
	M25: *Molinia caerulea-Potentilla erecta* mire	SBL: Purple moor-grass and rush pastures	Moderate		
E2.1 Flush and spring – acid/neutral				1.15	0
	M6 *Carex echinata - Sphagnum recurva/auriculatum* mire	SBL: Eutrophic standing waters	High		
G2.3 Running water		SBL: Eutrophic standing waters		0.07	0
I2.1 Quarry			No	6.36	0.25
J3.6 Buildings			No	0.66	0.00
J4 Bare ground			No	20.81	2.61
J5 Other habitat			No	0.03	0.00

Source: Natural Power

Field Surveys – Species

Bats

9.6.17 Full details of bat activity and carcass search surveys are presented in Technical Appendix 9.1. Locations of bat detectors are provided in Table 9.2 and Figure 9.3.

Static Detector Surveys

9.6.18 As required by guidance[34 35] survey data was input into Ecobat[40], which allows a comparison of activity levels within the Proposed Development Area and other sites located within a similar habitat and within a set vicinity. Six detectors were placed out between the 27 May and 30 September 2020 and each had the potential to record for 127 nights in total. Of these, 15 nights where weather conditions were adverse (average nightly temperature below 8 °C and/or wind speed > 5 m/s) were removed from the data set, leaving 112 potential nights of data per detector.

9.6.19 There were also nights where individual detectors failed. Table 9.11 shows the actual number of nights used for analysis per detector, as well as the number of these nights on which bat passes were recorded.

Table 9.11: Recording nights per detector

Detector	Number of survey nights	Number of survey nights bat passes were recorded	Notes
Control	112	72	Static bat detector and microphone functioned throughout whole deployment
G01	66	20	Surveyor reported issues with detector during August deployment. The detector was repaired and redeployed, and it recorded normally for five days. However, on analysis of the data it was found that files from September onwards had corrupted date information and so could not be used.
G15	22	4	Log files indicated detector was working normally, but data analysis showed that no audio files were recorded after 25 June 2020.
NT1	102	44	Detector stopped working on 15 August 2020. Taken for service until re-deployed on 3 September 2020.

Detector	Number of survey nights	Number of survey nights bat passes were recorded	Notes
P08	104	8	Microphone found by surveyor to be disconnected. No recordings between 19 August 2020 and 2 September 2020.
P18	112	23	Static bat detector and microphone functioned throughout whole deployment
Total	**518**	**171**	

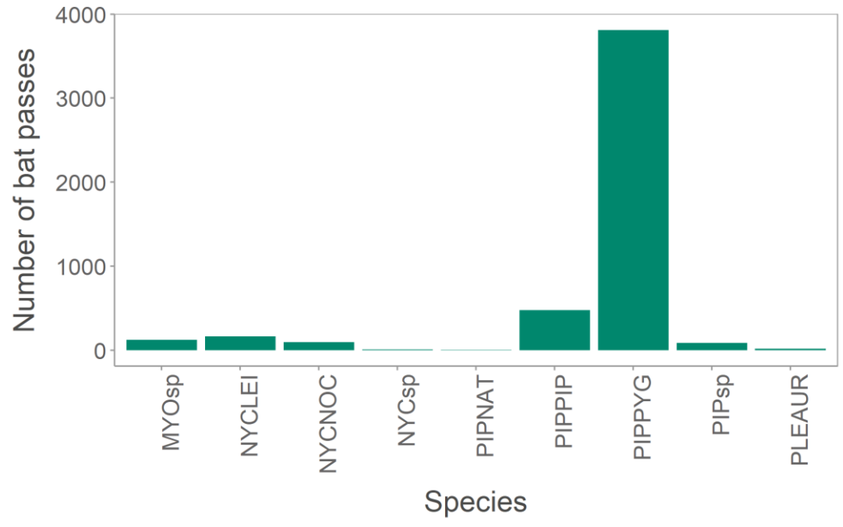
Source: Natural Power

9.6.20 Of the 518 total survey nights recorded by the six detectors, bat activity was recorded on 171 nights. There were a total 4777 calls recorded, 80% of which were soprano pipistrelle, and 83% of which were recorded at the control location. See Tables 9.12 and Graphs 9.1 and 9.2 below depicting the number of calls obtained from each species recorded and from each detector in the Proposed Development Area during the deployment.

Table 9.12: Summary of static detector data

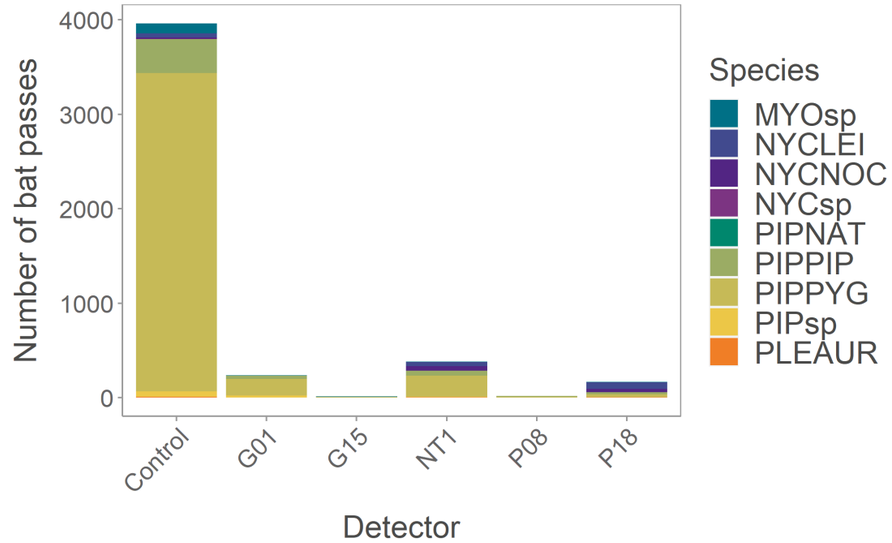
Species/species group	Total number of passes	Percentage of total (%)
Common pipistrelle	477	10.0
Soprano pipistrelle	3811	79.8
Nathusius' pipistrelle	2	0.0
Pipistrelle sp.	84	1.8
Myotis sp.	120	2.5
Noctule	96	2.0
Leisler's bat	162	3.4
Brown long-eared	18	0.4
Nyctalus sp.	7	0.1
Total	**4777**	**100**

Source: Natural Power 2021



Graph 9.1: Total number of passes per species/species group

Key: MYOsp = *Myotis* sp.; NYCLEI = Leisler's bat; NYCNOC = Noctule; NYCsp = *Nyctalus* sp.; PIPNAT = Nathusius' pipistrelle; PIPPIP = Common pipistrelle; PIPPYG = Soprano pipistrelle; PIPsp = *Pipistrellus* sp.; PLEAUR = Brown long-eared



Graph 9.2: Total number of passes of each species by detector location

Key: MYOsp = *Myotis* sp.; NYCLEI = Leisler's bat; NYCNOC = Noctule; NYCsp = *Nyctalus* sp.; PIPNAT = Nathusius' pipistrelle; PIPPIP = Common pipistrelle; PIPPYG = Soprano pipistrelle; PIPsp = *Pipistrellus* sp.; PLEAUR = Brown long-eared

9.6.21 Bat activity indices were calculated as part of the Ecobat output and are provided as both the maximum percentile and also the median level of activity per night (as per guidance[34 35]), which takes into account the fact that specific detectors had different effort depending on the number of nights that they were operating. Table 9.13 shows the bat activity index calculated by species across the Proposed Development Area.

9.6.22 Using information provided within guidance[34] an overall risk assessment can be made in relation to the site and relative activity. This defines the Proposed Development as a small project (≤8 turbines) with moderate habitat present to support bats (habitat used extensively by foraging bats; site connected to the wider landscape by linear features) which gives it a risk level of 2. This risk level of the site, combined with the level of bat activity identified from the percentile of relative activity provided in Ecobat (categorised from Table 1 from guidance[34]) provides a classification of overall risk to species or species group and is provided in Table 9.13 below. Table 9.14 provides the results by detector location and month. This table has been abbreviated for reference only, the full table which includes the confidence intervals (CI) and number of days each species was recorded is provided in Appendix 9.1 Table 9.18. This shows that the control detector, which was located within an area of high quality bat habitat optimal bat habitats has the highest level of. In addition, both Leisler and noctule bats will only be at medium risk in August and even then only at locations NT1 and P18, during the other months and at the other detectors a low risk was identified. While the highest levels of *Pipistrellus sp.,* activity was recorded on the control detector the other detectors also recorded moderate risk to both common pipistrelle and soprano pipistrelle bats during different months.

