

Chapter 6

Ecology

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List of Abbreviations and Acronyms

Abbreviation/Acronym	Description
AOD	Above Ordnance Datum (of height)
BLE	Brown long-eared bat
CEMP	Construction Environmental Management Plan
CMS	Construction Method Statement
CIEEM	Chartered Institute of Ecology and Environmental Management
DEFRA	Department of Environment, Farming and Rural Affairs
EC	European Commission
EclA	Ecological Impact Assessment
ECoW	Environmental Clerk of Works
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EPS	European Protected Species
FCS	Forestry Commission Scotland, now known as Forestry and Land Scotland (FLS)
FLS	Forestry and Land Scotland, formerly known as Forestry Commission Scotland (FCS)
GIS	Geographical Information Systems
GMBRC	Glasgow Museums Biological Record Centre
GWDTE	Ground Water Dependent Terrestrial Ecosystem
Habs Regs	The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) (the Habitats Regulations)
HMP	Habitat Management Plan
IEF	Important Ecological Feature
IEMA	Institute of Environmental Management and Assessment
JNCC	Joint Nature Conservation Committee
LBAP	Local Biodiversity Action Plan

Abbreviation/Acronym	Description
LBS	Local Biodiversity Site
Natural Power	Natural Power Consultants Limited, the lead EIA Co-Ordinator
NHZ	Natural Heritage Zone
NNR	National Nature Reserve
NVC	National Vegetation Classification
PAN	Planning Advice Note
RWE	RWE Renewables UK Developments Ltd, the Applicant
SAC	Special Area of Conservation
SBL	Scottish Biodiversity List
SEPA	Scottish Environmental Protection Agency
SNH	Scottish Natural Heritage, now known as NatureScot
SPP	Scottish Planning Policy
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)
WHS	World Heritage Site

6.1 STATEMENT OF COMPETENCE

- 6.1.1 This Environmental Impact Assessment Report (EIAR) chapter has been prepared by suitably qualified and experienced ecologists following a scoping process culminating in a scoping report issued in 2018 (see Appendix 1.1 of this EIAR). All data were collected by suitably qualified and experienced surveyors.
- 6.1.2 The author of this chapter has ten years of experience in the Ecology and Conservation sector and has been working as an Ecological Consultant for the last six and a half years. During this time, she has been involved with planning, managing and undertaking ecology surveys, and writing management plans and reports including assisting with EIAR chapters. The author has a first-class BSc (hons) in Biology and Chemistry from the University of Keele and an MSc in Environmental Monitoring, Modelling and Management from King's College, London. The author was assisted by Senior Environmental Consultants with five years of experience in undertaking Ecological Impact Assessment (EclA) and EIAR compilation, and an Associate Technical Director with ten years of experience in EclA and EIAR compilation.

6.2 INTRODUCTION

- 6.2.1 This ecological chapter of the EIAR has been prepared by Natural Power Consultants (Natural Power) on behalf of RWE (the "Applicant") in respect of the proposed Daer Wind Farm (hereafter referred to as the 'Proposed Development'). The Proposed Development comprises up to 17 wind turbines and associated infrastructure on land at Daer, South Lanarkshire and Kinnelhead, Dumfries and Galloway ("the Proposed Development Area", see Figure 6.1). The scoping process was conducted prior to ecological baseline surveys being carried out, and so no ecological features were scoped out of the EclA at the scoping stage. However, in line with the principles of proportionate EIA, embedded mitigation is considered at the outset of the assessment. Important Ecological Feature (IEF) status has only been assigned where there is still 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 EIAR chapter, where appropriate, with justification given (see Table 6.13).
- 6.2.2 An overview of the baseline ecological conditions relating to the habitats and (non-avian) fauna present within the Proposed Development Area and immediate surrounding environment is provided. Baseline ecological conditions have been established through combining the results of a desk-based review and recent ecological field surveys to obtain relevant ecological data. 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 (SNH, 2013¹ & CIEEM, 2018²) (see Paragraphs 6.2.8 to 6.2.11). This chapter establishes the ecological baseline and identifies IEFs based on the potential for ecological effects and impacts associated with the Proposed Development after the application of embedded mitigation. The potential for ecological impacts as a result of the Proposed Development during the construction, operational and decommissioning phases 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 ecological impacts have been identified and/or predicted for an IEF, appropriate mitigation to avoid or reduce the effects of such impacts are proposed. For IEFs for which greater than negligible residual effects are predicted after the application of this mitigation, Cumulative Impacts with other nearby developments have also been considered within this EclA.

- 6.2.3 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 7: Ornithology and Chapter 8: Hydrology, Geology and Hydrogeology.
- 6.2.4 The baseline studies referenced in this chapter are supported by the following technical appendices and supporting figures which provide detailed information regarding the ecological field survey methods and field data:
- Appendix 6.1: Ecology Technical Appendix
 - Figure 6.1: Ecology Survey Areas and Site Boundary
 - Figure 6.2: Bat Detector Locations and Roost Survey Area
 - Figure 6.3: Phase 1 Survey Results
 - Figure 6.4: NVC Survey Results
 - Figure 6.5: Bat Detector Results
 - Figure 6.6: Protected Mammal Survey Results (Confidential)
- 6.2.5 All Latin names for species recorded at the Proposed Development are given in Appendix 6.1.

Terminology

- 6.2.6 The following areas are defined within this chapter and its appendices;
- The 'Proposed Development': the turbines and all associated infrastructure required for Daer Wind Farm;
 - The 'Proposed Development Area': all land within the current application boundary, including the 'Primary proposed access route';
 - The 'Primary Proposed Access Route': The access routing for Daer Wind Farm – leaves the public road to the south east of the Proposed Development Area and approaches the site making use of existing forestry and wind farm tracks (included as part of the Proposed Development Area);
 - The 'Original Site Boundary': the proposed site boundary included in the Scoping Report (including Daer and Rivox land portions), which comprised a larger area than the Proposed Development.
 - The 'Daer Land Portion': Scottish Water Land Ownership, comprising of land south of Daer Reservoir. Wholly within the South Lanarkshire Local Authority Area.
 - The 'Rivox Land Portion': This Forestry and Land Scotland (formerly Forestry Commission) owned area of commercial forestry sits to the east of the Daer Land Portion. It was included within the scoping boundary but is not being considered for turbine placement at the EIA stage. Situated wholly within the Dumfries & Galloway Local Authority Area. Some of the access route goes through this land.
 - The 'Kinnelhead Development Area': Kinnelhead Land Ownership area to be developed consisting of land around and in between Hamarty Hill, Lamb Hill, Whiteside Hill and Hoarlaw. Situated wholly within the Dumfries & Galloway Local Authority Area.
 - The 'Main Wind Farm Area': the area comprising both the Daer Land Portion and the Kinnelhead Development Area. The area in which the wind turbines, met masts, substation and construction area (plus associated tracks) are proposed to be located (see Figure 6.1).
- 6.2.7 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

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

² CIEEM (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal. Chartered Institute of Ecology and Environmental Management, Winchester.

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).

Legislation, Policy and Guidance

6.2.8 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 ecological impact assessment takes account of the Chartered Institute of Ecology and Environmental Management (CIEEM) guidelines (CIEEM, 2018)².

Legislation

- Water Environment and Water Services (Scotland) Act 2003;
- Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the Habitats Directive);
- The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) (the Habitats Regulations), which transposes the Habitats Directive into law in Scotland; and
- 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");
- Wildlife and Countryside Act 1981 (as amended);
- The Nature Conservation (Scotland) Act 2004;
- The Wildlife and Natural Environment (Scotland) Act 2011;
- Protection of Badgers Act 1992 (as amended); and

Policy

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

- UK Post 2010 UK biodiversity framework;
- The Scottish Biodiversity Strategy comprising:
 - Scotland's Biodiversity: It's in Your Hands (Scottish Executive, 2004); and
 - The 2020 Challenge for Scotland's Biodiversity);
- PAN 60: Planning for Natural Heritage (Scottish Government, 2000); and
- Nature Conservation: Implementation in Scotland of the Habitats and Birds Directives: Scottish Executive Circular 6/1995 as amended (June 2000).

6.2.10 In addition, the South Lanarkshire Local Biodiversity Action Plan (South Lanarkshire Council, 2010) and Dumfries & Galloway Local Biodiversity Action Plan (Dumfries and Galloway Biodiversity Partnership, 2009) have been designed to set out regional targets for biodiversity and sustainability at a local scale.

Guidance

6.2.11 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 these guidance documents through this chapter where relevant:

- Chanin (2003b). Ecology of the European Otter³;
- CIEEM (2018). Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland²;
- Cresswell *et al.* (2012). UK BAP Mammals Interim Guidance for Survey Methodologies, Impact Assessment and Mitigation⁴;
- Dean *et al.* (2016). The Water Vole Mitigation Handbook⁵;
- Harris & Yalden (2008). Mammals of the British Isles: Handbook⁶;
- Neal & Cheeseman (1996). Badgers⁷;
- Scottish Executive (2001) European Protected Species, Development Sites and the Planning System: Interim guidance for local authorities on licensing arrangements⁸;
- SEPA (2014) Land Use Planning System SEPA Guidance Note 4: Planning Guidance on Windfarm Developments⁹;
- SNH (2012) Assessing the cumulative impact of onshore wind energy developments¹⁰;
- SNH (2016) General pre-application/scoping advice document¹¹;
- SNH (2019). Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation¹².
- SR, SNH, SEPA, FCS (2013) Good Practice during Wind Farm Construction¹³; and
- Strachan *et al.* (2011) The Water Vole Conservation Handbook¹⁴;

6.3 METHOD OF ASSESSMENT

Desk Study

6.3.1 A desk-based review was undertaken in August 2019 to collate relevant public domain survey data, scientific publications, and to obtain historical records of protected and relevant species from within the Daer Land Portion and surrounding environment. This provided background information on the habitats and species potentially present, to help inform and guide the baseline ecological field surveys and to provide context to their results. Combined with the results of the ecological field surveys, this information has been utilised to provide a

³ Chanin, P. (2003a). Ecology of the European Otter. Conserving Natura 2000 Rivers Ecology Series No. 10. English Nature, Peterborough.

⁴ Cresswell, W. J., Birks, J. D. S., Dean, M., Pacheco, M., Trehalla, 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.

⁵ Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016). The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series). Eds Fiona Mathews and Paul Chanin. The Mammal Society, London.

⁶ Harris, S. & Yalden, D.W. (eds). (2008). Mammals of the British Isles: Handbook, 4th Edition. The Mammal Society, Southampton.

⁷ Neal, E. and Cheeseman, C. (1996). Badgers. T & A D Poyser, London, p271 pp.

⁸ Scottish Executive (2001) (updated 2006). European protected species, development sites and the planning system: Interim guidance for local authorities on licensing arrangements. Scottish Executive, Edinburgh.

⁹ SEPA (2014). Land Use Planning System (LUPS), SEPA Guidance Note 4. Planning guidance on on-shore windfarm developments. Version 7. LUPS-GU4.

¹⁰ SNH (2012). Assessing the cumulative impact of onshore wind energy developments. SNH, Scotland.

¹¹ SNH (2016). General pre-application/scoping advice document, SNH, Scotland.

¹² SNH, Natural England, Natural Resources Wales, RenewableUK, Scottish Power Renewables, Ecotricity Ltd., the University of Exeter, and Bat Conservation Trust (BCT) (2019). Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation.

¹³ Scottish Renewables, SNH, SEPA, Forestry Commission Scotland (2013). Good practice during windfarm construction. 2nd edition.

¹⁴ Strachan, R., Moorhouse, T. & Gelling, M. (2011). The Water Vole Conservation Handbook. Third Edition, Wildlife Conservation Research Unit, University of Oxford, Abingdon.

comprehensive ecological baseline on which to base EclA. At the time the desk study was carried out the Primary Proposed Access Route and the Kinnelhead Development Area had not been identified, but the Rivox Land Portion was still part of the proposed Development Area. This means that the buffers for which data were sought were of the Daer and Rivox Land Portions (the Original Site Boundary). These buffers include areas of the Kinnelhead Development Area and the Primary Proposed Access Route and therefore the data obtained is considered to be representative of these parts of the Proposed Development Area.

Statutory, National and Locally Designated Sites of Nature Conservation

6.3.2 A web-based search employing the online tools SNH Sitelink¹⁵ and the Defra MAGIC Map application¹⁶ was undertaken to identify and provide information on statutory designated sites of nature conservation, located within 5 km of the Main Wind Farm Area. This was updated in September 2020 to include a buffer of the Primary Proposed Access Route. Sites designated solely for ornithological interests and of relevance to the Proposed Development are considered separately in Chapter 7: Ornithology.

Protected Species and Habitats

6.3.3 In August 2019 requests for existing records of target non-avian species within 5 km of the Original Site Boundary extended to 10 km for bat species, were made to South West Scotland Environmental Information Centre (SWSEIC) and Glasgow Museums Biological Record Centre (GMBRC).

Field Surveys

6.3.4 An overview of the field surveys used to inform this EIAR chapter is provided in Table 6.1 below. The table provides summary information of the dates, methodologies and survey extents of the field surveys. Further details of survey extents can be found in Figure 6.1.

