

WORK\75698287\v.2 Environmental Impact Assessment Report

# Lairdmannoch Energy Park

Chapter 6: Ecology

# Lairdmannoch Energy Park Limited Wind2

May 2025



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## Glossary of Terms

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Term	Definition		
The Applicant	Lairdmannoch Energy Park Limited		
The Agent	Atmos Consulting Limited		
Environmental Advisors and Planning Consultants	Atmos Consulting Limited		
Environmental Impact Assessment	Environmental Impact Assessment (EIA) is a means of carrying out, in a systematic way, an assessment of the likely significant environmental effects from a development		
Environmental Impact Assessment Regulations	The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (EIA Regulations)		
Environmental Impact Assessment Report	A document reporting the findings of the EIA and produced in accordance with the EIA Regulations		
Habitats Directive	European Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (as amended)		
The Proposed Development	Lairdmannoch Energy Park		
The Proposed Development Site	The full application boundary as per Figure 1-1		
Study Area	For designated sites up to 10 km, for non-statutory designated sites up to 3 km, for all other receptors – within the Proposed Development Site		
Solar Development	The area of the Proposed Development that contains the Solar Arrays and associated infrastructure. As shown on Maps 7, 8 and 9 of Figure 3-1.		
Wind Development	The area of the Proposed Development that contains the Wind Turbines and associated infrastructure. As shown on Maps 1, 2 and 4 of Figure 3-1.		

## List of Abbreviations

Abbreviation	Description
ARG UK	Amphibian and Reptile Groups of the United Kingdom
BAP	Biodiversity Action Plan
BCT	Bat Conservation Trust
CAR	Controlled Activities Regulations
CEMP	Construction Environment Management Plan
CIEEM	Chartered Institute of Ecology and Environmental Management
cm	Centimetre
DGC	Dumfries & Galloway Council
EcIA	Ecological Impact Assessment
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report



	Abbreviation	Description
	EnvCoW	Environmental Clerk of Works
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	FCS	Forestry Commission Scotland
	GWDTE	Ground Water Dependant Terrestrial Ecosystem
	ha	Hectare
	HAP	Habitat Action Plan
	HMP	Habitat Management Plan
	IEF	Important Ecological Feature
	JNCC	Joint Nature Conservation Committee
	km	Kilometre
	LDP	Local Development Plan
	LERC	Local Environmental Record Centre
	LNCS	Local Nature Conservation Site
	m	Metre
	mph	Miles per hour
	NGR	National Grid Reference
	NNR	National Nature Reserve
	NPF4	National Planning Framework 4
	NS	NatureScot
	NVC	National Vegetation Classification
	PPP	Pollution Prevention Plan
	PRF	Potential Roost Feature
	SAC	Special Area of Conservation
	SAP	Species Action Plan
	SBL	Scottish Biodiversity List
	SEPA	Scottish Environment Protection Agency
	SSPCA	Scottish Society of the Prevention of Cruelty to Animals
	SSSI	Site of Special Scientific Interest
	SWSEIC	South West Scotland Environmental Information Centre
	TA	Technical Appendix
	TN	Target Note
	Zol	Zone of Influence



## 6 Ecology

## 6.1 Introduction

This Chapter of the EIA Report describes and evaluates the current nature conservation interest for the Proposed Development Site and Study Area. The Chapter evaluates both habitats and non-avian animal species and assesses the potential impacts of the Proposed Development Site on habitats and species above a certain value.

Potential impacts on birds are considered separately in **Chapter 7: Ornithology** in **Volume 2** of this EIA Report.

This Chapter has been prepared by Atmos Consulting Ltd, led by Stephen McNee who is an Associate member of the Chartered Institute of Ecology and Environmental Management (CIEEM) with 15 years' experience as an ecological consultant.

The Proposed Development was subject to a pre-application enquiry, which at the time consisted of 12 wind turbines, 180 m at tip height; and other associated infrastructure, with no attached solar development (Planning Application Reference: 20/04174/PREMAJ). The Proposed Development has since been reduced to 9 turbines, and the solar array and BESS development included.

An Environmental Impact Assessment (EIA) Scoping Opinion request was submitted to the Energy Consents Unit in August 2023. This document detailed ecological surveys which were carried out in 2020 to inform that document, and further proposed surveys. An updated round of all required surveys was then undertaken in 2023/2024.

The results of the baseline surveys were used to inform the design of the Proposed Development and form the basis of the detailed assessment presented in this Chapter.

An outline Habitat Management Plan (HMP) has been produced as the mechanism to deliver mitigation in relation to sensitive habitats such as priority peatland and broadleaved woodland (see **Technical Appendix 6-6: Outline Habitat Management Plan** in **Volume 3** of this EIA Report).

The Proposed Development Site is centred on National Grid Reference (NGR) NX 66233 62404, located approximately 7 km north-east of Gatehouse of Fleet and 10 km west of Castle Douglas in Dumfries and Galloway. The Proposed Development Site occupies an area of approximately 612.2 ha.

The Chapter is supported by the following Technical Appendices:

- Technical Appendix 6-1: Extended Phase 1 Habitat Survey;
- Technical Appendix 6-2: National Vegetation Classification Survey;
- Technical Appendix 6-3: Bat Surveys (automated statics);
- Technical Appendix 6-4: Protected Mammal Surveys;
- Technical Appendix 6-5: (Confidential) Protected Mammal Surveys; and
- Technical Appendix 6-6: Outline Habitat Management Plan.



## 6.2 Legislation, Planning Policy and Guidance

The baseline surveys and ecological assessment have been carried out with reference to the legislation and guidance outlined below.

## 6.2.1 Legislation

The non-avian ecology assessment has been undertaken with reference to the following legislation:

- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora;
- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017;
- Wildlife and Countryside Act 1981 (as amended);
- Wildlife and Natural Environment (Scotland) Act 2011 (as amended);
- Nature Conservation (Scotland) Act 2004 (as amended);
- Protection of Badgers Act 1992; and
- Conservation (Natural Habitats, &c.) Regulations 1994 (as amended).

## 6.2.2 Planning Policy

#### National Policy

Relevant planning policy is summarised in **Chapter 4: Planning Policy and Legislation** in **Volume 2** of this EIA Report. This section focuses solely on policy which is relevant to non-avian ecology.

Policy 3 'Biodiversity' and Policy 4 'Natural Places' of the National Planning Framework 4 NPF4 is considered relevant to this assessment. In particular where it states at Policy 3(b):

"Development proposals for national or major development, or for development that requires an Environmental Impact Assessment will only be supported where it can be demonstrated that the proposal will conserve, restore, and enhance biodiversity, including nature networks so they are in a demonstrably better state than without intervention. This will include future management. To inform this, best practice assessment methods should be used. (Scottish Government, 2023)."

#### Local Planning Policy

The relevant provisions of the Dumfries and Galloway Local Development Plan (LDP) are important material considerations in relation to the Proposed Development. The Local Development Plan and supplementary guidance applicable to the Proposed Development currently consists of

- Dumfries and Galloway Council Local Development Plan 2 (DGC LDP2) (October 2019);
- Supplementary guidance: Wind Energy Development: Development Management Considerations (February 2020); and
- Supplementary guidance: Part 1 Wind Energy Development: Development Management Considerations Appendix 'C' DGWFLCS (February 2020).



#### Other Guidance

The Scottish Biodiversity List (SBL) (NatureScot (NS), updated 2022) is a list of animals, plants, and habitats that the Scottish ministers consider to be of principal importance for biodiversity conservation in Scotland.

Both scientific and social criteria have been used to define the SBL. Scientific criteria include all Priority Species and Priority Habitats included in the now superseded UK Biodiversity Action Plan (BAP) (UK Biodiversity Partnership, 2007 et seq.), which occur in Scotland.

Social criteria are based on the results of an omnibus survey of the Scottish public carried out in 2006 and includes some common species and habitats. This chapter only considers those listed using scientific criteria.

Additional key guidance documents relating to the assessment of effects of wind farms on non-avian ecological receptors that have been referenced in this assessment include the following:

- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal (CIEEM, 2022);
- Advising on peatland, carbon-rich soils and priority peatland habitats in development management (NatureScot, 2023);
- Bats and onshore wind turbines: survey, assessment and mitigation (Scottish Natural Heritage (SNH), Natural England, Natural Resources Wales, Renewable UK, Scottish Power Renewables, Ecotricity Ltd., the University of Exeter, and the Bat Conservation Trust (BCT), updated 2021);
- NatureScot pre-application guidance for solar farms (NatureScot, 2025).
- Scottish Environment Protection Agency (SEPA) Guidance on Assessing the Impacts of Developments on Groundwater Dependent Terrestrial Ecosystems (SEPA, 2024); and
- Good Practice During Windfarm Construction (Scottish Renewables, SNH, SEPA and Forestry Commission Scotland (FCS), 2010).

## 6.2.3 Consultation

The assessment process has been informed by the Pre-Application response received from the Dumfries and Galloway Council (20/1837/HLE) and the EIA Scoping Opinion (Ref. ECU00004900).

A summary of the key consultation responses relevant to non-avian ecology are presented below. The table has been condensed from the original text to focus on specific relevant scope notes/actions. Comments in the Pre-Application consultation response that were also included in the EIA Scoping Opinion have not been repeated.

It should be noted that some responses, such as that from NatureScot, included issues related to ornithology; those have been abridged to only present the statements relevant to non-avian ecology. Where these can be easily divested from ecology, text has been removed from Table 6-1. See **Chapter 7: Ornithology** in **Volume 2** of this EIA Report for a full response.

Chapter 5: Landscape and Visual in Volume 2 of this EIA Report should also be consulted for full NatureScot responses.



#### Table 6-1: Consultation

Consultee	Pre-Application Comments (November 2020)	Scoping Comments (September 2023)	Applicant Response/Where addressed within this Report
Dumfries and Galloway Council	<ul> <li>The key ecological planning constraints affecting this site include the following:</li> <li>Site covered by carbon rich soils, deep peat and priority peatland habitat.</li> <li>Laughenghie SSSI situated 500 m to west of site boundary.</li> <li>Watercourses situated within the site.</li> <li>Fleet Valley National Scenic Area situated 4.2 km to the west of the site. Galloway Hills Regional Scenic Area situated 1km to the north east.</li> <li>Gatehouse of Fleet Conservation Area situated to south west.</li> <li>Galloway and Southern Ayrshire Biosphere - Transition Area.</li> </ul>	The response from DGC reiterated the need cited by SEPA for NVC survey and that phase 1 and 2 peat survey will be required in tandem with a mitigation strategy within a Peat Management Plan (PMP). The need for a biosecurity plan, to avoid spread of the invasive American signal crayfish <i>Pacifastacus leniusculus</i> (present within Woodhall Loch and other near-by water courses), was also noted. It is noted that responses were received prior to implementation of National Planning Framework 4 (NPF4) which was introduced in February 2023. As such, any future Environmental Assessment Impact Report (EIAR) will adhere to NPF4 to conserve, restore, and enhance biodiversity.	The policies within the Local Development Plan have been adhered to. On application of mitigation and with regard to Designated Sites and National Scenic Areas the Proposed Development will consider and respect site topography and surrounding natural landmarks, and will be sited, as far as practicable, to retain natural features that contribute to biodiversity. Deep peat, Ground Water Dependant Terrestrial Ecosystems and watercourse features have been avoided insofar as possible (as shown on <b>Figure 8-1</b> and <b>Figure 8-6</b> in <b>Volume 4</b> of this EIA Report & <b>Chapter 8: Hydrology, Geology and Hydrogeology</b> in <b>Volume 2</b> of this EIA Report). Phase 1 Habitat, Protected Species and NVC surveys were carried out in accordance with current guidance and best practice. Details of which can be found in Section 6.4.2. Phase 1 and 2 peat probing have been undertaken and inform both the PMP (TA 8-2) and approach to restoration in identifying Priority Peatlands and their condition. Measures to avoid spread of the invasive American signal crayfish are included in the Construction Environment Management



Consultee	Pre-Application Comments (November 2020)	Scoping Comments (September 2023)	Applicant Response/Where addressed within this Report
			Plan (TA 15-1). Enhancements provide a significant benefit, as required under NPF4, are detailed in the Outline HMP (TA 6-6).
NatureScot (formerly Scottish Natural Heritage)	In terms of non-avian ecology NatureScot referred to their general pre- application and scoping advice for onshore wind farms (NatureScot 2022b), which contains advice for developers on the general considerations to inform the approach to environmental impacts for all onshore wind farms.	NatureScot is happy with the proposed scope for the assessment of Ecological receptors for the proposal. Similarly, the proposed peatland assessment seems appropriate. There is scope for micro-siting of infrastructure to further minimise potential impacts on peatland. Restoration options for peatland will be incorporated adhering to NatureScot guidance on priority peatland and ensure positive gain is achieved in terms of biodiversity and carbon management. NatureScot expects that the habitat management plans are fully developed and explored within the EIA rather than left to the post consent stage.	General scoping and pre-application guidance for onshore wind farms and Priority Peatland guidance has informed the design evolution in order to avoid and minimise negative impacts. A detailed Outline HMP has been produced (TA 6-6). The design has evolved via active consideration of impacts on priority peat with dialogue between ecologists, the peat specialist, and engineers. Micro-siting has reduced impacts on this as much as possible and further micrositing was effected following the NatureScot response. Chapter 8: Hydrology, Geology and Hydrogeology and Chapter 3: Description of the Development should be consulted for further information. Statutory Designated Sites have been scoped out (see section 6.4.1). Protected species and habitat surveys have been conducted and ecological features at risk of negative impacts have been assessed within this report. Potential impacts on the Fleet Valley NSA are addressed primarily in <b>Chapter 5 – Landscape and Visual</b> in <b>Volume 2</b> of this FIA Report.