9.6.23 Overall risk assessment is classed as low (green), medium (amber) or high as (red).

Table 9.13: Bat Activity Index and overall risk assessment by species for the deployment (all turbines all year)

Species	Median Percentile	95% CIs*	Max Percentile	Nights Recorded
Common pipistrelle	37	59.5 - 73.5	95	97
Soprano pipistrelle	65	78 – 88.5	99	159
Nathusius' pipistrelle	0	0	0	2
Noctule	45	44.5 – 67.5	86	24
Leisler's Bat	37	51 - 83	86	39
Brown long-eared	0	37 – 37	37	13
Myotis sp.	0	37 – 63.5	90	39

**CIs Confidence intervals*

Source: Ecobat 2022

Table 9.14: Bat Activity Index and overall risk assessment by species for the deployment (by turbines by month)

Species	Month	Control		G01		G15		NT1		P08		P18	
		Median Percentile	Max Percentile	Median Percentile	Max Percentile	Median Percentile	Max Percentile	Median Percentile	Max Percentile	Median Percentile	Max Percentile	Median Percentile	Max Percentile
Common pipistrelle	May	52	95	19	37	-	-	26	52	0	0	-	-
	Jun	71	84	56	80	19	37	52	73	0	0	37	52
	Jul	37	88	0	0	-	-	-	-	-	-	-	-
	Aug	70	89	52	52	-	-	45	70	26	52	37	70
	Sep	0	52	-	-	-	-	0	52	-	-	-	-
Soprano pipistrelle	May	87	92	60	88	-	-	37	70	-	-	0	0
	Jun	80	98	70	95	0	60	37	75	19	37	-	-
	Jul	82	99	52	52	-	-	0	0	-	-	-	-
	Aug	93	98	19	37	-	-	78	92	0	0	19	78
	Sep	87	98	-	-	-	-	37	80	60	60	0	0
Nathusius' pipistrelle	Aug	0	0	-	-	-	-	-	-	-	-	-	-
	Sept	-	-	-	-	-	-	0	0	-	-	-	-
Leisler's Bat	Jun	0	37	-	-	0	0	0	0	0	0	0	0
	Jul	0	0	37	37	-	-	-	-	-	-	0	0
	Aug	52	75	-	-	-	-	52	85	-	-	65	86
	Sep	-	-	-	-	-	-	-	-	0	0	-	-
Noctule	Jun	-	-	-	-	-	-	0	0	-	-	-	-
	Aug	37	60	-	-	-	-	52	86	-	-	56	75
Brown long-eared	Aug	37	37					0	0				
	Sep	37	37					0	0	0	0		
Myotis sp.	May	0	0	0	0	-	-	-	-			-	-
	Jun	71	90	0	0	0	0	0	0			0	0
	Jul	0	37	0	0	-	-	-	-			-	-
	Aug	0	65	-	-	-	-	0	0			0	37
	Sep	37	37	-	-	-	-	0	0			-	-

Source: Ecobat 2022

Emergence times

9.6.24 In order to inform the likelihood of nearby roost locations, and so the potential for significant effects to 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 Table 9.15. 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. Very few of the recorded calls were detected around sunrise/sunset, and the majority of those were recorded at the Control detector in higher value bat habitat. Three of the detectors (G01, G15 and P08) recorded no activity around sunset and sunrise.

9.6.25 Excluding the control location, which was chosen to represent an area of high-quality bat commuting and foraging habitat, there were nine bat passes around sunset and two bat passes around sunrise at the remaining four detector locations. Due to the low number of bat passes recorded around sunset and sunrise especially near the proposed turbine locations it is not considered likely that bat roosts are in close proximity.

Table 9.15: Bat pass timings per detector location (shown as a percentage and actual number (given in brackets))

Detector location	Passes from half hour before sunset to half hour after sunset	Passes between half hour after sunset and half hour before sunrise	Passes from half hour before sunset to sunset
Control	1.5% (60)	98.2% (3891)	0.3% (13)
G01	0	100% (237)	0
G15	0	100% (11)	0
NT1	2.1% (8)	97.6% (373)	0.3% (1)
P08	0	100% (18)	0
P18	0.6% (1)	98.8% (166)	0.6% (1)

Source: Natural Power 2022

Carcass searches

9.6.26 Dates and weather conditions for bat carcass searches are provided in Technical Appendix 9.1.

9.6.27 No bat carcasses were recovered at the operational Windy Standard I during the searches undertaken between 7 July and 30 September 2020.

9.6.28 14 of the 15 mice carcasses placed out during the carcass efficiency trials were located by the search team, and so searcher efficiency was 93%, and on average mouse carcasses persisted on site for between 2.5 and three days. Trail camera footage showed that in carcass persistence trials, carcasses were scavenged by corvids, a pine marten and a fox, though one mouse carcass was taken by another mouse. Analysis of the carcass search results are provided below.

9.6.29 The software Evidence of Absence[61] was used to analyse bat carcass data collected at the Proposed Development. This software allows a maximum number of fatalities to be predicted based on few or zero carcass detections. Evidence of Absence (EoA) uses data about the survey regime, the proportion of carcasses expected to fall within the searched area, the searcher efficiency (i.e. the probability of finding a carcass given that it has fallen within the searched area) and the carcass persistence rate (i.e. how quickly carcasses are removed by scavengers or degraded to the point of no longer being detectable) to calculate an overall detection probability using a generalised estimator[62]. Given the estimated detection probability and the number of carcasses observed, the software then calculates the maximum number of collisions expected to have taken place at a user defined level of credibility (equivalent to confidence).

9.6.30 Analyses were carried out for all searched turbines together (see Figure 9.3 for locations). Search schedule was inputted using the custom option in EoA since the search intervals were not completely regular.

9.6.31 There is no literature to suggest carcass distribution on such small turbine models so an investigation based on the Hull and Muir, 2010[63] paper values of percentiles of carcasses found at distances from turbines was conducted, assuming the same fall pattern witnessed at the other three turbine models (small, medium and large). The data was extrapolated to provide estimates for smaller turbine sizes that better match what we have on site. For bats, spatial coverage for searched turbines was estimated at one, as all bat carcasses were likely to fall in the 50 m search radius. Adjusting for the full site (i.e. to include turbines not searched) spatial coverage was set to 0.44

9.6.32 For bats, fourteen proxy carcasses were detected from a total of fifteen that were available for detection. The factor by which searcher efficiency changes with each search (*k*) was set to 0 (i.e. a carcass that went undetected during one search it was assumed to be undetectable in subsequent searches).

9.6.33 Results from the field trials of carcass persistence were used to fit a persistence distribution. A model was fit to the bat data using a lognormal distribution. A one-sided credible interval option was selected and the credibility level for calculating the maximum number of fatalities that might have occurred during the survey period was set to 0.95. Results are presented in Table 9.16.

Table 9.16: Estimated detection probability and maximum number of bat collisions at Windy Standard I Wind Farm between July and September 2020 using various spatial coverage values. (*numbers in brackets represent 95% credible intervals **equivalent to confidence)

Size class	Carcasses detected during the survey period	Spatial coverage value	Estimated detection probability*	Predicted maximum number of collisions during the survey period (at 95% credibility**)
Bats	0	0.44	0.144 (0.091 – 0.206)	13

Source: Natural Power

9.6.34 The predicted maximum number of collisions across the operational Windy Standard I was a total of 13 bats for the whole site and whole year, or 0.36 bats per turbine per year.

9.6.35 The National Bat Wind Turbine project (NBWT)[64] was a UK based programme set up to look at the impacts of turbines on bats which included carcass searches and associated trials which allows a crude comparison between the results at the existing Windy Standard I and the sites surveyed as part of the programme. The comparison is considered crude primarily because the carcass search methods employed for the NBWT are not directly comparable to those undertaken at Windy Standard I. Specifically, there are considerable differences with the survey effort and timings employed at the wind farms assessed. Each NBWT site was surveyed for a maximum period of one month whereas at Windy Standard I, surveys were undertaken over a twelve-week period and therefore more likely to detect casualties over the longer timeframe. Additionally, a study of bat mortality at wind turbines conducted throughout north western Europe found that 90% of bat casualties occurred between late July and early October[65], and the Windy Standard I surveys were conducted during this time frame.

9.6.36 However, the same analysis technique used at Windy Standard I was used for the NBWT. This method from guidance[35] converted the number of carcasses retrieved from surveys into estimated fatalities based on the biases obtained from the results of the searcher efficiency and carcass persistence trials. This number was then adjusted by the proportion of turbines searched, providing a figure for a minimum estimate of fatalities.