6.3.5 Detailed information for the surveys can be found in the Technical Appendix 6.1.

Table 6.1: Summary of field surveys undertaken within the Proposed Development Area

Survey	Method/Guidance followed	Date	Survey Area
Phase 1 Habitat survey	JNCC (2010) ¹⁷	August 2019; October 2019; August and September 2020	Daer Land Portion; Kinnelhead Development Area; Primary Proposed Access Route plus 250 m buffer (access permitting)
National Vegetation Classification (NVC) survey	Rodwell (2006) ¹⁸ ; and Averis <i>et al.</i> (2004) ¹⁹	August 2019; October 2019; August and September 2020	Daer Land Portion; Kinnelhead Development Area; Primary Proposed Access Route

Survey	Method/Guidance followed	Date	Survey Area
Bat activity survey – static detectors	Hundt (2012) ²⁰ ; and SNH (2019) ¹²	May to September 2019 inclusive	Daer Land Portion
Bat roost survey	Hundt (2012) ²⁰ ; and Collins (2016) ²¹	September 2019; August 2020	Main Wind Farm Area; Primary Proposed Access Route plus 250 m buffer (access permitting)
Otter and water vole survey	Sargeant & Morris (2003) ²² ; Chanin (2003b) ²³ ; Dean <i>et al.</i> (2016) ⁵ and Bang & Dahlstrøm (2001) ²⁴	August 2019; October 2019; August 2020	Daer Land Portion; Kinnelhead Development Area; Primary Proposed Access Route plus 250 m buffer (access permitting)
Red squirrel	Gurnell <i>et al.</i> (2009) ²⁵ ; Sargeant & Morris (2003) ²² ; and Bang & Dahlstrøm (2001) ²⁴	August 2020	Primary Proposed Access Route plus 250 m buffer (access permitting)
Badger	Harris <i>et al.</i> (1989) ²⁶ ; Neal and Cheeseman (1996) ⁷ ; Sargeant & Morris (2003) ²² ; and Bang & Dahlstrøm (2001) ²⁴	August 2019; October 2019; August 2020	Daer Land Portion; Kinnelhead Development Area; Primary Proposed Access Route plus 250 m buffer (access permitting)

Source: Natural Power

Bat Surveys

6.3.6 Bat activity surveys were undertaken in 2019 with 12 static detectors (full spectrum Wildlife Acoustic SM4 detectors) placed within Daer Land Portion (see Figure 6.2 and Table 6.2). Following the methodology outlined in SNH (2019)¹² and Hundt (2012)²⁰, a minimum of ten nights of survey was conducted during 2019 in each of the bat active seasons (spring, summer, autumn). See Technical Appendix 6.1 for further details of bat roost and bat activity surveys.

6.3.7 The analysis of the bat survey data was undertaken following the methodology outlined in SNH (2019)¹². A bat pass was defined as a sequence of bat pulses captured on a 15 second Anabat 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.

¹⁵ <https://sitelink.nature.scot/home>

¹⁶ <https://magic.defra.gov.uk/MagicMap.aspx>

¹⁷ JNCC (2010). Handbook for Phase 1 Habitat survey: a technique for environmental audit. JNCC, Peterborough.

¹⁸ Rodwell J. S. (2006). National Vegetation Classification: Users' handbook. JNCC, Peterborough.

¹⁹ Averis, A. *et al.* (2004). An Illustrated Guide to British Upland Vegetation. Joint Nature Conservation Committee. Peterborough.

²⁰ Hundt, L. (2012). Bat Surveys: Good Practice Guidelines, 2nd edition. BCT, London.

²¹ Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good practice Guidelines (3rd edition). The Bat Conservation Trust, London.

²² Sargeant G. & Morris P., (2003). How to Find and Identify Mammals. The Mammal Society, London.

²³ Chanin, P. (2003b). Monitoring the Otter *Lutra lutra*. Conserving Natura 2000 Rivers: Monitoring Series No. 10. English Nature, Peterborough.

²⁴ Bang, P. and Dahlstrøm, P. (2001). Animal Tracks and Signs. Oxford University Press, Oxford.

²⁵ Gurnell, J., Lurz, P., McDonald, R., Pepper, H. (2009). Practical Techniques for Surveying and Monitoring Squirrels. Forestry Commission Scotland, Edinburgh.

²⁶ Harris S. Cresswell P & Jefferies D., (1989). Surveying Badgers. The Mammal Society, London.

6.3.8 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.

6.3.9 Survey data was input into Ecobat online tool, 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. The recommended reference range is for each species to have more than 200 records within the set radius. This was satisfied for all species, except for the locally rare Nathusius' pipistrelle and brown long-eared bat (BLE), by using the recommended 100 km radius. The fact that there are fewer than 200 records for Nathusius' pipistrelle and BLE is due to their 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 disproportionately large relative to the risks posed to these species. Therefore, comparison on Ecobat was made using a 100 km radius for all species.

Table 6.2: Static bat detector deployment locations

Detector	X	Y	Habitat	Location description	Closest turbines (distance)	Elevation (AOD)
1	297040	605452	Grassland; Heathland	Near summit of Nether Law	7 (1210 m); 10 (1225 m)	422
2	297262	606233	Grassland; Open water	Adjacent to Crook Burn and dry-stone wall.	9 (930 m); 10 (990 m); 8 (1100 m)	346
3	297953	606673	Grassland; Heathland	Lower on plateau between Type Knowes and High Knowes.	9 (300 m); 8 (410 m)	402
4	298021	606364	Grassland; Heathland	On plateau of Type Knowes.	9 (180 m); 10 (510 m)	423
5	298254	605721	Grassland; Heathland; Mire	Higher on plateau of Type Knowes.	10 (170 m); 6 (550 m)	439
6	298423	605262	Grassland; Heathland; Mire	On slope of Whiteside Hill.	6 (70 m); 10 (660 m); 6 (745 m)	490
7	299000	607236	Grassland; Heathland	On side of Earlside Hill.	5 (170 m); 4 (640 m); 3 (850 m)	392
8	299106	607512	Grassland; Heathland	Near to Shiel Burn.	5 (460 m); 3 (790 m); 4 (890 m)	378
9	299881	607129	Woodland; Grassland; Heathland	Adjacent to forest edge on Mosshope Fell.	3 (125 m); 2 (870 m)	444
10	300304	607784	Woodland; Grassland	Adjacent to forest edge.	2 (270 m); 3 (700 m); 1 (995 m)	448

Detector	X	Y	Habitat	Location description	Closest turbines (distance)	Elevation (AOD)
11	300206	606636	Grassland; Heathland; Woodland and scrub	In forest ride with scattered willow scrub along Cloffin Burn.	3 (710 m); 4 (870 m)	391
12	298998	606174	Grassland; Heathland	Near to Black Burn.	4 (575 m); 10 (865 m); 9 (880 m); 2 (920 m)	376

Source: Natural Power

Other Species

6.3.10 Whilst no specific baseline surveys were undertaken for reptiles due to their generally widespread and ubiquitous nature, relevant information was obtained through consultation with SWSEIC and GMBRC, and incidental observations of habitat suitability were recorded during field surveys.

6.3.11 Protected fish species (Atlantic salmon and lamprey spp.) were not identified as features requiring consideration in the EclA for the Proposed Development Area following completion of the desk-based review and consultation with NatureScot on baseline survey methods. None of the local fisheries boards responded to the Scoping Report.

Survey Limitations

6.3.12 The following survey limitations were experienced:

- The Kinnelhead Land Portion was added to the Proposed Development Area after the bat activity survey was undertaken. This means that no bat detectors were located within the Kinnelhead Development Area. However, the bat detector survey undertaken is still in accordance with the guidelines set out by NatureScot¹²: the number of bat detectors is in line the number of turbines proposed (12 bat detectors used for a total of 17 proposed turbines (10 detectors plus a third of the additional turbines)). Furthermore, the bat detectors were located in areas that are representative of the spread of the habitat types present across the Proposed Development Area (including the Kinnelhead Development Area), and so this is not considered to represent a constraint to the impact assessment for bats.
- Some habitat surveys were taken outwith optimal survey times (spring and summer). However, none of the habitats recorded were ambiguous (i.e. requiring component plant species to be in full growth for accurate identification) and so all sensitive habitats were able to be identified for the purposes of impact assessment.
- The digital survey information of some small areas of habitat surveyed in 2019 within the Main Wind Farm Area was lost during data submission due to technical issues (see Figure 6.3). These areas total 0.8 ha (0.03% of the habitat survey area) and are all more than 250 m away from the Proposed Development. The loss of these data will have affected calculations of the overall amounts of habitat present at the Proposed Development, and thereby calculations of habitat loss as a proportion of the total habitat present. However, given the minor amounts of habitat concerned, it is considered that the effect this has had on the final results are negligible and have no material effect on the conclusions of the EclA.
- During mammal surveys within the Primary Proposed Access Route there were two days where the weather was sub-optimal (18th and 19th August 2020), with heavy showers having occurred within the previous 24-hour period. However, water levels were recorded as being medium and most areas that were surveyed on these days were in terrestrial habitats and therefore unaffected by the weather. Otter signs were still found within

riparian habitats on these survey days, indicating that the showers were not heavy enough to wash all field signs away. Given the levels of activity recorded across the wider Proposed Development Area, it is considered unlikely that this will have had any effect on the outcome of our assessment. Water vole signs and suitability were not found in any areas even in optimal survey conditions, making it unlikely that signs of any significance were missed due to the weather. There were two other days where the water level was recorded as being high, however no surveys were undertaken in riparian habitats on these days meaning that the water level would not have had an impact on the results of the survey. See Appendix 6.1 for further details of weather conditions during mammal surveys.

- During the bat activity survey sub-optimal weather conditions (as defined in SNH (2019)¹² (temperature >8 °C; wind <5 m/s)) were recorded on several days (see Appendix 6.1 for full details of weather conditions during bat surveys). However, the Proposed Development Area is located in an upland environment, where inclement weather is common. It is therefore considered that the weather conditions encountered during the survey were representative of the general weather conditions at the Proposed Development. Details of the sub-optimal weather conditions are outlined below:
 - In spring (May) there were ten out of a total of 12 nights of survey during which the weather was sub-optimal: the dusk temperature was below 8 °C on ten nights and the median wind speed was above 5 m/s on two nights. The closest substantial settlement is Moffat, where the average temperature in May is between 5 °C and 14 °C²⁷. The Proposed Development is at a higher altitude and more exposed than Moffat and is therefore likely to have a lower average temperature. This means that the weather conditions experienced during the survey were likely to be representative of the general conditions at the Proposed Development.
 - In summer (July) there were five out of a total of 14 nights of survey during which the weather was sub-optimal, when the median wind speed was above 5 m/s. As the Proposed Development is located in an exposed location with areas of land up to 611 AOD it is considered that windy conditions are representative of the general conditions at the Proposed Development. A total of nine nights during which bat detectors were running comprised ideal survey conditions.
 - In autumn (September) there were nine out of a total of 15 nights of survey during which the weather was sub-optimal: the dusk temperature was below 8 °C on three nights and the median wind speed was above 5 m/s on seven nights. The average temperature in Moffat in September is between 8 °C and 15 °C²⁷, which means that the weather conditions experienced during the survey were likely to be representative of the general conditions at the Proposed Development. Furthermore, as outlined in summer conditions above, windy conditions are considered to be representative of the general conditions at the Proposed Development due to the exposed and elevated nature of the site.
- During Phase 1 habitat, NVC and protected mammal surveys along the Primary Proposed Access Route access was restricted from 211 ha of land (7% of the total habitat survey area) within the buffer. See Figure 6.3 for details of access limitations. It was possible to survey 92 ha of this land from the access track, to which surveyors had access. This means that 119 ha of land (4% of the total habitat survey area) within the 250 m buffer of the Primary Proposed Access Route was not surveyed. Furthermore, the Primary Proposed Access Route was amended in December 2020, after surveys had been undertaken. Therefore, a small portion of the outer limits of the 250 m buffer of the amended sections of the Primary Proposed Access Route was not surveyed (11 ha, or 0.4% of the total habitat survey area). The access track already exists in these locations, and so it is anticipated that minimal work which might affect surrounding habitats will be required for upgrading.

Approach to impact assessment

6.3.13 This section presents the approach taken to the EclA within this chapter and provides an overview of how the potential for impact has been determined and the method by which impact significance has been ascertained. The

approach to the EclA adopted within this assessment follows the CIEEM guidelines², 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)

6.3.14 In accordance with CIEEM guidelines², the importance of an ecological feature is based upon its respective elements relating to biodiversity and ecosystem services. The importance of an ecological feature is determined within a geographical frame of reference as detailed in Table 6.3.

Table 6.3: Geographical context relating to the evaluation of an IEF

Level of value	Example of IEF
International	An internationally designated site (e.g. 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 NNR, or sites meeting the criteria for national designation (such as the JNCC guidelines). Species populations/habitat areas present with sufficient conservation importance to meet criteria for SSSI selection.
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 SNH 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 semi-natural ancient woodland smaller than 0.25 ha. 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, 2018²

6.3.15 The Proposed Development Area is located within NHZ 19 (Western Southern Uplands and Inner Solway) and so this is the Region against which impacts are assessed. NHZ 19 comprises a series of upland massifs separated by valleys with coastal flats and raised beaches along the shoreline. Over half of the land in NHZ 19 is below 200 m with a mixture of habitat types, though heather moorland combined with peat is not well represented in this area. However, the Proposed Development lies between 1 and 7 km from the border with NHZ 20 (Border Hills). NHZ 20 comprises smooth and rounded mountain ranges, hill slopes and summits vegetated by montane, moorland and grassland habitats²⁸. Given the broad descriptions of these two NHZs, and the habitats, topography and landscape character within the Proposed Development Area, the Proposed Development is considered to have more in common with NHZ 20, and therefore figures for NHZ 20 are also given for reference.

²⁷ Climate-Data.org. URL: <https://en.climate-data.org/europe/united-kingdom/scotland/moffat-9872/>

²⁸ SNH. (2002). Natural Heritage Zones: A National Assessment of Scotland's Landscapes. SNH, Edinburgh.

- 6.3.16 Attributing geographical value to a feature is generally straightforward in the case of designated sites, as the designations themselves are normally indicative of level of value. For example, a SAC designated under the Habitats Directive is explicitly of European (International) importance. However occasionally a default level of value may not be appropriate in the specific context of the Proposed Development. Where this is the case professional judgement has been applied and rationale for decreasing or increasing the geographical level of value of a feature is given. An example of this might be bats, all of which are of international importance due to their protection under Annex IV of the Habitats Directive. However, if only very few foraging/commuting records of common and widespread bat species were made at a site, attributing international importance to the population present at the proposed development would be disproportionate and the importance would be reduced accordingly (noting that this does not change the protection level from a legislative standpoint). For non-designated features, the use of guidelines such as the national guidelines for the selection of SSSIs can be helpful in determining a feature's importance and level of value.
- 6.3.17 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 proposed development to warrant impact assessment within the EclA, as there are unlikely to be significant effects to their population arising from the proposed development. However, due to the level of legal protection offered to these features, they are considered in the EclA within the context of legal and policy implications.
- 6.3.18 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 integrity²⁹ can be assessed (see Paragraphs 6.3.27 to 6.3.29). 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.
- 6.3.19 In line with the principles of proportionate EIA, 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

- 6.3.20 For the purposes of this assessment and of assigning value to bats, the guidance set out by NatureScot¹² has also been considered. Table 2 in this guidance identifies the population vulnerability of bat species based on the collision risk posed for individual bat species by wind turbines as determined by behavioural characteristics, and by bat population sensitivity based upon species rarity (adapted from Wray *et al.* (2010)³⁰). Table 6.4 summarises the risk of turbine impact to bat species and the sensitivity of bat populations.