Consultee	Pre-Application Comments (November 2020)	Scoping Comments (September 2023)	Applicant Response/Where addressed within this Report
Scottish Environmental Protection Agency	<ul> <li>To avoid delay and potential objection, the information outlined below must be submitted in support of the application:</li> <li>Map and assessment of all engineering activities in or impacting on the water environment including proposed buffers, details of any flood risk assessment and details of any related CAR applications.</li> <li>Map and assessment of impacts upon Groundwater Dependent Terrestrial Ecosystems and buffers.</li> <li>Map and assessment of impacts upon groundwater abstractions and buffers.</li> <li>Peat depth survey and table detailing re-use proposals.</li> <li>Map and table detailing forest removal.</li> </ul>	<ul> <li>SEPA set out information requirements relating to ecology based upon their best practice guidance and the previous scoping report:</li> <li>Site Layout: that the works minimise the extent of new undisturbed ground in their footprint, and that pre-existing infrastructure be re-used or upgraded as often as possible.</li> <li>Disturbance of Peat: the submission must demonstrate how the layout has been designed to minimise disturbance of peat and consequential release of CO<sub>2</sub>. It must also outline preventative/mitigation measures to avoid significant drying/oxidation of peat. A Peat Management Plan must also be considered depending on the volume of peat likely to be encountered in the project.</li> <li>GWDTE: must provide a map demonstrating that all GWDTE are outwith a 100 m radius of all excavations. A site-specific risk assessment is required if minimum buffers cannot be</li> </ul>	All appropriate surveys and assessments have been undertaken most of which relate to hydrological assessment, and which are covered in Chapter 8: Hydrology, Geology and Hydrogeology in Volume 2 of this ElA Report. Phase 1 Habitat and National Vegetation Classification (NVC) surveys were conducted, and included categorisation of ecological importance and which were passed to the hydrogeologist to establish GWDTE status. See Chapter 8: Hydrology, Geology and Hydrogeology in Volume 2 of this ElA Report and Figure 8-6 in Volume 4 of this ElA Report. See Chapter 3: Description of the Development in Volume 2 of this ElA Report for datailed information on design
	• Map and site layout of borrow pits.	<ul><li>equired if minimum buffers cannot be achieved.</li><li>Existing Groundwater: must include a map</li></ul>	for defailed information on design iterations, and environmental considerations which informed these
		demonstrating that all excavations shallower than 1 m, and outwith 250 m of all excavations	changes.
		extractions. If minimum buffers cannot be achieved, a site-specific risk assessment and appropriate mitigation will be required.	In addition to this assessment, description of methods to address impacts on peat, are considered in the PMP (TA 8-2).



## 6.3 Methodology and Approach

## 6.3.1 Baseline Data Gathering

#### Desk Study

An ecological desk study was undertaken to identify nature conservation designations and records of protected or otherwise notable species in the local area using data purchased from South West Scotland Environmental Information Centre (SWSEIC), a local environmental records centre (LERC), and freely available online data.

A review of online data was undertaken in 2023, following a previous review in 2020, and the review of SWSEIC data was carried out in 2023.

Distances are taken from the approximate centre of the Proposed Development Site for the following Important Ecological Features (IEFs):

- Non-statutory designated sites up to 3 km;
- Protected species records/records of high conservation significance (Scottish Biodiversity List, Schedule species from the Wildlife and Countryside Act 1981, local Biodiversity Action Plan species for up to from the centre of the Proposed Development); and
- Records of mobile species (bats 10 km).

CIEEM (2017) guidance notes the Zone of Influence (ZOI) should be decided based on sensitivity of the receptor and nature of the Proposed Development. Distances are not therefore proscribed. The distances shown above are considered appropriate based on experience by the author of working on projects of this type in this region of Scotland, and factor recommendation to extend the ZOI tor mobile species stated in the guidance.

Only those features that relate to non-avian ecology are considered in this Chapter, with ornithological data being presented in **Chapter 7: Ornithology** in **Volume 2** of this EIA Report.

#### Field Surveys

The results of the detailed ecological surveys undertaken are summarised in this Chapter, with more details provided in Technical Appendices, as shown in **Table 6-2**. A summary of the field survey used is provided below.

Study	Date Undertaken	Location in EIA Report
Extended Phase 1 Habitat	September 2023, September 2020, March 2025	Technical Appendix 6-1
NVC Surveys	September 2023	Technical Appendix 6-2
Bat Surveys (automated, static)	April - September 2023 and August - September 2024	Technical Appendix 6-3
Protected Mammal Surveys	June 2023, March 2025**	Technical Appendix 6-4

#### Table 6-2: Ecological Surveys Undertaken for the Assessment

Access to the Wind Development area of the Proposed Development is anticipated to be from the South West travelling north on the B727 before turning onto a (private)



existing forestry track through the Glengap Forest for approximately 7km before entering the Proposed Development Site boundary to the south.

The lack of surveys is not considered to materially alter the findings of this EIAR, as the un-surveyed land is dominated by existing commercial forestry track (to be upgraded), commercial conifer plantation and improved agricultural fields.

#### Extended Phase 1 Habitat Survey

As detailed in **Technical Appendix 6-1** in **Volume 3** of this EIA Report, the extended Phase 1 habitat survey was carried out in September 2023 to update a previous survey undertaken in September 2020. The survey on both occasions was within the Proposed Development Site.

The survey involved mapping areas of habitat greater than 0.1 ha and listing target notes to describe significant features as per Joint Nature Conservation Committee (JNCC, 2010). These included features with the potential to support protected or otherwise notable species that may require further survey.

The results are shown on Figure 6-3 in Volume 4 of this EIA Report.

#### National Vegetation Classification Survey

As detailed in **Technical Appendix 6-2** in **Volume 3** of this EIA Report the NVC survey was carried out in September 2023. The results are shown on **Figure 6-4** in **Volume 4** of this EIA Report. The survey was within the Proposed Development Site.

All surveys were carried out in dry weather conditions with good visibility.

The NVC communities were mapped by eye and classified according to Rodwell (1995, 1998a, 1998b, 2006). Where possible, floristic samples were recorded to allow the habitat to be categorised later into the appropriate NVC classification. Small areas of interest and general descriptions of features were made using target notes as per Phase 1 survey methodology (JNCC, 2010).

Higher plant nomenclature follows that of Stace (2020), bryophyte nomenclature follows that of Hill *et al.* (2008) and lichens follow Coppins (2002). Following the NVC survey, ecological importance among the recorded NVC communities was classified in terms of their potential groundwater dependence, based on SEPA guidance (SEPA, 2024).

#### Bat Surveys on the Wind Development

Automatic static surveys as detailed in **Technical Appendix 6-3** in **Volume 3** of this EIA Report, bat surveys were carried out in April – September 2023, and in August – September 2024 in accordance with current survey guidelines (NatureScot 2021).

The surveys comprised three seasonal (spring, summer, and autumn), ground level automated surveys were carried out. A total of nine static detector locations were used to suitably represent the likely position of turbine locations as set out in the EIAR.

The 2024 surveys surpassed that required under the NatureScot guidance but were carried out to better understand use and distribution of *Nyctalus* bats (Liesler's bat *Nyctalus leisleri* and/or noctule bat *Nyctalus noctula*) encountered in 2023 surveys as these are species at high risk from wind farm developments (NatureScot, 2021) and with limited distributions in Scotland.



Of the 18 UK bat species, ten occur in Scotland: common pipistrelle Pipistrellus pipistrellus, soprano pipistrelle P. pygmaeus, Nathusius' pipistrelle P. nathusii, Natterer's bat Myotis nattereri, Daubenton's bat M. daubentonii, noctule bat Nyctalus noctula, brown long-eared bat Plecotus auritus, Leisler's bat N. leisleri and whiskered/Brandt's bat M. mystacinus/M. brandtii bats.

However, the occurrence of these species is variable throughout Scotland.

In addition to the above, several bat species are included within the Scottish Biodiversity List, including Brandt's, Daubenton's, whiskered, Natterer's, noctule, Nathusius', common pipistrelle, soprano pipistrelle, and brown long-eared bat.

NatureScot guidance for bats and onshore wind turbines (NatureScot, 2021) provides guidance on the risk levels from wind farm developments associated with Scottish bat species, based on physical and behavioural characteristics and from evidence of casualty rates in UK and the rest of Europe.

**Table 6-3**, reproduced from the NatureScot guidance, shows the levels of risk derived for key species.

**Table 6-4**, also reproduced from NatureScot guidance, takes relative population sizes into account, and presents the levels of risk at population level. Appendix 1 in the guidance sets out the different physical and behaviour characteristics of bats and assigns a different risk category to each characteristic, allowing each bat species to then be categorised by risk (**Table 6-3**).

Low Risk	Medium Risk	High Risk
Brown long-eared bat	Not Applicable	Common pipistrelle
Daubenton's bat	Not Applicable	Soprano pipistrelle
Natterer's bat	Not Applicable	Nathusius' pipistrelle
Whiskered bat	Not Applicable	Noctule bat
Brandt's bat	Not Applicable	Leisler's bat

#### Table 6-3: Bat Species Likely to be at Risk from Wind Turbines

#### Table 6-4: Bat Populations Likely to be Threatened Due to Impacts from Wind Turbines

Low Risk	Medium Risk	High Risk
Brown long-eared bat	Common pipistrelle	Nathusius' pipistrelle
Daubenton's bat	Soprano pipistrelle	Noctule bat
Natterer's bat	Whiskered bat	Leisler's bat
	Brandt's bat	

Five species are identified to be of high risk from wind turbine mortality: common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, Leisler's bat and noctule bat. This is due to factors such as habitat preference, echolocation characteristics, wing shape, flight speed, flight behaviour and use of landscape, hunting techniques and migration strategies.

Common and soprano pipistrelle bats and *Myotis* species do cross open spaces; however, they are relatively less likely to fly at a height that will bring them into contact with a turbine blade. Despite this, based on research, they have been categorised as high risk. Noctule and Leisler's bats, and Nathusius' pipistrelle to a lesser extent, do fly at height and often cross open spaces, making them "high risk" species because they exhibit all of the characteristics associated with species at high risk.



The risk of species being struck does not always translate into population level effects and those species with smaller populations are more likely to encounter population levels effects.

As such, those species which show a high risk of collision and with smaller populations (noctule, Leisler's bat and Nathusius' pipistrelle) are considered most sensitive to negative effects from wind farm developments. Common and soprano pipistrelle, with typically much more robust populations, are considered less likely to have population level effects (**Table 6-4**).

A full description of the methodology for bat call analysis is provided in **Technical Appendix 6-3** in **Volume 3** of this EIA Report, a summary of the methodology is provided here.

Analysis of full spectrum .WAV files was undertaken firstly by Kaleidoscope (to convert the raw data into .ZCA files) and then Analook W software to enable identification of species.

All files were manually analysed to identify bat species and to separate common pipistrelle *Pipistrellus pipistrellus* and soprano pipistrelle *Pipistrellus pygmaeus*. All sonogram files classified as "noise" by Kaleidoscope during the conversion process were then subject to manual checking of sonograms, and where bat calls were present, manual identification was undertaken.

Absolute measures of bat activity are not possible to reliably calculate for automated field studies as during an individual recording session, it is not possible to differentiate between one individual bat passing the detector ten times or ten different bats passing the detector on a single occasion.

As per NS guidance, a measure of relative bat activity can be obtained using the secure online tool "Ecobat" to compare data collected from the Proposed Development Site with bat survey information collected from similar areas at the same of the year and in comparable weather conditions.

Ecobat generates a percentile rank for each night of activity and provides a numerical way of interpreting the levels of bat activity recorded at a site across regions in Britain by producing a Bat Activity Index (BAI). It is currently the most objective method of assessing bat activity (Lintott & Matthews, 2018) (NatureScot, 2021).

Bat data was then processed to quantify risk both for the Proposed Development overall and for the individual species recorded during the surveys. Full descriptions of the risk assessment methodology are presented in **Technical Appendix 6-3** in **Volume 3** of this EIA Report.