9.6.37 The numbers of retrieved carcasses from the NBWT sites were extremely variable, ranging from 0 to 5.7 per turbine per month or 0 to 77 per site per month (April - October only). The estimated 13 bats at Windy Standard I represents an estimate of 0.05 bats per turbine per month year and therefore sits at the lower end of this range.

[61] Daniel Dalthorp (2017). eoa: Wildlife mortality estimator for scenarios with low fatality rates and imperfect detection. R package version 2.0.3.

[62] Dalthorp, D. Huso, M. and Dail, D. (2017), Evidence of absence (v2.0) software user guide: U.S. Geological Survey Data Series 1055, 109 p., https://doi.org/10.3133/ds1055

[63] Hull, C.L, & Muir, S. (2010) Search areas for monitoring bird and bat carcasses at wind farms using a Monte-Carlo model, Australasian Journal of Environmental Management, 17:2, 77-87.

[64] Mathews, F., Richardson S., Lintott, P. & Hosken, D. (2016) Understanding the Risk to European Protected Species (bats) at Onshore Wind Turbine Sites to inform Risk Management. Final report. University of Exeter

[65] Rydell, Jens; Bach, Lothar; Dubourg-Savage, Marie-Jo; Green, Martin; Rodrigues, Luisa; Hedenström, Anders (2010). Bat mortality at wind turbines in northwestern Europe, Acta Chiropterologica, Volume 12(2), December 2010, pp. 261-274 (14).

Protected Mammal Species Walkover

9.6.38 Results of protected species walkover survey conducted in January 2022 are shown in Table 9.17 below.

Table 9.17: Protected mammal records from protected mammal survey conducted in January 2022.

Sign	Species	Easting	Northing	Distance from nearest turbine infrastructure	Distance to nearest infrastructure
Good potential habitat along Fingland Burn	Otter	259937	603911	480 m (T01)	460 m (Track)
Recent jelly like spraint along Fingland Burn	Otter	259898	604163	550 m (T01)	540 m (Track)
Good potential habitat along Water of Deugh	Otter	261901	602921	560 m (T07)	560 m (T07)
Suitable habitat in area for the species	Pine Marten	260516	601934	190 m (T05)	190 m (T05)
Live sighting.	Red Squirrel	259708	604142	725 m (T01)	710 m (Track)

Source: Natural Power

Incidental Records

9.6.39 During the camera trap persistence trials that were undertaken between June and end September 2021, there was an observation of a pine marten scavenging a buzzard carcass from the area of the existing Windy Standard I Turbine 18 on the 11 September.

9.7 ASSESSMENT OF POTENTIAL EFFECTS

9.7.1 The EcIA has been undertaken in accordance with CIEEM guidelines[3] with establishment of baseline ecological conditions within the Proposed Development Area 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.

9.7.2 This section outlines the potential impacts during the decommissioning and restoration of Windy Standard I, and construction, operation and decommissioning phases of the Proposed Development on IEFs, prior to the implementation of any further mitigation.

Predicted Impacts

9.7.3 Impacts may arise for species and habitats at the Proposed Development via a number of mechanisms:

- Direct impacts associated with habitat loss and/or mortality;
- Direct impacts on protected species associated with resting place destruction;
- Direct impacts on protected species associated with altering foraging and commuting behaviour;
- Indirect impacts on habitats and species associated with dust, siltation, leaks and spillages;
- Indirect impacts on protected species associated with disturbance; and
- Indirect impacts on species through pollution of habitats/watercourses affecting food sources.

9.7.4 Embedded mitigation measures are proposed at the outset of the Proposed Development, to reduce effects associated with construction and operation.

Potential effects during decommissioning of Windy Standard I

9.7.1 Good practice measures as described in the construction stage will be followed including specific guidance for the restoration and decommissioning of wind farms (Welstead *et al.* 2013[66]). New guidance available at the decommissioning phase would be adopted if appropriate, and a decommissioning plan will be drafted for agreement by Consultees prior to commencement of decommissioning.

Potential effects during construction

9.7.2 A Construction and Environmental Management Plan (CEMP) and Constructions Methods Statement (CMS) will be produced prior to decommissioning and construction works commencing in consultation with the Local Planning Authority (Dumfries and Galloway Council) (see Chapter 5: Project Description). The document will be a live document and will be updated throughout the pre-construction, construction and post-construction phases and will:

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

9.7.3 An ECoW will be present during enabling works and throughout the decommissioning and 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 CEMP, and to monitor compliance with relevant legislation and good practice (see 'Legislation, Policy and Guidance' above). The ECoW would contribute to all relevant CMS and CEMP documents. Once work has commenced, their role will be to provide ecological and pollution control advice, undertake water quality monitoring (see Paragraph 9.7.20 below) and monitor compliance of all relevant mitigation measures and legislation (see also Chapter 10: Hydrology, Geology and Hydrogeology Assessment). 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.

Habitats

9.7.4 Detailed mitigation measures will be provided in the CEMP 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
- Construction phase control measures will continue during the operational phase, through the operational management plan, where potential effects exist.

9.7.5 Where possible (and where other constraints allow) an allowance of 90 m micrositing 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 micrositing cannot avoid areas of sensitive

[66] Welstead, J., Hirst, R., Keogh, D., Robb G. and Bainsfair, R. (2013). Research and guidance on restoration and decommissioning of onshore wind farms. Scottish Natural Heritage Commissioned Report No. 591.

habitats or features, the ECoW would discuss and agree with relevant stakeholders additional required mitigation to ensure impacts are minimised.

9.7.6 Any land degraded by construction and not required for the operation of the Proposed Development, such as the construction compound, around areas of tracks and borrow pits, 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[25] 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 Proposed Development Area, 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.

9.7.7 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.

9.7.8 Pollution prevention measures will be detailed in the CEMP and overseen by the ECoW in the unlikely event a pollution incident occurs during construction or within the operational phase during maintenance works. Pollution with regards to waterbodies is further discussed in Chapter 10: Hydrology, Geology and Hydrogeology Assessment. 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 utilised by construction vehicles. In addition, as far as reasonably practicable, materials for construction will be sourced from on-site borrow pits, which would ensure the composition of materials used is as close to the local conditions as possible. Some material will be imported from local quarry sources, which will have similar chemical properties to stone found within the Proposed Development Area to ensure no alteration in soil chemistry. Further detail on the mitigation of potential dust impacts will be detailed within the CEMP.

Watercourses

9.7.9 The pre-construction quality of watercourses and waterbodies would be maintained during construction (see Chapter 10: Hydrology, Geology and Hydrogeology Assessment). Watercourse protection measures would be adopted within the CMS/CEMP 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 throughout the Proposed Development will be regularly monitored and maintained/replaced as required. Refuelling of vehicles and machinery will be carried out at a central designated area, on an impermeable surface, located at least 50 m away from any watercourse. Monitoring of water quality would be carried out before and during construction. The implementation of these measures would ensure impacts on protected species, such as otter and fish species, are minimised.

GWDTE

9.7.10 Details of how impacts upon groundwater flow are minimised and mitigated are detailed in Chapter 10: Hydrology, Geology and Hydrogeology Assessment.

Species

9.7.11 A Species Protection Plan (SPP) will be produced as part of the CEMP 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 Proposed Development Area. This will include good practice measures to prevent accidental mortality of protected species during construction, such as:

- A 15 mph 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 installed) when not active to prevent entrapment of animals;
- Pre-construction surveys undertaken for protected species, including bats, otter, red squirrel, pine marten and badger within set buffer areas of the Proposed Development;
- If a potential resting place (e.g. bat roost or otter holt) of a protected species is found within set buffer areas of construction 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, NatureScot will be consulted to discuss possible mitigation measures and/or seek an appropriate licence. Watercourse crossings will be designed so as to not impede otters and fish, or their food sources;
- Lighting design will ensure watercourses and woodland remain unlit at night. Security lighting and lighting associated with the temporary compound will be low lux[67] and directed away from sensitive species and habitats such as watercourses and woodland to reduce disturbance; and
- All site personnel will be made aware of the presence of protected species through toolbox talks.

9.7.12 A Water Quality and Fish Monitoring Programme (WQFMP) to monitor and protect fish populations pre-, during- and post-construction will be drafted in consultation with the GFT, to be agreed with the local planning authority in consultation with NatureScot and GFT. It is proposed that this may be secured via planning condition.

Potential effects during operation

9.7.13 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.

9.7.14 Where potential effects exist, control measures will be incorporated into an Operation Management Plan (OMP). In particular, the potential for pollution incidents during routine maintenance activities will be minimised by adoption of SEPA good practice guidance[68].