Table 6.4: Risk of turbine impact affecting bat populations³¹

Species	Turbine Impact/Collision risk	Sensitivity of Population
Nathusius' pipistrelle	High	High
Noctule	High	High
Leisler's bat	High	High
Common pipistrelle	High	Medium
Soprano pipistrelle	High	Medium

²⁹ 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.

Species	Turbine Impact/Collision risk	Sensitivity of Population
Myotis species	Low	Low/Medium
Long-eared bats	Low	Low

Source: SNH (2019)¹²

- 6.3.21 The guidance provided by Wray *et al.*³⁰ 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

- 6.3.22 The magnitude of effect is predicted quantitatively where possible. Where this is not possible, a more qualitative approach is taken. The criteria used in this assessment for describing the overall magnitude of a potential effect are summarised in Table 6.5.
- 6.3.23 The assessment also considers whether the effect 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 6.5: Criteria used within this EclA to determine the magnitude of ecological impacts

Impact magnitude	Description
Very highly negative	Total or almost complete loss of an ecological feature resulting in a permanent adverse effect on the integrity of the feature. The conservation status of the feature would be permanently affected.
Highly negative	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 long-term impacts that are small in magnitude, or larger-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, 2018²

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

³⁰ Wray, S., Wells, D., Long, E. & Mitchell-Jones, T. (2010) Valuing Bats in Ecological Impact Assessment. IEEM In-Practice p. 23-25.

³¹ Only those species which are known to occur in Scotland are included. BCT (2019). Find out more about Bats in Scotland. Available at: <https://cdn.bats.org.uk/pdf/Scottish-bats-2019.pdf?mtime=20190412121246&focal=none>

Habitat Loss Calculations

- 6.3.25 The construction of the Proposed Development would result in some permanent habitat loss to the infrastructure footprint (e.g. access tracks, turbine bases, crane hardstandings, and substations), 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 temporary loss; as such these areas are not included in calculations. Percentage habitat loss is based on the total area of each Phase 1 habitat type within the Proposed Development Area.
- 6.3.26 Habitat loss calculations are provided for all Phase 1 habitats (See Table 6.8) and taken on for impact assessment.

Determining Significance of Ecological Effects

- 6.3.27 The CIEEM guidelines² use only two categories to classify effects: “significant” or “not significant”. A significant effect is defined in ecological terms as an effect on the integrity or conservation status of a defined site, habitat or species. The significance of an effect is determined by considering the value level of the feature and the magnitude of the effect and applying professional judgement as to whether the integrity/conservation status of the feature will be affected at the given value level. This concept can be applied to both designated and undesignated sites and to defined populations.
- 6.3.28 In this assessment, an effect that threatens the integrity of a feature is considered to be significant in terms of the EIA Regulations. Effects assessed as not significant should be considered as not significant in terms of the EIA Regulations. It should be noted that, alongside the criteria provided, professional judgement is applied in determining the significance of a potential effect.
- 6.3.29 Where appropriate, mitigation and/or compensation measures, including the design process, are identified in order to avoid and reduce potentially significant effects. It is also good practice to propose mitigation measures to reduce negative effects that are not significant. The significance of residual effects on features after the effects of mitigation have been considered can then be determined, along with any monitoring requirements.

Trends and Predicted Future Baseline

- 6.3.30 In the absence of development, it is assumed that the habitat use at the Proposed Development Area would remain the same for the foreseeable future. Current habitat use within the Main Wind Farm Area is for sheep grazing and as such large areas of blanket and modified bog habitats are being actively drained to improve their quality for this purpose. In the absence of the Proposed Development this is likely to continue, leading to further modification impacts of drying and degradation of the bog habitat within the Proposed Development Area over the medium to long term.
- 6.3.31 It is more difficult to predict changes that that may occur in the longer-term (i.e. over 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.

6.4 CONSULTATION

- 6.4.1 The ‘Daer Wind Farm Scoping Report’ (see Appendix 1.1) was submitted by the Applicant to a range of consultees in December 2018. Those responses considered relevant to this chapter are summarised in Table 6.6.

Table 6.6: Summary of consultation responses to the Scoping Report

Consultee	Date	Issues raised and recommendations	Scoping response addressed
NatureScot (formerly SNH)	Feb 2019	Noted that the initial survey effort for bats will be based on medium risk, but this may be reduced if results indicate that this is justifiable.	Bats have been assessed based on the site risk level being medium.
		The reference to unpublished guidance on bats is now out of date as this has now been published.	All relevant references are to the up to date, published guidance.
Scottish Government	Mar 2019	Requested the Applicant takes account of the advice provided by Marine Scotland Science and contact the Annan District Salmon Fishery Board, the Clyde River Foundation and River Annan Trust for information on local fish stocks.	See response to Marine Scotland below.
		Scottish Ministers are aware indicative peat mapping suggests areas of deep peat and priority peatland within the area and therefore peat depth and vegetation surveys will be required as part of the EIA Report.	Detailed NVC surveys were undertaken and are assessed in this chapter. Assessment of peat depth surveys is provided in Chapter 8: Hydrology, Geology and Hydrogeology.
South Lanarkshire Council	Mar 2019	Noted that peatland and freshwater environments are considered irreplaceable in South Lanarkshire and this should be considered in the design. Mitigation against loss of these habitat types is unlikely to be considered acceptable.	The importance of sensitive habitats including blanket bog and freshwater was considered at all stages of the design process, and all infrastructure sited to avoid them where possible. As a result, only 7.8 ha of modified or blanket bog will be lost as a result of the proposed development, the majority of which (4.4 ha) is already heavily modified. The bog at the site is currently being actively drained for agricultural purposes, and this is likely to continue under the future baseline. The Applicant has committed to a Habitat Management Plan (HMP), which contains proposals for peatland restoration in c. 16 ha of land, see Paragraphs 6.6.59 to 6.6.61.
		Noted that there is no environmental records centre in South Lanarkshire and that records are generally passed onto GMBRC, with SWSEIC also likely to hold relevant data.	Records have been sought from GMBRC and SWSEIC and used as part of the assessment.

Consultee	Date	Issues raised and recommendations	Scoping response addressed
		A suitable buffer should be put in place to protect the Shiel Dod SSSI.	The SSSI is not hydrologically connected to the Proposed Development Area (See Chapter 8: Hydrology, Geology and Hydrogeology). Furthermore, all proposed infrastructure is at least 800 m from the SSSI. This means that there is no route to impact.
		Habitat Management should be considered as part of the overall EIA assessment process as it could potentially have a positive impact on the SSSI and other important habitats within the local area.	Proposals for an HMP, focussing on peatland habitats, has been considered as part of this assessment.
Marine Scotland	Jan 2019	<p>Recommends carrying out site characterisation surveys to provide information as to the presence and abundance of fish species and the water quality of watercourses which could potentially be impacted as a result of the proposed development. This would be useful for drawing up appropriate site-specific mitigation measures and establishing a monitoring programme for before, during and after construction.</p> <p>Baseline, pre-construction data collected at least 12 months prior to construction commencing, with the sites including the selection of control sites, the latter are unlikely to be impacted, should be considered within the monitoring programme. Further monitoring may be required one to two years prior to decommissioning taking place, which should be outlined in the Decommissioning Method Statement.</p> <p>Recommend contacting the Annan District Salmon Fishery Board, the Clyde River Foundation and River Annan Trust for information on local fish stocks.</p>	<p>Given the site location, size of the watercourses and water quality (most watercourses are “good” (see Chapter 8: Hydrology, Geology and Hydrogeology), it is presumed that there will be fish present in the watercourses. Good practice measures are embedded in the project to protect water quality during construction and operation, to be set out in a Construction Environmental Management Plan (CEMP) (see Paragraphs 6.6.8 to 6.6.15) and water quality monitoring and a pre-, during- and post-construction fish monitoring plan are proposed (Paragraphs 6.6.16 and 6.6.17). Given that fish have been scoped out of this EIA, and so will not be being separately assessed for impacts, it is not considered that information on local fish stocks is required to inform the baseline, and that the measures proposed are sufficient to prevent adverse impacts to fish as a result of the proposed development. Relevant fisheries trusts will be approached for their input into development and application of the fish monitoring plan.</p>

Consultee	Date	Issues raised and recommendations	Scoping response addressed
		Welcome the proposal to carry out a programme of aquatic ecological monitoring, including water quality, macroinvertebrate and fish surveys, should consent be granted. Encourage the developer to consult their generic monitoring programme for details on an integrated monitoring programme designed specifically for wind farm developments.	Noted.
		The developer should take appropriate action to minimise the spread of invasive non-native species including North American signal crayfish which is present locally, and can have a deleterious impact on salmonid stocks.	Precautionary measures to prevent the accidental spread of non-native species, including North American signal crayfish, will be included in the CEMP.
RSPB	Feb 2019	Wish to see the potential for a HMP to off-set some of the ecological impacts, explored through the EIA process. Opportunities for off-site enhancement should be considered. A draft version of the HMP (including a clear plan showing the identified HMP area) should be submitted along with the Environmental Statement. RSPB would welcome an opportunity to advise on the details of this.	Proposals for an HMP, focussing on peatland habitats, has been considered as part of this assessment.
Fisheries Management Scotland	n/a	No response received	n/a
Local district salmon fisheries boards	n/a	No response received	n/a

Source: Natural Power

6.5 BASELINE RESULTS

6.5.1 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

6.5.2 Two statutory sites of national importance for ecological interest are present within 5 km of the Proposed Development Area:

- Shiel Dod SSSI designated for Upland Habitat Assemblage including blanket bog, sub-alpine dry dwarf-shrub heath and calcareous types of spring-head, rill and flush. It is directly adjacent to the Proposed Development Area to the south west – to the west of Whiteside Hill and is roughly 800 m from the nearest proposed infrastructure.
- Lochwood SSSI designated for wood pasture and parkland, purple hairstreak butterfly and lichen assemblage. It is 1 km from the entrance to the access track where it joins the A701 public road.

6.5.3 Statutory sites designated solely for ornithological features are presented in Chapter 7: Ornithology.

Protected Species and Habitats

6.5.4 SWSEIC and GMBRC provided records of all protected or notable species occurring within 5 km of the Daer Land Portion, extended to 10 km for bat species.

6.5.5 Whilst all of these records were within a 5 km radius of the Daer Land Portion (10 km for bats), only one record (of a mountain hare) was located within the Proposed Development Area. Several of the records provided are more than five years old, and so are not necessarily indicative of continued presence of the species in question in the vicinity of the Proposed Development Area. Also it should be noted that, as with all Environmental Record Centre data, the distribution of records may be biased by the distribution of observers. Records are summarised in Table 6.7 and provided in full in Appendix 6.1.

Table 6.7: Desk study records of protected mammals, reptiles, amphibians and fish within 5 km of the Daer Land Portion (10 km for bats)

Taxon	Species	No. records	Most recent	Protection/Conservation status
Mammal	Natterer’s bat*†	7	2016	Habs Regs Sch. 2; WCA Sch. 5; SBL
	Daubenton’s bat*	7	2016	Habs Regs Sch. 2; WCA Sch. 5; SBL
	Whiskered/Brandt’s bat*	2	2016	Habs Regs Sch. 2; WCA Sch. 5
	Brown long-eared bat*	2	2016	Habs Regs Sch. 2; WCA Sch. 5; SBL
	Noctule bat*	12	2016	Habs Regs Sch. 2; WCA Sch. 5; SBL
	Nathusius’ pipistrelle*	1	2016	Habs Regs Sch. 2; WCA Sch. 5; SBL
	Common pipistrelle*†	20	2016	Habs Regs Sch. 2; WCA Sch. 5
	Soprano pipistrelle*†	13	2016	Habs Regs Sch. 2; WCA Sch. 5; SBL
	Pipistrelle bat species†	1	2016	Habs Regs Sch. 2; WCA Sch. 5
	Myotis bat species*†	5	2016	Habs Regs Sch. 2; WCA Sch. 5
	Nyctalus species*	1	2016	Habs Regs Sch. 2; WCA Sch. 5
	Bat species†	1	2016	Habs Regs Sch. 2; WCA Sch. 5
	Otter*	20	2016	Habs Regs Sch. 2; WCA Sch. 5; SBL
	Red squirrel*	175	2017	WCA Sch. 5; SBL
	Badger	43	2017	Protection of Badgers Act
	Mountain hare*	19	2016	Habs Regs Sch. 3; SBL
Brown hare*	1	2017	SBL	
Hedgehog*	5	2015	SBL	
Reptile	Common lizard*	17	2010	WCA Sch. 5; SBL
	Slow worm*†	4	2014	WCA Sch. 5; SBL

Taxon	Species	No. records	Most recent	Protection/Conservation status
Amphibian	Adder*	10	2017	WCA Sch. 5; SBL
	Common toad*	12	2015	WCA Sch. 5; SBL
	Common frog*†	19	2017	WCA Sch. 5
	Smooth newt*	5	2009	WCA Sch. 5
Fish	Palmate newt*	5	2017	WCA Sch. 5
	Atlantic salmon*	2	1985	Habs Regs Sch. 3; SBL
	European eel*	2	1985	SBL
	Brown/sea trout*	2	1985	SBL

Source: * SWSEIC; †GMBRC

Field Surveys - Habitats

Overview

6.5.6 The Proposed Development Area is located within an upland landscape context and comprises mostly marshy rush/purple moorgrass pasture to the north and modified or intact bog to the south. There are also large areas of upland acid grassland spread across the Proposed Development Area and some larger areas of flush and fen to the south. The Primary Proposed Access Route is through an area of managed coniferous plantation managed by Forestry Land Scotland. Topography within the Proposed Development Area ranges from 344 m to 611 m Above Ordnance Datum (AOD).

