Chapter 8 Ecology

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List of Abbreviations

Abbreviation	Description
AOD	Above Ordnance Datum (of height)
BCT	Bat Conservation Trust
CEMP	Construction Environmental Management Plan
CIA	Cumulative Impact Assessment
CIEEM	Chartered Institute of Ecology and Environmental Management
CMS	Construction Method Statement
CoWRP	Control of Woodland Removal Policy
Defra	Department of Environment, Farming and Rural Affairs
DVC	Deer-vehicle collisions
EEC	European Economic Community
EcIA	Ecological Impact Assessment
ECoW	Environmental Clerk of Works
EIA	Environmental Impact Assessment
et al.	*et alia* – and others
FCS	Forestry Commission Scotland, now known as Forestry and Land Scotland
FMMP	Fish and Macro-invertebrate Monitoring Plan
GIS	Geographical Information Systems
GWDTE	Ground Water Dependent Terrestrial Ecosystem
ha	Hectares
HBRG	Highland Biological Recording Group
HMP	Habitat Management Plan
ID	Identification number

Abbreviation	Description
IEF	Important Ecological Feature
IUCN	International Union for Conservation of Nature
JNCC	Joint Nature Conservation Committee
LBAP	Local Biodiversity Action Plan
LBS	Local Biodiversity Site
Natural Power	Natural Power Consultants Limited, the author
NHZ	Natural Heritage Zone
NNR	National Nature Reserve
NWC	New Water Crossing
NVC	National Vegetation Classification
PAN	Planning Advice Note
PRF	Potential (bat) Roost Feature
SAC	Special Area of Conservation
SBL	Scottish Biodiversity List
SEPA	Scottish Environmental Protection Agency
SNH	Scottish Natural Heritage, now known as NatureScot
sp.	Exact species unidentified (e.g. pipistrelle sp. represents a pipistrelle bat that was not able to be identified to species level)
spp.	Relating to all species within the specified genus (e.g. *Sphagnum spp.* relates to all species of *Sphagnum* bog moss)
SPP	Scottish Planning Policy
SR	Scottish Renewables
SSSI	Site of Special Scientific Interest
SWT	Scottish Wildlife Trust
T	Turbine (number)
THC	The Highland Council
UNESCO	United Nations Educational Scientific and Cultural Organisation
UK BAP	United Kingdom Biodiversity Action Plan (now superseded by the Nature Conservation (Scotland) Act (2004)
WCA	Wildlife and Countryside Act (1981)
WHS	World Heritage Site

8. Chapter 8 Ecology

8.1. Executive Summary

8.1.1. In order to inform the Ecological Impact Assessment (EcIA), baseline ecology surveys were undertaken in 2019. These included Phase 1 and National Vegetation Classification (NVC) habitat surveys, protected mammal surveys and bat surveys (roost assessment and activity surveys) following standard NatureScot guidance. Additional Phase 1 and NVC habitat surveys were undertaken in 2021 in areas not previously surveyed in 2019 that were within 300 m of the Proposed Development infrastructure (at the design chill stage).

8.1.2. An assessment has been made of the predicted significance of effects of the Proposed Development on ecological interests. This assessment predicted no significant effects on all of the Important Ecological Features (IEFs) recorded and no significant cumulative effects on any IEFs.

8.1.3. Habitat enhancement measures targeted at wet heath and blanket bog are proposed. Embedded mitigation measures to minimise impacts of the construction and operation of the Proposed Development on IEFs, and to prevent a breach of legislation under the *Wildlife and Countryside Act* (1981) as amended by the *Nature Conservation (Scotland) Act* (2004) are outlined. A Species Protection Plan (SPP) is proposed and good practice guidance regarding protected species and pollution prevention will be followed, with an ECoW employed during construction. Further mitigation in the form of a Habitat Management Plan (HMP) to restore blanket bog and wet heath habitats is proposed. It is considered that implementation of these mitigation and habitat enhancement measures will reduce the likelihood of impacts on IEFs at the appropriate biogeographical scale.

8.2. Introduction

8.2.1. This chapter describes the non-avian ecological interest at the Proposed Development site and assesses the predicted effects of the Proposed Development on these interests. It details the methods used to identify the baseline ecological community within the Proposed Development and surrounding locale, and the process used to determine the nature conservation value of the ecological features present. The chapter then sets out the potential impacts of the Proposed Development on ecology during construction, operation and decommissioning, and assesses the significance of potential effects on IEFs, including cumulative effects, at an appropriate bio-geographic scale. An assessment of residual effects, taking into consideration proposed embedded mitigation measures, is also provided. Avian ecology is assessed in **Chapter 7: Ornithology**, of the Environmental Impact Assessment (EIA) Report and hydrology is assessed in **Chapter 9: Geology, Peat, Hydrology and Hydrogeology**, which support this chapter.

8.2.2. This chapter has been prepared by suitably qualified and experienced ecologists following an extensive scoping process culminating in a Scoping Report issued in 2021. All data were collected by suitably experienced surveyors.

8.2.3. Following submission of the Scoping Report and subsequent consultation, this chapter focusses only on those features which have potential to be significantly affected by the Proposed Development, or for which the predicted effects are currently unknown, in line with the updated *Chartered Institute of Ecology and Environmental Management* (CIEEM) guidelines (CIEEM, 2018).

8.2.4. The following features were surveyed for but were subsequently scoped out of the EIA Report during the scoping process following agreement with NatureScot (previously known as Scottish Natural Heritage (SNH)):

- Badger (*Meles meles*);
- pine marten (*Martes martes*);
- red squirrel (*Sciurus vulgaris*); and
- all statutory and non-statutory designated sites of nature conservation importance (not including those designated for birds).

8.2.5. Survey methods, survey results and impact assessment are therefore not provided for these ecological features in this chapter. Baseline survey results for these ecological features can be found in the Scoping Report for the Proposed Development (refer to **Appendix 4.2**).

8.2.6. Potential impacts of the construction, operational and decommissioning phases have been reviewed, with particular attention paid to species and habitats of high vulnerability and conservation concern (*Scottish Biodiversity List* (SBL) or *Local Biodiversity Action Plan* (LBAP) species/habitats).

8.2.7. All survey data, including details of survey dates, times and weather conditions, plus results data, are available on request.

8.2.8. **Table 8.1** below contains a list of Figures and Appendices associated with this chapter.

Table 8.1: Ecology Figures and Appendices

Number	Title
Figure 8.1	Ecology Survey Areas
Figure 8.2	Static Detector and Potential Roost Locations
Figure 8.3	Phase 1 Habitat Overview
Figure 8.4	NVC survey results (a to f)
Figure 8.5	2019 Protected Mammal Survey Results (and also within Confidential **Appendix 8.2**)
Appendix 8.1	Technical Appendix
Appendix 8.2	Confidential Appendix
Appendix 8.3	Outline Habitat Management Plan

Terminology

8.2.9. The following areas are defined within this chapter:

- The 'Proposed Development': the turbines and all associated infrastructure required for Lethen Wind Farm.
- The 'site': all land within the application boundary.
- The 'site boundary': is the proposed application boundary for the Proposed Development.
- The 'survey area': describes the area within which the ecological surveys took place and refers to the previously proposed site boundary plus a defined surrounding buffer area which is stated in the methodology for the species/group being surveyed.

8.3. Legislation, Policy and Guidelines

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

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 Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017;
- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017; and
- The Wildlife and Natural Environment (Scotland) Act 2011

Policy

8.3.2. 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);
- 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).
- Scottish Planning Policy (SPP) (Scottish Government 2014)
- EU Exit: The Habitats Regulations in Scotland (Scottish Government, December 2020)

Guidance

8.3.3. 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 throughout this chapter where relevant:

- Chanin (2003). Ecology of the European Otter;
- CIEEM (2018). Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland;
- Cresswell *et al.* (2012). UK BAP Mammals Interim Guidance for Survey Methodologies, Impact Assessment and Mitigation;
- Dean *et al*. (2016). The Water Vole Mitigation Handbook;
- Harris & Yalden (2008). Mammals of the British Isles: Handbook;
- Scottish Executive (2001) European Protected Species, Development Sites and the Planning System: Interim guidance for local authorities on licensing arrangements;

- SEPA (2014) Land Use Planning System SEPA Guidance Note 4: Planning Guidance on Windfarm Developments;
- SNH (2012) Assessing the cumulative impact of onshore wind energy developments as updated by NatureScot in 2021;
- SNH *et al.* (2019, updated 2021) Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation;
- Scottish Renewables (SR), SNH, Scottish Environmental Protection Agency (SEPA), Forestry Commission Scotland (FCS) (2019) Good Practice during Wind Farm Construction;
- Strachan *et al*. (2011) The Water Vole Conservation Handbook;
- Scottish Biodiversity List (SBL)[1]; and
- International Union for Conservation of Nature (IUCN) Red List (IUCN, 2021).

8.4. Consultation

8.4.1. As per good practice guidelines (CIEEM, 2018), a Scoping Report for the Proposed Development was issued to a range of consultees in January 2021. This document contained details of the proposed assessment methodology and IEFs proposed for full impact assessment and those features to be scoped out (agreed with consultees) of impact assessment on the basis that construction and operation of the wind farm would not likely result in significant adverse effects to them. Details of the feedback from consultees on the Scoping Report and the resulting actions are provided in **Table 8.2**. Only aspects of the scoping responses with relevance to ecology have been included, other aspects will be addressed in the relevant chapters.

Table 8.2: List of Consultee Responses

Consultee	Issues raised and recommendations	Scoping response addressed
NatureScot March 2021	Advised that the layout of the Proposed Development is determined by habitat survey, hydrological assessment and peat probing results to avoid direct and indirect impacts to priority habitats. Where impacts cannot be avoided, they should be minimised and opportunities to mitigate or compensate for this should be identified.	Direct and indirect impacts to priority habitats have been minimised where possible. An outline Habitat Management Plan (HMP) is included as **Appendix 8.3,** setting out compensation for the loss of bog and wet heath habitats.
	Advised that if wild deer are present on or use the site then an assessment of potential impacts on deer welfare, habitats, road safety, neighbouring and other interests should be undertaken. Where significant impacts may result, a deer management statement should be provided, either as part of a Habitat Management Plan (HMP), a stand-alone document or modification of an existing Deer Management plan.	An assessment of impacts of the Proposed Development on wild deer has been included in this chapter (see **Paragraphs 8.6.34-8.6.41**).