Potential effects during decommissioning of Windy Standard Repower

9.7.1 Good practice measures as described in the construction stage will be followed including specific guidance for the restoration and decommissioning of wind farms (Welstead *et al.* 2013[69]). New guidance available at the decommissioning phase would be adopted if appropriate, and a decommissioning plan will be drafted for agreement by Consultees prior to commencement of decommissioning.

Embedded mitigation

9.7.1 Embedded mitigation is built into the Proposed Development to avoid or reduce any negative effects associated with the Proposed Development, and to ensure compliance with the WCA (1981)[8] as amended, as well as potentially providing positive effects in the longer term. Various mitigation measures will be implemented to provide compliance with legislation, and to follow good practice guidance and consultation recommendations with regard

[67] A standardised unit of measurement of light level intensity (illuminance)

[68] SEPA, (2010). Engineering in the water environment: good practice guide - river crossings (2nd Edition), SEPA.

[69] Welstead, J., Hirst, R., Keogh, D., Robb G. and Bainsfair, R. (2013). Research and guidance on restoration and decommissioning of onshore wind farms. Scottish Natural Heritage Commissioned Report No. 591.

to IEFs. Where experience of developing projects of this nature has shown that embedded mitigation is sufficient to prevent significant adverse impacts on IEFs, this has been built into the assessment in order to produce an EcIA which is proportionate to the risks posed by the Proposed Development. These embedded mitigation measures are outlined below and potential effects are assessed against the final design.

Decommissioning of Windy Standard I

9.7.2 The project design has assumed that the decommissioning of Windy Standard I will be undertaken immediately preceding the construction of Windy Standard Repower. As these will be undertaken in consecutively this reduces the disturbance impacts to IEFs compared to if both phases were to be undertaken separately.

9.7.3 The decommissioning of Windy Standard I will be undertaken immediately prior to the construction of the Proposed Development. As such, the 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.

Construction phase

9.7.4 All relevant construction phase embedded mitigation measures, such as appointment of an Environmental Clerk of Works (ECoW) and monitoring and protection for species, will be implemented through a Construction Environmental Management Plan (CEMP), which will be agreed with the local planning authority in consultation with NatureScot and Scottish Environment Protection Agency (SEPA). The Construction Method Statement (CMS) incorporating a CEMP are described setting out in detail the individual items of works associated with the construction of the Proposed Development (see Chapter 10: Hydrology, Geology & Hydrogeology for further detail on the CMS related to hydrological impacts and see Chapter 5: Project Description for more detail on the CEMP).

9.7.5 In line with good practice, an independent ECoW will be appointed prior to the commencement of construction and will be present on site during enabling works and throughout the construction and deconstruction phases. They will be a suitably experienced individual, whose role will be to oversee that all works are carried out in accordance with environmental legislation and good practice, and with agreed construction phase management plans such as the CEMP.

9.7.6 Prior to the start of the construction phase during the bird breeding season, contractors will be made aware of the ecological sensitivities within the site. The ECoW will give regular Toolbox Talks to contractors regarding the status and locations of protected and sensitive species at the Proposed Development. The ECoW will carry out pre-construction survey checks in advance of works to check for the presence of protected species. Full details of the ECoW's role and responsibilities will be provided in the CEMP and secured through appropriate planning condition.

9.7.7 During the design process, several aspects were taken into consideration in order to minimise the potential risk to species and habitats arising from the Proposed Development. See Chapter 4: Site Design and Design Evolution for detail on the overall design process.

9.7.8 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 10: Hydrology, Geology and Hydrogeology Assessment for further information regarding watercourse crossings that will be designed to allow otter and fish passage.

9.7.9 The layout of the Proposed Development has avoided impacts to sensitive habitats where possible (e.g. wet modified bog), and areas of deepest peat and peat slide hazard zones, taking into account other constraints. 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. Access tracks would be designed in keeping with NatureScot good practice guidance21. Further detail is provided in Chapter 10: Hydrology, Geology and Hydrogeology Assessment.

9.7.10 All proposed turbine locations are over 85 m from forestry, which gives more than the 83.25 m buffer between turbine blade tip and nearest woodland edge in relation to bats and wind farms as set out in current NatureScot guidance35. This calculation is based on assumed candidate turbine dimensions set out in Chapter 4: Project Description. The required buffer distance of 83.25 m is estimated by the equation:

√(〖(50+bl)〗^2- 〖(hh-fh)〗^2)

9.7.11 Where bl = blade length (79.35 m); hh = hub height (119 m); and fh = feature (tree) height, estimated here as 20 m.

9.7.12 The proposed turbines will be capable of full blade feathering which will be implemented to reduce the blades' rotation speed when idling at wind speeds less than 3 m/s.

Operational phase

9.7.13 With the exception of the operation and general maintenance of the wind 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 phase.

9.7.14 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.

Decommissioning

9.7.15 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.

Features brought forward for assessment

9.7.16 On the basis of the description of the ecological baseline and the definitions provided in Table 9.4 above, a summary of the habitats and species within the Proposed Development Area is provided in Table 9.18 below, together with the legislation and guidance.

9.7.17 In identification of designated sites as IEFs, consideration has been given to the existence of pathways for effects to occur. This includes direct effects such as impact on habitats and indirect effects through downstream hydrological connectivity. Where habitat mosaics have been identified by the baseline survey, the constituent Phase 1 habitat types are taken to be the relevant IEFs. Full details of habitat areas provided in the rationale are outlined in Technical Appendix A9.1. Where no significant effects are likely with the application of embedded mitigation this is specified, and the feature is not considered an IEF requiring EcIA.

Table 9.18: Summary of designated sites, habitats and species and their conservation importance

Species/Habitats	Covering legislation and guidance/conservation status	Geographical level of value	IEF	Rationale
Loch Doon SSSI	A SSSI is an area that has been notified as being of special interest due to its flora, fauna or geological or physiographical features under the Wildlife and Countryside Act 1981 (as amended) and the Nature Conservation (Scotland) Act, 2004.	National	No	Loch Doon SSSI is situated approximately 3.1 km west of the Proposed Development and is designated for Arctic charr. The burns and rivers within the Proposed Development Area flow into the Water of Deugh which flows into the Carsphairn Lane which is located down river from Loch Doon. Due to the geographic separation of the Proposed Development and the SSSI and the lack of habitat connectivity, any impact on the conservation objectives of the site is considered to be unlikely and is therefore not considered further in this assessment.
Broad-leaved woodland plantation	None	Negligible	No	None of this habitat will be permanently lost as part of the Proposed Development. A small area of temporary habitat loss is anticipated, however habitats present within the surveyed Proposed Development Area are limited to small areas where recent native tree species replanting has occurred on recently felled coniferous plantation, and therefore this habitat is not considered to be an IEF
Coniferous plantation woodland including recently felled	None	Negligible	No	The habitat in the Proposed Development Area holds little to no conservation interest and is widespread throughout Scotland. Where there is vegetation cover in felled areas it is relatively species-poor, primarily made up of sparse semi-improved acid grassland and tall ruderal vegetation. This habitat is therefore not considered to be an IEF.
Unimproved acid grassland	SBL, LBAP	Local	No	This habitat covers 49.2% of the total area of surveyed habitat within the Proposed Development (305.95 ha). Some of this habitat will be permanently lost as part of the Proposed Development (4.12 ha of surveyed habitat). This habitat is widespread throughout Scotland on well-drained acid soils and in the uplands of Scotland, this is the most extensive grassland broad habitat[70]. Additionally, upland acid grassland is only included in the SBL as a 'watching brief only' requiring monitoring to prevent decline and it is included within the LBAP as an important habitat for upland birds. At the Proposed Development this grassland is becoming visually dominated by common bryophytes (mosses) possible due to lack of grazing and the prevailing cold and wet climate, hence it is floristically poor. Typical grasses grow through the bryophyte layer and there is locally frequent bilberry with occasional heather and crowberry. Being floristically poor the habitat would not correspond to those described as part of the SBL and therefore has only low conservation value. 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 CEMP 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. Following removal of existing turbines within the wider windfarm development the reinstated areas will revert to unimproved acid grassland.
Unimproved neutral grassland	GWDTE	Local	No	None of this habitat will be permanently lost as part of the Proposed Development (0.05 ha/0.01% of surveyed habitat within Proposed Development Area). However, the potential for an indirect impact from dust created during construction works. The habitat will be identified within the CEMP and marked during construction to ensure that there is no disturbance or damage to the habitat, e.g. from tracking by works vehicles. Measures to control dust will be included in the CEMP and monitored by the ECoW, and 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. Given that this habitat has high potential for being a GWDTE the Proposed Development could impact on the hydrology of this habitat. Further discussion of GWDTEs is presented in Chapter 10: Hydrology, Geology and Hydrogeology Assessment.
Marshy grassland	SBL; LBAP; GWDTE	Local	No	This habitat covers 1.06% of the total surveyed area within the Proposed Development (6.62 ha). A very small area of this habitat will be permanently lost as part of the Proposed Development (0.03 ha of surveyed habitat). All marshy grassland