6.5.7 There are several watercourses within and surrounding the Proposed Development Area, including Sweetshaw Burn, Shiel Burn, Black Burn, Crook Burn and Daer Water, which runs along the southern portion of the western boundary of the Proposed Development Area. The Daer Reservoir abuts the Proposed Development Area to the northwest.

6.5.8 The simple ground cover within the Proposed Development Area is consistent with that of the surrounding area, which encompasses open moorland to the north, west and south. The Proposed Development Area also abuts the Rivox Forest conifer plantation to the east, through which the Primary Proposed Access Route runs.

Habitats Phase 1 and NVC Results

6.5.9 An overview of the Phase 1 Habitat Survey results, showing the area of recorded habitat occurring within the Proposed Development Area is provided in Table 6.8 and illustrated in Figure 6.3. Further details defining each habitat type along with target notes taken during the survey are provided within the Technical Appendix 6.1. The NVC survey characterised the habitats further and results are included in Table 6.8 and illustrated on Figure 6.4. The survey identified a range of typical upland habitat types within the Proposed Development Area to community and sub-community level where possible.

6.5.10 The NVC M25 community can represent two Phase 1 classifications: marshy grassland and wet modified bog. This community has been recorded as both Phase 1 habitat types within the Proposed Development Area, depending on the peat depths in the area of habitat. Where the peat depths average more than 0.5 m the species present within these areas are better fitted to mire (wet modified bog) as opposed to marshy grassland. Also, the NVC community M19 is represented as both blanket bog and dry modified bog Phase 1 habitat classifications at the Proposed Development. In areas where it has been classified as modified bog this shows a lack of *Sphagnum* bog moss cover.

6.5.11 GWDTEs have protection under the Water Environment and Water Services (Scotland) Act 2003, to prevent deterioration, protect and enhance the status of terrestrial ecosystems and wetlands and the aquatic ecosystems they depend on. Therefore, mitigation must be undertaken when carrying out any activities that may impact upon any of these ecosystems. The NVC survey results were used to identify potential GWDTEs. Altogether 14 NVC

communities were present which are classed in SEPA guidance⁹ 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. Further details on GWDTE assessment can be found in Chapter 8: Hydrology, Geology and Hydrogeology.

Table 6.8: Phase 1 and NVC communities present within the Habitat Survey Area with conservation designations, GWDTE potential, area within the Proposed Development Area and area and percentage of each habitat permanently lost to the footprint of the Proposed Development.

Phase 1 Habitat type	NVC Community	Conservation Designation	GWDTE potential	Area in Proposed Development Area (ha)	Area lost to Proposed Development (ha)	% lost to Proposed Development
A1.1.1 Semi-natural broadleaved woodland	W7: <i>Alnus glutinosa-Fraxinus excelsior-Lysimachia nemorum</i> woodland	Annex 1: Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> SBL: Wet woodland	High	0.03	0	0
A1.1.2 Plantation broadleaved woodland	W7: <i>Alnus glutinosa-Fraxinus excelsior-Lysimachia nemorum</i> woodland	N/A	High	2.26	0.09	3.98
A1.1.2 Plantation broadleaved woodland	W11: <i>Quercus petraea-Betula pubescens- Oxalis acetosella</i> woodland OR None	N/A	No			
A1.2.2 Plantation coniferous woodland	N/A	N/A	No	120.88	4.06	3.36
A1.3.2 Plantation mixed woodland	N/A	N/A	No	4.56	0.24	5.26
A2 Scrub	W7: <i>Alnus glutinosa-Fraxinus excelsior-Lysimachia nemorum</i>	N/A	High	2.67	0.04	1.50
A2 Scrub	W11: <i>Quercus petraea-Betula pubescens- Oxalis acetosella</i> ; W4 <i>Betula pubescens-Molinia caerulea</i> woodlands OR None	N/A	No			
A3.1 Broadleaved parkland	N/A	N/A	No	0.62	0.04	6.45
A4.2 Recently felled coniferous woodland	N/A	N/A	No	26.47	1.46	5.52
B1.1 Unimproved acid grassland	U5: <i>Nardus stricta-Galium saxatile</i> ; U6: <i>Juncus squarrosus-Festuca ovina</i> grasslands	SBL: <i>Nardus stricta-Galium saxatile</i> and <i>Juncus squarrosus-Festuca ovina</i> grasslands	No	214.99	0.75	0.35
B1.2 Semi-improved acid grassland	U2: <i>Deschampsia flexuosa</i> ; U4: <i>Festuca ovina-Agrostis capillaris-Galium saxatile</i> grasslands	N/A	No	56.17	0.5	0.89
B2 Neutral grassland	MG5: <i>Cynosurus cristatus-Centaurea nigra</i> grassland	N/A	No	20.45	0.03	0.16
B2 Neutral grassland	MG9: <i>Holcus lanatus-Deschampsia cespitosa</i> grassland; MG10: <i>Holcus lanatus-Juncus effusus</i> rush-pasture	N/A	Mod	3.39	0.03	0.88
B3 Calcareous grassland	CG10: <i>Festuca ovina-Agrostis capillaris</i> grassland	Annex 1: Species-rich <i>Nardus</i> grassland, on siliceous substrates in mountain areas; SBL: Upland calcareous grassland	High	26.67	0	0
B4 Improved grassland	MG6: <i>Lolium perenne-Cynosurus cristatus</i> grassland; MG7: <i>Lolium perenne</i> leys	N/A	No	15.90	0.29	1.82
B5 Marshy grassland	M23: <i>Juncus effusus/ acutiflorus-Galium palustre</i> mire	SBL: Purple moor-grass and rush pastures	High	348.73	1.85	0.53
B5 Marshy grassland	M27: <i>Filipendula ulmaria-Angelica sylvestris</i> mire	SBL: Lowland fens	Mod			
B5 Marshy grassland	MG9: <i>Holcus lanatus-Deschampsia cespitosa</i> grassland; MG10: <i>Holcus lanatus-Juncus effusus</i> rush-pasture; M25: <i>Molinia caerulea-Potentilla erecta</i> mire	N/A	Mod			

Phase 1 Habitat type	NVC Community	Conservation Designation	GWDTE potential	Area in Proposed Development Area (ha)	Area lost to Proposed Development (ha)	% lost to Proposed Development
B6 Poor semi-improved grassland	MG6: <i>Lolium perenne-Cynosurus cristatus</i> grassland	N/A	No	11.98	0.05	0.42
C1 Bracken	U20: <i>Pteridium aquilinum-Galium saxatile</i> community	N/A	No	1.25	0.03	2.40
C3.2 Tall herb and fen: non-ruderal	N/A	N/A	No	1.38	0.02	1.45
D1.1 Acid dry dwarf shrub heath/acid grassland mosaic	H10: <i>Calluna vulgaris-Erica cinerea</i> ; H12: <i>Calluna vulgaris-Vaccinium myrtillus</i> ; H21: <i>Vaccinium myrtillus-Racomitrium lanuginosum</i> heaths	Annex 1: European dry heaths; SBL: Upland heathland	No	20.18	0.04	0.20
D2 Wet dwarf shrub heath	M15: <i>Scirpus cespitosus-Erica tetralix</i> wet heath	Annex 1: Northern Atlantic wet heaths with <i>Erica tetralix</i> ; SBL: Upland heathland	Mod	6.86	0	0
D6 Wet dwarf shrub heath/acid grassland mosaic	M15: <i>Scirpus cespitosus-Erica tetralix</i> wet heath; U5: <i>Nardus stricta-Galium saxatile</i>	Annex 1: Northern Atlantic wet heaths with <i>Erica tetralix</i> ; SBL: Upland heathland; SBL: <i>Nardus stricta-Galium saxatile</i>	Mod	17.73	0.60	3.38
E1.6.1 Blanket bog	M17: <i>Scirpus cespitosus-Eriophorum vaginatum</i> ; M18: <i>Erica tetralix-Sphagnum papillosum</i> ; M19: <i>Calluna vulgaris-Eriophorum vaginatum</i> blanket mires; M2: <i>Sphagnum cuspidatum/recurvum</i> ; M3: <i>Eriophorum angustifolium</i> bog pools	Annex 1 and SBL: Blanket bog	No	610.31	3.95	0.65
E1.7 Wet modified bog	M15: <i>Scirpus cespitosus-Erica tetralix</i> wet heath; M17: <i>Scirpus cespitosus-Eriophorum vaginatum</i> blanket mire; M25: <i>Molinia caerulea-Potentilla erecta</i> mire (when on peat >0.5 m deep)	Annex 1: Degraded raised bogs still capable of natural regeneration; SBL: Blanket bog	No	355.27	3.34	0.94
E1.8 Dry modified bog	M19: <i>Calluna vulgaris-Eriophorum vaginatum</i> ; M20: <i>Eriophorum vaginatum</i> blanket mires	Annex 1: Degraded raised bogs still capable of natural regeneration; SBL: Blanket bog	No	137.56	1.11	0.81
E2.1 Acid/neutral flush/spring	M4: <i>Carex rostrata-Sphagnum recurvum</i> mire	Annex 1: Transition mires and quaking bogs; SBL: Upland flushes, fen and swamp	No	29.16	0.01	0.03
E2.1 Acid/neutral flush/spring	M6: <i>Carex echinata-Sphagnum recurvum auriculatum</i> mire	SBL: Upland flushes, fen and swamp	High			
E2.1 Acid/neutral flush/spring	M29: <i>Hypericum eloides-Potamogeton polygonifolius</i> spring	N/A	High			
E2.2 Basic flush/spring	M11: <i>Carex demissa-Saxifraga aizoides</i> mire	SBL: Upland flushes, fen and swamp	High	55.87	0	0
E2.2 Basic flush/spring	M10: <i>Carex dioica-Pinguicula vulgaris</i> mire	Annex 1: Alkaline fens; SBL: Upland flushes, fen and swamp	High			
E2.2 Basic flush/spring	M37: <i>Cratoneuron commutatum-Festuca rubra</i> spring	Annex 1: Petrifying springs with tufa formation; SBL: Upland flushes, fen and swamp	High			
E2.3 Bryophyte dominated flush and spring	M32: <i>Philonotus fontana-Saxifraga stellaris</i> spring	SBL: Upland flushes, fen and swamp	High	0.30	0	0

Data Source: Natural Power, Tringa Ecology

Field Surveys - Species

Bats

Bat Roost Surveys

6.5.12 Nine potential roosting features were found during the bat roost survey undertaken in September 2019 and August 2020 and these are detailed in Appendix 6.1. All potential roosting features were more than 350 m from the Proposed Development.

Bat Activity Surveys

6.5.13 In 2019, a total of c. 5,000 bat passes were recorded over 235 nights out of 492 nights of data collection (one night is counted as one night at one detector; 12 detectors were running for a total of 41 nights). A minimum of seven species/species groups (soprano pipistrelle, common pipistrelle, Nathusius' pipistrelle, *Myotis* sp., noctule, Leisler's bat and brown long-eared bat.) were recorded. See Table 6.9 for total numbers of passes recorded at the Proposed Development in 2019 for each species.

6.5.14 Activity levels at median and maximum percentiles for each species, including confidence intervals and reference ranges for EcoBat analysis, is presented in Table 6.10. Chart 6.1 shows the numbers of bat passes per night for common and soprano pipistrelles by sample locations and season. Relative activity levels for common and soprano pipistrelles at each detector are shown in Figure 6.5.

6.5.15 Detector locations, survey dates and weather conditions during bat activity surveys can be found in Technical Appendix 6.1, along with key metrics for each detector and bat species recorded.

Table 6.9: The total number of passes recorded for each species across all of the detectors.

Species/species group	Total number of passes	Percentage of total (%)*
Common pipistrelle	2738	49.9
Soprano pipistrelle	2058	37.5
Nathusius pipistrelle	23	0.4
Pipistrellus sp.	50	0.9
Noctule	8	0.1
Leisler's bat	9	0.2
<i>Nyctalus</i> sp.	14	0.3
<i>Myotis</i> sp.	566	10.3
Brown long-eared (BLE)	16	0.3
TOTAL	5482	99.9

Source: Natural Power

* The 'Total' percentage is not exactly 100% due to rounding of the percentages per species.