[1] Scottish Biodiversity List (SBL): https://www.nature.scot/scotlands-biodiversity/scottish-biodiversity-strategy/scottish-biodiversity-list

Consultee	Issues raised and recommendations	Scoping response addressed
	Advised that a suitable area of modified blanket bog should be identified and restored as compensation for the estimated loss of any functioning blanket bog which cannot be avoided. The compensatory area should be of sufficient size and assessed for suitability.	Only 0.25 ha of quality blanket bog will be lost to the Proposed Development. An additional 9.9 ha of modified bog will also be lost. However, an area of modified blanket bog will be restored, as set out in the outline HMP included as **Appendix 8.3.**
Royal Society for the Protection of Birds (RSPB) March 2021	Advised that an HMP should be prepared and submitted with any application.	An outline HMP is included as **Appendix 8.3**.
	Advised that a suitable area of modified blanket bog should be identified and restored as compensation for the estimated loss of any functioning blanket bog which cannot be avoided.	Only 0.25 ha of quality blanket bog will be lost to the Proposed Development. An additional 9.9 ha of modified bog will also be lost. However, an area of modified blanket bog will be restored, as set out in the outline HMP included at **Appendix 8.3** to this chapter.
The Highland Council (THC) March 2021	Advised that if wild deer are present or will use the site an assessment of the potential impact on deer will be required. This should address deer welfare, habitats and other interests.	An assessment of impacts of the Proposed Development on wild deer has been included in this chapter (see **Paragraphs 8.6.34-8.6.41**).
	Advised that the EIA Report needs to address the aquatic interests within local watercourses, including downstream interests that may be affected by the Proposed Development.	A water quality and fisheries monitoring plan is part of the embedded mitigation of the Proposed Development. This will be written upon consent and will be implemented at least one year prior to wind farm construction. See **Chapter 9** for further information on water quality.
	Advised that habitat enhancement and mitigation measures should be detailed, particularly in respect to blanket bog, in the context of biodiversity conservation.	Only 0.25 ha of quality blanket bog will be lost to the Proposed Development. An additional 9.9 ha of modified bog will also be lost. However, an area of modified blanket bog will be restored, as set out in the outline HMP (**Appendix 8.3**).
	Advised that construction down the west side of the site could have an adverse impact on woodland along the Leonach Burn. It is advised that a specific EIA chapter on forestry is included given that existing woodland is present on site. The EIA Report should provide a baseline survey of the trees and plants (including fungi, lichens and bryophytes) present on the site to determine the presence of any rare or threatened species.	No development is planned within the area of existing woodland in the west of the site and the closest proposed infrastructure is over 180 m from any woodland. This means that the area of woodland will not be impacted by the Proposed Development. Therefore, no additional forestry surveys were carried out and a forestry chapter is not required, as was presented in the Gatecheck Report to THC.
Scottish Forestry March 2021	Recommended that all impacts on woodland are set out in one section of EIA Report for the Proposed Development. Also advised that any woodland removal for development purposes will be subject to *Scottish Governments' Policy on Control of Woodland Removal* (CoWRP).	No development is planned within the area of existing woodland and closest proposed infrastructure is over 180 m from any woodland. This means that the area of woodland will not be impacted by the Proposed Development and no trees will be removed as part of the Proposed Development. Therefore, a standalone forestry chapter is not required. An

Consultee	Issues raised and recommendations	Scoping response addressed
		assessment on the impacts to woodland are included within this chapter.
Findhorn, Nairn and Lossie Rivers Trust March 2021	Wish to see that all river crossings are designed to ensure that all fish species migration is facilitated, bridges over large tributaries should be clear span design while on small tributaries, if culverts are used these should be sunk into the riverbed to allow fish and sediment passage.	Noted. Water crossings will be designed to allow access for fish species. See **Chapter 9** for further information.
	Requires that a water quality and fisheries monitoring plan is developed to ensure that no detrimental effects are evident in the fish populations downstream of the Proposed Development. This plan should include the following elements: water quality monitoring, invertebrate monitoring and fish monitoring, and it is essential that at least one year data is collected prior to the commencement of construction.	A Water Quality and Fisheries Monitoring Plan is part of the mitigation proposals included for the Proposed Development. This will be written upon consent and will be implemented at least one year prior to construction of the Proposed Development. See **Chapter 9** for further information on water quality.
East Nairnshire Community Council March 2021	Had concerns over wording within the Scoping Report in relation to disturbance, displacement and collision risk to bats: "*We have concerns over wording within the scoping report "the greater good of the project over the disturbance, displacement, and collision of bats*"	The text referenced in the Community Council response is not present within the Scoping Report. The Proposed Development has been designed taking into account potential bat roosting features and areas of high bat activity on site, in particular along some watercourses in the north of the site (see **Paragraphs 8.7.7-8.7.8** for further information). Other areas of the site showed moderate levels of relative bat activity. Bat species have been fully assessed within **Section 8.7** of this chapter.
Marine Scotland Science July 2020	Recommended that a water quality and fish population monitoring programme is carried out to ensure that the proposed mitigation measures are effective.	A Water Quality and Fisheries Monitoring Plan is part of the mitigation proposals included for the Proposed Development. This will be written upon consent and will be implemented at least one year prior to construction of the Proposed Development. See **Chapter 9** for further information on water quality.

8.5. Assessment Methods and Significance Criteria

Desk Study

Protected Species and Habitats

8.5.1. To provide background information pertaining to the baseline status of protected species in the local environment, requests for existing records of target non-avian species within 5 km of the site boundary, extended to 10 km for bat species, were made to Highland Biological Recording Group (HBRG). Data were initially requested in 2018 for the previous 10 years (2008-2018). Further data were requested in 2021 for the period of 2018-2020. Therefore, desk study data included in this assessment are from 2008-2020.

Deer

8.5.2. A desk-based study was undertaken in June 2021 to determine the deer species and numbers present within the site boundary and the wider area. The study consisted of consultation with the following resources:

- Lethen Estate Woodlands Forest Plan 2017-2026;
- Defra's online Magic Map Application (to search for sites designated for habitats within 10 km of the Proposed Development);
- NatureScot's Sitelink website (to assess the vulnerability of the designated site to deer with regards to habitat, distance and connectivity with the site); and

Deer count density polygons and deer-vehicle collisions points from NatureScot's Natural Spaces online database.

Field Surveys

8.5.3. An overview of the field surveys used to inform this chapter is provided in **Table 8.3** below. The table provides summary information of the dates, methodologies and survey extents of the field surveys. Further details of survey extents and access restrictions can be found in **Figure 8.1**. Access was restricted in areas to the north and west of the site boundary.

8.5.4. Detailed information including exact dates and methodologies for the surveys can be found in the **Appendix 8.1**.

Table 8.3: Summary of Field Surveys Undertaken

Survey	Method/Guidance followed	Date	Survey Area
Phase 1 Habitat survey	Joint Nature Conservation Committee (JNCC) (2010)	July and August 2019	2019 site boundary
		June 2021	Areas within 300 m of infrastructure layout at design chill not already surveyed in 2019
National Vegetation Classification (NVC) survey	Rodwell (2006) Averis *et al.* (2004)	July and August 2019 June 2021	2019 site boundary Areas within 300 m of infrastructure layout at design chill not already surveyed in 2019
Bat activity survey – static detectors	Hundt (2012); and SNH *et al.* (2019)	May to September 2019 inclusive (three deployments)	2019 site boundary (see **Figure 8.2** for detector locations)
Preliminary bat roost assessment	Hundt (2012); and Collins (2016)	April 2019	2019 site boundary with 200 m buffer (access permitting)
Bat roost monitoring – static detectors	Hundt (2012)	01 to 09 August 2019	2019 site boundary (see **Figure 8.2** for detector locations)
Otter (*Lutra lutra*) and water vole (*Arvicola amphibius*) survey	Sargeant & Morris (2003); Chanin (2003); Dean *et al.* (2016) and Bang & Dahlstrøm (2001)	August and September 2019	2019 site boundary with 250 m buffer (access permitting)

Bat Activity Surveys

8.5.5. Bat surveys were undertaken in 2019 following standard guidance (SNH, 2019). Based on this guidance and the number of proposed turbines, fourteen static detectors were placed on site near to turbine locations at the time of deployment (where possible) and in locations representative of habitats on site, with four of these detectors being placed along watercourses (see **Table 8.4** and **Figure 8.2**). Proposed turbine locations have moved since the 2019 bat activity survey, but the survey results are still representative of bat usage at the site given that the habitat and land use at the turbine and detector locations are comparable.

Table 8.4: Bat Detector Locations

Bat detector	Grid reference	Nearest Turbine	Distance from turbine (m)	Location description/linear features
1	NH 94208 36576	4	1,075	Wet heath; ditch <25 m
2	NH 93655 33473	17	833	Dry heath; no linear features
3	NH 92318 32895	16	1,161	Wet heath; watercourse <25 m
4	NH 91613 34066	15	438	Acid grassland; watercourse adjacent
5	NH 92161 33706	16	465	Wet heath; no linear features
6	NH 93570 36303	4	668	Modified bog; ditch <25 m
7	NH 91857 35068	12	273	Dry heath; watercourse adjacent, placed on lone standing tree
8	NH 92712 35441	9	403	Wet heath; watercourse <50 m
9	NH 91961 35771	8	234	Coniferous woodland; along woodland edge
10	NH 93302 37394	2	278	Dry heath; Tomlachlan Burn adjacent, placed on lone standing tree
11	NH 92400 36616	6	111	Wet heath; no linear features
12	NH 91963 37269	5	423	Dry heath; Leonach Burn adjacent
13	NH 92349 38003	1	306	Modified bog; standing water/linear bog erosion feature adjacent
14	NH 94096 34166	14	617	Wet heath; no linear feature adjacent

8.5.6. Static detectors were deployed in spring, early summer and autumn for 12-14 nights duration, per deployment:

- 29 May – 11 June 2019 (Survey 1),
- 17 – 31 July 2019 (Survey 2); and
- 5 – 19 September 2019 (Survey 3).

Survey Limitations

8.5.7. The following survey limitations were experienced:

8.5.8. During the bat activity survey some bat detectors produced no audio files and/or no log files but no detector issues were recorded by surveyors. Usually, it is expected that after a deployment that both audio and log files would be produced by the detector. It was assumed that where either audio or log files were present that the detector had worked correctly (no audio files could mean that no detectable sounds were made during the deployment, i.e., no bat passes; where audio files were recorded but no log file it was assumed that the detector had worked due to the presence of audio files). Detectors 4 and 9 produced no audio files

during the autumn deployment and it was therefore assumed that there were no bat passes at these locations in autumn and this has been included in the assessment. Detector 9 produced no log file but more than 1300 audio files during the summer deployment and these were included in the assessment. Only one detector, during one deployment, did not record either an audio file or a log file: during the autumn deployment one bat detector (detector 11) produced no audio or log files. It was assumed that there had been a fault with the detector due to the absence of any files. Therefore detector 11 was removed from bat analysis for the autumn deployment. However, this is not considered to have a significant impact on the survey results.

8.5.9. No weather station was deployed during spring and summer bat detector surveys in 2019 and as a result, detailed site-specific weather data was not collected for these survey periods. However, historic climate averages for Ferness (approximately 8 km north of the Proposed Development) were accessed from World Weather Online (2021) and these provide a summary of conditions during these periods. In June 2019 (spring deployment) the average minimum temperature was 8 °C and the average wind speed was 3.8 m/s. In July 2019 (summer deployment) the average minimum temperature was 11 °C and the average wind speed was 2.9 m/s. This suggests that in general the weather conditions were within optimal conditions for bat surveys (as defined in SNH *et al.* (2019) (temperature >8 °C; wind <5 m/s)) during the spring and summer deployments. Site specific weather data allows the removal of any nights where conditions may limit bat activity which would therefore potentially lead to an underestimate of bat activity on the site. There was one night during the spring period where no bat activity was recorded, and no nights during the summer period. A precautionary approach has been taken when interpreting the activity levels for each period, and both the median and the maximum results are provided as required by guidance. In addition, currently Ecobat relative activity assessments are only based on nights where bat activity was detected, and as a result zero activity nights are not included in the assessment. Therefore, whilst it is acknowledged that the lack of weather data is less than optimal, in this instance it is not considered that there will be a significant change to the assessment of bat activity at the Proposed Development without this detail.