[70] https://www.nature.scot/sites/default/files/2018-02/Broad%20Habitat%20-%20Acid%20Grassland.pdf (Last accessed February 2022)

Species/Habitats	Covering legislation and guidance/conservation status	Geographical level of value	IEF	Rationale
				habitats found within the Proposed Development Area are priority habitats on the SBL (M23) and are usually associated with small header streams arising near the tops of the hill. One of these streams has M23 marshy grassland along its banks and is present just north of an existing track and this track is due to be upgraded. Protection for watercourses is embedded in the project design through good practice. Protection measures will be outlined in the CEMP. Further information on watercourses can be found in Chapter 10: Hydrology, Geology and Hydrogeology Assessment. 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 CEMP and monitored by the ECoW, and 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. M23 has high 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 10: Hydrology, Geology and Hydrogeology Assessment.
Dwarf shrub heath (dry and wet)	Annex 1 of Habitat's Directive; SBL	Local	No	These habitats cover less than 0.01% of the total area within the survey area. None of these habitats will be permanently lost as part of the Proposed Development. Dwarf shrub heath is a priority habitat on Annex 1 and the SBL. 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 CEMP 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. The scale of habitat loss from the Proposed Development represents a low proportion of the community found within the Proposed Development Area and as such no significant effects of the Proposed Development on the integrity of this feature are likely. Therefore, the habitat is not considered to be an IEF.
Mosaic of acid grassland and dry heath	Annex 1 of Habitat's Directive; SBL; LBAP	Negligible	No	This habitat covers 3.09% of the total surveyed area within the Proposed Development (19.23 ha). A very small area of this habitat will be permanently lost as part of the Proposed Development (0.37 ha of surveyed habitat). Dry heath is a priority habitat on Annex 1; SBL and LBAP. However, given the limited extent of the habitat within the Proposed Development Area, it is not considered to appreciably enrich the ecological resource within the local context and is therefore considered to be of negligible value. 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 CEMP 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. The scale of habitat loss from the Proposed Development represents a low proportion of the community found within the Proposed Development Area and as such no significant effects of the Proposed Development on the integrity of this feature are likely. Therefore, the habitat is not considered to be an IEF.
Bog habitats (E1.2 and E1.6.1)	Annex 1 of Habitat's Directive; SBL	Local	No	This habitat is present infrequently on the higher ground within the Proposed Development Area and covers 8.99 ha within the surveyed area, of which none will be either temporarily or permanently lost as part of the Proposed Development. These habitats correspond to the Annex 1 and SBL priority habitat 'Blanket Bog' which is a common and widespread habitat in south-west Scotland and is rarely pristine when found in the agricultural plantation forestry setting, however in these areas this habitat type show less modification than that which has been classed as wet modified bog. 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 CEMP and monitored by the ECoW, and 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 condition of this feature are likely. Therefore, this habitat is not considered to be an IEF. 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 10: Hydrology, Geology and Hydrogeology Assessment.

Species/Habitats	Covering legislation and guidance/conservation status	Geographical level of value	IEF	Rationale
Wet modified bog	Annex 1 of Habitat's Directive; SBL	Local	No	This habitat occurs as small patches in hollows on the higher ground as well as one of the forest rides and covers 8.55 ha within the survey area, a very small area of which will be permanently lost as part of the Proposed Development (0.01 ha). Wet modified bog corresponds to the Annex 1 and SBL priority habitat 'Blanket Bog'. However, this is a common and widespread habitat in south-west Scotland and is rarely pristine when found in the agricultural plantation forestry setting. The heavy modification due to drainage and shading means that this habitat is unlikely to be important at a greater than local scale. 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 CEMP and monitored by the ECoW, and 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 condition of this feature are likely. Therefore, this habitat is not considered to be an IEF. M25 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 10: Hydrology, Geology and Hydrogeology Assessment.
Running water	SBL	Local	No	The watercourses which drain the Proposed Development Area are predominantly uppermost tributary channels of streams which feed into the Water of Deugh, the upper reaches of which have been identified as important fisheries which support good populations of wild brown trout and coarse fish. Within the Proposed Development these watercourses are typical upland watercourses, narrow, shallow and vegetated in places, shaded by the surrounding conifer plantation and situated in heavily vegetated riparian zones. Given the above, the watercourses within the Proposed Development Area are unlikely to be of importance in regional terms. However, it is likely that good spawning habitat for salmonids may exist further downstream of the Proposed Development, and as such the watercourses are probably locally important. Rivers and burns are listed on the SBL and river headwaters are a LBAP. In order to minimise potential impacts on watercourses, where possible a minimum distance of 50 m has been maintained between the proposed infrastructure and watercourses at the design stage and there is no proposed construction of new watercourse crossings. These habitats are widespread across Scotland. Protection for watercourses is embedded in the project design through good practice. Protection measures will be outlined in the CEMP. Further information on watercourses can be found in Chapter 10: Hydrology, Geology and Hydrogeology Assessment. This habitat is not considered to be an IEF and is therefore not discussed further in this chapter.
Bats (all)	Conservation Regulations; Wildlife and Countryside Act; SBL	Local	Yes	The site offers some limited foraging and commuting corridors along Fingland Burn and Water of Deugh. The open moorland and coniferous plantation habitat within the Proposed Development Area is considered low quality for foraging bats. For instance, the Control static detector in more suitable bat foraging and commuting habitat alongside Fingland Burn recorded 83% (3963) of all bat passes. In contrast only 3.5% (168) of passes were recorded at the static detector P18 which also functioned for the whole survey period and 0.4% (18) of bat passes were recorded at static detector P08 that functioned for most of the survey period (104 nights out of 112 nights). P08 is the most comparable location regarding habitat for much of the Proposed Development Area. The overall collision risk for bats at the Proposed Development is considered to be low to moderate. Two species recorded during surveys (Nathusius's pipistrelle and Leisler's bat) are considered to be rare in Scotland and are only found in the south-west of the country (in the Proposed Development Area). A low collision risk was predicted for both Leisler's bat and Nathusius's pipistrelle, Nathusius's pipistrelle was only recorded on the control detector. Although noctule is a common species it is only found in the south-west of Scotland and at the Proposed Development a medium collision risk was predicted. All other species recorded were common and widespread and known to occur throughout Scotland. Soprano pipistrelle had the highest activity levels at the Proposed Development and a medium collision risk was predicted for this species. All other species recorded were predicted to have low to medium collision risk. The Proposed Development is therefore considered of local conservation importance for all occurring species of bats.

Species/Habitats	Covering legislation and guidance/conservation status	Geographical level of value	IEF	Rationale
				No actual carcasses were retrieved, however statistical modelling using results from the efficiency and persistence trials has predicted 13 carcasses per year. Due to the medium levels of activity of some bat species at the site and the rarity of some bat species recorded, the Proposed Development has potential to cause a significant effect on bats. Therefore, they are considered to be an IEF.
Protected mammals	Conservation Regulations; Wildlife and Countryside Act; SBL	Local	No	Signs of badger, pine marten, red squirrel and otter were found within the Proposed Development Area. No signs of other protected mammal species were found. All species recorded are widespread across Scotland and in the Proposed Development Area. The levels of activity recorded indicate that while all species are present within the Proposed Development Area this is unlikely to be in sufficient numbers to consider the population of greater than Local value. Pre-construction mammal surveys included in the embedded mitigation will confirm signs and/or resting places such as badger setts, otter couches, squirrel dreys 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 (see Paragraph for further information). All potential impacts to protected mammals will be mitigated under embedded mitigation, including embedded mitigation to avoid indirect impacts such as pollution of watercourses. Therefore, a significant effect on the integrity of the local population is considered unlikely and protected mammals are not considered to be an IEF.
Fish	Conservation Regulations; Wildlife and Countryside Act; SBL	Regional	No	There are no new or upgrades of existing watercourse crossings proposed within the Proposed Development Area and hence, there is no potential for direct impacts to fish. However, 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 10. As such, a pollution prevention plan and measures to control dust will be included in the CEMP 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 the integrity of this feature are likely. Additionally, it is proposed that a Water Quality, Macro-Invertebrate and Fish Monitoring Plan (WQMFMP) is implemented as part of the planning conditions. This will include pre-construction, construction and post-construction water quality, macro-invertebrate and fish surveys. Therefore, fish are not considered to be an IEF and are not discussed further in this chapter.