Table 6.10: Median and maximum percentiles for each species

Species/Species group	Median percentile	95% CI*	Max percentile	Nights of recorded activity	Reference range high	Reference range low
Common pipistrelle	51	58 - 81	98	197	1696	807
Soprano pipistrelle	43	51 - 72	98	206	1675	889
Nathusius' pipistrelle	34	34 - 78	78	5	9	7
<i>Myotis</i> species	34	8 - 35.5	87	134	880	655
Noctule	1	1 - 1	34	7	314	120
Leisler's bat	22	0	57	4	304	132
Brown long eared bat	1	34 - 34	34	12	112	46

Source: EcoBat

*CI – Confidence interval

Source: Natural Power

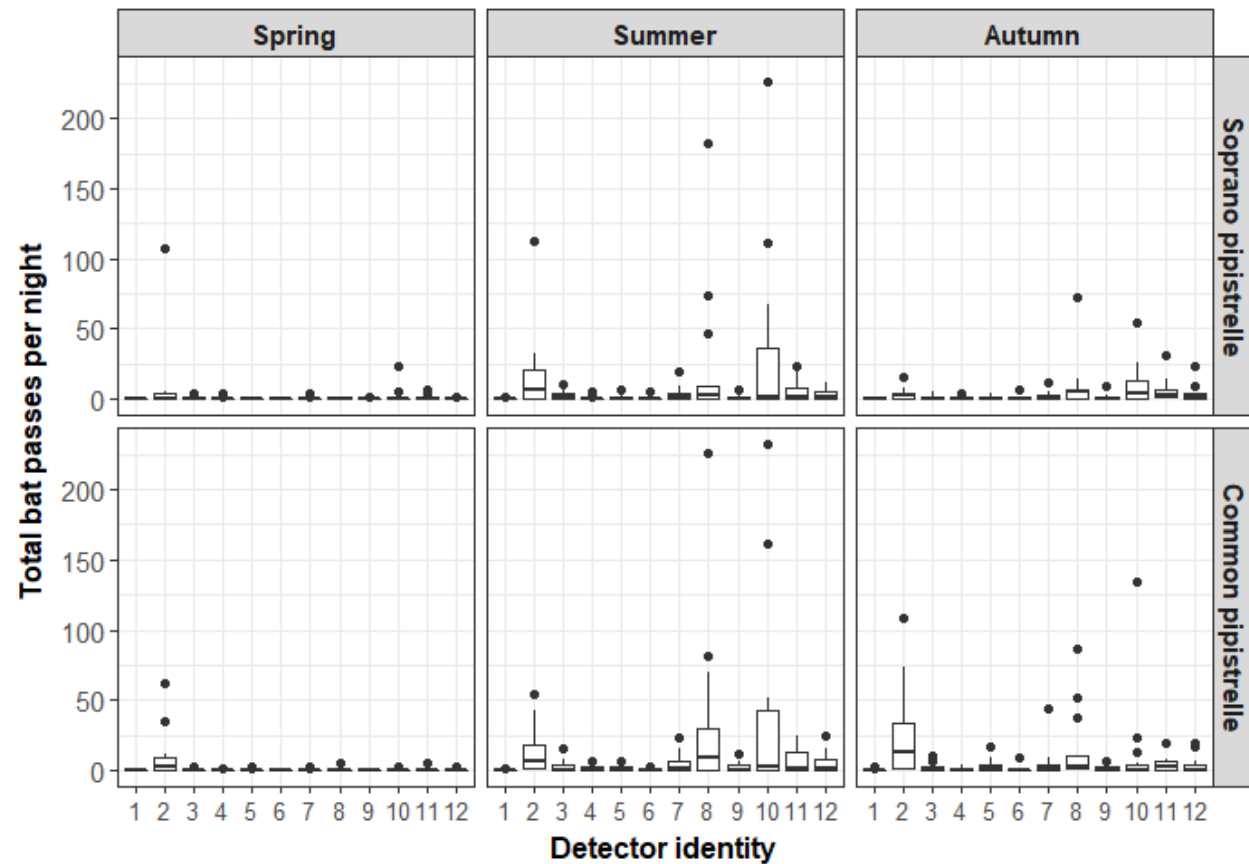


Chart 6.1: Box plots showing numbers of bat passes per night for each detector for common and soprano pipistrelle species (including zero detection nights)³².

Ecobat: Relative Abundance

6.5.16 Following NatureScot guidance¹², data from all seasons was run through Ecobat in order to provide an assessment of relative bat activity at the Proposed Development Area when compared with bat activity at sites within 100 km. Relevant results are presented within Appendix 6.1 and full copies of the reports generated are available on request.

6.5.17 Ecobat has assessed the median activity level of bats across all seasons surveyed within the Proposed Development Area to be moderate or low, and the maximum activity level to be high or moderate. Median values calculated through Ecobat do not take into account nights where no bats were detected.

Overall Risk Assessment

6.5.18 Using information provided within Tables 3a and 3b of SNH guidance¹², an overall risk assessment can be made in relation to the site and Ecobat relative activity. These tables define the Proposed Development Area as a **large** project (>10 turbines at a height of >100 m) with **low** habitat present to support bats (small number of low quality potential roost features; low quality foraging habitat; not connected to wider landscape by prominent linear features) which gives it a risk level of **3**. Based on this, the overall risk assessment for each species or species group is provided in Table 6.11.

6.5.19 Risk has been classified according to guidance, with low assessed as between 0-4, medium as 5-12 and high as 15-25.

Table 6.11: Overall risk assessment

Species	Assessment (Median)	Assessment (Maximum)
Common pipistrelle	9 (Medium)	15 (High)
Soprano pipistrelle	9 (Medium)	15 (High)
<i>Myotis</i> sp.	6 (Medium)	15 (High)
Nathusius' pipistrelle	6 (Medium)	12 (Medium)
Noctule	3 (Low)	6 (Medium)
Leisler's bat	6 (Medium)	9 (Medium)
Brown long-eared	3 (Low)	6 (Medium)

Source: Natural Power/SNH 2019¹²

6.5.20 As some species (common and soprano pipistrelle and *Myotis* sp.) were identified as having a high magnitude of risk during maximum activity levels, a further risk assessment has been carried out at the detector level in order to identify areas of the Proposed Development Area with the highest relative activity levels. This assessment is provided in Table 6.12.

Table 6.12: Risk Assessment by detector for species showing a high risk across the Proposed Development Area at maximum activity levels. Highlighted rows show detectors within 500 m of a proposed turbine where bats were assessed to be at high risk at maximum activity levels (score of 15).

Detector	Adjacent to feature?	Nearest turbine (distance)	Common pipistrelle*		Soprano pipistrelle*		Myotis sp. †	
			Med	Max	Med	Max	Med	Max
1	No	7 (1210 m)	3	9	3	6	6	9
2	Watercourse	9 (930 m)	12	15	12	15	6	12
3	No	9 (300 m)	9	12	6	12	3	9
4	No	9 (180 m)	6	12	6	9	3	6
5	No	10 (170 m)	6	15	6	12	6	12
6	No	6 (70 m)	3	12	3	12	NA	NA
7	No	5 (170 m)	9	15	6	15	3	6
8	Watercourse	5 (460 m)	12	15	12	15	3	12
9	Forest edge	3 (125 m)	9	12	6	12	3	3
10	Forest edge	2 (270 m)	9	15	12	15	3	9
11	Watercourse + forest edge	3 (710 m)	12	15	9	15	9	15
12	Watercourse	4 (575 m)	9	15	6	15	12	15

Source: Natural Power/SNH 2019¹²

* High collision risk species (SNH, 2019¹²); † Low collision risk species (SNH, 2019¹²)

6.5.21 Four of the seven of the detector locations that showed a high collision risk for bat species (at maximum activity levels) were located within 500 m of a proposed turbine (see highlighted rows in Table 6.12).

³² The 'box' shows the interquartile range, which is where the middle 50% of the data lie. The line dividing the box is the median, the mid-point of the data. The 'whiskers' extend from the box and represent the ranges for the bottom 25% and the top 25% of the

data values, excluding outliers. An outlier is any extreme value that lies further away from the box than 1.5 times the interquartile range. Outliers are shown as dots. Where very few passes are recorded it is not possible to produce the box, so the data are shown as a line.

Common and Soprano Pipistrelle

- 6.5.22 Common pipistrelle was the most frequently recorded bat species in 2019 (total 2738 passes, representing nearly 50% of the total bat passes recorded during the survey period). The highest call rate for common pipistrelle was in summer. Detection rates of common pipistrelle were spread across the Daer Land Portion. However, detectors 2, 8 and 10 had a higher percentage of nights with a high number of calls for this species. In the summer survey period common pipistrelle activity was recorded from 30 minutes after sunset and was then constant through the night. However, during the autumn survey period activity started around sunset and then dropped off after around four hours after sunset. There was less activity in the spring, but activity in spring started around 30 minutes after sunset and dropped off around three hours after sunset.
- 6.5.23 Soprano pipistrelle was the second most frequently recorded bat species in 2019 (total 2058 passes, representing nearly 40% of the total bat passes recorded across the Daer Land Portion). Together with common pipistrelle they made up nearly 90% of the total bat calls detected during the survey period. The highest call rate for soprano pipistrelle was in autumn. Detection rates of soprano pipistrelles were similar across the Daer Land Portion. However, detectors 2, 8 and 10 had a higher percentage of nights with a high number of calls for this species. Activity across the night for soprano pipistrelle was similar to that of common pipistrelle, with an earlier start for activity in autumn (starting around sunset) compared with spring and summer (starting around 30 minutes after sunset). In summer activity was spread across the night and in spring and autumn it dropped off after around three hours.
- 6.5.24 Most common and soprano pipistrelle activity was concentrated during the summer and autumn months (July and September were months of survey). Detector locations that show a high risk (at maximum activity levels) for common and soprano pipistrelles were 2, 7, 8, and 10-12. Common pipistrelles also had a high risk (at maximum activity levels) at turbine 5. At median activity levels detectors 2, 8, 10 (soprano pipistrelle) and 11 (common pipistrelle) had the highest risk assessment scores: 12, which equates to medium risk. Detectors 1, 3, 4, 6 and 9 scored no more than a medium risk for these species.
- 6.5.25 Four of the seven detector locations that were assessed as having a high collision risk for pipistrelles (at maximum activity levels) were located within 500 m of proposed turbine locations: detector 10 was located along the edge of the Rivox forestry plantation and was 270 m from proposed turbine 2; detector 8 was located along the Shiel Burn and was 460 m from proposed turbine 5; and detectors 5 and 7 were both approximately 170 m from the nearest proposed turbine (turbines 10 and 5 respectively) and neither were located near to linear features. It is thought that areas around detectors 5 and 7 are likely to be used by bats for commuting between the main watercourses in the Main Wind Farm Area.

Nathusius' Pipistrelle

- 6.5.26 Nathusius' pipistrelle were recorded very rarely across the Daer Land Portion, with a total of 23 passes for the whole survey period. Nathusius' pipistrelle were not recorded at all in the spring period and were recorded infrequently in both summer and autumn. This species was recorded only at detectors 7, 8 and 10. Relative activity of Nathusius' pipistrelle was moderately high, giving the species an overall risk assessment of medium at the Proposed Development. Activity of Nathusius' pipistrelle was mostly between 30 minutes and five hours after sunset and at least two hours before sunrise.

Nyctalus species (noctule and Leisler's bat)

- 6.5.27 Both *Nyctalus* species (noctule and Leisler's bat) were recorded in 2019. However, they were recorded very rarely (a total of 8 passes for noctule, 9 for Leisler's bat and 14 for unknown *Nyctalus* sp.). *Nyctalus* bats were only recorded during the summer and autumn survey periods. Noctules were recorded at detectors 2, 3, 5, 7 and 11; Leisler's bat were recorded at detectors 2, 6 and 11; and unknown *Nyctalus* bats were recorded at detectors 2, 7, 10, 11 and 12. These species were assessed as having a low or medium collision risk (during periods of activity) at the Proposed Development. Noctule activity was mostly between 30 minutes and seven hours after sunset and

always at least one hour before sunrise. Activity of Leisler's bat was all between 30 minutes and three hours after sunset. Unknown *Nyctalus* species activity was recorded mostly between 30 minutes and seven hours after sunset and always at least one hour before sunrise.

Myotis species

- 6.5.28 In 2019, *Myotis* species were the only species recorded in any large numbers other than pipistrelles, with *Myotis* calls making up 10% of the total number of bat calls across the Daer Land Portion in 2019 (566 calls). They were recorded most frequently at detector 12 in the summer and there were nights with a high number of calls at detector 11 in the spring. This species group was assessed as having a medium to high risk at the Proposed Development (dependent on activity levels and location). The highest activity levels for *Myotis* sp. were at detectors 11 and 12, which were assessed as being high risk to this species group at maximum activity levels. Both of these detectors were located next to a watercourse.
- 6.5.29 In spring *Myotis* sp. activity started around 1.5 hours after sunset and was spread throughout the night until approximately six hours after sunset. In summer *Myotis* sp. activity started around 30 minutes after sunset and was spread throughout the night until approximately five hours after sunset. In autumn *Myotis* sp. activity started around 45 minutes after sunset and continued throughout the night until roughly nine hours after sunset. In all month's activity ended at least one hour before sunrise and was spread fairly evenly throughout the night.

Brown long-eared bats

- 6.5.30 Brown long-eared bats were recorded very infrequently across the Daer Land Portion (a total of 16 passes for the whole survey period) and were recorded most frequently in the autumn survey period. Brown long-eared bats were recorded at detectors 1, 4, 7, 8, 10, 11 and 12, with activity recorded mostly between three and eight hours after sunset, and always at least one hour before sunrise. This species was assessed as having a low to moderate collision risk (during periods of activity) at the Proposed Development.

Otter

Signs

- 6.5.31 Otter spraints were recorded in 2019 surveys within the Main Wind Farm Area along the Sweetshaw Burn, Crook Burn and Daer Water (see Figure 6.6 and Technical Appendix 6.1). There were records of recent otter spraint on Crook Burn and Daer Water, but all spraint records on Sweetshaw Burn were considered to be old.
- 6.5.32 During the 2020 surveys along the Primary Proposed Access Route, otter signs were found along the Kinnelhead Water, Broadshaw Water, Lochan Burn and Rivox Burn.

Resting Sites

- 6.5.33 One otter holt was found along the Daer Water during 2019 surveys within the Main Wind Farm Area. Recent otter activity was assumed due to the presence of a partially eaten frog within the couch and a spraint found 13 m away. This holt consisted of an overhang created by a partially collapsed bank that would provide shelter from the weather but shallow and expose and was therefore not considered to be suitable for use as a breeding holt. Two other potential couches were found in the Main Wind Farm Area – one along the Sweetshaw Burn and the Crook Burn. All resting places were over 250 m from the Proposed Development.
- 6.5.34 During the 2020 surveys along the Primary Proposed Access Route two potential otter couches were found – one along Garpol Water (87 m from Primary Proposed Access Route) and one along Broadshaw Water (218 m from Primary Proposed Access Route). Otter spraints were also recorded along Broadshaw Water with the closest one being approximately 80 m away from the potential couch.

Water Vole

- 6.5.35 No water vole signs were recorded within the Proposed Development Area during field surveys. Burns surveyed were noted as having low potential for water vole. The banks of the burns in the Main Wind Farm Area were poached by livestock and burns within the buffer of the Primary Proposed Access Route were rocky and fast flowing. Full details of the results are in Appendix 6.1.

Red Squirrel

Signs

- 6.5.36 No surveys were undertaken for red squirrel in the Main Wind Farm Area as it is all open ground with no tree cover. Ten records of squirrel feeding signs were found during 2020 surveys along the Primary Proposed Access Route. The main areas of squirrel activity were between Ingleston and Lochan Burn (see Figure 6.6 and Technical Appendix 6.1). It is considered that these signs could be of either grey or red squirrel as both species are present within the surrounding area.

Drey Sites

- 6.5.37 No drey sites were found within the Primary Proposed Access Route during field surveys and no suitable habitat is present within the Main Wind Farm Area.