#### **Bat Roost Potential surveys**

As per NatureScot (2021) surveys included a search for key features that could support maternity roosts and significant hibernation and/or swarming sites within 200m plus rotor radius of the boundary of the proposed development.

#### Bat Surveys on the Solar Development

During protected species surveys any signs of bat roost potential features within 30 m of infrastructure (e.g., holes within trees or structures) were recorded and considered in the evolving design process. NatureScot pre-application guidance for solar farms was updated in February 2025 and contains the following wording:



"Our standing advice for bats should be referred to inform survey, assessment, mitigation and any licensing requirements. Solar PV farm developments should be designed and constructed to avoid damage or disturbance to bat roost sites and to minimise any loss or fragmentation of foraging and commuting habitat. The risk of collision for solar PV farm developments is low so bat activity surveys are not required."

#### Protected Species Survey

Surveys for non-volant or non-flying protected species were undertaken during June 2023 with the findings presented in **Technical Appendix 6-4** in **Volume 3** of this EIA Report. The survey was within the Proposed Development Site.

Whilst target species were considered to be otter *Lutra lutra*, water vole *Arvicola amphibius*, badger *Meles meles* and red squirrel *Sciurus vulgaris*, signs of other protected species, such as pine marten *Martes martes*, if present would have been recorded (if present). Additionally, any signs of bat roost potential features within 30m of infrastructure (e.g., holes within trees or structures) were recorded.

The otter survey followed standard methodologies (Purseglove, 1995; Chanin, 2003; Bang and Dahlstrøm, 2006; Muir and Morris, 2013); the water vole survey was conducted with reference to Strachan (2011); and the badger survey used the methodology in Harris *et al.* (1989).

Habitat Suitability Index surveys for great crested newt *Triturus cristatus* suitability were carried out on ponds as per the methodology outlined in ARG UK (2010).

#### Limitations

The forestry plantation to the north and north-west which borders the Proposed Development Site where the existing western access track crosses through was inaccessible at the time of survey.

As works for this track mostly comprises localised upgrades such as widening and resurfacing both within commercial plantation and improved agricultural grasslands this is not considered to be a significant limitation.

Both of the NVC surveys and Phase 1 survey were carried out in the beginning of September 2023 during the growing season and as this is within the optimum timing for habitat surveys in Scotland, this presented no limitation. It is possible that early flowering plants may have been missed; however, any effect is considered negligible and is unlikely to affect the accurate classification of communities.

Due to the change in the access route into the Proposed Development Site, the temporary construction compound was moved to the south west of the Wind Development area in January 2025. For further information see **Chapter 3 Description of Development** and **Figure 3-6**. This is covered by extended Phase 1 survey data (from 2020) but not from NVC data gathered in September 2023.

This is because the Proposed Development Site boundary extended further south at the time of the 2020 survey but was reduced before the time of the 2023 NVC survey. The area not covered by NVC was re-surveyed in 2025 and results confirmed minimal change from the 2020 surveys. Approximately 2,38 ha wet modified bog will be lost in this area of which 1.36 ha is at 50 cm peat depth or more.



NVC mapping shows M15b wet heath, M25b mire and U20 bracken community present to the north of this area; satellite imagery suggests the wet modified bog is in keeping with those mapped areas.

As a result of the above, where loss will occur on peat of 50 cm depth or more (as recorded in Phase 1 and Phase 2 peat depth surveys), wet modified bog is assumed to be M25a mire because this is the prevailing habitat on the Proposed Development Site. These loss calculations have been factored into habitat loss tables **Table 6-9 and 6-16**.

There were no significant limitations concerning the static bat detector surveys; The 2024 survey effort was not conducted during spring and only focussed on summer and autumn surveys.

This is not considered a limitation, as there was very little bat activity recorded during the spring surveys of 2023; in addition, the 2024 surveys were conducted to supplement the data collected in 2023 which adhered to NatureScot (2021) guidance. The 2024 surveys were supplementary to that.

Protected species surveys were conducted during suitable times of the year for the target species. Access within the Proposed Development Site was freely available. Areas outside of the boundary were only available for access via public roads and it was therefore not possible to follow the recommended guidance when surveying these areas in relation to appropriate survey buffers. This is not considered to have been a limitation factor in the results overall.

Taking account of the above no significant survey limitations were identified from any survey used to inform this EIA Report.

## 6.3.2 Significance Criteria

The key objective of field and data analysis is to identify those receptors liable to comprise likely significant effects as a result of the Proposed Development as described in the CIEEM guidelines.

The CIEEM Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2024) (henceforth referred to as the CIEEM guidelines) form the basis of the impact assessment presented in this chapter.

These guidelines set out a process of identifying the value of each ecological receptor and then characterising the impacts that are predicted, before discussing the effects on the integrity or conservation status of the receptor, proposed mitigation and significance of effects of any residual impacts predicted.

The following definitions of the terms 'impact' and 'effect' are used in this chapter:

- Impact actions resulting in changes to an ecological feature. For example, the construction activities of a development removing a hedgerow; and
- Effect outcome to an ecological feature from an impact. For example, the effects on a dormouse population from loss of a hedgerow.

The initial action for any ecological EIAR is to determine which features should be subject to detailed assessment. Those ecological receptors subject to more detailed assessment should be of sufficient value that impacts upon them could result in effects which are significant in terms of either legislation or policy. The receptors should also be vulnerable to significant impacts arising from the Proposed Development.



All designated nature conservation sites, plant and animal species, habitats and integrated plant and animal communities that occur within the Zone of Influence (ZoI) of the Proposed Development are defined as potential ecological features (as described below).

The Zol for a project is defined here as the area over which ecological features may be affected by biophysical changes as a result of the Proposed Development and associated activities.

The Zol is likely to extend beyond the Proposed Development Site, for example where there are ecological or hydrological links beyond the Proposed Development Site boundary. The Zol will also vary for different ecological features, depending on their sensitivity to environmental change.

## 6.3.3 Determining Value

The CIEEM guidelines recommend that the value of ecological features is determined based on a geographic frame of reference. For this project the following geographic frame of reference is used:

- International (nature conservation designation, habitat or populations of species of international importance, e.g., a Special Area of Conservation (SAC) or significant numbers of a designated population outside the designated site);
- National (nature conservation designation, habitat or populations of species of Scottish importance, e.g., a Site of Special Scientific Interest (SSSI) or a National Nature Reserve (NNR), a nationally important population / assemblage of a European Protected Species and / or a species listed on Schedule 5 of the Wildlife and Countryside Act 1981);
- Regional (nature conservation designation, habitat or populations of species of SC area importance, e.g., a site / population that meets SSSI designation criteria but has not been designated due to better examples being present in the regional area or a regionally important population / area of an SBL priority species / habitat);
- County (Metropolitan, County, vice-county or other local authority-wide area);
- Local (a nature conservation site, habitat, or species of importance in the local or district area, e.g., a breeding population / viable area of an SBL or local BAP species / habitat); and
- Less than local (unremarkable habitat / common species of little or no intrinsic nature conservation value).

## 6.3.4 Valuing Habitats

The value of habitats, according to the CIEEM guidelines, is measured against published selection criteria where available. Reference may therefore be made to both the SBL and Habitat Action Plans (HAPs) contained within the D & G Local Biodiversity Action Plan (2009).

As the guidelines note, the presence of a HAP reflects the fact that the habitat concerned is in a sub-optimal state and hence the action plan is required and a HAP does not, therefore, necessarily imply any specific level of importance for the habitat.

It must be noted that features may be assigned greater value if there is reasonable chance that they can be restored to a higher value in the future as per the requirements of the guidance.



Notwithstanding the above, the principal guidance driving compensation and enhancement is the 1:10 loss to compensation ratio and a further 10% enhancement requirement for priority peatland habitats, as set out in guidance (NatureScot, 2023).

The enhancement fraction is considered to be 10% of potential National interest Priority Peatlands, which at the Proposed Development are M17 mire and M18 mire and associated sub-communities. See sections below and the Peat Management Plan (**Technical Appendix 8-2**) for further information.

## 6.3.5 Valuing Species

In assigning a level of value to a species, it is necessary to consider its distribution and status, including a consideration of trends based on available historical records. Rarity is an important consideration because of its relationship with threat and vulnerability.

However, because some species are inherently rare, it is necessary to look at rarity in the context of status. A species that is rare and declining should be assigned a higher level of importance than one that is rare with a stable population.

Reference may also be made to SBL and Species Action Plans (SAPs) contained within D & G Local Biodiversity Action Plan (2009) and other indicators of conservation status, as appropriate, although, as above with HAPs, the existence of an SAP does not necessarily imply any specific level of importance.

## 6.3.6 Predicting and Characterising Impacts and Effects

The CIEEM guidelines suggest that the process of predicting ecological impacts and effects should take account of relevant ecosystem structure and function such as:

- Available resources e.g., territory, food and water;
- Environmental process e.g., flooding, erosion, eutrophication, deposition and climate change;
- Ecological processes and relationships e.g., population dynamics, vegetation dynamics and predator / prey relationships;
- Human influences e.g., animal husbandry, burning, pollution, disturbance from public access; and
- Historical context e.g., natural range of variation, historical human influences, and geomorphological evolution.

In accordance with the CIEEM guidelines, when describing impacts and effects, reference is made to the following, where appropriate:

- Confidence in predictions the level of certainty that an impact will occur as predicted, based on professional judgement and where possible evidence from other schemes – this is based on a four-point scale: certain / near certain; probable; unlikely; and extremely unlikely;
- Magnitude the size of an impact in quantitative terms where possible;
- Extent the area over which an impact occurs;
- Duration the time for which an impact is expected to last;
- Reversibility a permanent impact is one that is irreversible within a reasonable timescale or for which there is no reasonable chance of action being taken to reverse it. A temporary impact is one from which a spontaneous recovery is possible; and



• Timing and frequency – i.e., whether impacts occur during critical life stages or seasons.

Both direct and indirect impacts are considered:

- Direct ecological impacts are changes that are directly attributable to a defined action, e.g., the physical loss of habitat occupied by a species during the construction process; and
- Indirect ecological impacts are attributable to an action, but which affect ecological resources through effects on an intermediary ecosystem, process, or receptor, e.g., external sourcing of stone for road surfaces may cause growth of plant species not generally found in that area of the Proposed Development Site.

The potential for cumulative effects was also considered. Cumulative effects can arise from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a location. Ecological features may already be exposed to pressure and further impact could cause irreversible decline (CIEEM, 2024).

Developments within 10 km of the Proposed Development were identified as this is considered to be the maximum ZoI for ecological receptors. In line with CIEEM guidance, the following development types were included:

- Proposals for which planning consent has been applied for which are awaiting determination in any regulatory process;
- Projects which have been granted planning consent, but which have not yet been started or which are under construction;
- Proposals which have been refused planning permission, but which are subject to appeal, and the appeal is undetermined; and
- To the extent that their details are in the public domain, proposed projects that will be implemented by a public body but for which no consent is needed from a competent authority.

## 6.3.7 Significant Effects

For the purposes of Ecological Impact Assessment (EcIA), the CIEEM guidelines define a significant effect as; "...an effect that either supports or undermines biodiversity conservation objectives for important ecological features or for biodiversity in general".

Significant effects can be either positive or negative and are qualified with reference to an appropriate geographic scale, from international to local, however, it should be noted that the scale of significance of an effect may not be the same as the geographic context in which the feature is considered important.

For example, an effect on a species which appears on a national list of species of principal importance for biodiversity may not have an effect on its national population.

Significance relates to the weight which should be attached to effects when decisions are made. Any significant effects remaining after mitigation (residual effects), together with an assessment of the likelihood of success of the mitigation, are the factors to be considered against legislation, policy, and development control in determining the application.



## 6.3.8 Mitigation, Compensation and Enhancement

It is important as part of any Environmental Impact Assessment to clearly differentiate between mitigation, compensation and enhancement and these terms are defined here as follows:

- Mitigation is used to refer to measures to avoid, reduce or remedy a specific negative impact in situ. Mitigation is only required for negative impacts assessed as being significant or where required to ensure compliance with legislation;
- Compensation is used to refer to measures proposed in relation to specific negative impacts but where it is not possible to fully mitigate for negative impacts in situ. Compensation is only required for negative impacts assessed as being significant or where required to ensure compliance with legislation; and
- Enhancement is used to refer to measures that will result in positive ecological impacts, but which do not relate to either specific significant negative impacts or where measures are required to ensure legal compliance.

## 6.3.9 Assessment Areas

The assessment area for designated sites is up to 10 km, for non-statutory designated sites up to 3 km, and for all other receptors within the Proposed Development Site.

With respect to vegetation and most fauna the assessment focuses on areas extending up to 250 m from borrow pits or structures requiring foundations, and 100 m out from all infrastructure, i.e., areas which are considered to be potentially impacted upon by the Proposed Development.

The faunal surveys cover a wider area, so impacts have been assessed within the zone of impact appropriate for each receptor, which at its maximum accounts for otter up to 200 m of infrastructure.