8.5.10. A weather station was deployed during the autumn bat activity survey deployment. During this deployment sub-optimal weather conditions according to guidance (SNH, 2019) were recorded on 13 out of a total of 14 nights of survey: the dusk temperature was below 8 °C on four nights and the median wind speed was above 5 m/s on 11 nights (see **Appendix 8.1** for full details of weather conditions during autumn bat surveys). Two survey nights (10th and 14th September) were removed from the assessment as no bat passes were recorded, likely due to wind speeds of over 20 m/s. Bat passes were recorded on all other survey nights and therefore all other nights have been included within the assessment. It is considered that the weather conditions experienced during the survey were likely to be representative of the general conditions at the site as it is located in an upland environment, where inclement weather is common. In the local area, the average night time temperature in September is 8 °C, and the average wind speed in September is approximately 4 m/s (World Weather Online, 2021). The average wind speed recorded during the autumn survey period was approximately 9.5 m/s, but the site is in a more exposed location than Ferness. Furthermore, windy conditions are considered to be representative of the general conditions at the Proposed Development due to the exposed nature of the site.

8.5.11. During Phase 1 habitat, NVC and protected mammal surveys access was restricted from 40.3 ha of land (2.8% of the total habitat survey area) within the buffer of the site boundary. See **Figure 8.1** for details of access limitations. It was possible to identify the Phase 1 habitat type of all areas within the habitat survey area. However, it was not possible to identify the NVC community in 15.8 ha (1.1% of the total habitat survey area) of land outwith the site boundary due to access limitations. The infrastructure layout was updated after the 2021

Phase 1 and NVC habitat survey, resulting in 2.6 ha of un-surveyed land within the 250 m buffer of infrastructure. This equates to 0.4% of the 250 m buffer of planned infrastructure at the Proposed Development. This area is considered to be consistent with the habitats surveyed across the site.

Habitat Loss Calculations

8.5.12. The construction of the Proposed Development will 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 site boundary.

Approach to Impact Assessment

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

Determining Important Ecological Features (IEFs)

8.5.14. In accordance with CIEEM guidelines (CIEEM, 2018), 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 8.5**.

Table 8.5: Geographical Context Relating to the Evaluation of an IEF

Level of Value	Example
International	An internationally designated site (e.g. Special Area of Conservation (SAC)), or site meeting criteria for international designations such as a World Heritage Site (WHS) or United Nations Educational Scientific and Cultural Organisation (UNESCO) Biosphere Reserve.
	Species populations/habitat areas present with sufficient conservation importance to meet criteria for SAC selection.
National	A nationally designated site such as a Site of Special Scientific Interest (SSSI), or a National Nature Reserve (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.

Level of Value	Example
Negligible	Usually widespread and common habitats and species. Features falling below Local importance are not normally considered in detail in the assessment process.

Source: CIEEM (2018)

8.5.15. The site is located within NHZ 10 (Central Highlands) and so this is the region against which impacts are assessed. NHZ 10 is characterised by upland and mountainous terrain deeply incised in places by burns and rivers. The dominant land cover types in NHZ 10 are peatland, heather moorland, montane and rough and improved grassland (SNH, 2001).

8.5.16. 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.

8.5.17. 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 EcIA, 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 EcIA within the context of legal and policy implications.

8.5.18. 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 integrity can be assessed. 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.

8.5.19. 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

8.5.20. For the purposes of this assessment and of assigning value to bats, the guidance set out in SNH *et al.* (2019, updated 2021) 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)). **Table 8.6** summarises the risk of turbine impact to bat species and the sensitivity of bat populations.

Table 8.6: Risk of Turbine Impact Affecting Bat Populations[2]

Species	Turbine Impact/Collision risk	Sensitivity of Population
Noctule	High	High
Leisler's bat	High	High
Nathusius' pipistrelle	High	High
Common pipistrelle	High	Medium
Soprano pipistrelle	High	Medium
Myotis* species	Low	Low/Medium
Brown long-eared bat	Low	Low

**Myotis is the genus that includes daubenton's bat, natterer's bat and whiskered bat*

Source: SNH et al. (2019, updated 2021)

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

8.5.22. Following SNH *et al.* (2019, updated 2021), data from all seasons was run through Ecobat in order to provide an assessment of relative bat activity at the site when compared with bat activity at other sites within 100 km.

8.5.23. Using information provided within *Tables 3a* and *3b* of SNH *et al.* (2019, updated 2021), an overall risk assessment was made in relation to the site and Ecobat relative activity. The Proposed Development is considered to be a medium sized project as defined by *Table 3a* in SNH *et al.* (2019, updated 2021): the Proposed Development is between 10 and 40 turbines (17 turbines) with one other operational wind development within 10 km (Tom nan Clach Wind Farm). The Proposed Development has turbines at a height greater than 100 m, for which the guidance suggests should be considered to be large. However, most wind developments now contain turbines above 100 m and the rest of the criteria suggest that the Proposed Development should be considered of medium size. Therefore, for the purpose of this assessment it is considered as medium sized. The site is defined as a moderate habitat risk due to the small number of moderate quality potential roost features; low quality foraging habitat; and connection to the wider landscape by linear features (Tomlachlan and Leonach Burns). The combination of these two factors gives it a risk level of 3.

Characterising Potential Impacts on Features

8.5.24. The magnitude of impact is predicted quantitatively where possible e.g., habitat loss. 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 impact are summarised in **Table 8.7**.

8.5.25. The assessment also considers whether the effect is beneficial or adverse, short-term (for example only during construction) or long-term (throughout the lifetime of the Proposed Development), reversible or permanent.

[2] Only those species which are known to occur in Scotland are included. BCT (2019).

Table 8.7: Description of Impact Magnitudes Relating to the Evaluation of an IEF

Impact magnitude	Description
Very highly adverse	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.
Major adverse	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.
Moderate adverse	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 adverse	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.
Beneficial	The changes in the ecological feature are considered to be beneficial to its ecological integrity or nature conservation status.

Source: CIEEM (2018)

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

Determining Significance of Ecological Effects

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

8.5.28. In this assessment, an effect that threatens the integrity of a feature is considered to be significant in terms of the EIA Regulations (2017). 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.

Mitigation

8.5.29. 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 adverse 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

8.5.30. In the absence of the Proposed Development, it is assumed that the habitat use at the site would remain the same for the foreseeable future. Current habitat use is grouse moorland with some sheep grazing and as such large areas of blanket and modified bog habitats are being actively drained and patches of heather are periodically burned to improve their quality for this purpose. In the absence of the Proposed Development, this is likely to continue, leading to possible further modification impacts of drying and degradation of the bog habitat within the site boundary over the medium to long term.

8.5.31. 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 site 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.

8.6. Baseline Conditions

Desk Study

8.6.1. Records found within 5 km of the Proposed Development include:

- Red squirrel;
- Badger;
- Brown and mountain hare;
- Four common amphibian and reptile species;
- A total of three protected insect species: two included on the SBL and two included on the IUCN Red List (IUCN, 2021); and
- Six lichen species included on the SBL.

8.6.2. Full results of the desk study are included in **Appendix 8.1**.

Habitats

Overview

8.6.3. The site is located within an upland landscape context and comprises mostly wet heath on slopes and dry modified bog on areas of flatter land. There are also areas of dry heath on steeper slopes and along steep river banks; areas of grassland and acid flush mostly along the edges of the burns; and a small area of planted Scot's pine (*Pinus sylvestris*) and Norway and Sitka spruce (*Picea abies* and *Picea sitchensis*) woodland near the Leonach Burn. Topography within the site boundary ranges from 260 m to 418 m Above Ordnance Datum (AOD).

8.6.4. There are two main watercourses within the site boundary: Tomlachlan Burn and Leonach Burn, the latter of which forms the western boundary of the site along with its tributary Allt a' Choire Odhair Bhig.

8.6.5. The habitat within the site boundary is consistent with that of the surrounding area, which encompasses open moorland on all sides.

Habitats Phase 1 and NVC Results

8.6.6. The Phase 1 Habitat Survey results are provided in **Table 8.8** and illustrated in **Figure 8.3**, showing the area of recorded habitat occurring within the site boundary. Further details defining each habitat type along with target notes taken during the survey are provided within the **Appendix 8.1**. The NVC survey characterised the habitats further and results are included in **Table 8.8** and illustrated on **Figure 8.4**. The survey identified a range of typical upland habitat types within the site boundary to community and sub-community level, where possible.

8.6.7. The NVC M15 community can represent two Phase 1 classifications: wet heath and wet modified bog. This community has been recorded as both Phase 1 habitat types within the site boundary, 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 wet heath. Also, the NVC community M19 is represented as both blanket bog and dry modified bog Phase 1 habitat classifications at the site. In areas where it has been classified as modified bog this shows a lack of *Sphagnum* bog moss cover.

8.6.8. Ground Water Dependent Terrestrial Ecosystems (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 (2017) 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 of the GWDTE assessment can be found in **Chapter 9**.

8.6.9. Habitats found during Phase 1/NVC surveys at the site are listed below in **Table 8.8** along with the relevant conservation status of the habitat. Habitat locations within the site are shown in **Figures 8.3** and **8.4**. The predominant habitats found at the site were wet dwarf shrub heath (M15) and dry modified bog (M19a).

Table 8.8: Summary of Habitats Identified during the Phase 1 and NVC Habitat Survey

Phase 1 Habitat	NVC Community and Description	Conservation Designation	GWDTE* potential	Area in site boundary (ha)	Area lost to Proposed Development (ha)	% Lost to Proposed Development
A1.2.1 Semi-natural coniferous woodland	W18: Scot's pine with non-native Norway and Sitka spruce with a heather/bog understory	**Annex 1**† Caledonian forest; **SBL**‡ Native pine woodlands	No	10.17	0	0
A2.1 Scrub	W19: Areas of *Juniperis communis* scrub along burns	**Annex 1**†	No	0.1	0	0
B1.1 Unimproved acid grassland	U5/U5b/U5c/U5d *Nardus stricta-Galium saxatile* grassland	**SBL**‡ *Nardus stricta-Galium saxatile* grassland	No	15.68	0.51	3.26
B1.2 Semi-improved acid grassland	U4 *Festuca ovina-Agrostis capillaris-Galium saxatile* and U13a: *Deschampsia cespitosa-Galium saxatile* grassland	-	No	2.07	0	0
B2 Neutral grassland	MG10/MG10a *Holcus lanatus-Juncus effusus* rush-pasture	-	Moderate	0.84	0.06	7.13
B4 Improved grassland	U4b *Festuca ovina-Agrostis capillaris-Galium saxatile* grassland	-	No	1.57	0	0
B5 Marshy grassland	M23b *Juncus effusus – Galium palustre* rush-pasture	**SBL**‡ Purple moor-grass and rush pastures	High	22.63	0.54	2.38
	MG10 *Holcus lanatus-Juncus effusus* rush-pasture and M25a/M25b: *Molinia caerulea-Potentilla erecta* mire	**SBL**‡ Purple moor-grass and rush pastures	Moderate			
	U2 *Deschampsia flexuosa* grassland	-	No			
C1 Bracken	U20 *Pteridium aquilinum-galium saxatile* community	-	No	0.68	0	0
D1.1 Acid Dry dwarf shrub heath	H10a/H10b *Calluna vulgaris-Vaccinium myrtillus*; H12a/H12b/H12c *Calluna vulgaris-Erica cinerea*; and H16b/H16c *Calluna vulgaris-Arctostaphylos uva-ursi* heaths	**Annex 1**† European dry heaths; **SBL**‡ Upland heathland	No	105.21	1.85	1.75
	H13a *Calluna vulgaris-Cladonia arbuscula*	**SBL**‡ Upland heathland	No			
D2 Wet dwarf shrub heath	M15a/M15b/M15c/M15d *Scirpus cespitosus-Erica tetralix* wet heath	**Annex 1**† Northern Atlantic wet heaths with	Moderate	581.07	25.07	4.3