Badger

Signs

- 6.5.38 One badger latrine was found along Sweetshaw Burn during badger surveys in 2019, which was recorded as being recent (see Figure 6.6 and Technical Appendix 6.1). This was the only evidence of badger activity found during 2019 surveys within the Main Wind Farm Area. During 2020 surveys along the Primary Proposed Access Route eight badger signs were found, including runs, snuffle holes and recent digging. All badger signs were found between the Kinnel Water and the forest at Ingleston.

Setts

- 6.5.39 No badger setts were recorded within the Main Wind Farm Area during 2019 surveys. The Main Wind Farm Area offers relatively few features suitable for badger sett creation. Northern areas comprised of pasture hold the most potential for sett creation. However, the ground is relatively wet and there is little to no tree or scrub cover, which is the preferred habitat for badger setts³³.
- 6.5.40 During 2020 surveys along the Primary Proposed Access Route two badger setts were found – one main sett with at least three entrances and one outlier sett with a single entrance. The two setts were located very close together and both were within 40 m of the Primary Proposed Access Route.

Reptiles

- 6.5.41 During surveys in 2020 three areas of drystone wall were found within 10 m of the Primary Proposed Access Route that had potential for use as reptile hibernacula: two near to the Kinnel Water and one on the edge of the forest near to Ingleston.

Incidental Records

- 6.5.42 There were no incidental records of non-avian protected species in the Proposed Development Area during ornithological or ecological surveys undertaken in 2018, 2019 or 2020. However, there was an incidental record of North American signal crayfish remains being present in otter spraint found along the Daer Water during protected mammal surveys. This species is an invasive non-native species and it is an offence to move, transport

or release this species without a licence. This includes releasing an animal back to the wild if it is accidentally captured.

6.6 ECOLOGICAL IMPACT ASSESSMENT

- 6.6.1 The EclA has been undertaken in accordance with CIEEM guidelines² 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 impact significance.

Predicted Effects

- 6.6.2 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;
 - 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 affect food sources.
- 6.6.3 Embedded mitigation measures are proposed at the outset of the proposed development, to reduce impacts associated with construction and operation, as outlined below.

Embedded mitigation

Mitigation by Design

- 6.6.4 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 2: Design Evolution for detail on the overall design process.
- 6.6.5 Where possible, 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 8: Hydrology, Geology and Hydrogeology for further information regarding watercourse crossings.
- 6.6.6 The layout of the Proposed Development has avoided impacts to sensitive habitats where possible (e.g. modified and blanket bog), and areas of deepest peat and peat slide hazard zones, taking into account other constraints. Where avoidance has not been possible, the access 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 SNH good practice guidance¹³. Further detail is provided in Chapter 8: Hydrology, Geology and Hydrogeology.
- 6.6.7 All proposed turbine locations are over 101.2 m from forestry, which gives more than the 50 m buffer between turbine blade tip and nearest woodland edge as set out in current NatureScot guidance¹² in relation to bats and wind farms. This calculation is based on assumed candidate turbine dimensions set out in Chapter 3: Project Description. Buffer distance is estimated by the equation:

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

Where bl = blade length; hh = hub height; and fh = feature (tree) height – estimated here as 25 m.

³³ Woods, M. (2010). The Badger. The Mammal Society, Southampton.

Construction

- 6.6.8 A CEMP/CMS will be produced prior to construction works commencing in consultation with the Local Planning Authority(ies) (see Chapter 3: 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 construction, during construction and post-construction; and
 - Provide details of all pre-construction surveys required including methods and timings.
- 6.6.9 An ECoW will be present during enabling works and throughout the construction period of the Proposed Development. They will be a suitably experienced individual, whose role would be to provide advice so that that works are carried out in accordance with environmental measures detailed in the 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 and monitor compliance of all relevant mitigation measures and legislation (see also Chapter 8: Hydrology, Geology and Hydrogeology). The ECoW will also give regular toolbox talks to make site personnel aware of the ecological sensitivities on site. The ECoW would have the authority to stop any construction activity that is having or likely to have a significant environmental impact or be in breach of legislation.
- Habitats**
- 6.6.10 Detailed mitigation measures will be provided in the CEMP for the protection of 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.
- 6.6.11 Where possible (and where other constraints allow) 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 habitats or features, the ECoW would discuss and agree additional required mitigation to ensure impacts are minimised.
- 6.6.12 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 best practice for re-use in the restoration of areas not required for the operation of the Proposed Development. As such, any vegetation removed for the construction phase would be reinstated within the 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 best 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.

6.6.13 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.

6.6.14 Pollution incidents may occur during construction as well as within the operational phase during maintenance works. Pollution prevention measures will be detailed in the CEMP and overseen by the ECoW. Pollution with regards to waterbodies is further discussed in Chapter 8: Hydrology, Geology and Hydrogeology. Measures to control the impact of dust on sensitive habitats would be implemented during the preparation and construction phase. These measures will be adopted when necessary, in dry weather, in areas of active development, and will most likely involve the controlled dampening of tracks 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

6.6.15 The pre-construction quality of watercourses and waterbodies would be maintained during construction (see Chapter 8: Hydrology, Geology and Hydrogeology). 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.

Fish

6.6.16 A comprehensive Fish and Macro-invertebrate Monitoring Programme (FMMP) will be produced in consultation with NatureScot and local fishery boards to monitor the watercourses and the species that depend on them. The monitoring will commence during the pre-construction phase and continue during the period of construction of the Proposed Development. The requirement for operational monitoring will be determined following completion of the pre-construction and construction monitoring.

6.6.17 In order to obtain up-to-date baseline and pre-construction information regarding the status of fish populations, electrofishing surveys will be carried out along watercourses draining the Proposed Development. Macro-invertebrate monitoring will also be undertaken to establish water quality information (using biological indicator species) to assess the health of the watercourse ecosystems. This monitoring programme will run alongside the pre-construction and construction water quality monitoring detailed in Chapter 8: Hydrology, Geology and Hydrogeology which includes assessments of turbidity levels and chemical indicators of pollution as well as biological indicators.

GWDE

6.6.18 Details of how impacts upon groundwater flow are minimised and mitigated are detailed Chapter 8: Hydrology, Geology and Hydrogeology.

Species

- 6.6.19 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 suitable vehicle speed limit to be enforced within the Proposed Development;
 - Warning signs installed, where appropriate, to reduce risk of collision with protected species;
 - Covering of deep excavations, foundations and pipe openings (or a ramp installed) when not active to prevent entrapment of animals;
 - Pre-construction surveys undertaken for protected species, including bats, otter, red squirrel and badger within set buffer areas of the Proposed Development and tree felling;
 - 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 until it can be established whether it is in active use by a protected animal. If presence is confirmed then NatureScot will be consulted to discuss possible mitigation measures and/or seek an appropriate licence;
 - Watercourse crossings will be designed so as to not impede otters 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 lux³⁴ and directed away from watercourses and woodland to reduce disturbance;
 - Good practice described in FCS Guidance Note 33³⁵ is followed while undertaking felling works; and
 - All site personnel will be made aware of the presence of protected species through toolbox talks.

Operation

6.6.20 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.

- 6.6.21 Where potential effects exist, control measures will be incorporated into the operation management plan. In particular, the potential for pollution incidents during routine maintenance activities will be minimised by adoption of SEPA good practice guidance³⁶.
- 6.6.22 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.
- 6.6.23 The operation management plan will detail mitigation measures required during the operational phase relating to protected species to ensure ongoing compliance with relevant environmental legislation.

Decommissioning

6.6.24 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.* 2013³⁷). 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.

Feature Assessment

- 6.6.25 On the basis of the description of the ecological baseline and the definitions provided in Table 6.3 above, a summary of the habitats and species within the Proposed Development Area is provided in Table 6.13 below, together with the legislation and guidance.
- 6.6.26 In identification of 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. Where no significant effects are likely with the application of embedded mitigation this is specified, and the feature is not considered an IEF requiring EclA.

Table 6.13: Summary of designated sites, habitats and species and their conservation importance

Species/Habitat	Covering legislation and guidance/conservation status	Geographical level of value	IEF	Rationale
Shiel Dod 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	Shiel Dod SSSI is ~800 m from the Proposed Development at the closest point. It is designated for its upland blanket bog, dry dwarf-shrub heath and calcareous types of spring-head, rill and flush habitats. The upland habitat assemblage that the site is designated for is listed as being in favourable maintained condition. The base-rich cleughs also support an interesting flush flora which includes the Nationally Scarce hairy stonecrop <i>Sedum villosum</i> . There is no hydrological connection between the Proposed Development and the SSSI (for further information see Chapter 8: Hydrology, Geology and Hydrogeology) and as such given the distance of the SSSI from the Proposed Development it is considered that there is no likely route to impact from pollution events. There is the potential for an indirect impact from dust created during construction works. 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 the SSSI and it is not considered to be an IEF in the context of the Proposed Development.
Lochwood 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	National	No	Lochwood SSSI is located ~1 km to the east of the entrance to the Primary Proposed Access Route where it joins the A701 public road. It is an area of old parkland oakwood, designated for wood pasture and parkland, purple hairstreak butterfly and lichen assemblage. As the access route in this location already exists, the activity required for the Proposed Development in this area will be confined to vehicle movements. Given the nature of

³⁴ A standardised unit of measurement of light level intensity (illuminance)

³⁵ Forestry Commission Scotland (2006). FCS Guidance Note 33: Forest operations and red squirrels.

³⁶ SEPA, (2010). Engineering in the water environment: good practice guide - river crossings (2nd Edition), SEPA.

³⁷ 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.

Species/Habitat	Covering legislation and guidance/conservation status	Geographical level of value	IEF	Rationale
	amended) and the Nature Conservation (Scotland) Act, 2004.			development activity in this location, the distance from the track entrance to the SSSI and the nature of the features for which the SSSI is designated, it is considered that there is no route to impact to the SSSI and so it is not considered to be an IEF in the context of the Proposed Development.
Semi-natural/plantation broadleaved woodland and scrub	Annex 1 of Habitat's Directive; SBL; GWDTE	Negligible	No	<p>1.5% of scrub and 4% of plantation broadleaved woodland within the Proposed Development Area would be lost to the Proposed Development. Although some examples of the W7 NVC community (which some areas of these habitats were recorded as) may correspond with priority habitat on Annex 1 and the SBL, the habitats found within the Proposed Development Area are restricted to very small patches of habitat within coniferous plantation and are not typical of the W7 community. As such, areas of scrub and broadleaved plantation within the Proposed Development Area are not considered to represent Annex 1 or SBL priority habitats. These habitats therefore have negligible conservation value and are not considered to be IEFs.</p> <p>Some areas of this habitat have high potential to be 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 8: Hydrology, Geology and Hydrogeology.</p>
Coniferous and mixed plantation woodland	NA	Negligible	No	The habitat in the Proposed Development Area holds little to no conservation interest and is widespread throughout Scotland. This habitat is therefore not considered to be an IEF.
Improved and semi-improved grassland	NA	Negligible	No	The habitat in the Proposed Development Area holds little to no conservation interest and is widespread throughout Scotland. This habitat is therefore not considered to be an IEF.
Unimproved acid grassland	SBL	Local	No	Some of this habitat will be lost as part of the Proposed Development (0.8 ha/0.35% of habitat within Proposed Development Area). All areas of unimproved grassland within the Proposed Development Area correspond with habitats that are included on the SBL, however this is a watching brief only 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.
Calcareous grassland	Annex 1 of Habitat's Directive; SBL; GWDTE	Local	No	<p>None of this habitat will be lost as part of the Proposed Development, and all proposed infrastructure is > 100 m away from it. There is 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 so it is not considered to be an IEF.</p> <p>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 8: Hydrology, Geology and Hydrogeology. This habitat is not considered to be an IEF and is therefore not discussed further in this chapter.</p>
Marshy grassland	SBL; GWDTE	Local	No	<p>Some of this habitat will be lost as part of the Proposed Development (1.9 ha/0.5% of habitat within Proposed Development Area). Most areas of this habitat that will be lost to the Proposed Development have no conservation value (M25 marshy grassland makes up 75% of the marshy grassland habitat within the Proposed Development Area). 20% of the total area of marshy grassland habitats found within the Proposed Development Area are priority habitats on the SBL (M23 and M27). Of these two communities only a low proportion of the more widespread M23 community will be lost to the Proposed Development. The CEMP will include provision for micro-siting of infrastructure where possible to ensure construction does not impact on the most sensitive areas of this habitat. 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.</p> <p>This habitat has moderate and high potential to be a GWDTE (depending on the NVC classification of the area). Given that some infrastructure will be located within 250 m of these habitats, the proposed development could have an impact on the hydrology of this habitat. Further discussion of GWDTEs is presented in Chapter 8: Hydrology, Geology and Hydrogeology.</p>