Given the mobility of bats, the ZoI extends to up to 10 km based on the presence of desk top records, but with priority given to the value of the Proposed Development Site itself, based on the 2023 and 2024 static survey findings.

Access was not limited within the Proposed Development Site, though was restricted in parts of the survey buffer. This is not considered a limitation as most of the infrastructure is contained within 250 m of the Proposed Development Site boundary and where this is not the case, commercial plantation forestry abuts the boundary.

There are instances where this distance is not maintained in relation to solar panels, but the lack of excavation involved means the occurrence of indirect effects (i.e. up to 250 m beyond the area of direct impact) is unlikely.

## 6.4 Baseline Conditions

The land cover within the Proposed Development Site is predominantly marshy acidic grassland in the southern parts, with modified blanket bog bordered by conifer plantation forestry in the north and northwest.

There are some small watercourses within the development boundary, namely the Anstool Burn and the Kirkconnell Linn. There is a body of water, Loch Mannoch, south of the Proposed Development Site boundary.



The settlement pattern in the wider area is characterised by scattered residences and farm houses with the nearest substantial settlement being the town of Gatehouse of Fleet located approximately 6.2 km from the Wind Development area of the Proposed Development.

## 6.4.1 Desk Study

#### Nature Conservation Designations

Statutory designated sites for non-avian ecological interests within 10 km of the Proposed Development Site are shown in **Table 6-5** and on **Figure 6-1** in **Volume 4** of this EIA Report.

Where sites have a combination of both ecological and ornithological features, ornithological features are not stated here; for any such designations refer to **Chapter 7**: **Ornithology** in **Volume 2** of this EIA Report. For the sake of completeness, **Figure 6-1** in **Volume 4** of this EIA Report shows designations relevant to both ecology and ornithology.

11 designated sites relevant to ecology were identified, nine SSSIs, one Ramsar Designation, one SAC and one NNR; as shown in **Table 6-5**.

Two non-statutory sites are considered potentially relevant to this assessment based on a 3 km distance of the Proposed Development Site (**Figure 6-2** in **Volume 4** of this EIA Report).

Ancient Woodland Inventory Sites adjacent to the Proposed Development Site are included (Figure 6-2 in Volume 4 of this EIA Report).

Designated Sites	Designated Features	Distance from Proposed Development Site
Statutory		
Special Area of Conservat		
Galloway Oakwoods	Western acidic oak woodland	4.2 km
Site of Specific Scientific In	iterest (SSSI)	
Woodhall Loch	Beetles Caddisfly (Phacopteryx brevipennis) Fen meadow Oligotrophic Loch Open water transition fen	3.5 km
Carstramon Wood	Upland oak woodland	4.2 km
Threave and Carlingwark Loch	Fen meadow	5.4 km
Killiegowan Wood	Upland oak woodland	6.3 km
River Dee (Parton to Crossmichael)	Dragonfly assemblage Lowland acid grassland Open water transition fen	6.5 km
Ardwall Hill	Upland assemblage Wet woodland	6.9 km
Cairnsmore of Fleet	Blanket bog Upland assemblage	7.6 km

 Table 6-5: Statutory and Non Statutory Nature Conservation Sites



Designated Sites	Designated Features	Distance from Proposed Development Site
Airds of Kells Wood	Upland mixed ash woodland	7.9 km
	Upland oak woodland	
Skyreburn Grasslands	Fen meadow	9.4 km
	Lowland neutral grassland	
Ramsar Site		
Loch Ken and River Dee	Beetles	5.4 km
Marshes	Vascular plant assemblage	
National Nature Reserve		
Cairnsmore of Fleet	See SSSI entry.	7.6 km
Non Statutory		
Local Wildlife Site		
Culcaigrie & Trostrie Lochs LWS	Designated for its fen, willow carr and marshy grassland	3 km
Scottish Wildlife Trust		
Carstramon Wood	Oak, beech, birch and rowan woodland. Target species include pied flycatcher Ficedula hypoleuca and redstart Phoenicurus phoenicurus	3 km
Ancient Woodland Invent	ory Site	
A 4.84 ha area	AW of Ancient (of semi-natural origin)	Adjacent

With the exception of the Ancient Woodland Inventory Site all designated sites are scoped out of further assessment based on the distance from the Proposed Development Site.

#### Protected Species Records

Target species were identified as those that are either afforded specific legislative protection or represent qualifying interests in designated sites in the immediate wider area.

Valuations are not provided for desktop protected species records as they are considered as an indicator as to what may be found during surveys, only adding weight to valuations based on receptors found during surveys, if applicable (i.e. where records are likely to be connected to the Proposed Development Site by means of proximity, or habitat connectivity).

#### Table 6-6: Protected Species Historical Records

Species	Summary of Records and Distance from the Proposed Development Site
Adder Vipera berus	2 records 2016 & 2020, closest 3 km west
Common frog Rana temporaria	7 records 2013-2023, closest 2 km northeast
Common lizard Zootoca vivipara	11 records 2013-2023, closest 1.5 km southwest
Common toad Bufo bufo	7 records 2013-2019, closest 1 km east
Great crested newt Triturus cristatus	3 records from 2022, closest 3 km northeast
Badger Meles meles	9 records 2013-2023, closest 1 km northwest
Otter Lutra lutra	3 records from 2023, locations unknown
Red squirrel Sciurus vulgaris	68 records 2013-2021, mostly from Laurieston



Species	Summary of Records and Distance from the Proposed Development Site
	Forest
Common pipistrelle Pipistrellus pipistrellus	51 records 2013-2019, closest 2.5 km northeast
Soprano pipistrelle Pipistrellus pygmaeus	55 records 2013-2016, closest 0.5 km south
Nathusius' pipistrelle Pipistrellus nathusii	3 records from 2016, closes 6 km south
Pipistrelle bat species Pipistrellus sp.	51 records 2013-2017, closest 3 km north
Daubenton's bat Myotis daubentonii	26 records from 2016, closest 2.5 km southeast
Natterer's bat Myotis nattereri	32 records from 2016, closest 2 km northeast
Whiskered bat Myotis mystacinus	1 record from 2018, 7 km southwest
Whiskered/Brandt's bat Myotis mystacinus/brandtii	19 records from 2016, closest 3.5 km northeast
Myotis bat species Myotis spp.	28 records from 2016, closest 2 km northeast
Nyctalus bat species Nyctalus spp.	6 records from 2016, closest 6 km southwest
Leisler's bat Nyctalus leisleri	42 records 2014-2022, closest 2.5 km northeast
Noctule bat Nyctalus noctule	21 records from 2016, closest 5.5 km southwest
Brown long-eared bat Plecotus auritus	19 records 2013-2016, closest 3 km northeast
Unidentified bat Chiroptera	2 records 2014 & 2018, closest 5 km east

## 6.4.2 Field Survey

Field survey information is preceded by species records in the relevant sections below to provide context, and to provide an accurate baseline understanding.

#### Extended Phase 1 habitat survey

The Proposed Development Site is dominated by marshy grassland, and, at lower elevations, wet modified bog. The Proposed Development Site rises to the north/northeast with ridges of higher land orientated on a north/south axis.

Habitats in this part of the Proposed Development are dominated by marshy grassland, semi-improved acid grassland, bracken *Pteridium aquilinum* and dry dwarf shrub heath. Elsewhere, and particularly to the west and in the far north, wet modified bog is dominant. There are several small watercourses flowing south or south-east.

Two types of marshy grassland are present. The first and most widespread, is mature purple moor-grass *Molinia caerulea* grassland. Comprising the most dominant habitat within the Proposed Development Site, it is interspersed with occasional heather *Calluna vulgaris* and bilberry *Vaccinium myrtillus*.

Rush pasture is the second type, present in lower areas and adjacent watercourses. It is dominated by soft-rush *Juncus effusus* and sharp-flowered rush *Juncus acutiflorus*. Wet modified bog is present in the west spreading through the centre to the north. The absence of bog-mosses *Sphagnum* is notable.

Dwarf shrub heath is dominated by varying quantities, heather, deergrass *Trichophorum* germanicum, purple moor-grass and occasional crossed leaved heath *Erica tetralix*. These are characterised by the rush species referred to above, occasional *Sphagnum*, carnation sedge *Carex panicea* and broad-leaved pondweed *Potamogeton natans*.



Blanket bog is present in the north west, differentiated by the wet modified bog which proliferates elsewhere by the increased presence of sphagnum species which included *S. palustre* and *S. capillifolium*.

Conifer seedlings from seeds in plantations to the west and north occur sporadically throughout the northern part of the Proposed Development Site.

One small woodland, classified as semi-natural broadleaf woodland is present in the southwest, with two other patches of mixed woodland nearby, which lie just outside the southern Proposed Development Site boundary. An area of Ancient semi-natural woodland is present adjacent to the Solar Development in the southeast, as discussed in non-statutory designated sites in **Table 6-5.** This area was not accessible for survey.

Evaluations for habitats are provided in the NVC section, below.

#### National Vegetation Classification

The survey recorded vegetation communities that are considered to be of potential conservation interest due to their status as Annex I habitats within the European Habitats Directive, appearing on the SBL, or by being classified as potential GWDTEs.

Where these communities were floristically distinct, they were assigned into corresponding sub-communities. NVC communities of particular interest recorded during the survey were:

- Mires, flushes and swamps: M17, M18, M23, M25, S8 and S9;
- Grasslands and tall herb communities: U4 and U5;
- Heath: M15; and
- Woodland: W9 and W15.

These are described in further detail below. Analysis of GWDTEs in terms of their hydrogeological value is detailed in **Chapter 8: Hydrology, Geology and Hydrogeology** in **Volume 2** of this EIA Report.

In addition, the survey recorded MG7 Lolium perenne leys and related grasslands, U20 *Pteridium aquilinum-Galium saxatile* community and W23 *Ulex europaeus–Rubus fruticosus* scrub also occurred on within the Proposed Development Site; MG7 is an improved and poor semi-improved pasture type, U20 is continuous bracken and W23 is gorse scrub.

These have limited conservation value and are never ground water dependent. These communities are therefore not considered further in this report.

The Proposed Development is split between upland in the west, where the wind Development and BESS is intended, and lowland agricultural fields in the east, intended for the Solar Development.

#### **Habitat Details**

**M15 Trichophorum germanicum-Erica tetralix wet heath** – the typical sub-community of M15b Scirpus cespitosus-Erica tetralix wet heath, was found in the far south-west in the vicinity of the proposed turbine 4 and associated infrastructure. An area was also found in the far west, abutting the plantation where the ground drops from the drier M25 grassland in the vicinity of a burn.



As is typical with M15, overall, there was much variation within a wet-dry gradient. This was present in both M15b (the typical sub-community) and where more pronounced, could be split out into other sub-communities defined by the degree of wetness (as typified by grasses at one end of the spectrum, and Sphagnum moss the other). Cross-leaved heath Erica tetralix was a constant across all M15 types recorded.

Much smaller amounts of the grassier, M15d Scirpus cespitosus-Erica tetralix wet heath, Vaccinium myrtillus sub-community, were found on higher areas as this is a drier subcommunity. The grasses mat grass Nardus stricta, sheep's fescue Festuca ovina and also heather Calluna vulgaris were more common, as was the ubiquitous springy turf moss, Rhytidiadelphus squarrosus.

The M15a Scirpus cespitosus-Erica tetralix wet heath, Carex panicea sub-community was highly localised, south-east of the proposed turbine 1. Differentiating species to M15a included Sphagnum palustre, bog asphodel Narthecium ossifragum and star sedge Carex echinata.

M15 is considered Annex I habitat H4010 Northern Atlantic wet heaths with Erica tetralix or, when on deep peat ( $\geq$  50 cm), Annex I habitat H7130 Blanket bogs. M15 is also a Scottish Biodiversity List priority habitat.

**M17 Trichophorum germanicum-Eriophorum vaginatum blanket mire** – M17 blanket mire is found in one discrete location in the north of the Proposed Development Site (centred on grid reference NX 63586 62683).

The area was dominated by Sphagnum capillifolium, purple moor-grass Molinia caerulea and common cottongrass Eriophorum angustifolium and Sphagnum papillosum. Narthecium ossifragum was present, as was the notable species round-leaved sundew Drosera rotundifolia.

The presence of the latter species indicates an affinity with M18 raised mire and it is noted the area sits within a depression as the land descends to the edge of the plantation.

M17 blanket bog is an Annex I habitat and a Scottish Biodiversity List priority habitat.

**M18** Erica tetralix-Sphagnum papillosum raised and blanket mire – The M18a subcommunity is found at a single location at the north-east edge of the survey area towards the Solar Development (NX 66465 62224).

M18 is a community found on waterlogged, ombrogenous peats where the mire surface is rainwater fed rather than being influenced by groundwater. Located within a small depression with a domed profile, the discreet location was dominated by Calluna vulgaris, Erica tetralix and hare's tail cotton-grass Eriophorum vaginatum.