Source: Natural Power

Impact Assessment

9.7.18 One feature, bat species, has been identified as an IEF, requiring EcIA following the application of embedded mitigation (see Paragraphs 9.7.4 to 9.7.24).

Bats

Decommissioning and Construction

9.7.19 The open moorland and coniferous plantation habitats around the proposed turbines are considered low quality for roosting bats. Static detector data highlighted low activity before sunset and after sunset with only two passes recorded at any of the static detectors located near existing turbines at operational Windy Standard I within open habitat (G01, G15, P08 and P18) and nine passes at a static detector along an existing woodland edge (TN1). Therefore, it is considered unlikely that there are any significant roost locations nearby (see Figure 9.3 for locations).

9.7.20 The loss of habitat to the Proposed Development will not significantly reduce the foraging opportunities within the Proposed Development Area. However, some foraging and commuting behaviour may be altered as a result of construction, but this is likely to be short-term temporal only. Furthermore, the implementation of lighting mitigation as specifically included within SPP and outlined within embedded mitigation (see Section 9.7.6) 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.

9.7.21 Pre-construction surveys of 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.

9.7.22 Bats are considered to be of Local nature conservation importance and after application of embedded mitigation the effect of displacement or disturbance to foraging or commuting bats during construction is considered to be negligible and not significant.

Operation

9.7.23 During the operational phase, rotating turbines present a risk to flying bats resulting in potential collision when flying in close proximity to turbines. Recent research work by Exeter University (DEFRA, 2016)[71] found that most bat fatalities at UK wind farms 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.

[71] DEFRA (2016). Understanding the Risk to European Protected Species (bats) at Onshore Wind Turbine Sites to inform Risk Management. University of Exeter.

9.7.24 The Proposed Development Area offers some foraging and commuting corridors along the forestry edge and burns. The overall bat activity level within the Proposed Development Area is considered to be low. The Proposed Development is therefore considered of Local conservation importance for all occurring species of bats.

9.7.25 Bat activity levels are classified according to the guidance provided by NatureScot[35] and relative activity levels based on the output provided by Ecobat, with results shown in Table 9.13 and Table 9.14.

Soprano and Common Pipistrelle

9.7.26 Soprano and common pipistrelle was both recorded at the Proposed Development, accounting for 91.5% of all recorded bat passes and soprano and common pipistrelle were assessed as being at a medium and low to medium collision risk respectively. The Control static detector located in higher quality habitat recorded 86.6% of all soprano and common pipistrelle bat passes. This species is assessed as having a high collision risk with wind turbines, but due to the species being common and widespread across Scotland they have only a medium population vulnerability to wind turbines.

9.7.27 Static detectors P08 and P18 functioned for all or most of the deployment period are the most comparable locations regarding habitat for much of the Proposed Development being located in open habitat and are at least 60 m from forest edges. Overall, low activity levels of soprano and common pipistrelle were recorded at P08 and P18, representing 0.34% and 1.24% respectively of all soprano pipistrelle and common pipistrelle bat passes recorded throughout the static detector survey. At the control detector, moderate risk to both species at both the median and maximum percentile was observed in all months. Risk was lower at representative habitats, with moderate risk at both the median and maximum percentile in June and August 2020 at G01 and NT1 only for common pipistrelle, and May – July at G01 for soprano pipistrelle.

9.7.28 All turbines will be greater than 100 m from the forestry edges. No potential roost features were identified within these plantations.

9.7.29 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 of these species and therefore considered to be **low negative** and **not significant**.

Nathusius' pipistrelle

9.7.30 Nathusius' pipistrelle bats are assessed by NatureScot guidance[35] to be of high risk in terms of collision and threat to national populations. For the periods during which this species was active, activity levels were low. This meant that this species was assessed as being at low risk (during periods of activity) at the Proposed Development. There were only two passes of Nathusius' pipistrelle through survey periods one at the Control static detector and one at NT1 located alongside a stream and woodland edge and along woodland edge respectively.

9.7.31 According to research work by Exeter University[65], acoustic recording from the ground underestimates the presence of Nathusius' pipistrelle bats within the at-risk zone of the turbine rotor sweep (with an up to 14% probability of not detecting Nathusius' pipistrelle bats). Therefore, the temporal surveys may have underestimated the presence of this species. Overall, the detection rate of the species was low (see Table 9.12). If it were assumed that there were 14% more Nathusius' pipistrelle passes during the survey period then this would result in only 2.28 passes in total, accounting for 0.05% of all bat passes recorded, which is still extremely low.

9.7.32 Overall, low activity levels were recorded throughout the Proposed Development Area. The overall collision risk assessment (see Table 9.11) indicates that the locations of proposed turbines in open habitat were not used by Nathusius' pipistrelle and that they are most likely to be using the linear features of the burns within the Proposed Development. 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 of this species and therefore considered to be **low negative** and **not significant**.

Nyctalus species (noctule and Leisler's bat)

9.7.33 Leisler's bat and noctule bats are assessed as having high population sensitivity in NatureScot guidance[35]. For the survey period, they were assessed as having low to medium and medium collision risk respectively at the Proposed Development. Noctule, Leisler's bat and *Nyctalus* sp. accounted for 2.0%, 3.4% and 0.15% of all recorded bat passes respectively. The three static detectors located adjacent to or nearest to woodland edge (Control, NT1 and P18) recorded 98% of all *Nyctalus* sp. passes. Moderate risk at both the median and maximum percentile was identified at the control location NT1 and P18 for both species in August only, with no – low risk identified during all other months and detector locations.

9.7.34 All turbines will be greater than 100 m from the forestry edges. No potential roost features were identified within these plantations.

9.7.35 According to the research work by University of Exeter[71], acoustic recording from the ground can underestimate the presence of noctule bats within the at-risk zone of the turbine rotor sweep (with an up to 21% probability of not detecting noctule bats). Therefore, the temporal surveys may have underestimated the presence of noctule bats and potentially Leisler's bat. If it were assumed that there were 21% more *Nyctalus* bat passes during the survey period then this would result in noctule 107.5; Leisler's 181.4; and *Nyctalus* sp. 7.8 passes in total accounting for 6.21% of all bat passes recorded.

9.7.36 Overall, the activity levels and collision risk assessment (see Table 9.12) indicates that the Proposed Development Area was used by *Nyctalus* bats during the survey period and the risk to noctules was medium and the risk to Leisler's bat was low to medium.

9.7.37 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 therefore considered to be **moderately negative** and **not significant**.

Myotis species

9.7.38 *Myotis* sp. are assessed by NatureScot guidance[35] to be of low risk in terms of collision and threat to national populations. This species group was assessed as having a low risk at the Proposed Development. *Myotis* species were recorded with a total 120 passes, 2.5% of total bat passes recorded. The Control static detector located in higher quality habitat recorded 88.3% of all *Myotis* species passes. Moderate risk at both the median and maximum percentile was identified only at the control location in June only, with no – low risk identified during all other months and detector locations.

9.7.39 Overall, the activity levels and collision risk assessment (see Table 9.12) indicates that the Proposed Development Area is occasionally used by *Myotis* bats and they are most likely to be using the linear features of the burns within the Proposed Development.

9.7.40 The significance of effect during operation is considered to be **low negative** and **not significant**.

Brown long-eared bat

9.7.41 The overall activity rates of brown long-eared bat were low and the species is considered to be at low risk in terms of collision with turbines (NatureScot[35]). This species was assessed as having a low collision risk of activity during the survey period at the Proposed Development. Brown long-eared bats activity accounted for 0.38% of all overall total of bat passes recorded throughout the survey period (a total of 18 passes). No – low risk was identified at all locations and during all survey months.

9.7.42 Overall, the activity levels and collision risk assessment (see Table 9.12) indicates that the Proposed Development Area is occasionally used by brown long-eared bats.

9.7.43 The significance of effect during operation is considered to be **low negative** and **not significant**.

Predicted Effects – Decommissioning

9.7.44 Decommissioning would be expected to lead to short term, temporary disturbance on habitats and species. For bat species assessed above, decommissioning effects are predicted to be of similar or lower magnitude to the effects during construction. Habitat restoration following removal of infrastructure will lead to an increase of habitats on site in comparison to the operational phase.

Habitat Management Plan (HMP)

9.7.45 It is proposed that post consent and as part of the proposal a detailed HMP for the Proposed Development will be provided This will be subject to a planning condition and to consultation and agreement with stakeholders such as the landowner, NatureScot and the Local Planning Authority.