Species/Habitat	Covering legislation and guidance/conservation status	Geographical level of value	IEF	Rationale
Dry heath	Annex 1 of Habitat's Directive; SBL	Negligible	No	Some of this habitat will be lost as part of the Proposed Development (0.04 ha/0.2% of habitat within Proposed Development Area). Dry heath is a priority habitat on Annex 1 and the SBL. 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 at the Proposed Development. 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 very 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.
Wet heath	Annex 1 of Habitat's Directive; SBL; GWDTE	Negligible	No	No pristine wet heath habitat will be lost as part of the Proposed Development. However, 0.6ha of wet heath/acid grassland mosaic (3.38% of this habitat within Proposed Development Area) will be lost to infrastructure. Wet heath is a priority habitat on Annex 1 and the SBL. However, in mosaic with acid grassland it is common and widespread and not considered to be an example of priority habitat, or to appreciably enrich the ecological resource within the local context, and therefore the wet heath that will be lost as a result of the Proposed Development is considered to be of negligible geographical 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, 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 and is not discussed further in this chapter. This habitat 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 8: Hydrology, Geology and Hydrogeology.
Wet/dry modified bog and blanket bog	Annex 1 of Habitat's Directive; SBL	Regional	Yes	This habitat is the most commonly found in the Proposed Development Area (>50% (modified and blanket bogs combined) of the total area). A total of 8.4 ha of blanket and modified bog will be lost to the Proposed Development. That constitutes 0.8% of blanket and modified bog habitats within the Proposed Development Area. Blanket and modified bog are priority habitats on Annex 1 and the SBL. The habitat is widespread throughout Scotland. However, blanket bog communities are under-represented within the region. Blanket/modified bog is therefore considered to be important in regional terms. Due to the extent of habitat loss, the Proposed Development could have a significant impact on this habitat. Therefore, blanket and modified bog is considered to be an IEF.
Flushes and springs	Annex 1 of Habitat's Directive; SBL; GWDTE	Local	No	A small area of acid/neutral flush will be lost to the Proposed Development (0.01 ha/0.03% of habitat within the Proposed Development Area) and there will be no loss of other flush/spring habitats. Some areas of acid/neutral flush are a priority habitat on Annex 1 and the SBL. However, the area of habitat loss is of a habitat type included on the SBL as a watching brief only. This means that the habitat has only small conservation value. There are some areas of acid/neutral and basic flush that are located within 50 m of the Proposed Development, therefore these habitats could be impacted by dust and compaction through vehicles tracking over them, or by pollution. These areas of habitat will be identified in the CEMP and protected during construction to minimise the potential for impacts. Sensitive areas will be marked out by the ECoW and infrastructure will be microsituated to avoid the most sensitive areas, where possible. Furthermore, given that these habitats have high potential for being GWDTEs the Proposed Development could impact on the hydrology of these habitats. Further discussion of GWDTEs is presented in Chapter 8: Hydrology, Geology and Hydrogeology. As areas of this habitat lost to the Proposed Development are very small and have only a low conservation value this habitat is not considered to be an IEF and is therefore not discussed further in this chapter.
Running water	SBL	Local	No	A river and a number of small burns are located within the Proposed Development Area. Rivers and burns are listed on the SBL. These habitats are widespread across Scotland and South Lanarkshire/Dumfries and Galloway. 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 8: Hydrology, Geology and Hydrogeology. This habitat is not considered to be an IEF and is therefore not discussed further in this chapter.
Open water	SBL	Local	No	The Daer Reservoir abuts the western boundary of the Proposed Development Area. Standing water is listed on the SBL. These habitats are widespread across Scotland. Protection for standing water is embedded in the project design through good practice. Protection measures will be

Species/Habitat	Covering legislation and guidance/conservation status	Geographical level of value	IEF	Rationale
				outlined in the CEMP. Further information on standing water can be found in Chapter 8: Hydrology, Geology and Hydrogeology. This habitat is not considered to be an IEF and is therefore not discussed further in this chapter.
Bats	Conservation Regulations; Wildlife and Countryside Act; SBL	Local	Yes	No bat roosts or potential bat roosts were identified within 200 m of the Proposed Development and overall recorded bat activity levels (other than common and soprano pipistrelles) within the Proposed Development were low. Most of the species recorded were common and widespread and known to occur throughout Scotland, with the exception of Nathusius' pipistrelle, which is a rare species in the UK. Nathusius' pipistrelle is considered to be at high risk of collision with wind turbines but as there were very few recordings of this species (a total of 23 throughout the survey period), the Proposed Development Area is likely to be used by only low numbers of individuals on an infrequent basis. Common and soprano pipistrelles had high activity levels recorded within the Proposed Development Area. Although these species are common and widespread across Scotland, they have a high collision risk. There is therefore a possibility that the Proposed Development could have a significant effect on bat populations within the Proposed Development Area. This means that bats are considered to be an IEF.
Otter	Habitat Regulations; Wildlife and Countryside Act; SBL	Local	No	Otter resting places were found in the Proposed Development Area. There were two potential resting places found within 250 m of the Primary Proposed Access Route. Otter activity was also found on the Crook Burn near to the water crossing point for the site track, and a probable holt was located on the Daer Water over 1 km away from the Proposed Development. This was not considered to be suitable for use as a breeding holt, but would offer shelter from the weather. Otters are widespread across Scotland and in the local area of the Proposed Development, and the levels of activity recorded indicate that while otter are present at the Proposed Development this is unlikely to be in sufficient numbers to consider the population of greater than Local value. Embedded mitigation measures, including protection via a SPP and a CEMP and pre-construction surveys, will be implemented during construction and operation to prevent a breach of legislation pertaining to this species. A significant effect on the integrity of the local population of otter arising as a result of impacts associated with the proposed development is considered unlikely, and as such they are not considered an IEF, in line with the principles of proportionate EIA.
Water vole	Wildlife and Countryside Act; SBL	Likely absent	No	There was no evidence of any water vole activity in the Proposed Development Area and the habitat potential for water vole was low. Therefore, there is no route to impact for this species. This means that it is not considered to be an IEF and will not be discussed further in this chapter.
Red squirrel	Wildlife and Countryside Act; SBL	Local	No	Squirrel feeding signs were found in woodland along the Primary Proposed Access Route. No dreys were found but there is some potential for impact on red squirrels during construction of the Primary Proposed Access Route, through destruction of dreys as new dreys may be constructed before/during construction. However, the Proposed Development would be unlikely to have a significant impact on the population of red squirrel within the site as any disruption would be minimal and temporary. Furthermore, embedded mitigation, including pre-construction and pre-felling surveys to ensure no dreys will be destroyed as outlined in Paragraph 6.6.19, will be sufficient to minimise any impacts on this species to negligible. Therefore, red squirrel are not considered to be an IEF.
Badger	Protection of Badgers Act	Local	No	Two badger setts were found near to the Primary Proposed Access Route with suitable habitat for sett creation and foraging present along the Primary Proposed Access Route within the Proposed Development Area. Several badger signs were found along the Primary Proposed Access Route near to the area in which the two setts were found (between Kinnel Water and Ingleston). This suggests that this area is used frequently by foraging badgers. Signs were not found anywhere else along the Primary Proposed Access Route, which suggests that badgers do not frequently use the forest between Ingleston and the Main Wind Farm Area for foraging or commuting. There was very minimal evidence of badger within the Main Wind Farm Area (only one latrine found). The Proposed Development would therefore be unlikely to have a significant impact on the population of badger within the site as no setts will be disturbed and any disruption will be temporary. Furthermore, embedded mitigation outlined in Paragraphs 6.6.8 to 6.6.24, including a CEMP and Species Protection Plan, will ensure no breach of legislation relating to this species. Therefore, badger are not considered to be an IEF.
Reptiles	Wildlife and Countryside Act (protected against trade); SBL	Local	No	Consultation with SWSEIC and GMBRC provided records of adder, common lizard and slow worm within 5 km of the Site. Habitat and potential refugia/hibernacula are present within the Proposed Development Area. However, the Proposed Development would be unlikely to have a significant impact (in EIA terms) on the population of reptiles within the site as any disruption would be minimal and temporary. Furthermore, embedded mitigation outlined in Paragraphs 6.6.8 to 6.6.24, including toolbox talks and the implementation of a speed limit, will be sufficient to minimise any impacts to these species to negligible at a population level. Therefore, reptiles are not considered to be an IEF.
Amphibians	Wildlife and Countryside Act (protected against trade); SBL	Negligible	No	Records of common frog, common toad, palmate newt and smooth newt were returned from within 5 km of the Proposed Development Area through consultation with SWSEIC and GMBRC. Common frog was observed regularly within the Proposed Development Area. However, the Proposed

Species/Habitat	Covering legislation and guidance/conservation status	Geographical level of value	IEF	Rationale
Brown/mountain hare	SBL	Negligible	No	Development would be unlikely to have a significant impact on the population of amphibians within the site as any disruption would be minimal and temporary. Furthermore, embedded mitigation outlined in Paragraphs 6.6.8 to 6.6.24, including toolbox talks and the implementation of a speed limit, will be sufficient to minimise any impacts to these species to negligible at a population level. Therefore, amphibians are not considered to be an IEF. Records of brown and mountain hare were returned from within 5 km of the Proposed Development Area through consultation with SWSEIC and GMBRC. One record of mountain hare was within the Proposed Development Area. However, the Proposed Development would be unlikely to have a significant impact (in EIA terms) on the population of hares within the site as any disruption would be minimal and temporary. Furthermore, embedded mitigation outlined in Paragraphs 6.6.8 to 6.6.24, including toolbox talks and the implementation of a speed limit, will be sufficient to minimise any impacts on this species to negligible. Therefore, hares are not considered to be an IEF.

Source: Natural Power

Impact Assessment

6.6.27 Two features have been identified as IEFs, requiring EclA following the application of embedded mitigation (see Paragraphs 6.6.8 to 6.6.24). These are:

- Blanket bog
- Bats

6.6.28 Assessment of impacts of the proposed development on these IEFs is provided below.

Blanket and modified bog

6.6.29 The Proposed Development is considered likely to have a **low magnitude** and **not significant** effect on blanket and modified bog.

6.6.30 Direct impacts will occur to blanket bog habitat from the construction of the Proposed Development. Construction activities have the potential to indirectly impact the hydrological flow and connectivity affecting the integrity of the habitat type. In addition, dust particles have the potential to interfere with peat forming species such as *Sphagnum sp.* and other sensitive plants. There is also a small risk of water pollution incidents occurring during the construction phase of the Proposed Development, potentially impacting on the plant species present. However, application of embedded mitigation implemented via construction phase plans such as the CEMP reduces the likelihood and magnitude of these impacts to low and not significant.

6.6.31 The principal impact of the Proposed Development to blanket bog is via permanent habitat loss. The total extent of blanket and modified bog habitats lost to the footprint of the Proposed Development is 8.4 ha, which comprises 0.8% of the habitat within the Proposed Development Area and 0.4% of the estimate of all blanket and modified bog habitat within NHZ 19 (see Table 6.14). The Proposed Development Area is close to NHZ 20 and is of a character more in line with the description of this area than NHZ 19. The total extent of blanket and modified bog lost comprises 0.1% of the estimate of all blanket and modified bog habitat within NHZ 20.

Table 6.14: Comparison of areas of bog habitats within the Proposed Development Area with NHZ 19 habitat area, showing area of habitat lost to Proposed Development as total area and percentage of Proposed Development Area and NHZ habitat estimates.

Phase 1 Habitat	Area within Proposed Development Area (ha)	Area lost to Proposed Development (ha)	% habitat in Proposed Development Area lost	Estimated area of habitat in NHZ 19 (ha) ³⁸	% habitat in NHZ 19 lost	Estimated area of habitat in NHZ 20 (ha) ³⁸	% habitat in NHZ 20 lost
E1.6.1 Blanket bog	610.31	3.95	0.65	992.2	0.4	6727.2	0.06
E1.7 Wet modified bog	355.27	3.34	0.94	1039.4	0.3	1583.1	0.2
E1.8 Dry modified bog	137.56	1.11	0.81	908.6	0.1	908.4	0.1
Combined	1103.14	8.4	0.8	2114.7*	0.4	8380.4*	0.1

Source: Natural Power; SNH (2001)³⁸

*These figures are not a total of all figures above because there is overlap in NVC communities (as described in SNH (2001)³⁸) between habitat types.

6.6.32 Phase 1 habitat types have been used to calculate habitat loss calculations as some NVC communities can be classified as either modified bog or marshy grassland/wet heath (e.g. M25 and M15), depending on the peat depth. However, NVC communities can help to determine areas of highest quality bog.

6.6.33 Blanket and modified bog communities that will be lost to the Proposed Development are M17, M19, M20 and M25. As described in Paragraphs 6.6.4 to 6.6.6, the layout of the Proposed Development has avoided bog habitats where possible, taking into account other constraints. As such, areas of the highest quality bog habitat at the Proposed Development (in particular areas of M18 blanket mire) have been avoided as part of the design process, and the extent of this habitat affected by the Proposed Development is a very small proportion of the habitat available, particularly in relation to the extensive modification of bog habitat which is already taking place under baseline conditions. Without mitigation it is considered that impacts associated with loss of blanket bog at the Proposed Development will lead to a low, not significant negative effect on the integrity of this feature at a Regional level. Although this is not considered to be a significant effect a proposed HMP is detailed below. This comprises

³⁸ SNH. (2001). Natural Heritage Zones: A National Assessment of Biodiversity (Habitats). SNH, Edinburgh.

restoration of highly modified and degraded bog habitats, resulting in an overall net increase of good quality blanket bog habitats at the Proposed Development, and reversing some of the baseline modification which may be expected to continue in the absence of the Proposed Development. With the application of this mitigation the magnitude of residual effect is expected to be low beneficial, and not significant (see Table 6.15).

Bats

Construction

- 6.6.34 Bats are considered to be of local nature conservation importance and after application of embedded mitigation the impact during construction is considered to be **negligible** and **not significant**.
- 6.6.35 Nine potential roosting features were found during surveys within the Proposed Development Area, however these were all more than 350 m from the Proposed Development and therefore will not be affected by the Proposed Development. Static detector data did not highlight any activity likely to be indicative of nearby roosts i.e. significant bat activity recorded close to known emergence times for species found within the Proposed Development Area. Activity was recorded for some species within around 30 minutes of sunset, and so there may be roosts within the wider area, but there was no activity recorded around sunrise and so it is considered unlikely that there are any significant roost locations nearby.
- 6.6.36 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 of short-term temporal magnitude only. Furthermore, the implementation of lighting mitigation as included within CEMP and outlined within embedded mitigation (see Section 6.6) 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.
- 6.6.37 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. This will include any tree clearance on the Primary Access Route

Operation

- 6.6.38 During the operational phase, rotating turbines present a risk to flying bats as a result of potential collision³⁹ when flying in close proximity to turbines. Recent research work by Exeter University (DEFRA 2016⁴⁰) 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.
- 6.6.39 The Proposed Development Area offers some limited foraging and commuting corridors along the adjacent forestry edge, burns and the adjacent Daer Reservoir. There were no potential roost sites found within 100 m of the Proposed Development during field surveys. The overall bat activity level within the Proposed Development is considered to be moderate. The Proposed Development is therefore considered of **local** conservation importance for all occurring species of bats.
- 6.6.40 Bat activity levels are classified according to the guidance provided by SNH¹² and relative activity levels based on the output provided by Ecobat can be found in Technical Appendix 6.1.