Phase 1 Habitat	NVC Community and Description	Conservation Designation	GWDTE* potential	Area in site boundary (ha)	Area lost to Proposed Development (ha)	% Lost to Proposed Development
		Erica tetralix; **SBL**‡ Upland heathland				
D5 Dry heath/acid grassland mosaic				3.08	0	0
E1.6.1 Blanket bog	M17a/M17b *Scirpus cespitosus-Eriophorum vaginatum* blanket mire and M19a *Calluna vulgaris-Eriophorum vaginatum* mire	**Annex 1**† Blanket bog; **SBL**‡ Blanket bog; **deep peat**	No	38.8	0.25	0.65
E1.7 Wet modified bog	M15b/M15c *Scirpus cespitosus-Erica tetralix* wet heath; M17b *Scirpus cespitosus-Eriophorum vaginatum* blanket mire; and M25a/M25b *Molinia caerulea- Potentilla erecta* mire	**Annex 1**† Degraded raised bogs still capable of natural regeneration; **SBL**‡ Blanket bog; deep peat	No	32.54	0.87	2.68
E1.8 Dry modified bog	M19a *Calluna vulgaris-Eriophorum vaginatum* mire and M20b *Eriophorum vaginatum* mire	**Annex 1**† Degraded raised bogs still capable of natural regeneration; **SBL**‡ Blanket bog; **deep peat**	No	468.89	9.55	2.04
E2.1 Acid flush	M6a/M6b/M6c: *Carex echinata-Sphagnum recurvum/ auriculatum* mire	**SBL**‡ Upland flushes, fen and swamp	High	23.89	0.04	0.17
E2.2 Basic flush	M10a: *Carex dioica-Pinguicula vulgaris* mire	**Annex 1**† Alkaline fens; **SBL**‡ Upland flushes, fen and swamp	High	0 (habitat outside site boundary)	0	0
F1 Swamp	S10: *Equisetum fluviatile* swamp	**SBL**‡ Upland flushes, fen and swamp	No	0.12	0	0

GWDTE – Ground water dependent terrestrial ecosystem (SEPA, 2017b). High/mod (moderate) refers to the potential of the habitat to be a GWDTE. See **Chapter 7: Hydrology, Geology and Hydrogeology for more information.*

†Annex 1 – Listed on Annex 1 of EU Habitats Directive;

‡SBL – Listed on Scottish Biodiversity List and UK Biodiversity Action Plan.

Bats

Preliminary Bat Roost Assessment

8.6.10. One ruined building and eight trees within the site boundary were found to have potential bat roost features (PRFs) (see **Table 8.9** and **Figure 8.2**).

8.6.11. Bat detectors were placed at or near to all PRFs except for tree 8 and the ruin, which are both located over 200 m from any proposed infrastructure. At the time of deployment both features were located over 500 m from proposed infrastructure. Detectors 15-17 were deployed between 01 and 09 August 2019 in order to assess the likelihood that the features were being used consistently by roosting bats. Detectors 7 and 10 were deployed as part of the bat activity surveys outlined in **Paragraphs 8.4.4-8.4.5**.

Table 8.9: Potential Bat Roost Locations

Ref	Number of PRFs	Tree Category†/ Roost suitability	Distance from proposed infrastructure (m)	Type of infrastructure	Bat detector No.
1	2	1	198	T12	15 (62 m from PRF)
2	2	2	155	T12	15 (0 m from PRF)
3	4	2	214	Crane pad	16 (0 m from PRF)
4	2	1*	228	Crane pad	16 (48 m from PRF)
5	1	1*	278	T3	10 (0 m from PRF)
6	1	2	281	Track	17 (0 m from PRF)
7	2	1*	214	Crane pad	7 (0 m from PRF)
8	2	1*	660	T8	>100 m
Ruin	1	Low	205	Crane pad	>100 m

Source: Natural Power
†Tree category based on tree assessment in Hundt (2012). 1- trees capable of supporting larger bat roosts; 1- trees with potential for use by single bats; 2- trees with no obvious potential but may have some limited potential to support bats.*

8.6.12. The timings of bat calls detected compared with sunrise and sunset were used to assess the likelihood of a large bat roost in these locations. Less than 3% of bat calls detected were within half an hour of sunrise or sunset for all locations. It was therefore considered unlikely that any of the PRFs were used regularly by roosting bats.

Bat Activity Surveys

8.6.13. A total of 18,080 bat passes were recorded, consisting of the following species/species groups: soprano pipistrelle (*Pipistrellus pygmaeus*), common pipistrelle (*Pipistrellus pipistrellus*), Pipistrelle sp. (*Pipistrellus sp.*), *Myotis* sp. and brown long-eared bat (*Plecotus auritus*) (see **Table 8.10**). The highest number of calls was associated with soprano pipistrelle followed by common pipistrelle. Detector location 10 had the highest number of bat passes out of all the detector locations for all bat species (59 % of all bat passes recorded at the site). This detector was located at the northern end of the Tomlachlan Burn, at the confluence with Allt Bad an Iasgair near to a lone standing tree, which was assessed as having potential to support roosting bats (PRF 5, see **Table 8.9**). It is likely that the high number of bat calls recorded at this location is due to bats commuting and foraging along the two burns and around the tree. Only 1 % of the bat calls detected at this location were within 30 minutes of sunrise or sunset and it is therefore considered unlikely that bats were roosting at this location.

Table 8.10: Summary of Bat Passes Recorded at Static Detectors Throughout the Bat Activity Survey Period, plus Bat Passes Recorded During Each Season

Detector	1	2	3	4	5	6	7	8	9	10	11*	12	13	14				
Distance from nearest turbine (m)	1,075	833	1161	438	465	668	273	403	234	278	111	423	306	617				
Species															**Total**	**Spring**	**Summer**	**Autumn**
Myotis sp.	32	3	6	52	9	32	47	24	1	182	2	23	31	29	**473**	21	135	317
Common Pipistrelle	206	556	375	188	160	195	471	307	577	3,734	107	389	242	127	**7,634**	1,519	4,521	1,594
Soprano Pipistrelle	72	18	29	149	27	101	416	48	809	6,556	31	1,150	107	201	**9,714**	2,288	4,384	3,042
Pipistrelle *sp.*	4	3	0	0	2	4	13	1	6	133	0	1	3	4	**174**	21	133	20
Brown long-eared bat	8	4	3	0	2	8	16	5	0	16	0	4	14	3	**83**	0	4	79
Total	**322**	**584**	**413**	**389**	**200**	**340**	**965**	**385**	**1,393**	**10,621**	**140**	**1,567**	**397**	**364**	**18,080**	**3,849**	**9,179**	**5,052**
Percentage of total calls	**2**	**3**	**2**	**2**	**1**	**2**	**5**	**2**	**8**	**59**	**1**	**9**	**2**	**2**				

** Detector 11 did not return any log files or audio files during the autumn deployment and was therefore deemed to be faulty. This means that these values represent spring and summer deployments only.*

Ecobat: Relative Abundance

8.6.14. Ecobat has assessed the median activity level of bats across all seasons surveyed within the site boundary 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. Relevant results are presented within **Appendix 8.1**

Overall Risk Assessment

8.6.15. The overall risk assessment for each species or species group as calculated using the Ecobat results and the SNH *et al.* (2019, updated 2021) guidance is provided in **Table 8.11**. Risk assessment scores are based on *Table 3b* in SNH *et al.* (2019, updated 2021) using a site risk level of 3 (as set out in **Paragraph 8.5.22**). The guidance classifies risk as follows:

- Low: scores between 0 and 4;
- Medium: scores between 5 and 12; and
- High: scores between 15 and 25.

Table 8.11: Overall Bat Risk Assessment

Species	Assessment (Median)	Assessment (Maximum)
Common pipistrelle	9 (Medium)	15 (High)
Soprano pipistrelle	9 (Medium)	15 (High)
Myotis species	6 (Medium)	15 (High)
Brown long-eared bat	3 (Low)	9 (Medium)

Source: Natural Power/SNH et al. *(2019, updated 2021); Colour coding: red shows high risk, orange shows medium risk; green shows low risk*

8.6.16. 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 site with the highest relative activity levels. This assessment is provided in **Table 8.12**.

Table 8.12: Risk Assessment by Detector for Species Showing a High Risk Across the Site at Maximum Activity Levels.

Detector	Adjacent to feature?	Nearest turbine (distance m)	Common pipistrelle		Soprano pipistrelle		Myotis sp.	
			Med	Max	Med	Max	Med	Max
1	Ditch (within 25 m)	T4 (1,075)	9 (med)	12 (med)	6 (med)	9 (med)	3 (low)	12 (med)
2	No	T17 (833)	9 (med)	12 (med)	3 (low)	9 (med)	3 (low)	3 (low)
3	Watercourse (within 25 m)	T16 (1,161)	6 (med)	12 (med)	3 (low)	9 (med)	6 (med)	9 (med)
4	Watercourse	T15 (438)	12 (med)	15 (high)	9 (med)	15 (high)	3 (low)	3 (low)
5	No	T16 (465)	9 (med)	12 (med)	6 (med)	6 (med)	3 (low)	9 (med)
6	No	T4 (668)	9 (med)	15 (high)	6 (med)	12 (med)	3 (low)	12 (med)

Detector	Adjacent to feature?	Nearest turbine (distance m)	Common pipistrelle		Soprano pipistrelle		Myotis sp.	
			Med	Max	Med	Max	Med	Max
7	Watercourse, tree	T12 (273)	9 (med)	15 (high)	9 (med)	15 (high)	6 (med)	12 (med)
8	Watercourse (within 50 m)	T9 (403)	6 (med)	12 (med)	3 (low)	6 (med)	3 (low)	9 (med)
9	Woodland edge	T8 (234)	15 (high)	15 (high)	12 (med)	15 (high)	3 (low)	6 (med)
10	Watercourse, tree	T2 (278)	15 (high)	15 (high)	15 (high)	15 (high)	9 (med)	15 (high)
11	No	T6 (111)	6 (med)	12 (med)	6 (med)	6 (med)	3 (low)	6 (med)
12	Watercourse	T5 (423)	9 (med)	15 (high)	12 (med)	15 (high)	6 (med)	9 (med)
13	Standing water	T1 (306)	9 (med)	15 (high)	9 (med)	12 (med)	6 (med)	12 (med)
14	Side of steep hill	T14 (617)	9 (med)	15 (high)	6 (med)	15 (high)	6 (med)	12 (med)

Source: Natural Power/SNH et al. *(2019, updated 2021); Colour coding: red shows high risk, orange shows medium risk; green shows low risk*

Common and Soprano Pipistrelle

8.6.17. Soprano pipistrelle was the most frequently recorded bat species in 2019 (total 9,714 passes, representing over 50 % of the total bat passes recorded during the survey period). The highest call rate for soprano pipistrelle was in summer. Soprano pipistrelle were recorded across the site. However, detector 10 had a much higher percentage of nights with a high number of calls for this species.

8.6.18. In the spring survey period, for soprano pipistrelle, the earliest recorded activity was approximately 30 minutes before sunset, but most started from approximately 45 minutes after sunset. Activity was not consistent throughout the night across the survey period, but for all nights on which soprano pipistrelles were recorded, activity was also recorded after sunrise (latest activity recorded approximately 1 hour after sunrise). In the summer survey period soprano pipistrelle activity was recorded from 45 minutes after sunset and was then constant through the night until approximately 30 minutes before sunrise. During the autumn survey period activity started approximately 30 minutes after sunset and then dropped off after around four hours after sunset.