9.7.46 NatureScot requested that an Outline Habitat Management Plan should be submitted with this EIA, and that it should include restoration of wet and dry modified bog habitat. However, no extensive areas of deep peat (>0.5 m) have been highlighted within the Proposed Development Area (see Chapter 10: Hydrology, Geology and Hydrogeology Assessment), and there are very limited opportunities for enhancing these habitats within the Proposed Development Area. In lieu of suitable opportunities within the Proposed Development Area, it is proposed that post-consent and as part of the proposal, funding is provided by the Applicant to support appropriate off-site mitigation project for these habitats in agreement by stakeholders.

9.7.47 Discussions have been undertaken with the Galloway and Southern Ayrshire Biosphere (Andrew Tait and Ed Forest, pers. comm 31 March 2022) as to the potential for suitable opportunities (see also Chapter 8: Ornithology Assessment, and this proposal has been verbally agreed by the RSPB (Ed Tooth, pers. comm. 4 April 2022)). Funding will be provided to the Biosphere to support projects such as habitat enhancements for black grouse and bog restoration in appropriate locations where they will have a larger net benefit for this species.

9.7.48 Trees and scrub, particularly conifers may naturally regenerate in the felled areas. Control of tree and shrub regeneration would need to be implemented as part of the management regime. Otherwise, the vegetation in the open areas will be allowed to regenerate naturally.

9.8 CONCLUSIONS

9.8.1 It is predicted that following the implementation of embedded mitigation, the Proposed Development would not have any significant effects on any IEFs. It has been assessed that there would be a moderate negative (not significant) effect on noctule and Leisler's bat species and a low negative (not significant) effect on other bat species.

9.9 MITIGATION AND RESIDUAL EFFECTS

9.9.1 The magnitude of pre-mitigation effects and the magnitude and significance of residual effects on each IEF during the construction phase and operation before and after mitigation is detailed in Table 9.19.

Table 9.19: Summary of pre-mitigation effects and residual effects on each IEF, and the residual significance of effect

IEF	Conservation importance	Nature of potential pre-mitigation effect	Magnitude of pre-mitigation effect	Significance of pre-mitigation effect	Specific mitigation/ compensation measure	Magnitude of residual effect	Residual significance	Level of certainty
Construction/Decommissioning								
Bats	Local	Displacement or disturbance to foraging or commuting bats from construction activity and/or through habitat loss.	Low negative	Not significant	Nothing in addition to embedded mitigation.	Negligible	Not significant	Certain
Operation								
Common and soprano pipistrelle	Local	Collision risk.	Low negative	Not significant	Nothing in addition to embedded mitigation.	Low negative	Not significant	Probable
Noctule and Leisler's bat	Local	Collision risk.	Moderate negative	Not significant	Nothing in addition to embedded mitigation.	Low negative	Not significant	Probable
Nathusius' pipistrelle; *Myotis* sp.; brown long-eared bat	Local	Collision risk.	Low negative	Not significant	Nothing in addition to embedded mitigation.	Low negative	Not significant	Probable

Source: Natural power

9.9.2 The mitigation measures are expected to reduce the magnitude of residual effects for all IEFs to which they apply, in the short and long term, and as such no significant residual effects are predicted as a result of the construction and operation of Proposed Development.

CUMULATIVE EFFECTS

9.9.3 NatureScot guidance[35] states that assessments should focus on the most significant cumulative impacts and conclude with a clear assessment of those which are likely to influence decision making. As per this guidance, any wind farm developments of fewer than three turbines (small scale wind energy proposals[72]) were excluded from the cumulative impact assessment. This is due both to the lack of quantitative environmental information which usually exists in the public domain for such small scale developments, and also due to the low likelihood that significant adverse effects would be predicted for them. Only IEFs for which a greater than negligible residual impact is predicted are considered in the cumulative impact assessment, as negligible impacts will not result in a detectable increase in cumulative impacts.

9.9.4 The context in which cumulative effects are considered depends upon the ecology of the species or habitat in question. Of all protected mammal species observed, bats are most likely to be affected by additional wind farm 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 minimise impacts on commuting and foraging bats minimises likelihood of cumulative impact. With low negative residual effects predicted for Common,

[72] SNH (2016) Assessing the impact of small-scale wind energy proposals on the natural heritage (Guidance note). SNH.

Soprano and Nathusius' pipistrelle, *Myotis* sp. and brown long-eared bats, these have been scoped into the cumulative assessment.

9.9.5 All existing, consented and submitted developments (of three or more turbines) within 10 km of the Proposed Development, were considered as part of the cumulative impacts assessment (CIA).

9.9.6 Within this search area there are a total of 18 developments that have been included in the CIA which include:

- Six operational wind farms;
- Nine consented wind farms; and
- Three wind farms at the application/appeal stage.

9.9.7 It should be noted that cumulative assessments may be complicated by availability of EcIA/EIAR chapters and appraisals for consented developments and, where this information is available, survey periods and methods may differ between sites. Furthermore, some wind farms may have been in existence for many years, and thus contemporary data may not be available. Information for informing the CIA was available from three application/appeal, nine consented and two operational wind farms. No EIARs were available for a further three wind farms (Hare Hill, Sanquhar and Whiteside Hill) and one consented wind farm (Auchingee Hill Farm); thus cumulative totals reflect minimum values only (see Table 9.20).

Table 9.20: Cumulative Impact Assessment

Site	No. Turbines	Distance to Proposed Development (km)	Site status	Baseline bat surveys undertaken	Bat Assessment
Windy Standard I Repower (Proposed Development)	8	N/A	EcIA	2020	Bat species considered to be of Local value. Habitat within the Proposed Development 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. A low negative impact was predicted for common, soprano and Nathusius' pipistrelles, *Myotis* sp. and brown long-eared and a moderate negative impact for noctule and Leisler's bat. No significant effects predicted.
Windy Standard II	30	Adjacent	Operational	NA	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 Rig	12	< 1.25	Consented	2014	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. 45 bat passes were recorded during transect surveys; 44 of these were Pipistrelle species, and 690 bat passes were recorded during static detector surveys; 607 of these were Pipistrelle and 81 *Myotis* species. Prior to mitigation the magnitude of impacts to bat species are considered low and not significant. Mitigation includes reducing 'light leakage' during construction, best practice measures implemented via a CEMP and appointment of an ECoW. The magnitude of residual impacts is identified as slight and not significant, with bat activity assessed as of negligible ecological value at a cumulative scale.
Afton	25	< 1.5	Operational	ES submitted 2004	Only a bat roost assessment undertaken during baseline surveys. There are no structures or trees present within the study area suitable for use as bat roosts. In addition, much of the adjacent forestry is unsuitable for roosting bats as the trees are not yet of sufficient size to afford good roosting opportunities, and much of the forestry around the reservoir has been or is being felled. Pipistrelle bats are likely to be present in the general area and may use the adjacent forested habitats in low densities. However, there is no evidence that bats are present in the study area, which does not contain any forested areas and is considered unlikely to support an important foraging resource for bats.
Windy Standard III	20	<1.5	Consented	2012	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. The timings of bat activity recorded during the automated bat surveys indicated that no bat roosts were located within or in the vicinity of the proposed wind farm, supporting the results of the walkover survey. Very low levels of bat activity were identified during the transect and static detector surveys. No significant effects predicted on local bat populations.
Pencloe Forest Resubmission	19	< 1.5	Consented	2013	Bats considered to be of Local value. No likely roost sites identified. Very low levels of bat activity were recorded on the site. The static monitoring recorded 303 bat passes in total and identified the presence of *Myotis* bat species. Common and soprano pipistrelle were recorded during transect surveys (22 passes in total).