Common and Soprano Pipistrelle

- 6.6.41 The effect of the Proposed Development on common and soprano pipistrelles during operation is predicted to be **moderately negative** and **not significant**.
- 6.6.42 Common and soprano pipistrelle bats were both recorded at the Proposed Development and were assessed as being at a medium to high collision risk at both the site level and detector level. Some detectors where these species were assessed as being at a medium to high collision risk were near to where turbines are proposed (in particular near to forest edges). Both species are assessed as having a high collision risk with wind turbines, but due to both species being common and widespread across Scotland they have only a medium population vulnerability to wind turbines.
- 6.6.43 Detectors 1, 3, 4, 5 and 6 are the most comparable locations regarding habitat for much of the Proposed Development as they are located along ridge lines and away from the Rivox forest. All of these detectors, except for detector 5, had low or moderate relative activity levels of pipistrelle species and were assessed as low or medium risk to pipistrelle species. The location of detector 5 was assessed as having a high collision risk for common pipistrelle (but not soprano pipistrelle) at the maximum activity level recorded.
- 6.6.44 However, there are seven turbines (2, 3, 4, 6, 13 and 14) within 500 m of the forest edge. These turbine locations are most comparable to detectors 7, 9 and 10 in terms of habitat. Detectors 7 and 10 were assessed as having a medium collision risk at median activity levels and a high risk at maximum activity levels. Turbines have been set back from the forest edge in line with NatureScot guidance¹² (see Paragraph 6.6.7). Therefore, it is likely that some turbines within the Proposed Development will pose a medium collision risk to common and soprano pipistrelles overall.
- 6.6.45 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 so would not be significant.

Nathusius' pipistrelle

- 6.6.46 The effect during operation on Nathusius' pipistrelle is considered to be **low negative** and **not significant**.
- 6.6.47 Nathusius' pipistrelle bats are assessed by SNH guidance¹² 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 variable. This meant that this species was assessed as being at medium risk (during periods of activity) at the Proposed Development. Nathusius' pipistrelle were recorded on five nights during the survey period at detectors 7, 8 and 10 (which are all within 500 m proposed turbine locations).
- 6.6.48 According to the research work by Exeter University⁴⁰, 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 (a total of 23 passes). If it were assumed that there were 14% more Nathusius' pipistrelle passes during the survey period then this would result in only 26.22 passes in total, which is still very low.
- 6.6.49 On the few nights in which this species was recorded the relative activity levels were sometimes moderately high. However, the relative activity levels are based on a small number of nights (7), due to the rarity of the species within Scotland. Ecobat recommends using a reference range of 200 nights, which was achieved for all other

³⁹ Barotrauma, injury caused by a change in air pressure, affecting typically the ear or the lung has previously been suggested as a potential cause of bat deaths at wind farms. However it is unlikely to be a significant cause of bat fatalities. Modelling of changes of air pressure caused by rotating turbine blades suggests that the low-pressure region over the blade suction side is extremely localized and bats that experience the low-pressure region are likely to impact the blade. Furthermore, observations showed that most bat deaths occurred at low wind speeds near 5 m/s, when bats are the most active. Fatalities at higher wind speeds (> 5 m/s) are less common, likely because fewer bats are flying in these conditions. Considering that the pressure changes around wind

turbine blades at low wind speeds are insignificant and that there are few bat deaths at higher wind speeds, it seems unlikely that barotrauma is a significant cause of bat fatalities around wind turbines, and that most bat fatalities are a result of blade strikes. See Lawson et al. 2018 Estimating the Likelihood of Bat Barotrauma using Computational Simulations and Analytical Calculations. NREL poster presentation to the AWEA siting meeting in March 2018.

⁴⁰ DEFRA (2016). Understanding the Risk to European Protected Species (bats) at Onshore Wind Turbine Sites to inform Risk Management. University of Exeter.

species. This therefore makes it easy for activity rates to score at a high percentile as compared with other locations.

- 6.6.50 Overall, the activity levels and overall collision risk assessment indicates that the Proposed Development Area is not commonly used by Nathusius' pipistrelle. 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 so would not be significant.

Nyctalus species (noctule and Leisler's bat)

- 6.6.51 The effect during operation on *Nyctalus sp.* is considered to be **low negative** and **not significant**.
- 6.6.52 Leisler's bat and noctule bats are assessed as having high population sensitivity in SNH guidance¹². For the periods during which these species were active, they were assessed as having low or medium collision risk at the Proposed Development. Noctules were recorded at detectors 2, 3, 5, 7 and 11 and Leisler's bat were recorded at detectors 2, 6, 8 and 11. Noctules were recorded on a total of seven nights (with a total of eight passes); Leisler's bat were recorded on a total of four nights (with a total of nine passes); and unidentified *Nyctalus sp.* were recorded on a total of ten nights (with a total of 14 passes) during surveys in the Proposed Development Area.
- 6.6.53 This activity level indicates that the Proposed Development Area is not commonly used by these species. According to the research work by Exeter⁴⁰, 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 species passes during the survey period then this would result in 9.68 noctule; 10.89 Leisler's; and 16.94 *Nyctalus sp.* passes in total, which is still very low.
- 6.6.54 Overall, the activity levels and collision risk assessment indicates that the Main Wind Farm Area is not commonly used by *Nyctalus* bats. 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 so would not be significant.

Myotis species

- 6.6.55 The significance of effect during operation is considered to be **low negative** and **not significant** effect. *Myotis sp.* are assessed by SNH guidance¹² to be of low risk in terms of collision and threat to national populations. This species group was assessed as having a medium to high risk at the Proposed Development (dependent on activity levels and location). The highest activity levels for *Myotis sp.* were at detectors 11 and 12, which were assessed as being high risk to this species group at maximum activity levels. Both of these detectors were located along watercourses and were more than 500 m from proposed turbine locations. Relative activity levels of *Myotis sp.* at detectors located in habitats most similar to turbine locations (detectors 3-7, 9 and 10) were low to moderate, even at the maximum activity levels recorded on site.

Brown long-eared bat

- 6.6.56 The significance of effect during operation is considered to be **low negative** and **not significant** effect.
- 6.6.57 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 (SNH, 2019¹²). This species was assessed as having a low to moderate collision risk

(during periods of activity) at the Proposed Development. Brown long-eared bats were recorded on 12 nights during the survey period (with a total of 16 passes) and were recorded at detectors 1, 4, 7, 8, 10, 11 and 12, but at low rates at each detector.

Predicted Effects – Decommissioning

- 6.6.58 Decommissioning would be expected to lead to short term, temporary disturbance on habitats and species. For all habitats and 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)

- 6.6.59 A Habitat Management Plan (HMP) for the Proposed Development will be provided, subject to consultation with the landowner, NatureScot, South Lanarkshire Council and Dumfries and Galloway Council. The main aim of this HMP will be to improve and restore areas of blanket and modified bog within the Proposed Development Area.
- 6.6.60 As described in the Trends and Future Baseline section (Paragraphs 6.3.30 to 6.3.31), much of the blanket and modified bog within the Proposed Development Area already has areas of extensive drainage and/or haggling and erosion, and so has good potential for peatland restoration. Restoration will focus on ditch blocking to rewet drained areas of peatland and restoration of areas of eroding peat. Suitable locations have been identified in which to undertake peatland restoration, totalling c. 16 ha. The most appropriate methods to be used are dependent on a number of factors, including peat depth, topography, and extent of degradation/ modification. It is proposed that specific methods to be employed will be decided and agreed with consultees post-consent, as part of the production of the draft HMP.
- 6.6.61 A monitoring regime would be included as part of this plan in order to assess the effectiveness of management measures implemented as part of the HMP.

6.7 CONCLUSIONS

- 6.7.1 It is predicted that unmitigated the Proposed Development would have a no significant effects on any IEFs but will have a **moderate negative** (not significant) effect on common and soprano pipistrelle bats and a **low negative** (not significant) effect on other bat species and on blanket and modified bog. Despite the absence of significant effects, a Habitat Management Plan (HMP) is proposed, with the aim of restoring areas of modified and damaged bog habitats within the Proposed Development Area. It is considered that this will reduce the magnitude of the residual impacts to peatland habitats to low beneficial, not significant. 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 6.15 below.

Table 6.15: 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								
Wet/Dry modified and blanket bog	Regional	Permanent habitat loss; changes to hydrology via drainage.	Low negative	Not significant	A HMP is proposed which will restore areas of blanket and modified bog within the Proposed Development Area.	Low beneficial	Not significant	Level of certainty: Probable
Bats	Local	Displacement or disturbance to foraging or commuting bats from construction activity and/or through habitat loss.	Negligible	Not significant	Nothing in addition to embedded mitigation.	Negligible	Not significant	Level of certainty: Certain
Operation								
Wet/ Dry modified and Blanket bog	Local	Accidental pollution incident leading to contamination of habitats.	Low negative	Not significant	The potential for chance pollution incidents during routine maintenance activities will be minimised by adoption of best practice guidance.	Low negative	Not significant	Level of certainty: Probable
Common and soprano pipistrelle	Local	Collision risk to bats.	Moderate negative	Not significant	Nothing in addition to embedded mitigation.	Moderate negative	Not significant	Level of certainty: Probable
Nathusius' pipistrelle; Noctule; Leisler's bat; Myotis sp.; Brown long-eared bat	Local	Collision risk to bats.	Low negative	Not significant	Nothing in addition to embedded mitigation.	Low negative	Not significant	Level of certainty: Probable

Source: Natural Power

Residual Effects

6.7.2 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.

6.8 CUMULATIVE IMPACTS

6.8.1 SNH guidance 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 the guidance, any wind farm developments of fewer than three turbines 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.

6.8.2 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 and soprano pipistrelles, these have been scoped into the cumulative assessment, along with bog habitats which also have low beneficial residual effects predicted.

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

6.8.4 Within this search area, data were sought for a total of five developments (and one extension) for inclusion in the cumulative impact assessment which comprise:

- **Lion Hill Wind Farm (consented)** – This is a 4-turbine consent, which has not been built out, close to the north of the Proposed Development Area.
- **Clyde Wind Farm (operational)** – This is a 152-turbine operational site, located further to the north of the Proposed Development Area.
- **Clyde Wind Farm Extension (operational)** – is also partially within 10 km of the Proposed Development, being located further north of the Clyde Wind Farm, to the north of the A74 (M). The Extension was included in the CIA due to the EIA for Clyde Wind Farm not being accessible.
- **Crookedstane Wind Farm (consented)** – This is 4-turbine consent, which has not been built out, located to the north of the Proposed Development Area, and to the west of the Clyde Wind Farm.
- **Harestanes Wind Farm (operational)** – This is a 68-turbine operational site, located to the south east of the Proposed Development Area, being found to the south of the Kinnelhead Land Portion. An extension to this wind farm development, known as Harestanes South Wind Farm Extension.
- **Minygap Wind Farm (operational)** – This is a 10-turbine operational site, located to the south east of the Proposed Development Area on open ground to the east of the Harestanes Wind Farm.

6.8.5 It should be noted that cumulative assessments may be complicated by availability of EIAR/ES 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 two consented and

three operational wind farms. No ESs were available for a further two wind farms (Clyde and Minnygap); thus cumulative totals reflect minimum values only (see Table 6.16).

Table 6.16: Cumulative Impact Assessment

Site	Daer (Proposed Development)	Lion Hill	Clyde	Clyde Extension	Crookedstane	Harestanes*	Minnygap	Cumulative residual effects
No. Turbines	17	4	152	54	4	68	10	309 turbines
Site status	EIA	Consented	Operational since 2012	Operational since 2017	Consented	Operational since 2014	Operational since 2017	
Baseline surveys undertaken	2019	2011 and 2012	ES could not be accessed.	2009 and 2010	2013	2002 and 2003	ES for wind farm could not be accessed. EIA for Access route: 2014	
Species								
Bats	Moderate magnitude of impact predicted for common and soprano pipistrelles. Bats considered to be Local value. Moderate-high activity of common and soprano pipistrelle . Moderate activity of <i>Myotis sp.</i> , low activity of Nathusius' pipistrelle, noctule, Leisler's and brown long-eared bat. No confirmed roosts, limited roosting features.	Bats not considered in EIA. No trees or buildings onsite with no suitable roosting, commuting or foraging habitat. No activity surveys necessary.	ES could not be accessed.	Low magnitude of impact predicted. Common and soprano pipistrelles considered at Local value, other bats negligible . No predicted effects on bats. Mitigation not required. Records of common pipistrelle, soprano pipistrelle and <i>Myotis sp.</i> Single recording of noctule bat and brown long-eared bat . Very low levels of bat activity across study area. Roosting features very limited across site.	Low magnitude of impact predicted. No significant effects from fatalities predicted. Records of common pipistrelle, soprano pipistrelle and <i>Myotis sp.</i> Activity levels were highest close to the woodland edge habitat at the conifer plantation. No suitable roosting habitat available.	Very low risk of collision. Overall, Minor positive and not significant impact predicted. Records of soprano pipistrelle, pipistrelle sp. and Daubenton's bat . Soprano pipistrelle roosts confirmed alongside two other pipistrelle sp. roosts . Vegetation expected to develop in keyhole areas resulting in increase of suitable foraging habitat including forest edge, rough grass and dry blanket bog with heather. Considered positive impact.	Access route: Low likelihood loss of roosting sites.	1 x moderate negative 2 x low negative magnitude at local value. 1 x minor beneficial magnitude.
Habitats								
Bog	8.4 ha of blanket and modified bog to be lost. 16 ha identified for restoration under HMP.	0.048 ha lost	0.69 ha lost (information found in Harestanes ES)	16.3 ha blanket bog lost 12.3 ha modified bog lost Convert 176 ha of modified bog to blanket bog	0 ha lost	Up to 0.3 ha lost Development of additional areas of bog in keyholed areas during operation - minor positive	Access route: 0.19 ha Wind Farm: 0.8 ha (information found in Harestanes ES)	39 ha lost 192 ha modified bog restored 153 ha additional bog restored overall

Source: Natural Power
* Only able to access Supplementary Environmental Information

6.8.6 With the application of best practice mitigation in relation to bats, the cumulative impact is predicted to be low negative magnitude and not significant. With the restoration of bog habitats as part of HMPs for the Proposed Development and Clyde Wind Farm Extension there will be an overall positive regional impact on blanket bog. An additional 153 ha of bog will be restored above the extent of bog habitat loss. Therefore, no additional mitigation other than what has already been provided is required.

6.9 STATEMENT OF SIGNIFICANCE

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

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