8.6.19. Common pipistrelle was the second most frequently recorded bat species in 2019 (total 7,634 passes, representing just over 40 % of the total bat passes recorded during the survey period). Together with soprano pipistrelle and unidentified pipistrelle species they made up 97 % of the total bat calls detected during the survey period. Common pipistrelle passes were recorded much more frequently in the summer deployment compared with spring and autumn. Common pipistrelle were recorded across the site. However, detector 10 had a much greater percentage of nights with a high number of calls for this species.

8.6.20. As no Nathusius's pipistrelle (*Pipistrellus nathusii*) calls were recorded during the survey period and it is a very rare species in the region, it is assumed that all records of unidentified pipistrelle species were either common or soprano pipistrelle.

8.6.21. Activity across the night for common pipistrelle was similar to that of soprano pipistrelle, although less common pipistrelle activity was recorded after sunrise in spring (none recorded after sunrise in summer or autumn). In summer, activity was spread across the night and in autumn it dropped off after around four hours.

8.6.22. Most common and soprano pipistrelle activity was concentrated during the summer months (July). The highest relative activity and calculated risk to common and soprano pipistrelles was at detector 10, which had a high risk for both pipistrelle species at both maximum and median activity levels. Detector 9 also had a high risk for common pipistrelle at both maximum and median activity levels (and high risk for soprano pipistrelle at maximum activity levels only). Other detector locations showing a high risk at maximum activity levels for both species were 4, 7, 12 and 14. Other detectors scored no more than a medium risk for pipistrelles.

8.6.23. Four of the eight detector locations that were assessed as having a high collision risk for pipistrelle species (at maximum activity levels) were adjacent to a watercourse (detectors 4, 7, 10 and 12). Three of the other detectors assessed as having a high collision risk for pipistrelle species (at maximum activity levels) were near to natural features likely used by pipistrelles for commuting and/or feeding. Detector 9 was located on the edge of semi-natural coniferous woodland; detector 13 (high risk for common pipistrelle only) was located next to standing water; and detector 14 was located next to a steep linear hill feature that could be used by bats for commuting. Detector 6 (assessed as being high risk at maximum activity levels for common pipistrelles) was located on flat open ground 164 m from Tomlachlan Burn, in between Tomlachlan Burn and one of its small tributaries.

Myotis Species

8.6.24. *Myotis sp.* were the third most recorded species/species group. However, *Myotis sp*. only made up 3 % of the total bat passes recorded during the survey period. They were recorded most frequently during autumn. 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*. was at detector 10, which was the only detector assessed as being high risk to this species group at maximum activity levels. This detector was located next to a watercourse and a lone standing tree. The watercourse was the Allt Bad an Iasgair, which is a tributary of Tomlachlan Burn. This watercourse provides connectivity with the area of woodland to the east of the B9007 (outside of the site boundary). Therefore, this watercourse potentially provides a commuting corridor for bats from the nearby woodland. Bats may also use the lone standing tree to forage around, which could mean that the large number of bat passes was from a much smaller number of individual bats.

8.6.25. In spring and summer, *Myotis sp*. activity was sporadic, with no activity recorded within 1 hour of sunrise or sunset. In autumn, activity started around 45 minutes after sunset and was spread throughout the night until approximately 1.5 hours before sunrise.

Brown Long-eared Bats

8.6.26. Brown long-eared bats were recorded infrequently during the survey period and accounted for less than 1% of the total bat passes recorded. This species was recorded most frequently in the autumn survey period and there were no records of the species during the spring survey period. Brown long-eared bats were recorded at all detectors except for 4, 9 and 11. Activity was recorded between 45 minutes after sunset and 2 hours before sunrise. This species was assessed as having a low to moderate collision risk (during periods of activity) at the Proposed Development.

Otter

Signs

8.6.27. Recent otter spraints were recorded in 2019 surveys within the site boundary along the Tomlachlan and Leonach Burns and the Allt Bad an Iasgair (a tributary of Tomlachlan Burn). Otter tracks were found on the Tomlachlan Burn (see **Figure 8.5** and **Appendix 8.1**).

Resting Sites

8.6.28. One confirmed otter holt and two potential otter holts were found within the site boundary during 2019 surveys. During the mammal survey an otter was observed exiting the confirmed holt. Neither of the potential holts had any sign of recent activity. No further surveys were undertaken to ascertain the activity status of the potential holts. All three holts consisted of a hole in the steep bank of the burn. The confirmed holt was 125 m from Proposed Development infrastructure and the potential otter holts were 103 m and 130 m from Proposed Development infrastructure.

8.6.29. A potential otter couch was found within the site boundary. Marks were found here showing locations of old otter spraint, which suggests that an otter may have previously used this location as a resting place. The potential couch was located over 250 m from any Proposed Development infrastructure.

Water vole

Signs

8.6.30. Recent water vole droppings, feeding signs and runs were recorded in 2019 surveys within the site boundary along the Tomlachlan Burn and the Allt Bad an Iasgair (see **Figure 8.5** and **Appendix 8.1**). Suitable habitat was recorded along much of the length of the Tomlachlan Burn and the Allt Bad an Iasgair water courses that lie within the site boundary.

Burrows

8.6.31. Active water vole burrows were recorded in 2019 surveys along the Tomlachlan Burn. All water vole burrows and signs were over 100 m from any proposed infrastructure.

8.6.32. Two possible water vole burrows were also recorded along the Leonach Burn. However, no other water vole signs were found on that watercourse, which is fast flowing and of low suitability for water vole. It is therefore considered more likely that these burrows were used by rat rather than water vole.

Deer

Deer Species and Numbers

8.6.33. The *Lethen Estate Woodlands Forest Plan* (containing a deer management plan) states that red, roe and sika deer (*Cervus elaphus*, *Capreolus capreolus* and *Cervus nippon* respectively) are present in the area of woodland to the north and east of the site. Roe deer are present in the highest numbers. Red deer populations are of low density and Sika deer are only seen in the area sporadically. Annual cull returns (**Table 8.13**) from the Dunearn area of the Lethen Estate (which is the area that includes the Proposed Development site) show that in most years no red deer were culled, whereas roe deer culling numbers range between 13 and 66 deer culled per year between 2012 and 2021. No figures for Sika deer culling were provided.

Table 8.13: Dunearn Deer Cull Results 2012-2021

Year	Bucks	Does	Kids	TOTAL ROES	Stags	Hinds	Calves	TOTAL REDS
2012	9	0	4	**13**	0	0	0	**0**
2013	22	27	17	**66**	0	0	0	**0**
2014	11	15	11	**37**	0	0	0	**0**
2015	21	29	13	**63**	0	0	0	**0**
2016	16	9	11	**36**	0	1	1	**2**
2017	19	11	13	**43**	2	0	0	**2**
2018	13	15	9	**37**	0	0	0	**0**
2019	15	14	7	**36**	3	0	0	**3**
2020	11	8	2	**21**	0	0	0	**0**
2021	15	13	5	**33**	0	0	0	**0**

8.6.34. Roe deer live primarily in woodlands but will forage in open areas close to woodland. This is shown by national deer cull statistics: over 85 % of roe deer culled between 2011 and 2016 were in woodland (Pepper *et al.*, 2019). It is therefore considered likely that the deer within the Dunearn management area, for which the statistics in **Table 8.13** are provided, mostly relate to animals in the forested part of the estate and that these numbers do not represent the open habitat of the site. Numbers of deer within the site are likely to be much lower than the cull figures suggest, and this is borne out by the experience of the surveyors that undertook baseline ecological recording.

Sources of Food and Shelter

8.6.35. The site is comprised of unenclosed open moorland of primarily modified bog and wet heath habitats which is managed mainly as a grouse moorland but also has low density sheep grazing. There is a small area (11 ha) of semi-natural Scot's pine woodland, which consists mostly of scattered trees rather than continuous woodland cover. This woodland is in the west of the site that could provide a low-quality shelter resource for deer. See **Paragraphs 8.5.2-8.5.8** for further information about habitats within the site boundary.

8.6.36. The Lethen Estate Woodlands are north of the site boundary, with one area of woodland directly opposite the site on the B9007 road. The woodlands closest to the site are semi-natural woodlands with areas of both coniferous and broadleaved woodland.

Designated Sites

8.6.37. One site designated for habitats lies within 10 km of the site: Carn na Tri-tighearnan SSSI and SAC. As a SSSI this is designated for blanket bog and subalpine dry heath; as a SAC this is designated for blanket bog only. Carn na Tri-tighearnan SSSI/SAC is 5 km from the closest Proposed Development infrastructure. This SSSI/SAC lies further away from the Proposed Development than nearby areas of woodland (including areas of extensive woodland to the north of the site), which are more suitable for the main deer species likely to be present at the site and within the surrounding area (roe deer).

Current Impacts on Deer

8.6.38. The main impact on deer in this area is the management of deer in relation to the protection of native and commercial woodland in the wider area to the north of the Proposed Development. One of the objectives of the *Lethen Estate Woodlands Forest Plan* is to manage the deer population to allow successful replanting and natural regeneration without the need

for deer fencing. There is no target for deer density set out in the *Lethen Estate Woodlands Forest Plan*, but NatureScot guidance (SNH, 2016) states that a sustainable deer density in woodland is less than 3-5 deer/km^2 and cull targets are usually set in accordance with this guidance.

8.6.39. A total of 20 deer-vehicle collisions (DVC) were recorded between 2008 and 2018 (an average of approximately two deer per year) within a 10 km radius of the site (The Deer Initiative, 2018). Of these 20 DVCs, 16 were on A-roads at least 4 km from the Proposed Development (A9 (six), A939 (six) and A938 (four)). The location information of one DVC in 2017 showed it being near to the site, on the B9007. However, the road number given was the A82 and therefore the confidence in this record is low.

8.6.40. In the same period across THC area 676 DVC were reported; in the nearby Moray council area a total of 258 DVC were reported (Langbein, 2019). This means that the DVC recorded within the 10 km of the Proposed Development represents 3 % of those recorded across THC area and 8 % of those recorded across the Moray council area. The 10 km radius search area represents 1 % of the size of THC land area and 14 % of the size of the Moray council land area. The DVC within the 10 km radius of the Proposed Development are therefore lower than average for the Moray council area. Although the Proposed Development is entirely within THC area it is considered that the area is more similar in road density and road and land use to the Moray council area and a portion of the 10 km radius of the Proposed Development falls within the Moray council area. Furthermore, much of the area of THC area is mountainous with very few roads, whereas the area within 10 km of the Proposed Development contains several well-used A-roads (including the A9 trunk road).

8.7. Potential Effects

8.7.1. This EcIA has been undertaken in accordance with CIEEM guidelines, establishing the baseline ecological conditions within the site boundary and identification of ecological features through a combination of 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 Impacts

8.7.2. 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 displacement; and
- Indirect impacts on species through pollution of habitats/watercourses affect food sources.

Bats

8.7.3. During the operational phase, rotating turbines present a risk to flying bats as a result of potential collision when flying in close proximity to turbines. Research work by Exeter University (Mathews *et al.*, 2016) found that most bat fatalities at UK wind farms were common pipistrelle, soprano pipistrelle and noctule bats. In this study 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.

Embedded Mitigation

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

Mitigation by Design

8.7.5. 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. Refer to **Chapter 2: Site Selection and Design** for detail on the overall design process.

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

8.7.7. 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 will be designed in keeping with good practice guidance (Scottish Renewables *et al.*, 2019). Further detail is provided in **Chapter 9**.

8.7.8. All proposed turbine locations are over 81.24 m from forestry and watercourses showing bat activity levels assessed as being at high risk. This gives more than the 50 m buffer between turbine blade tip and nearest woodland edge/key habitat feature as set out in current NatureScot guidance 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 15m.