Cranberry Vaccinium oxycoccus was present and is regarded as a strong indicator of raised bog as is, although to a lesser extent, Drosera rotundifolia and Sphagnum papillosum. Other species included Narthecium ossifragum, Sphagnum capillifolium and bog-bead moss Aulacomnium palustre.

M18 bog is an Annex I habitat.

**M23** Juncus effusus/acutiflorus-Galium palustre rush pasture – The majority of M23 was found on the northern track leading into the Proposed Development Site, and to a lesser extent, in the far south of the Solar Development. Much of it aligned with the common, less species-rich M23b Juncus effusus/acutiflorus-Galium palustre rush-pasture, Juncus effusus sub-community.



However, in some instances it was not possible to assign to a sub-community as quadrats returned a poor goodness of fit.

The prevalence of soft-rush Juncus effusus and grasses including tufted hair-grass Deschampsia cespitosa, false oat-grass Arrhenantherum elatius and species associated with disturbance (or tolerance thereof), including common nettle Urtica dioica and foxglove Digitalis purpurea, further indicate the less sensitive M23b sub-community.

The topographical position further tends toward the less flush-influenced M23b subcommunity (and less likely to be GWDTE) as stands were typically in recently constructed ditches adjacent to the northern track, or depressions in agricultural fields.

Whilst M23 may form part of the SBL Upland flushes, fens and swamps, and Purple moorgrass and & rush pastures communities the type encountered was that which is commonly found within agricultural settings and did not align with the species-rich M23a community, which is more likely to have a groundwater influence.

**M25** Molinia caerulea-Potentilla erecta mire – M25 is a vegetation type found on well aerated, moist peat and peaty soils and which is generally overwhelmingly dominated by Molinia caerulea. This habitat is dominant in the upland area of the Proposed Development.

The M25a Molinia caerulea-Potentilla erecta mire, Erica tetralix sub-community dominates, and to a much lesser degree M25 stands that could not be assigned clearly to a sub-community due to a poor goodness of fit with the quadrat data.

M25a is typically the wetter form typified by species such as Sphagnum capillifolium, Sphagnum palustre, bog myrtle Myrica gale and Erica tetralix, albeit in reduced proportions to the Molinia caerulea which was dominant.

Quadrats surveyed comprised Molinia caerulea as the main constant, with other dwarf shrubs including heather Calluna vulgaris and bilberry Vaccinium myrtillus, although as a much smaller proportion of the habitat overall. The presence of a large Molinia-stool indicated that this habitat was well established in what was difficult terrain to cross.

Myrica gale was present in lower-lying areas. Species diversity was low with forbs dominated by tormentil Potentilla erecta and smaller proportions of creeping buttercup Ranunculus repens, Devil's-bit scabious Succisa pratensis (c. <5% per quadrat), meadow buttercup Ranunculus acris (c. <2%) and marsh violet Viola palustris (c. <1%).

Across all M25 types the potential value of the habitats will align more closely with peat depth, rather than floristic community composition. When on deep peat (≥ 50 cm) M25 is considered to be the Annex I habitat H7130 Blanket bog and Scottish Biodiversity List priority habitat.

**S8** Scirpus lacustris spp. lacustris swamp – At the edge of Loch Mannoch, the edge of the survey area covers a S8 Scirpus lacustris ssp. lacustris swamp, which was the only species recorded throughout the habitat. This abuts the S9 Carex rostrata swamp. S8 is further into Loch Mannoch than S9 as the former represents the deep-water limit of swamp vegetation in Britain (Rodwell, 1995).

S8 comprises the Upland flushes, fens and swamps/ Purple moor-grass and & rush pastures Scottish Biodiversity List habitats.

**S9 Carex rostrata swamp** – Landward of the S8 Scirpus lacustris ssp. lacustris swamp at the edge of Loch Mannoch the S9 Carex rostrata swamp was dominated by bottle sedge Carex rostrata at 75%, with Broad-leaved Pondweed Potamogeton natans at



less than 5%. The remaining area within the quadrat was open water. Iris pseudocorus was present at the edge of the area suggesting a transition to M28 Iris pseudacorus-Filipendula ulmaria mire but which was too small to map.

S9 comprises the Upland flushes, fens and swamps/ Purple moor-grass and & rush pastures Scottish Biodiversity List habitats.

**U4 Festuca ovina-Agrostis capillaris-Galium saxatile grassland** – U4 is a pasture type found on base-poor but well-drained mineral soils in the upland fringes of north and west Britain. Across the survey area this community was found on high ground where rocky outcrops occurred.

Much of this area is found where bracken Pteridium aquilinum (U20) is found. The majority of this type was the U4a typical sub-community which is species poor and has no distinguishing features of its own (JNCC, 2004).

The U4a sub-community was characterised by a co-dominance of Festuca ovina, Agrostis capillaris and Anthoxanthum odoratum with mosses including Hylocomium splendens, Rhytidiadelphus squarrosus and Hypnum jutlandicum.

The U4b sub-community occurred in closer proximity to agricultural pasture (MG7 type) as evidenced by species indicating improvement such as rank grasses including Yorkshire fog Holcus lanatus, false oat-grass Arrhenantherum elatius and cock's-foot Dactylis glomerata but also forbs such as yarrow Achillea millefolium and ribwort plantain Plantago lanceolata.

The surveyed U4 grasslands have low conservation interest showing a poor fit to the Juncus squarrosus-Festuca ovina grassland SBL habitat.

**U5** Nardus stricta-Gallium saxatile grassland – An area of U5d Nardus stricta-Galium saxatile grassland, Calluna vulgaris-Danthonia decumbens sub-community is present in the south-central portion of the Proposed Development Site between the intended Wind Development and Solar Development.

The classification at U5d is based on the consistent presence of Nardus stricta in tandem with the dominant grasses, Festuca ovina, Agrostis capillaris and Anthoxanthum odoratum. The presence of Nardus stricta was considered the differentiating factor between U5d and the U4a.

This grassland is considered to have low conservation interest showing a poor fit with the SBL priority of Nardus stricta-Galium saxatile grassland SBL habitat.

**W9** Fraxinus excelsior-Sorbus aucuparia-Mercurialis perennis woodland – This is an area of W9b Fraxinus excelsior-Sorbus aucuparia-Mercurialis perennis woodland, Crepis paludosa sub-community, the upland counterpart of the W9a sub-community. This dry, base-tending woodland was found within the Solar Development adjacent the A762.

The woodland was dominated by the canopy species hazel Corylus avellana and downy birch Betula pubescens, understorey by a 70% cover of broad-buckler fern Dryopteris dilatata, and a ground layer of 70% common tamarisk moss Thuidium tamariscidium. Other ferns included scaly male-fern Dryopteris affinis and Pteridium aquilinum.

Whilst W9b can be of conservation interest, based on uncommon plants and presence of lichens (JNCC, 2004), this example is not considered to meet that threshold based on the low species diversity and lack of lichens. This example is therefore not considered to



comprise the H9180 Mixed woodland on base-rich soils associated with rocky slope habitat.

**W15 Fagus sylvatica-Deschampsia flexuosa woodland** – Whilst typically a community of southern Britain this assignation was considered appropriate based on the 90% dominance of planted beech Fagus sylvatica and understorey of bilberry Vaccinium myrtillus.

Ground flora was sparse, apart from the Vaccinium, with moss species dominated by Thuidium tamariscidium and Dicranum majus. The single stand was found at the northern most end of the northern access track, on the far side of the B road which borders the north of the proposed development site.

This woodland is considered to have minimal intrinsic botanical interest.

#### Vegetation Community Summary

A number of the recorded communities are considered to have conservation value at a European level (Annex I) (European Commission, 2013) or at a national level (Scottish Biodiversity List). A summary of habitats and their designations are found in **Table 6-7**.

NVC Code	Annex I	SBL Habitats	Priority Peatlands
M15	H7130 (Only applicable on peat ≥ 50 cm deep)	Blanket bog	On 50 cm or more
M15	H4010 (Wet heathland with cross-leaved heath)	Upland heathland	No
M17	H7130 Blanket bogs	Blanket bog	Yes
M18	H7110 Active raised bogs	N/A	Yes
M25	H7130 (Only applicable on peat ≥ 50 cm deep)	Blanket bog	On 50 cm or more
S8	N/A	Upland flushes, fens and swamps/ Purple moor-grass and & rush pastures	No
S9	N/A	Upland flushes, fens and swamps/ Purple moor-grass and & rush pastures	No

 Table 6-7: Annex I, Scottish Biodiversity List Habitats and Priority Peatlands

With regards to M15 and M25 peatland habitats as part of the Annex I H7130 designation, these communities are only classed as having Annex I quality if they adhere to certain criteria. For the H7130 Annex I classification the peat layer should be greater than 50 cm in depth and be capable of regeneration within a period of 30 years (European Commission, 2013).

For the community to regenerate within a period of 30 years there needs to be a *Sphagnum* assemblage capable of generating a peat layer. The main peat building *Sphagnum* species that form the bulk of the peat layer are *S. medium*, *S. papillosum* and to a lesser extent, *S. capillifolium*. Whilst these species are absent from the M15 and M25, given that *S. papillosum* and *S. capillifolium* is found elsewhere, if correct hydrology/grazing levels were in place there is the potential for it to become habitat of Annex 1 quality. However, this process is unlikely to happen without dedicated peatland restoration measures.



Of the recorded communities within the survey area in the current baseline, M17 and M18 exhibited this suite of *Sphagnum* species. As such, in terms of Blanket Bog only M17 and M18 communities are considered to be classed as Annex I habitats.

M15 is considered to align with the Annex I habitat H4010 Wet heathland with cross-leaved heath.

The W9b Fraxinus excelsior-Sorbus aucuparia-Mercurialis perennis woodland, Crepis paludosa sub-community woodland is not considered to comprise the H9180 Mixed woodland on base-rich soils associated with rocky slope habitat.

#### **Potential GWDTE**

Groundwater dependency is often linked to wetlands that contain flora that is dependent upon the chemical composition of the water fed from a groundwater source. SEPA (2024) defines the habitats with regard to their potential for groundwater dependency as identified above.

The potential groundwater dependency of the habitats identified in **Table 6-8** is discussed in **Chapter 8: Hydrology, Hydrogeology and Soils** in **Volume 2** of this EIA Report which determines that none of these habitats are dependent on groundwater.

On this basis, none of the habitats identified in **Table 6-8** are taken forward for assessment in **Chapter 8: Hydrology, Hydrogeology and Soils** in **Volume 2** of this EIA Report



Community Code	Community Name	SBL, UK BAP, Annex I	Designated Nature Conservation Site Feature	Habitat Connectivity	Ecosystem Services Provided	Relative Extent in Scotland	Significant Decline / Unfavourable Condition	Importance for Supporting Species
M15	Trichophorum germanicum – Erica tetralix wet heath	SBL / Annex I	-	Limited as surrounded by poor quality M25 Molinia grassland, commercial forestry and lowland habitats to the east	Carbon storage, water attenuation	Widespread	Yes (as per SBL)	Yes (as per SBL)
M23	Juncus effusus/acutiflorus - Galium palustre rush-pasture	-	-	Limited. Small areas in lowland agricultural areas,	Water attenuation, Nutrient capture	Widespread	-	-

#### Table 6-8: Ecological Importance Criteria from SEPA (2024) for Potential GWDTEs



#### Habitat Loss Calculations

**Table 6-9** shows the areas of habitats recorded within the Proposed Development Site which will be lost to construction. The relative proportions of each habitat lost is compared against the baseline total area of habitat recorded within the Proposed Development Site. Habitats where there is no loss have not been included.

Temporary habitat loss, which is due to temporary infrastructure such as crane platforms, material storage, etc. has been classified as permanent loss where it occurs in areas of priority peatland. This is due to the sensitive nature of Peatland habitats and the potentially long regeneration periods that would be required for full restoration of these habitats in the event of any damage or degradation.

Indirect loss is assumed as 10 m from direct loss.

As noted in section 6.1.3 Limitations, approximately 2.38 ha wet modified bog will be lost in this area of which 1.36 ha is at 50 cm peat depth or more. This allocation of wet modified bog to M25a is split between less than 50 cm peat, or 50 cm or more and included in the relevant sections of **Tables 6.9 and 6.16**.

This is an area where extended Phase 1 surveys were carried out in lieu of an NVC survey. This is an area covered by a temporary construction compound and new access track. NVC mapping shows M15b, M25b and U20 to the north and satellite imagery to the south of that is very much in keeping with those mapped areas, in addition to grassland.

It is therefore assumed to be M25a as this is the prevailing habitat on the Proposed Development Site.

There may be minor discrepancies between totals due to rounding. Figures are to two decimal places.

NVC Communities taken forward for assessment have been highlighted separately in Table 6-16.