Site	No. Turbines	Distance to Proposed Development (km)	Site status	Baseline bat surveys undertaken	Bat Assessment
					No significant impacts are anticipated on bats during construction, the apparent absence of suitable roosting habitat within the application site suggests that individual bats only use the site for commuting or foraging. Construction will only occur during the day to reduce potential disturbance to any bats, bat buffers to forest edges will be maintained. Broadleaved planting and habitat improvements will be implemented via an HMP. Following mitigation, impacts are considered low and not significant.
South Kyle	50	< 3	Consented	2010, 2012	Bats considered to be of Regional value. There was no evidence of any bat roosts within 500 m of the proposed wind farm infrastructure. Habitat quality for foraging and commuting bats within the majority of the survey area was considered to be relatively low. *Myotis* and Pipistrelle species were identified during both transect and static detector surveys. There were 93 passes recorded during transect surveys (91 Pipistrelle sp. and 2 *Myotis* sp.) and 3,501 during static detector survey including (2,111 Pipistrelle sp. and 390 *Myotis* sp.). The majority of bat passes were of commuting bats. Prior to mitigation the potential impact is considered low to negligible. Mitigation includes pre-construction roost surveys, and where disturbing roosts is unavoidable, a mitigation plan and licence will be required. Following mitigation the residual impact is considered low, not significant.
Enoch Hill	16	< 4	Consented	2012, 2013, 2014	The Development Site was assessed as being of Local value to all bat species. No results are given within the Chapter and the Technical Appendix is not in the public domain. Overall bat activity levels were reported as low, however twice as much activity was recorded for Leisler's/*Nyctalus* sp. when compared to pipistrelle species. No bat roosts were identified within the Development Site and the habitat is considered generally unsuitable for providing roosting habitat, although there were roosts identified but >1.5 km from the nearest wind farm infrastructure. Likely bat activity within the Development Site is therefore limited to foraging and commuting which is likely to be in the lower-lying, sheltered areas of the Development Site, along edge habitats and along watercourses. Bat activity recorded during transect surveys was generally low. Bat activity (dominated by pipistrelle bats) was concentrated near the boundaries, along sheltered valleys, along watercourses within the Development Site. Mitigation measures include pre-construction surveys, sensitive timing/phasing of works, keeping artificial lighting to a minimum and ensuring it is directed away from sensitive species and habitats, SNH licence applications where appropriate, compliance with the CEMP, works to be overseen by an ECoW and adoption of best practice. Residual effects on bats were considered to be negligible for operation, to small (low) for construction and not significant.
Shepherd's Rig	17	< 6	Application	2018	Bats considered to be of Regional value. No bat roosts were recorded within the site or surrounding area. There was generally low levels of foraging and commuting bat activity of predominately common and widespread bat species and this is likely due to the lack of optimal foraging habitats, such as broadleaved woodland. Overall, it was considered that effects on bats would not be significant.
Benbrack Variation	18	< 6.5	Consented	2011, 2013	All bats species encountered in the bat surveys are considered to be of Local value. No bat roosts were identified and the site is considered to be generally unsuitable to provide roosting habitat for bats. Overall bat activity levels were generally considered to be low. Very low numbers of bats were recorded; 864 passes recorded from the static detector surveys, which included Pipistrelle and *Myotis* species. It was considered that pre-mitigation effects would be negligible and not significant. Mitigation measures proposed included best practice measures, such as clearly defined working areas, implemented via a CEMP, appointment of an ECoW, work only being carried out during daylight hours and updated bat roost survey pre-construction. The magnitude of residual effects was considered negligible and not significant.
Lorg	9	< 6.5	Consented	2012, 2013	All bats species (Pipistrelle, Daubenton's Bat and *Nyctalus* sp.) encountered in the bat surveys are considered to be of Local value except for Brown long-eared which was considered to be less than Local.

Site	No. Turbines	Distance to Proposed Development (km)	Site status	Baseline bat surveys undertaken	Bat Assessment
					A small summer roost of soprano pipistrelle confirmed at Lorg farmhouse and common pipistrelle and Daubenton's bat may also use these for roosting. Higher altitude areas of the site provide low quality foraging habitat with no opportunities for roosting. Bats primarily utilised better quality habitat at lower altitudes with Lorg Farmhouse and its immediate environs being the main foraging area. In general, very low levels of bat activity were recorded with activity dominated by pipistrelle species. *Myotis* and Pipistrelle bat species were recorded during automated surveys. There were very low levels of activity recorded across the open hill tops and the majority of the activity recorded at the main site is considered to represent commuting bats with some foraging activity. Killing/ injury of foraging and commuting bats as a result of blade strikes will be resolved with relevant guidelines with regard to stand-off distances of turbines from features known to be used by bats, thereby reducing the potential for adverse effects to occur. Overall, it was considered that effects on bats would not be significant.
Sanquhar II Community Wind Farm	7	< 7	Application	2015, 2020	The site was categorised as 'low risk' for bats given the exposed, upland setting and the limited diversity and scale of the foraging and roosting habitats present. This was confirmed by survey results which located no bat roosts and recorded low numbers of bats crossing the moorland where some of the turbines are to be located. For turbines located nearer to the forestry edge mitigation measures would reduce any negative impact to a low magnitude and of minor significance with some potential for positive impact.
Hare Hill	20	< 7	Operational	NA	No likely roosts identified. In absence of suitable habitat for bats it has been concluded that it is not likely there will be any negative impacts on bats and residual impacts are considered slight (low) adverse and not significant. Mitigation includes a mammal protection plan.
Hare Hill Extension	35	< 7	Operational	NA	No habitats suitable for bats were identified during the extended Phase 1 habitat survey undertaken in 2007, and consequently no detailed bat surveys were undertaken as part of the EIA. Overall, it was considered that effects on bats would not be significant.
Sanquhar	4 (of 9) within 10 km	< 9	Operational	NA	No data available.
Auchingee Farm	3	< 9	Consented	N/A	No ES was submitted for this application and hence, there is no evidence that an assessment of bat species/populations was undertaken.
Cornharrow	8	< 9	Appeal	2016	Common and soprano pipistrelle considered to be of Local value and *Myotis* sp., Brown long-eared bat, *Nyctalus* sp. (noctule or Leisler's bat) considered to of Less than Local value. No potential bat roost was identified within 200 m of any proposed turbine and very limited roosting resources outside the turbine envelope. Bats were found to use the habitats within the turbine envelope for commuting and foraging but the levels of activity recorded in transect surveys were very low. Overall, the turbine envelope is used by relatively low numbers of bats (especially common and soprano pipistrelle) consistently throughout the hours of darkness, and throughout the active season for foraging and commuting purposes. Overall, it was considered that effects on the conservation status of bats species would not be significant.
Greenburn	1 (of 16) within 10 km	< 10	Application	2017, 2018	Bats considered to be of Regional value. There are no known bat roost sites or potentially suitable features recorded within the site. Several species recorded, in particular, *Nyctalus* and Pipistrelle species, considered to be at a comparatively high risk from wind turbine mortality. In general, higher levels of *Nyctalus* bat activity were recorded along the edges of the conifer plantation, in comparison with more open locations, away from woodland. For common and soprano pipistrelles, activity was spread more evenly across the site but also tended to be relatively high along forest edges (including openings and clearfell areas within the plantation) and also near to watercourses away from areas of woodland. The analysis of site-wide risk, determined that the site presents a Moderate to High risk to *Nyctalus* and Pipistrelle bats and without mitigation, the mortality risk to bats from collision with turbines (particularly *Nyctalus* sp.), is assessed as being significant.

Site	No. Turbines	Distance to Proposed Development (km)	Site status	Baseline bat surveys undertaken	Bat Assessment
					Proposed mitigation included maintenance of a minimum 50 m wide buffer from the wind turbine blade tips to nearest planted forest edge; Development and implementation of a site-specific turbine management protocol (curtailment) to minimise the risk of bat mortality during the operational period; and Bat activity monitoring (pre- and post-construction) and bat carcass searches (post-construction) for up to 3 years. With mitigation it was considered that effects on all species of bats would not be significant.
Whiteside Hill	4 (of 10 within 10 km	< 10	Operational	NA	No data available.
Cumulative residual effects	306				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, only seven other developments lie within the maximum foraging distance (4 km) of soprano pipistrelle the species that accounted for the large majority of records at the Proposed Development. Therefore, there is no route for some of the developments in Table 9.17 to impact upon the bat populations that utilise the Proposed Development. For all wind farm sites included in the CIA, potential bat roosting sites, where present, should be protected through embedded mitigation measures and so no significant effects on roosting sites was concluded. The activity of bats at all sites was such that collision impacts were also concluded to be of low magnitude and not significant in all cases. When looked at cumulatively, it is considered that the low impact of collision predicted at each wind farm site would not result in an overall change in the status to the local bat populations. Therefore, no significant cumulative effect on bats is predicted.

Source: Natural Power

9.9.8 With the application of good practice mitigation in relation to bats, the cumulative impact is predicted to be low negative magnitude and not significant. Therefore, no additional mitigation other than what has already been provided is required.

9.10 STATEMENT OF SIGNIFICANCE

9.10.1 An assessment has been made of the potential for significant effects of the Proposed Development on habitats and non-avian species.

9.10.2 In relation to bats, the effects as a result of the Proposed Development are assessed as being low – moderate negative but not significant.

9.10.3 By applying effective mitigation measures, mainly through the design process (embedded mitigation) and following good practice guidelines during construction including production of a HMP, the magnitude of residual effects of the Proposed Development are assessed as being low/negligible in terms of magnitude, and thus not significant.