8.7.9. Additionally, a buffer of at least 200 m has been left between turbines and watercourses where high bat activity was detected (northern sections of the Tomlachlan and Leonach Burns and Allt Bad an Iasgair).

8.7.10. A buffer of at least 100 m has been left between proposed infrastructure and potential and confirmed otter holts to minimise disturbance to otters on site. Any otter holts within 200 m of construction works will be monitored during the construction phase to determine whether it is being used for breeding. For further information on otter mitigation during the construction phase see **Paragraph 8.6.21.**

Construction

8.7.11. A Construction Environmental Management Plan (CEMP)/Construction Method Statement (CMS) will be produced prior to construction works commencing in consultation with THC (see **Chapter 3**). An outline CEMP is provided in **Appendix 3.1**. 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.

8.7.12. An Environmental Clerk of Works (ECoW) will be present during enabling works and throughout the construction phase of the Proposed Development. They will be a suitably experienced individual, whose role will 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 will 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 9**). The ECoW will also give regular toolbox talks to make site personnel aware of the ecological sensitivities on site. The ECoW will 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

8.7.13. 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 an operational management plan, where potential effects exist.

8.7.14. 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 will discuss and agree additional required mitigation to ensure impacts are minimised.

8.7.15. 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, will be restored as soon as possible after construction is completed. Turves will be carefully removed during construction, as far as practicable, and stored for re-use in the restoration of areas not required for the operation of the Proposed Development following good practice. As such, any vegetation removed for the construction phase will be reinstated within the site boundary, facilitating natural re-colonisation of vegetation communities. Permanent habitat loss will be limited to that required for the footprint of infrastructure and good site management practices will 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.

8.7.16. 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. Pollution incidents may occur during construction as well as within the operational phase during maintenance works.

8.7.17. Pollution prevention measures will be detailed in the CEMP and overseen by the ECoW. Pollution with regards to waterbodies is further discussed in **Chapter 9**. Measures to control the impact of dust on sensitive habitats will 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 will 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 site boundary to ensure no alteration in soil chemistry. Further detail on the mitigation of potential dust impacts will be detailed within the CEMP.

Watercourses

8.7.18. The pre-construction quality of watercourses and waterbodies will be maintained during construction (see **Chapter 9**). Watercourse protection measures will be adopted within the CMS/CEMP and include protection against siltation, sedimentation and pollution incidents. For instance, by 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 will be carried out before and during construction. The implementation of these measures will ensure impacts on protected species such as otter and fish species, are minimised.

GWDTE

8.7.19. Details of how impacts upon groundwater flow will be minimised and mitigated are detailed in **Chapter 9**.

Protected Species

8.7.20. 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 site boundary. 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 within set buffer areas of the Proposed Development a maximum of 8 months prior to commencement of works;
- If a potential resting place (e.g. bat roost or otter holt) of a protected species is found within set buffer areas of construction then work will cease within the appropriate buffer area 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, water voles, fish or their food sources;
- Lighting design will ensure watercourses and woodland remain unlit at night. Security lighting and lighting associated with the temporary compound will be low lux and directed away from woodland and watercourses to reduce disturbance; and

- All site personnel will be made aware of the presence of protected species through toolbox talks.

Operation

8.7.21. 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.

8.7.22. 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 Scottish Environmental Protection Agency (SEPA) good practice guidance.

8.7.23. 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.

8.7.24. The Operation Environmental Management Plan (OEMP) will detail mitigation measures required during the operational phase relating to protected species to ensure ongoing compliance with relevant environmental legislation.

Decommissioning

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

Feature Assessment

8.7.26. On the basis of the description of the ecological baseline and the definitions provided in **Table 8.5** above, a summary of the habitats and species within the site boundary is provided in **Table 8.14** below, together with the relevant legislation and guidance.

8.7.27. 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 potential significant effects are likely with the application of embedded mitigation this is specified, and the feature is not considered an IEF requiring EcIA.

Table 8.14: Summary of Habitats and Species and their Conservation Importance

Species/ Habitat	Covering legislation and guidance/ conservation status	Geographical level of value	IEF	Rationale
Semi-natural coniferous woodland/scrub	Annex 1 of Habitat's Directive; SBL	Local	No	Semi-natural coniferous woodland and scrub habitats within the site are priority habitats on Annex 1 and the SBL. No areas of these habitat will be lost to the Proposed Development and all areas of these habitats are at least 180 m from proposed infrastructure. There is, however, 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 this habitat. Given the low risk of impact to these habitats they not considered to be an IEF in the context of the Proposed Development and they are therefore not discussed further in this chapter.
Improved and semi-improved grassland	N/A	Negligible	No	The habitat in the site boundary holds no conservation interest and is widespread throughout Scotland. This habitat is therefore not considered to be an IEF and not discussed further in this chapter.
Unimproved acid grassland	SBL	Negligible	No	A small amount of this habitat will be lost to the Proposed Development (0.54 ha / 3.8 % of the habitat within the site boundary). All areas of unimproved grassland within the site boundary correspond with habitats that are included on the SBL as a watching brief only and therefore this area has only low conservation 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. 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 and not discussed further in this chapter.
Neutral grassland	GWDTE	Negligible	No	Some of this habitat will be lost to the Proposed Development (0.06 ha / 7.15 % of the habitat within the site boundary). However, this habitat has no conservation value and is widespread across Scotland. Therefore, this habitat is not considered to be an IEF and is not discussed further in this chapter.

Species/ Habitat	Covering legislation and guidance/ conservation status	Geographical level of value	IEF	Rationale
				This habitat has moderate potential to be a GWDTE, which means that the Proposed Development could have an impact on the hydrology of this habitat. Further discussion of GWDTEs is presented in **Chapter 9**.
Marshy grassland	SBL; GWDTE	Local	No	A small area of this habitat will be lost as part of the Proposed Development (0.54 ha / 2.38 % of habitat within site boundary). Some of the marshy grassland habitat that will be lost to the Proposed Development is M25, which has no conservation value (M25 is not included in the purple moorgrass/rush pasture habitat on the SBL), meaning that the value of SBL habitat lost is less than 0.54 ha. The total area of habitat loss arising from the Proposed Development represents only a small proportion of the community found within the site boundary. As such, no significant effects of the Proposed Development on the integrity of this feature are likely. Furthermore, the CEMP will include provision for micrositing 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. It is therefore 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 and is not discussed further in this chapter. This habitat has moderate and high potential to be a GWDTE (depending on the NVC classification of the area: e.g., M25 has moderate and M23 has high potential to be a GWDTE). 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 9**.
Bracken	N/A	Negligible	No	The habitat in the site boundary holds little to no conservation interest and is widespread throughout Scotland. Furthermore, none of this habitat will be lost to the Proposed Development. This habitat is therefore not considered to be an IEF and is not discussed further in this chapter.
Dry heath	Annex 1 of Habitat's Directive; SBL	Regional	No	A small area of this habitat will be lost as part of the Proposed Development (1.86 ha / 1.78 % of habitat within site boundary). Dry heath is a priority habitat on Annex 1 and the SBL. The dry heath found within the site boundary represents 4.4 % of the NHZ 10 dry heath habitat estimate, and as such dry heath at the Proposed Development is considered to be of regional

Species/ Habitat	Covering legislation and guidance/ conservation status	Geographical level of value	IEF	Rationale
				importance. The amount of dry heath lost to the Proposed Development represents 0.08 % of the NHZ 10 habitat estimate. There is also 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 indirect 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 site boundary and within the NHZ. 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	Regional	Yes	This habitat is commonly found in the site boundary and a total of 24.97 ha of wet heath will be lost to the Proposed Development. This constitutes 4.3 % of the wet heath habitat within the site boundary. Wet heath is a priority habitat on Annex 1 and the SBL. The wet heath habitat found within the site boundary represents 36 % of the NHZ 10 wet heath habitat estimate. Wet heath is therefore considered to be important in regional terms. Due to the high conservation status and the extent of habitat loss, the Proposed Development has potential to cause a significant effect on this habitat. Therefore, blanket and modified bog is considered to be an IEF. Given that wet heath has high potential for being GWDTE the Proposed Development could impact on the hydrology of these habitats. Further discussion of GWDTEs is presented in **Chapter 9.**
Wet/dry modified bog and blanket bog	Annex 1 of Habitat's Directive; SBL	Regional	Yes	This is the most commonly found habitat in the site boundary after wet heath. A total of 10.15 ha of blanket and modified bog will be lost to the Proposed Development. This constitutes 1.9 % of blanket and modified bog habitats within the site boundary. Blanket and modified bog are priority habitats on Annex 1 and the SBL. The blanket and modified bog habitats found within the site boundary represent 3.4 % of the NHZ 10 blanket/modified bog habitat estimate. Blanket/modified bog is therefore considered to be important in regional terms. Due to the high conservation status and the extent of habitat loss, the Proposed Development has potential to cause a significant effect on this habitat. Therefore, blanket and modified bog is considered to be an IEF.

Species/ Habitat	Covering legislation and guidance/ conservation status	Geographical level of value	IEF	Rationale
Acid/neutral Flush	SBL; GWDTE	Local	No	A small area of acid/neutral flush will be lost to the Proposed Development (0.04 ha / 0.17 % of habitat within the site boundary). Acid/neutral flush habitats within the site are on the SBL as a watching brief only. This means that the habitat has only low conservation value. There are also some areas of acid/neutral 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 microsited to avoid the most sensitive areas, where possible. 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. These habitats have high potential for being GWDTEs and the Proposed Development could impact on the hydrology of these habitats. Further discussion of GWDTEs is presented in **Chapter 9.**
Basic Flush	Annex 1 of Habitat's Directive; SBL; GWDTE	Local	No	Basic flush habitats within the site are a priority habitat on Annex 1 and the SBL. There is one small area (0.8 ha)of basic flush, which is 135 m from any Proposed Development infrastructure. Therefore, none of this habitat will be lost to the Proposed Development. However, there may be some indirect impacts of 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. There are no direct impacts to this habitat predicted and all indirect impacts will be mitigated under embedded mitigation. Therefore, this habitat is not considered to be an IEF and is not discussed further in this chapter. This habitat has high potential for being GWDTE. Further discussion of GWDTEs is presented in **Chapter 9**.
Swamp	SBL	Negligible	No	The habitat in the site boundary holds negligible conservation interest and is widespread throughout Scotland and will not be impacted by the Proposed Development. This habitat is therefore not considered to be an IEF and is not discussed further in this chapter.