Habitat Type NVC	Total Habitat in Proposed Development Site (ha)	Total Permanent Loss (ha)	Total Temporary Loss (ha)	Total Indirect Loss (ha)	Total loss (Permanent, Temporary and Indirect (ha)	Total Loss (Permanent, Temporary and Indirect (%)
Priority Peatland Habitats						
M15b on peat $\geq$ 50 cm	14.54	0.6	0.17	0.65	1.42	9.82%
M25 on peat $\geq$ 50 cm	9.04	0.17	-	0.28	0.45	6.57%
M25a on peat $\geq$ 50 cm	89.48	2.39	0.84	4.29	7.52	8.4%
Other NVC Habitats						
M15b on peat < 50 cm	13.39	1.19	0.21	1.57	2.97	22.16%
M23b	2.16	0.07	-	0.18	0.25	11.89%
M25 on peat < 50 cm	2.57	0.04	-	0.14	0.18	7.05%
M25a on peat < 50 cm	158.30	8.40	1.31	8.66	18.37	11.06
MG7	54.87	7.15	-	17.58	24.73	45.08%

|--|



Habitat Type NVC	Total Habitat in Proposed Development Site (ha)	Total Permanent Loss (ha)	Total Temporary Loss (ha)	Total Indirect Loss (ha)	Total loss (Permanent, Temporary and Indirect (ha)	Total Loss (Permanent, Temporary and Indirect (%)
U20	40.90	2.71	0.11	2.90	5.72	7.38%
U4	5.31	0.09	-	0.26	0.35	6.66%
U4b	1.15	0.04	-	0.20	0.24	21.14%
W23	4.87	0.16	-	0.41	0.57	11.69%
Non-NVC	12.25	0.60	-	1.63	2.23	18.19%

#### Bats

Static bat detectors were deployed at nine locations over three visits in April, July, and September 2023 and two visits in August and September in 2024 in the same locations. Full spectrum bat detectors (Wildlife Acoustics Song Meter Mini Bats) were used. See **Figure 6-6** in **Volume 4** of this EIA Report.

The detectors were set up to record activity from 30 minutes before sunset to 30 minutes after sunrise for a period of at least 10 nights (Collins, 2023). TA 6-3 contains detailed survey results.

#### 2023

The results of the 2023 static detector deployment surveys identified the presence of at least five species; *Myotis* sp., *Nyctalus* sp., common pipistrelle, soprano pipistrelle and brown long-eared bat. The inability to differentiate *Myotis* sp. and *Nyctalus* sp. passes to species resulted in the identification to genus only.

A total of 3,715 passes were recorded throughout the year; 2% of the calls were recorded in the spring, 45% in summer and 52% in autumn. The majority of the calls were identified as *Nyctalus* sp., equating to approximately 65% of the total passes. Most of the remaining calls were evenly distributed between *Myotis* sp., common pipistrelle and soprano pipistrelle, 10%, 13%, and 10%, respectively, and very few were brown long-eared bat, 3%.

#### 2024

The results of the 2024 static detector deployment surveys identified the same five species within the Proposed Development Site as in 2023: Myotis sp., Nyctalus sp., common pipistrelle, soprano pipistrelle and brown long-eared bat.

A total of 1,895 passes were recorded the two deployments, fewer than the previous year, and the vast majority were recorded during the summer, approximately 75%.

Similarly, the majority of passes recorded were identified as *Nyctalus* sp., making up approximately 40% of the total calls; slightly greater proportions of common pipistrelle and soprano pipistrelle were recorded, 20% and 29%, respectively, although the total number of passes were similar to that of the previous year. Little activity was recorded by *Myotis* sp (approximately 7% - 147 passes and brown long-eared bat, approximately 4% - 85 passes).

More details of the results and analysis of the bat surveys can be found in **Technical Appendix 6-3** in **Volume 3** of this EIA Report.



#### **Risk Assessment**

A risk assessment of the Proposed Development Site was conducted according to NatureScot guidance (NatureScot, 2021). The initial risk assessment considers the size of the project and the quality of the habitat within the Proposed Development Site, see **Table 6-9**.

The Proposed Development Site is considered to be of medium size as there are fewer than 10 turbines, there are other small private wind farm developments within 5 km (1 to 2 turbines, and the turbine height is greater than 100 m.

The habitat is considered of medium quality roosting and foraging habitat for species as the Proposed Development Site is connected to the wider landscape through linear features such as tree lines and streams. Therefore, the overall score of the Proposed Development Site is 3 as highlighted below.

#### Table 6-10: Proposed Development Site Risk Assessment

		Project Size									
Habitat Quality	Small	Medium	Large								
Low	1	2	3								
Medium	2	3	4								
High	3	4	5								

A secondary risk assessment was conducted by comparing the Site risk assessment with the relative amount of activity within the Proposed Development Site per species. This is completed using the median and maximum percentiles of activity to produce four tables, two for 2023 and two for 2024; see **Tables 6-11 to 6-14**, inclusive.

#### **Median Activity Risk**

In both 2023 and 2024, the overall risk calculated for the median level of activity for common pipistrelle and soprano pipistrelle was low (**Tables 6-11 and 6-12**). This remained true across the nine detectors and throughout the seasons for both species.

In 2023, the overall risk calculated using the median level of activity for *Myotis* sp., *Nyctalus* sp. and brown long-eared bat was medium. The associated risk for brown long-eared bat was the greatest of all the species, activity around two detectors was of high risk, S3 and S5, and the remaining five detectors were of medium risk, and the associated risk was medium during all three seasons.

The risk associated with *Myotis* sp. was high at \$1 and medium at \$5 which related to a medium risk during the autumn, the remaining detector localities and seasons were of low risk. The risk associated with *Nyctalus* sp. was medium at four locations \$1, \$2, \$5 and \$6, as well as during the autumn, the remaining four locations and two seasons were of low risk.

In 2024, unlike 2023, the overall risks of *Myotis* sp. and *Nyctalus* sp. were low across all detector locations and during the two deployment seasons. Brown long-eared bat had a medium level of overall risk, with similarly high risk at \$5 and medium risk during summer and autumn compared to 2023; the remaining eight localities were of medium risk.



#### Table 6-11: Median Activity Risk Assessment 2023

	Median Activity 2023												
						Dete	ctor				Season		
Species	Overall	1	2	3	4	5	6	7	8	9	Spring	Summer	Autumn
Myotis sp.	5	15	3	3	3	6	3	3	3		3	3	6
Nyctalus sp.	5	6	6	3	3	9	6	3	3	3	3	3	6
Pipistrellus pipistrellus	1	0	0	0	0	0	3	0	0	0	0	3	3
Pipistrellus pygmaeus	1	3	3	0	0	3	3	0	0	0	3	3	3
Plecotus auritus	11	9	9	15	6	15	12		12		6	9	12

#### Table 6-12: Median Activity Risk Assessment 2024

	Median Activity 2024												
						Dete	ctor				Season		
Species	Overall	1	2	3	4	5	6	7	8	9	Spring	Summer	Autumn
Myotis sp.	3	3	3	3	3	3	3	3	3	3	N/A	3	3
Nyctalus sp.	3	3	3	3	3	3	3	3	3	3	N/A	3	3
Pipistrellus pipistrellus	0	0	0	0	0	0	3	0	0	0	N/A	3	0
Pipistrellus pygmaeus	1	0	0	3	0	0	3	0	0	3	N/A	3	3
Plecotus auritus	10	9	9	9	9	15	9	12	9	9	N/A	12	9

#### **Maximum Activity Risk**

In both 2023 and 2024, the overall level of risk calculated for the maximum activity level of common pipistrelle and soprano pipistrelle was low, this was true across all detectors and throughout both seasons (**Tables 6-13 and 6-14**).

In 2023, the overall level of risk for the maximum activity recorded within the Proposed Development Site was high for *Myotis* sp., *Nyctalus* sp. and brown long-eared bat, see **Table 6-13.** Brown long-eared bat activity was detected at seven locations, five of which had a high associated risk during the autumn.

The high risks associated with *Myotis* sp. and *Nyctalus* sp. were caused by activity at S1 during the autumn and S2 during the summer, respectively.

In 2024, the overall level of risk associated with the maximum level of activity was high for brown long-eared bat due to high-risk activity around \$1, \$5 and \$7 during the summer and autumn. Medium overall risk was calculated for *Myotis* sp. and *Nyctalus* sp., compared with high in 2023, caused by medium risk activity recorded at \$1-\$3, \$5, \$7 and \$8 during the summer and autumn.



	Maximum Activity 2023												
						Dete	ctor				Season		
Species	Overall	1	2	3	4	5	6	7	8	9	Spring	Summer	Autumn
Myotis sp.	15	15	6	3	6	6	6	3	6			3	15
Nyctalus sp.	15	9	15	9	9	9	12	3	9		6	15	12
Pipistrellus pipistrellus	3	3	3	3	3	3	3	0	3	3	0	3	3
Pipistrellus pygmaeus	3	3	3	3	3	3	3	0	3	0	3	3	3
Plecotus auritus	15	15	15	15	12	15	15		12		6	12	15

#### Table 6-13: Maximum Activity Risk Assessment 2023

#### Table 6-14: Maximum Activity Risk Assessment 2024

	Maximum Activity 2024												
						Dete	ctor					Season	
Species	Overall	1	2	3	4	5	6	7	8	9	Spring	Summer	Autumn
Myotis sp.	9	9	6	6	3	6	3	6	6	3	N/A	9	6
Nyctalus sp.	12	6	6	12	12	9	12	9	9	9	N/A	12	9
Pipistrellus pipistrellus	3	3	3	3	3	3	3	3	3	3	N/A	3	3
Pipistrellus pygmaeus	3	3	3	3	3	3	3	3	3	3	N/A	3	3
Plecotus auritus	15	15	12	12	9	15	9	15	12	12	N/A	15	15

#### **Roosting and Foraging Potential**

The desk study found that ten species of bat have been recorded within proximity to the Proposed Development.

These were soprano pipistrelle (55 records), common pipistrelle (51 records), Leisler's bat (42 records), Natterer's bat (32 records), Daubenton's bat (26 records), noctule bat (21 records), whiskered/Brandt's bat (19 records), brown long-eared bat (19 records), Nathusius' pipistrelle (three records) and whiskered bat (one record).

There were a further 51 records of *Pipistrellus* bats, 28 records of *Myotis* bats and six records of *Nyctalus* bats, not identified to species level, with an additional two records of unidentified bats not ascribed to any genus.

Four potential bat roost sites were found, all lying within the Proposed Development Site Boundary. Three were assessed as having moderate bat roost potential and were located at NX 67641 61256 (several old oak trees), at NX 67708 61118 (old ash tree) and at NX 67726 61061 (old ash tree).

An old dead oak tree was assessed as having high bat roost potential located at NX 67369 60315 on the edge of the Proposed Development Boundary. Furthermore, the Proposed Development is bordered on its northern and western edges by mature plantation which has potential to contain further bat roosts not identified during the survey. These trees will be outwith the works area by at least 30 m.



The combination of watercourses and ditches crossing the Proposed Development allow for bat foraging opportunities, as does the large waterbody of Loch Mannoch, and the Proposed Development is connected to the wider landscape by both watercourses and mature hedges.

The wider landscape surrounding the Proposed Development contains large areas of mature plantation (to the north and west) and to the southeast, mature broadleaf woodland, with further potential for bat roosts. Please refer to **Technical Appendix 6-3 Bat Surveys** in **Volume 3** of this EIA Report for information on the results of the bat survey.

#### Protected Species Surveys (non-volant)

#### Amphibians/Reptiles

A search of SWSEIC records showed only two records of adder within proximity of the Proposed Development although not within it. Common toad and common frog both had a similarly relatively low number of records (seven each) within proximity (but outside) the Proposed Development.

Additionally, there were three records of great crested newt, and eleven records of common lizard, all within proximity but outside the Proposed Development.

Inspection of aerial mapping of the area 250 m - 500 m from proposed infrastructure identified five bodies of water which were potentially suitable for great crested newt. It was confirmed via habitat suitability survey that four of the bodies of water scored below average in habitat suitability criteria for this species.

One pond, located at NGR NX 67607 60324 was considered to have good suitability for supporting a population of great crested newt.

However, the habitat between this pond and infrastructure is improved grassland with heavily eutrophied pond (which scored a below average HSI). Movement of great crested newt would be towards much more suitable terrestrial and aquatic habitat lies to the east, away from the Proposed Development. See TA 6-4 and **Figure 6-5** in **Volume 4** of this EIA Report for further information.

No reptiles or amphibians were recorded during the protected species survey, although two potential reptile/amphibian hibernacula were noted, at NX 67592 61318 and at NX 67716 61087. Given the habitats on the Proposed Development, it is possible that reptiles and amphibians are present.

#### Otter and Water Vole

There were three records of otter within proximity to the Proposed Development noted in the SWSEIC records, and although their precise locations were unavailable it was noted that none of these records were within the Proposed Development Site Boundary. There were no records of water vole in the SWSEIC records.