Species/ Habitat	Covering legislation and guidance/ conservation status	Geographical level of value	IEF	Rationale
Running water	SBL	Local	No	A number of small burns are located within the site boundary. Rivers and burns are listed on the SBL. These habitats are widespread across Scotland. Protection for watercourses is embedded in the project design through good practice. Protection measures will be outlined in the CEMP. Further information on watercourses can be found in **Chapter 9**. 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; LBAP	Local	Yes	The site offers some foraging and commuting corridors along watercourses, primarily the Leonach and Tomlachlan Burns. Trees within the site boundary include deciduous trees along the Leonach Burn, the small area of semi-natural coniferous woodland close to the Leonach Burn and a small number of lone deciduous trees and mature pines scattered across the site. 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. All of the species recorded were common and widespread and known to occur throughout Scotland. Common and soprano pipistrelles had high activity levels recorded within the site boundary. Due to the high levels of activity of some bat species at the site, the Proposed Development has potential to cause a significant effect on bats. Therefore, they are considered to be an IEF.
Otter	Habitat Regulations; Wildlife and Countryside Act; SBL	Local	No	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. Otter signs were found within the site, with one confirmed holt, two potential holts and one potential couch identified. The confirmed holt and the two potential holts were found between 100 m and 200 m of the Proposed Development; the couch was over 200 m from the Proposed Development. Pre-construction mammal surveys included in the embedded mitigation will confirm the status of otter holts and identify those that need to be protected during the construction phase. Any works undertaken within 100 m of an active otter holt (or 200 m of a natal holt) will be carried out under licence from NatureScot. Water crossings will also be built to ensure safe access for otters up and down stream of the track. All potential impacts to otter will be mitigated under embedded mitigation, including embedded mitigation to avoid indirect impacts such as pollution of watercourses. Therefore, a significant

Species/ Habitat	Covering legislation and guidance/ conservation status	Geographical level of value	IEF	Rationale
				effect on the integrity of the local population is considered unlikely and otter is not considered to be an IEF. Otter is not discussed further in this chapter.
Water vole	Wildlife and Countryside Act; SBL; LBAP	Local	No	Water voles are widespread across Scotland and in the local area of the Proposed Development, and the levels of activity recorded indicate that while water vole are present at the Proposed Development this is unlikely to be in sufficient numbers to consider the population of greater than Local value. Water vole signs were found within the Tomlachlan Burn, including around the proposed New Water Crossing location NWC1. However, no water vole signs or burrows were found within 50 m of the Proposed Development during baseline surveys. Water vole populations can show considerable fluctuations in their size and location. This means that it is possible that the area of water vole activity within the site boundary will be different during the construction phase compared with where signs were found during baseline surveys. Pre-construction mammal surveys included in the embedded mitigation will confirm areas of water vole activity that need to be protected during the construction phase. Water crossings will also be built to ensure safe access for water voles up and down stream of the track. Any works undertaken within 10 m of an active water vole burrow will be carried out under licence from NatureScot. As all potential impacts to water vole will be mitigated under embedded mitigation water vole is not considered to be an IEF and is not discussed further in this chapter.
Deer	N/A	Negligible	No	Roe deer is the main deer species in the area surrounding the Proposed Development with only a small number of red and sika deer present in the wider area. Roe deer are primarily a woodland species that will forage in open areas but return to wooded or scrubland habitats for shelter. As the site is overwhelmingly dominated by open habitats, roe deer are likely to only use the site irregularly. Deer are actively culled within the local Lethen Estate with the aim of allowing successful woodland replanting and natural regeneration without the need for deer fencing. Furthermore, the numbers of red deer (associated with open habitats) within the Lethen Estate are low, which is borne out by cull numbers from the Dunearn area of the estate (area that includes the Proposed Development). It is therefore assumed that roe deer culling figures given are associated with wooded areas and that the deer density within the site boundary is low. The main potential impact that the Proposed Development poses to deer is displacement during construction. This could impact grazing levels on nearby designated sites or increase deer-vehicle collisions on nearby roads. The nearest biologically designated site is Carn nan Tri-tighearnan SSSI/SAC, designated for blanket bog and dry heath habitats, which is 5 km

Species/ Habitat	Covering legislation and guidance/ conservation status	Geographical level of value	IEF	Rationale
				from the Proposed Development. Given the distance to this designated site, which lies further away than more suitable woodland habitats closer to the Proposed Development, it is likely that any displaced deer would have, at most, a negligible impact upon the integrity of the designated habitat. Deer-vehicle collisions within 10 km of the site boundary average two animals a year. The majority of the DVCs recorded in the search area are on A-roads located at least 4 km from the site. It is therefore considered very unlikely that any increase in the number of displaced deer from the Proposed Development would have a noticeable effect on the number of DVCs in the local area. Given the low density of deer within the site boundary, the distance from nearby designated sites and the low DVC rate in the surrounding area it is considered unlikely that the Proposed Development will have a significant effect on deer welfare, surrounding habitats or road safety. Deer is therefore not considered to be an IEF and is not considered further in this chapter.

Impact Assessment

8.7.28. Three features have been identified as IEFs, requiring EcIA following the application of embedded mitigation (see **Paragraphs 8.6.3 to 8.6.26**). These are:

- Blanket bog;
- Wet heath; and
- Bats.

8.7.29. Assessment of impacts of the Proposed Development on these IEFs is provided below.

Blanket and Modified Bog

8.7.30. 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 spp*. 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 level of these indirect effects The impact on blanket and modified bog as a result of construction activities is anticipated to be to **negligible**, resulting in an effect which is **not significant** at the Regional level.

8.7.31. The principal impact of the Proposed Development to blanket and modified bog is via permanent habitat loss. The total extent of blanket and modified bog habitats lost to the footprint of the Proposed Development is 10.2 ha, which comprises 1.9% of the habitat within the site boundary and 0.06 % of the estimate of all blanket and modified bog habitat within NHZ 10 (see **Table 8.15**).

8.7.32. 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 (i.e., representing a different IEF or not an IEF), depending on the peat depth (e.g., M25 and M15). However, NVC communities can help determine areas of highest quality bog. NHZ Habitat estimates given in SNH (2001) are for NVC communities and not Phase 1 habitat types. Therefore, NHZ estimates shown in **Table 8.15** represent the sum of the NHZ estimates for NVC communities found within the site that correspond with each Phase 1 habitat type.

Table 8.15: Summary of Habitat Loss for Bog Habitats within the Site Boundary Compared with NHZ 10 Habitat Estimates

Phase 1 Habitat	Area within site boundary (ha)	Area lost to Proposed Development (ha)	% Habitat in site boundary lost	Estimated area of habitat in NHZ 10 (ha)	% Habitat in NHZ 10 lost
E1.6.1 Blanket bog	38.8	0.3	0.7	14172.8	0.00
E1.7 Wet modified bog	32.5	0.9	2.7	1810.8	0.05
E1.8 Dry modified bog	468.9	9.0	1.9	14054	0.06
Combined	**540.2**	**10.2**	**1.9**	**15864.8***	**0.06**

**This figure is not a total of all figures above as there is overlap in NVC communities (as described in SNH (2001)) between Phase 1 habitat types.*

Source: Natural Power; SNH (2001)

8.7.33. Blanket and modified bog communities that will be lost to the Proposed Development are M15c and M19a, with the majority being M19a dry modified bog. As described in **Paragraph 8.6.6,** the layout of the Proposed Development has avoided bog habitats where possible, taking into account other constraints (for more information see **Chapter 2** and **Chapter 9**). As such, areas of the highest quality bog habitat at the Proposed Development have been avoided as part of the design process, in particular the area described as Phase 1 blanket bog habitat (areas with a good coverage of *Sphagnum* moss). Furthermore, the extent of this habitat affected by the Proposed Development is a very small proportion of the habitat available both within the site and the NHZ, 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 and modified bog at the Proposed Development will be **low adverse** resulting in an effect which is **not significant** on the integrity of this feature at a Regional level.

Wet Heath

8.7.34. Construction activities have the potential to indirectly impact the habitat by impacting the hydrological flow and connectivity affecting the integrity of the habitat. 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 indirect effects to **low adverse** resulting in an effect which is **not significant** at the Regional level.

8.7.35. The principal impact of the Proposed Development to wet heath is via permanent habitat loss. The total extent of wet heath habitats lost to the footprint of the Proposed Development is 25.07ha, which comprises 4.3 % of the habitat within the site boundary and 1.55 % of the estimate of all wet heath habitat within NHZ 10 (see **Table 8.8**).

8.7.36. The only wet heath communities that will be lost to the Proposed Development are M15b and M15c. The majority of the wet heath habitat to be lost is the drier M15c. The areas of wet heath within the site boundary have already undergone extensive draining and burning to dry out the habitats, and this is likely to continue in the absence of development (see **Paragraphs 8.6.34 and 8.6.35**). This means that the areas to be lost by the Proposed Development are not examples of good quality wet heath habitat.

8.7.37. As described in **Paragraph 8.6.6**, the layout of the Proposed Development has avoided bog and deep peat habitats where possible, taking into account other constraints. As such, wet heath habitats have the largest amount of habitat loss in order to minimise peat loss and impacts to deep peat (for more information see **Chapter 9**).

8.7.38. Without compensation it is considered that impacts associated with loss of wet heath at the Proposed Development will be **moderate adverse,** resulting in an effect which is **not significant** on the integrity of this feature at a Regional level. The Proposed Development will not change the overall status of wet heath within the region.

Bats

Construction

8.7.39. During the construction phase bats could be impacted by disturbance or displacement from roost locations or by loss of foraging and commuting habitat.

8.7.40. Nine structures (eight trees and one ruined building) containing features considered to have potential for roosting bats were found within the survey area. However, these were all more than 100 m from infrastructure and will therefore not be affected by construction of 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 sunrise or sunset). As the site

is largely featureless open ground it is unlikely that bat roosts will appear within the 30 m disturbance distance of infrastructure prior to construction. However, embedded mitigation will include pre-construction checks for potential bat roosts within 30 m of working areas as part of the standard ecological pre-construction checks.

8.7.41. The loss of habitat to the Proposed Development will not significantly reduce the foraging opportunities within the site boundary. 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 **Paragraph 8.6.23**) means that any disruption caused by construction works will be minimised. Thus, the potential impact of displacement or disturbance to foraging or commuting bats during construction is considered **negligible,** resulting in an effect which is **not significant** at the Local level.

Operation

8.7.42. Bat activity levels are classified according to the guidance provided by SNH *et al.* (2019, updated 2021). Relative activity levels based on the output provided by Ecobat can be found in **Appendix 8.1**.

Common and Soprano Pipistrelle

8.7.43. 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 (particularly at detectors positioned near to watercourses). One or both of these species were assessed as being at a high collision risk at eight detectors, but none of these were within 200 m of proposed turbines.

8.7.44. Detectors 1, 5, 6, 8, 11 and 13 are the most comparable locations regarding habitat for much of the Proposed Development as they were located away from watercourses in areas of open ground and at a similar altitude to turbine locations. All of these detectors were assessed as having a low or a medium collision risk for both pipistrelle species, with the exception of detectors 6 and 13. Detectors 6 and 13 were assessed as having a high collision risk (at maximum activity levels) to common pipistrelles only. Detector 13 was located adjacent to an area of standing water/linearly eroded bog and all turbines are located away from such features. Detector 6 was located between Tomlachlan Burn and one of its small tributaries, meaning that bats may use the area around detector 6 to commute between the two watercourses. Furthermore, no turbines are proposed to be placed in the area around detector 6, with the closest proposed turbine being 668 m from the detector location.

8.7.45. Turbines 10, 12 and 16 are located within 200 m of Tomlachlan or Leonach Burn (see **Table 8.16**) and Turbine 08 is approximately 210 m from an area of semi-natural coniferous woodland. Turbine 08 is situated over the NatureScot recommended distance of 81.24 m from woodland (refer to **Paragraph 8.6.7** for further information). The middle and upper reaches of the Tomlachlan Burn, where Turbines 10 and 16 are located, showed low pipistrelle activity with no more than a medium risk for both pipistrelle species (detectors 3 and 8, see **Table 8.12**). The pipistrelle activity along the Leonach Burn was assessed as being at high risk (at maximum activity levels) at detectors 4, 7 and 12 (located along the Leonach Burn, see **Table 8.12**). Turbine 12 is 135 m from the Leonach Burn, which is over the 81.24 m distance recommended by NatureScot.

Table 8.16: Turbine Locations in Relation to Watercourses.