Two signs of otter presence within the Proposed Development Site Boundary were recorded during the protected species survey; an otter spraint beside the Tarff Water at NX 67690 60689 and an otter print also beside the Tarff Water at NX 67704 60880, located on the far eastern boundary. No holt or other resting place was recorded. There were no signs of water vole recorded during the protected species survey.



#### **Red Squirrel**

The results of the desk study showed that the wider area had a significant number of records of red squirrel, 68 within the last ten years. Most of these records were from Laurieston Forest to the north of the Proposed Development, and there were no records in the SWSEIC data from within the Proposed Development Site Boundary.

Two squirrel dreys were noted during the protected species survey, at NX 66960 61598 and at NX 67028 61596, both in a small area of plantation forestry in the centre of the Solar Development. This plantation does not comprise part of the Proposed Development but is enclosed by it and the dreys lie outwith 50 m of proposed works areas.

There is little forestry directly within the Proposed Development Boundary and that which is excluded from the Proposed Development Boundary (**Figure 6-3** in **Volume 4** of this EIA Report). As such, the chance of direct loss of trees used by red squirrel is minimal. This IEF is however has been taken forward for assessment.

#### Badger

Fiver setts were found and there were nine records of badger noted in the desk study within the proximity of the Proposed Development. All setts are beyond 30 m from proposed works areas.

Information on badger is regarded as confidential and therefore included in **Confidential Technical Appendix 6-6** in **Volume 5** of this EIA Report.

Considering the number of reported badger sightings, this species will require consideration in this EIAR as there is a high chance the area of the Proposed Development is used by badgers for foraging. Reptiles and a range of bat species are also highly likely to be present.

## 6.4.3 Scoped out of the assessment

As stated above, all nature conservation designations are scoped out of further assessment based on distance from the Proposed Development Site.

Habitats not brought forward are excluded on the basis of either low ecological value (e.g. M25 Molinia grassland less than 50 cm deep and therefore not Priority Peatland) and/or distance from the potential ZoI.

#### Bats (except Nyctalus spp).

Common and Soprano pipistrelle bats are scoped out as all nights of common pipistrelle and soprano pipistrelle activity were ranked as low with respect to the surrounding area and time of year in both 2023 and 2024. In addition, there was little activity within the emergence time ranges for each of the species throughout the Proposed Development Site.

Myotis spp. are scoped out of the assessment as the total amount of activity recorded in 2023 and 2024 (379 passes and 147 passes, respectively, spread across nine detector locations), indicates that the Proposed Development Site is not used regularly or abundantly by these species.

Whilst peaks of activity occurred occasionally at \$1 in 2023 (Figure 6-3 in Volume 4 of this EIA Report.), this level of activity was not replicated during 2024 surveys, and there



were no nights of exceptional, high or moderate-high activity recorded during that year.

The two species most likely to be present (i.e. Daubenton's bat and Natterer's bat) are considered to be of low risk to impacts of wind farms at both the individual and population level (**Tables 6-3 and 6-**4) and are common and widespread throughout the UK (NatureScot, 2021) (Russ, 2012).

It is noted that populations of both these species in Scotland have been stable in the long-term (since 1999) and the short-term (since 2017) (Daubenton's) and since 2011 for Natterer's (BCT, 2024).

Brown long-eared bat was recorded with 97 passes in 2023 and 85 passes in 2024. When considering the activity in relation to the wider area, three nights of activity were considered exceptional in each year, around T5 and T6 in 2023 and S1 and S5 in 2024 (**Figure 6-3** in **Volume 4** of this EIA Report.), and a further 10 nights and 5 nights were considered high activity, respectively.

These translated into a medium overall risk when considering the median level of activity and high risk when considering the maximum level.

Without context, the exceptional nights of activity and medium associated risk for the species appears to be of concern.

However, taking into account the total amount of activity within the Proposed Development, fewer than 100 passes recorded across nine detector locations during multiple seasons of survey in each year, indicates that the habitat is not important for the species as it is not sufficiently present within the area.

Furthermore, the species is considered to be at low risk of wind turbine collision, as seen in **Tables 6-3 and 6-4**, due to the nature of their flight, whereby they would usually fly below the sweep of the turbines (Huston, 2022) (NatureScot, 2021).

TA 6-3 and **Figure 6-3** in **Volume 4** of this EIA Report should be viewed for further information and context in respect of bat species.

All bat roost potential trees will remain outwith the works area by at least 30 m. See TA 6-4 and **Figure 6-5** in **Volume 4**.

#### Fish

The likelihood of fish species within the Development Boundary has been discounted, as the rivers in the area are small and unlikely to support a population of fish. Additionally, the dam at NX 66586 60916 on the eastern side of Loch Mannoch is considered impassable to migratory fish. This was raised in the Scoping Report and NatureScot confirmed they were happy with fish to be scoped out of the assessment (Table 6-1).

#### Great crested Newt

One pond was recorded as having a score of 'Good' from Habitat Suitability Surveys, it is located c.280 m south of the nearest infrastructure at its closest, which are solar panels.

Whilst 500 m is stated in NatureScot guidance (2024) as the distance when further survey is required (which has been interpreted as surveys beyond the Habitat Suitability Index i.e. eDNA, Population Class Assessment)), this is on the basis of potential newt



habitat, but there is none between the pond and infrastructure, as it comprises improved grassland.

Natural England (2001) notes that 500 m applies on sites with refuges (such as piles of logs or rubble), grassland, scrub, woodland or hedgerows (p.21) and consistently refers to 250 m as a threshold in terms of suitable habitat and barriers to dispersal. On this basis great crested newt is scoped out of the assessment.

#### Ancient Woodland

The single area of Ancient Woodland within the Zol of the Proposed Development (which is considered to be either within or adjacent to it) as identified in **Table 6-5** and on **Figure 6-2** in **Volume 4** of this EIA Report is scoped out on the basis of adequate Root Protection Areas to be in place (see section 6.6.2).

## 6.5 Assessment of Effects

## 6.5.1 Future Baseline

The Proposed Development Site is likely to currently support species at or near to carrying capacity with historical management practices and deer/livestock pressures having facilitated what appears to be the degrading condition of much of the habitat found within the upper slopes of the study area.

This means that in the absence of the Proposed Development a net increase in species population numbers would not be expected, should the Proposed Development not go ahead, and a continued depletion of the habitats on the upper slopes through dewatering processes and the erosion/desiccation of areas of exposed peat leading to further reduction in the quality of the mire.

Other changes over time may occur as a result of climatic change; these are difficult to predict but are likely to involve increased precipitation and gradual increases in average temperatures. Some change in the vegetation assemblage is likely to occur as a result of these changes.

## 6.5.2 Ecological Features Brought Forward for Assessment

The following applies to all non-avian ecological receptors brought forward to the detailed ecological impact assessment stage. Their value is assessed as being important at a Local level or higher and they are potentially vulnerable to significant impacts from the Proposed Development.

Ecological features meeting these criteria are considered IEFs and the ecological impact assessment concerns these features only. However, mitigation is proposed to reduce the risk of legal offences occurring on individual animals of protected species (i.e. even if they're not an IEF in the assessment). IEF's include the following described below.



#### Habitats

The following habitats presented in **Table 6-15** are taken forward for assessment based on direct and indirect loss from the Proposed Development.

As described in section 6.4.2 with regards M15 and M25 peatland habitats, these communities are not considered as priority peatland within the Proposed Development unless they are situated on peat of depth greater than 50 cm. It was also concluded that these communities did not qualify as Annex 1 H7130 due to their lack of essential blanket bog-building flora such as *Sphagnum* species.

The M15 community qualifies as a Blanket bog SBL Habitat unless it is on peat measuring less than 50 cm in depth. In this circumstance it qualifies as an Annex I Habitat H4010, and is classified as an Upland heathland SBL Habitat rather than Blanket bog.

Table 6-15: Habitats Taken Forward for Assessment based on Potential Impacts and Conservation Value

NVC Code	Annex I	SBL Habitats	Priority Peatlands
M15	-	Blanket bog	On 50 cm or more
M15	H4010 (Wet heathland with cross-leaved heath)	Upland heathland	No
M17	H7130 Blanket bogs	Blanket bog	Yes
M18	H7110 Active raised bogs	N/A	Yes
M25	-	Blanket bog	On 50 cm or more

M15 and M25 are considered of Local value in EIA terms, based on their conservation significance and balanced against their ubiquity in the upland Scottish setting.

M17 and M18 are considered of County value in EIA terms, given their importance under NatureScot (2023) guidance for Priority Peatlands which are likely to be of National significance.

**Table 6-16** shows the areas of habitats recorded within the Proposed Development Site which will be lost to construction and the relative proportions of each habitat lost against the total area of that habitat recorded within the Proposed Development Site. Habitats where there is no loss have not been included.

Temporary habitat loss has been classified as permanent loss where it occurs in areas of priority peatland. This is due to the sensitive nature of Peatland habitats and the potentially long regeneration periods that would be required for full restoration of these habitats in the event of any damage or degradation.

There may be minor discrepancies between totals due to rounding. Figures are to two decimal places.

Table 6-16: Predicted Loss of IEF Habitats	Associated with the Proposed Development
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Habitat Type NVC	Total Habitat in Proposed Development Site (ha)	Total Permanent Loss (ha)	Total Temporary Loss (ha)	Total Indirect Loss (ha)	Total loss (Permanent,	Temporary and Indirect (ha)	Total Loss (Permanent, Temporary and Indirect (%)
Priority Peatland Habitats							
M15b Trichophorum germanicum	14.54	0.6	0.17	0.65	1.42		9.82%



Habitat Type NVC	Total Habitat in Proposed Development Site (ha)	Total Permanent Loss (ha)	Total Temporary Loss (ha)	Total Indirect Loss (ha)	Total loss (Permanent, Temporary and Indirect (ha)	Total Loss (Permanent, Temporary and Indirect (%)
- Erica tetralix wet heath on peat $\geq$ 50 cm						
M25 Molinia caerulea – Potentilla erecta mire on peat ≥ 50 cm	9.04	0.17	-	0.28	0.45	6.57%
M25a Molinia caerulea – Potentilla erecta mire Erica tetralix sub-community on peat ≥ 50 cm	89.48	2.39	0.84-	4.29	7.52	8.4%
Other NVC Habitats						
M15b Trichophorum germanicum – Erica tetralix wet heath on peat < 50 cm	13.39	1.19	0.21	1.57	2.97	22.16%

#### Fauna

The following species are brought forward for assessment:

Nyctalus sp. (Leisler's bat and noctule bat) are **Regional** value IEFs and assessed at the genus level as data analysis did not separate to species due to the inherent difficulty in doing so.

Otter, badger and red squirrel are regarded as Local IEFs in the context use of the Proposed Development by these species as evidenced from survey results and their widespread distribution in Dumfries and Galloway.

Although not observed during surveys, reptiles are also brought forward for assessment on the basis of suitable likely habitat and likelihood of presence.

## 6.6 Mitigation

In line with current CIEEM guidelines, the impact assessment in this chapter is carried out in the assuming the implementation of the standard mitigation measures. The following mitigation measures and good practice measures will be applied to the Proposed Development during construction and operation to ensure that any effects on the IEFs, and site ecology in general, are reduced.

## 6.6.1 Design Mitigation

Embedded mitigation relates primarily to the design evolution of the Proposed Development and agreement on proposed management practices intended from the start of construction.

Detailed information on infrastructure layout and design evolution is shown in the Design & Access Statement, and Chapter 3: Description of the Development in Volume 2 of this EIA Report, however elements specific to terrestrial ecological and environmental protection are summarised here.

The design has evolved iteratively to minimise the impacts on potential GWDTEs and peat habitats through taking account of NVC results and hydrological assessments, in



addition to the presence of watercourses. Much of this was in the early phase of the design and subsequent to measures to avoid potential GWDTE, detailed hydrological assessment for the EIA has confirmed that no GWDTEs are present. See Chapter 8: Hydrology, Geology and Hydrogeology for further information.

The Proposed Development has been designed to minimise works in the vicinity of mapped watercourses and to minimise the need for new water crossings to reduce the risk of pollution and changes to watercourse morphology. Eight watercourse crossings are proposed.

A Pollution Risk assessment will be carried out identifying materials, areas and activities of greatest risk and laying out controls on these. From this a Pollution Prevention Plan (PPP) will be prepared. The PPP will form part of the CEMP. A PPP will also be in place during the operation and decommissioning phases of the Proposed Development.

The Proposed Development will be constructed in cognisance of the following guidelines:

- 'Control of water pollution from construction sites Guidance for consultants and contractors' (Masters-Williams *et al.* 2001); and
- 'Control of water pollution from linear construction projects' (Murnane et al. 2006).

The drainage design will comply with General Binding Rules (GBR's) 10, 11 and 21 for the track drainage, under the Water Environment (Controlled Activities) (Scotland) Regulations (CAR) 2011 (as amended) (SEPA, 2023).