Turbine	Distance from nearest watercourse (m)	Watercourse
1	460	Leonach Burn
2	211	Tomlachlan Burn
3	270	Tomlachlan Burn
4	377	Leonach Burn
5	214	Leonach Burn
6	628	Leonach Burn
7	531	Tomlachlan Burn
8	362	Leonach Burn
9	459	Tomlachlan Burn
10	127	Tomlachlan Burn
11	100	Tributary
12	135	Leonach Burn (upper reaches)
13	245	Tomlachlan Burn (upper reaches)
14	203	Tributary
15	325	Tributary
16	73	Tomlachlan Burn (upper reaches)
17	382	Tomlachlan Burn (upper reaches)

Highlighted rows show turbine locations within 200 m of one of the main watercourses in the site boundary

8.7.46. The majority of pipistrelle passes recorded during the bat activity survey were at detector 10: 49 % of all common pipistrelle passes and 67 % of all soprano pipistrelle passes were recorded at this detector. This is thought to be due to bats foraging and commuting along the Tomlachlan Burn, the Allt Bad an Iasgair and around the tree on which the bat detector was located. The nearest turbine to this location is 278 m (Turbine 02). This distance is more than the conservative Eurobats guidance of 200 m between turbines and habitats that are specifically important to bats (Rodrigues *et al.*, 2015).

8.7.47. Common and soprano pipistrelle activity has been shown as high risk for turbine collision in some areas of the site, but the recommended buffer distance has been left between turbines and areas of highest activity. However, given the limited understanding of bat interaction with turbines and the high relative activity of common and soprano pipistrelles at the site, there is still a risk that common and soprano pipistrelle species will be impacted by the Proposed Development. Both pipistrelle species are assessed in SNH *et al.* (2019, updated 2021) as having an overall 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. 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.

8.7.48. Therefore, the impact of the Proposed Development on common and soprano pipistrelles during operation is predicted to be **moderate adverse** resulting in an effect which is **not significant** at the Local level.

Myotis Species

8.7.49. *Myotis* sp. are assessed by SNH *et al.* (2019, updated 2021) 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 detector 10, which were assessed as being high risk to this species group at maximum activity levels. This detector was located along a watercourse and next to a lone standing tree. The detector was located more than 250 m from proposed turbine locations. Relative activity levels of *Myotis* sp. at all other detectors were low to moderate, even at the maximum activity levels recorded on site.

8.7.50. The impact during the operational phase on *Myotis* bat species is therefore considered to be **low adverse** resulting in an effect which is **not significant** at the Local level.

Brown Long-eared Bat

8.7.51. 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 *et al.*, 2019 (updated 2021); Mathews *et al.*, 2017). 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 13 nights during the survey period (with a total of 83 passes) and were recorded at all detectors except for 4, 9 and 11, but at low rates at each detector (maximum total 16 passes at detectors 7 and 10.

8.7.52. The significance of the impact during operation on brown long-eared bats is therefore considered to be **negligible** resulting in an effect which is **not significant** at the Local level.

Decommissioning – Predicted Effects

8.7.53. 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 to the effects identified during construction. Habitat restoration following removal of infrastructure will lead to an increase of habitats on site in comparison to the operational phase.

8.8. Mitigation/Compensation

Habitats

8.8.1. A Habitat Management Plan (HMP) for the Proposed Development will be provided, subject to consultation with the landowner, NatureScot and THC. The main aim of this HMP will be to improve and restore areas of wet heath and modified bog within the site boundary.

8.8.2. As described in the Trends and Future Baseline section (**Paragraphs 8.6.34 and 8.6.35**), much of the wet heath and bog habitats within the site boundary already has areas of extensive drainage, and so has excellent potential for peatland restoration. Restoration will focus on ditch blocking to rewet drained areas of peatland and a review of the burning regime in the area. Suitable locations have been identified in which to undertake peatland restoration, totalling *c.* 38.5 ha of modified bog and 55.8 ha modified and degraded wet heath (see outline HMP, **Appendix 8.3**). 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. For ornithological reasons heather

management has been included within the outline HMP. For further information refer to **Chapter 7**.

8.8.3. A monitoring regime will be included as part of this plan in order to assess the effectiveness of management measures implemented as part of the HMP.

Fish

8.8.4. 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.

8.8.5. 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 9** which includes assessments of turbidity levels and chemical indicators of pollution as well as biological indicators.

8.9. Residual Effects

8.9.1. The mitigation and compensation measures are expected to reduce the level 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.

8.9.2. The restoration of highly modified and degraded bog habitats set out in **Section 8.8** will result in an overall net increase of good quality blanket bog habitats at the Proposed Development. This will reverse some of the baseline modification which may be expected to continue in the absence of the Proposed Development. With the application of this enhancement measure the magnitude of residual impact is expected to be **low beneficial**, resulting in an effect which is **not significant** at the Regional level.

8.9.3. The restoration of highly modified and degraded wet heath habitats set out in **Section 8.8** will result in an overall net increase of good quality wet heath habitats at the Proposed Development. This will reverse some of the baseline modification which may be expected to continue in the absence of the Proposed Development. With the application of this compensation the magnitude of residual impact is expected to be **negligible**, resulting in an effect which is **not significant** at the Regional level.

8.9.4. Confidence in predictions for effects on bog and wet heath habitat is moderate as the outcome of habitat restoration can be more difficult to predict. Confidence in predictions for effects on bats is high.

8.10. Cumulative Effects

8.10.1. NatureScot guidance (SNH, 2012 as updated online 2021) states that assessments should focus on the most significant cumulative effects 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 (CIA). 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 effect is predicted are considered in the CIA, as negligible effects will not result in a detectable increase in cumulative effects.

8.10.2. 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 moderate adverse residual effects predicted for common and soprano pipistrelles, these have been scoped into the CIA, along with bog habitats which also have minor beneficial residual effects predicted.

8.10.3. 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.

8.10.4. It should be noted that CIAs 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.

8.10.5. Within this search area, three development sites were identified:

- **Cairn Duhie Wind Farm (consented)** – This is a 20-turbine consented scheme (note application to amend is currently in planning), which has not been built out, located to the north-east of the Proposed Development.
- **Tom nan Clach Wind Farm (operational)** – This is a 13-turbine operational site, located to the south-west of the Proposed Development.
- **Remore Quarry (consented)** – This is a sand and gravel quarry with consent granted in August 2021, located 9.2 km north of the Proposed Development.
- **Ourack Wind Farm (scoping)** – This is a 27-turbine development, located to the east of the Proposed Development, currently at the scoping stage.
- **Tom nan Clach Wind Farm extension (scoping)** – A potential seven turbine development to the west of the Proposed Development.

8.10.6. Therefore, information for informing the CIA was available from one consented and one operational wind farm and one consented quarry (see **Table 8.17**). The two developments at the scoping stage have not been included as impacts have not yet been assessed and the projects have yet to go through planning.

8.10.7. With the application of good practice mitigation in relation to bats, the cumulative impact is predicted to be **low adverse** resulting in an effect which is **not significant**. With the restoration of bog and wet heath habitats as part of the HMP for the Proposed Development there will be a **negligible** impact on blanket bog and wet heath, resulting in an effect which is **not significant**.

Table 8.17: Cumulative Impact Assessment

Site	Lethen (Proposed Development)	Cairn Duhie Wind Farm	Tom nan Clach Wind Farm	Remore Quarry	Cumulative residual effects
No. Turbines	17	20	13		53 turbines
Site status	EIA	Consented	Operational since 2019	Consented	
Baseline surveys	2019	2012 and 2019	2014 and 2015	2015	
Species					
Bats (collision risk)	**Moderate** adverse magnitude of impact predicted for **common and soprano pipistrelles**. **Minor** adverse magnitude of impact predicted for ***Myotis sp.*** Bats considered to be **Local** value.	**Low** beneficial magnitude of impact predicted at the **Local** level. Records of **common pipistrelle**, **soprano pipistrelle**, **Daubenton's bat** and **brown long eared bat**. 0.27 ha of woodland to be felled, with 1.4 ha to be replanted so overall abundance of woodland habitat will increase. 50 m watercourse buffer so linear watercourse features largely unaffected by infrastructure or construction.	**Low** adverse magnitude of impact predicted at the **Site** level. Records of **common pipistrelle**, **soprano pipistrelle**, ***Myotis sp.*** and **brown long eared bat**. Low levels of bat activity across study area. Roosting features very limited across site.	N/A	**Low beneficial** impact predicted at Cairn Duhie and **low adverse** impact predicted at Tom nan Clach for all bat species recorded (at the **Local/Site** level). It is considered that these impacts counteract one another, leaving cumulative impact as **Moderate adverse** for pipistrelles and **Low adverse** for *Myotis sp*. at the **Local** level as predicted for the Proposed Development.
Habitats					
Bog	**10.15 ha** lost **38.5 ha** modified bog restored	Up to **17.03 ha** lost	Up to **22.10 ha** lost Overall positive effect predicted when compensatory habitat enhancement considered under HMP.	Not assessed	**49.28 ha** lost, 38.5 ha restored at Proposed Development, further restored at Tom nan Clach Wind Farm. Overall negligible beneficial cumulative effect.
Wet heath	**24.97 ha** lost **55.8 ha** wet heath restored	Up to **17.11 ha** lost	Up to **2.33 ha** lost	Not assessed	**44.41 ha** lost, 55.8 ha restored Overall negligible beneficial cumulative effect

8.11. Summary

8.11.1. In order to inform the EcIA, baseline ecology surveys were undertaken in 2019. These included Phase 1 and NVC habitat surveys, protected mammal surveys and bat surveys (roost assessment and activity surveys) following standard NatureScot guidance. Additional Phase 1 and NVC habitat surveys were undertaken in 2021 in areas not previously surveyed in 2019 that were within 300 m of the Proposed Development infrastructure (at the design chill stage).

8.11.2. An assessment has been made of the predicted significance of effects of the Proposed Development on ecological interests. This assessment predicted no significant effects on all of the IEFs recorded and no significant cumulative effects on any IEFs.

8.11.3. Habitat enhancement measures targeted at wet heath and blanket bog are proposed. Embedded mitigation measures to minimise impacts of the construction and operation of the Proposed Development on IEFs, and to prevent a breach of legislation under the *Wildlife and Countryside Act* (1981) as amended by the *Nature Conservation (Scotland) Act* (2004) are outlined. A SPP is proposed and good practice guidance regarding protected species and pollution prevention will be followed, with an ECoW employed during construction. Further mitigation in the form of a HMP to restore blanket bog and wet heath habitats is proposed. It is considered that implementation of these mitigation and habitat enhancement measures will reduce the likelihood of impacts on IEFs at the appropriate biogeographical scale. A summary of effects is found in **Table 8.18.**

Table 8.18: Summary of Effects

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/Adverse		Significance	Beneficial/Adverse
Bats – Construction (disturbance/displacement)	Negligible	Adverse	Nothing in addition to embedded mitigation.	Negligible	Adverse
Common and soprano pipistrelle – Operation (collisions)	Moderate	Adverse	Nothing in addition to embedded mitigation.	Moderate	Adverse
Myotis sp. bats – Operation (collisions)	Minor	Adverse	Nothing in addition to embedded mitigation.	Minor	Adverse
Brown long-eared bats – Operation (collisions)	Negligible	Adverse	Nothing in addition to embedded mitigation.	Negligible	Adverse
Blanket/modified bog – Construction (indirect pollution)	Negligible	Adverse	Nothing in addition to embedded mitigation.	Negligible	Adverse
Blanket/modified bog – Construction (habitat loss)	Minor	Adverse	HMP to restore blanket bog	Minor	Beneficial
Wet heath – Construction (indirect pollution)	Negligible	Adverse	Nothing in addition to embedded mitigation.	Negligible	Adverse
Wet heath – Construction (habitat loss)	Moderate	Adverse	HMP to restore wet heath habitats	Negligible	Beneficial

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