Guidance issued by Natural England (2014) and NatureScot (2021) provides a methodology for determining the minimum buffer distance required between a linear feature of potential value for bats and a wind turbine.

A minimum stand-off buffer of 50 m will be maintained between the rotor-swept area and the nearest linear feature, which is considered to be conifer plantation tree-lines bordering the Proposed Development Site.

On the basis of current dimensions of 98.5 m to hub height and up to 180 m tip (79.7 m blade length, excluding nacelle length) the calculation for the recommended minimum 50m buffer from blade tips calculates the distance required using the formula: Buffer distance from edge/feature =  $\sqrt{(50m + bl)^2 - (hh - fh)^2}$ ;

• Where "bl" = blade length, "hh" = the hub height and "fh" = feature height. For woodland up to 10 m this corresponds to a minimum buffer of 97 m between turbine towers and the nearest woodland/edge feature; and

• In considering the height of trees at the end of the operational period (40 years hence) using information on Sitka growth from Forestry Commission's Forest Yield software it is considered trees will be c.32 (Matthews *et al.* 2016). On this basis a minimum buffer of 113m between turbine towers and the nearest woodland/edge feature will be required.

All turbine locations are beyond 113 m from the nearest woodland/edge feature.

## 6.6.2 Pre-Construction Phase

A pre-construction survey will be undertaken within 4 weeks of the start of construction, covering suitable habitat within 200 m from construction areas. This buffer accounts for potential otter presence as well as all other possible protected species interests. The



survey will be undertaken by a suitably qualified ecologist and the results will inform whether the CEMP will include further mitigation, if required.

Should the presence of a protected species be found in an area where disturbance or destruction of breeding structures, cannot be avoided, a protected species licence may be required.

Root Protection Areas as per BSI (2012) will be in place around all woodland blocks both within and immediately adjacent the Proposed Development Site boundary.

## 6.6.3 Construction Phase

Full details of construction mitigation measures will be provided in **Technical Appendix 11-2 Outline CEMP** to be agreed with Dumfries and Galloway Council, in consultation with relevant stakeholders, post-consent but prior to development commencing. The PPP will detail proposed surface drainage measures to treat and deal with surface runoff from the Site, will be designed in accordance with sustainable drainage systems (SuDS) principles. This plan will form part of the CEMP.

Measures in the CEMP will also include the following:

#### General

- Works to be overseen by an Environmental Clerk of Works (EnvCoW) and their role and responsibilities. In outline, this role will include ongoing monitoring of environmental / ecological constraints, review and audit of the appointed contractor's environmental performance, delivery of toolbox talks, and supervision of construction works;
- There will be no direct discharges to any natural watercourses, with all drainage waters being dispersed as overland flows, as directed by the EnvCoW to avoid erosion or siltation of existing watercourses in the process;
- Silt fencing will be placed at the Proposed Development boundary edge where watercourses occur within 50 m of the boundary;
- Wind turbines and associated infrastructure including tracks and other hardstandings will have a micro siting allowance of up to a radius of 50 m;
- Drainage measures, including drainage ditches and silt traps, will be provided to collect and treat increased surface run off;
- Appropriate bunded storage will be in place for storage of fuels/oils, with onsite storage of hydrocarbons to be kept to a minimum;
- Use of wet-cement products within the hydrological buffer will be avoided, insofar as possible. Should their use be proposed, this would be in agreement between the EnvCoW and SEPA prior to their use;
- Wastewater emanating on-site (sewage, wastewater from site office) will be taken off-Site for disposal/treatment at controlled facilities. To this effect, welfare facilities for construction site workers will include self-contained port-a-loos with an integrated waste holding tank;
- Infiltration interception drains for upslope 'clean' water collection and dispersion;
- Flow attenuation and filtration check dams will be installed, where appropriate, to reduce velocities, with consideration given to gradient with drains to determine spacing requirements;



- Silt fences, straw bales and biodegradable matting will be used to control surface water runoff for deposition areas; and
- Deposition areas will be sealed with a digger bucket and vegetated as soon possible to reduce sediment entrainment in runoff.

#### Habitats

The loss of plant communities is an unavoidable consequence of the Proposed Development. However, incidental habitat loss will be avoided by minimising the footprint of construction activities. This will be achieved by:

- Operating machinery and storing materials within the footprint of permanent construction features wherever practicable; and
- By ensuring that vehicles and their operators do not inadvertently stray onto adjacent habitat areas.

Other indicative measures within the CEMP will be:

- Re-instatement of habitats best practice techniques for vegetation and habitat reinstatement will be adopted and implemented on areas subject to disturbance, such as the temporary construction compound area, as soon as is practicable;
- Materials and other temporary infrastructure will be removed off-site and all temporary construction areas will be reinstated;
- The surface layer of soil and vegetation will be stripped separately from the lower soil layers, stored separately, and replaced as intact as possible once the construction phase is complete. Turf material will be replaced as far as possible in similar locations to where it was removed;
- Soils removed from the excavated area will be stored separately in piles, no greater than 3 m in height, directly adjacent to, or near the tracks on ground appropriate for storage of materials, i.e. relatively dry and flat ground, a minimum of 50 m away from watercourses (where possible). Wherever possible, reinstatement of ground disturbed to facilitate construction of the track will be carried out as track;
- No refuelling will be permitted at works locations within the 50 m of watercourses (where possible);
- Impermeable barriers and/or clay plugs will be used to avoid the trenches acting as preferential conduits of groundwater; and
- Areas of identified sensitivity (GWDTEs and flushes) will be marked out / fenced-off to prevent accidental vehicular access.

#### Fauna

- As there is potential for fauna to access the Proposed Development Site excavations/holes will be covered at the end of each working day, or a wooden plank placed inside to allow faunal species to escape, should they enter the hole. Any temporarily exposed open pipe system would be capped in such a way as to prevent wildlife gaining access;
- No in-channel obstructions (floodlighting, fencing or diversions) will be permitted within watercourses unless specifically authorised in writing by the relevant authority (i.e., SEPA and/or a suitably experienced freshwater Ecologist);



- In the event that a protected species is discovered all work in that area would stop immediately and the EnvCoW would be contacted. Increased buffer areas may be required in these locations;
- A toolbox talk highlighting the presence of protected species should be given to all staff during their induction;
- The pre-construction survey will confirm if measures such as 'badger gates' are required within works fencing to ensure safe access to badger setts and the wider area for foraging;
- No new ground will be cleared without prior inspection by the EnvCoW to ensure reptiles, should they be present, are encouraged to disperse before clearance. Clearance will occur in a manner to ensure dispersal routes for reptiles;
- A speed limit of 15 mph will be in place at all times to reduce the risk of collision and protected species mortality associated with construction vehicles; and
- Measures shall be implemented to reduce the potential for even non-significant construction impacts to bats, e.g., downward-directed artificial lighting will be used to shine light to the working area only and reduce 'light leakage' that may temporarily affect bat flightlines.
- The following measures will be incorporated into a sensitive lighting regime if construction lighting is to be used, in respect of bats:
  - Lighting columns that are set back from treelines;
  - Use of warm white LEDs (lights should peak higher than 550 nm);
  - Lights with a 0% upward spill ratio (no vertical light spill);
  - Light should be kept near to or below the horizontal;
  - Waterbodies or watercourses will not be directly illuminated; and
  - Use of warm white LEDs (lights should peak higher than 550 nm.

## 6.6.4 Operational Phase

During the operational phase the following mitigation and compensation will be in place.

#### Habitats

**Table 6-17** shows priority peatland loss compared against intended restoration. A principal aim of restoration will be to restore all peatlands towards M17. M25 is typically a degraded form of bog which, with the right interventions, can be pushed towards M17. M17 is typically wetter, holds deeper peat and a higher diversity of mosses and floral species.

Erosion features including artificial drains and areas for bog improvement have been identified as shown on **Figure 6-8** in **Volume 4** of this EIA Report and form the basis of compensation and enhancement calculations within unimpacted priority peatland and peaty soil habitats which remain following infrastructure installation.

It is noted that the priority peatland loss accounts for 9.39 ha. On a x10 basis 93.9 ha is therefore required as compensation under NatureScot (2023) guidance. For enhancement, an additional 10% of potential National interest Priority Peatlands is required, which amounts to 0.12 ha based on the 1.02 ha of these types within the Proposed Development Site.



As such, 95.1 ha is required in total under guidance and 88 ha has been identified under the current restoration plan.

This is less than the target under guidance as several areas containing cultural heritage assets have been removed from earlier restoration proposals. It is however considered a significant enhancement given the 1/9.25 loss/compensation ratio when considered in the context that guidance defines Priority peatlands as peatlands which show 'evidence of being undisturbed and actively forming peat.'

In addition, in line with the principles of the Fourth National Planning Framework (NPF4) which sets out requirements for developments to deliver positive effects and conserve, restore and enhance biodiversity under Policy 3 (Scottish Government, 2023), an extensive range of planting types have been included on the lowland Solar Development, as included in the Outline HMP (TA 6-6).

The EnvCoW will monitor the condition of sensitive habitats, including areas GWDTE, restored peat and watercourses. Details of the reinstatement and monitoring programme are included in the HMP (TA 6-6). Quadrats will be established in year 1 following the start of restoration with surveys carried out in year 3 and 5. Further surveys will be carried out in years 7,10, 15 and 40.

The proposed access tracks will be left in place after completion of the construction phase as they will provide access for maintenance, repairs, and the eventual decommissioning phase.

Hardstanding areas at each turbine location will be retained for use in on-going maintenance operations, with the edges as far as possible blended to the adjacent contours with natural vegetation being allowed to re-establish.

#### Fauna

A site speed limit of 15 mph will be always in place to reduce the risk of faunal collisions with construction vehicles, as detailed in the CEMP.

The following measures will be incorporated into a sensitive lighting regime if operational lighting is to be used, in respect of bats, lighting will only be turned on when staff are present and will have the following characteristics:

- Use of warm white LEDs (lights should peak higher than 550 nm);
- Lights with a 0% upward spill ratio (no vertical light spill);
- Light should be kept near to or below the horizontal;
- Waterbodies or watercourses will not be directly illuminated; and
- Use of warm white LEDs (lights should peak higher than 550 nm.

## 6.7 Identification and Evaluation of Effects

The three phases of the project lifecycle are considered separately as different effects will occur over the project lifetime.

## 6.7.1 Construction Effects

During construction it is anticipated that, in the absence of further mitigation to that described above, likely sources of direct and secondary effects may arise from:



- Habitat loss or damage (permanent and temporary) due to construction of wind farm infrastructure;
- Sedimentation or other pollution of watercourses from construction activities and vehicular traffic;
- Secondary effects on sensitive habitats through siltation/pollution/spread of invasive species;
- Inadvertent killing, injuring or disturbance of fauna during construction; and
- Disturbance to fauna due to vehicular traffic, operating plant, and the presence of construction workers.

#### Habitats

**Chapter 3: Description of the Development** in **Volume 2** of this EIA Report includes proposed dimensions of all turbines, turbine foundations, crane hard-standings, access tracks, substation, borrow pits, control building and construction compounds. The impacts are categorised as follows:

- Permanent habitat loss: this includes habitats present under the footprint of the Proposed Development, including tracks, turbine bases, substation, compounds, and drains;
- Temporary habitat loss: relating to infrastructure in use only during the construction phase, i.e. temporary scaffolds, storage of construction materials; which may cause damage or loss of habitat but is likely to regenerate after the construction phase has finished; and
- Indirect habitat disturbance: where temporary infrastructure is proposed and in relation drying out effects on habitat adjacent to that directly lost, based on 10 m distance from direct loss.

These potential impacts are addressed for each IEF brought forward to assessment.

**Table 6-16** above indicates the potential temporary and permanent habitat loss associated with the infrastructure and habitats brought forward for assessment. Loss calculations include a 10 m buffer of infrastructure land-take to account for indirect, drying effects.

#### M15b Trichophorum germanicum – Erica tetralix wet heath on peat $\geq$ 50 cm

This habitat is of **Local** value and aligns with the SBL habitat, 'Blanket Bog' when on peat 50 cm depth or more.

There will be loss of 1.42 ha; 0.6 ha of which will be permanent loss. The combined loss equates to 9.82% of the 14.54 ha recorded within the Proposed Development Site. Given the proposed restoration of 88 ha of peatland, a **minor temporary adverse effect** on a Local IEF applies in the short term, which is **not significant** in EIA terms.

#### M15b Trichophorum germanicum – Erica tetralix wet heath on peat < 50 cm

This habitat is of **Local** value. It aligns with the SBL habitat 'Upland Heathland' and also qualifies as an Annex I Habitat 'H4010 (Wet heathland with cross-leaved heath)' when on peat depths of less than 50cm.

There will be loss of 2.97 ha; 1.19 ha of which will be permanent loss. The combined loss equates to 22.16% of the 13.39 ha recorded within the Proposed Development Site, which is considered to be a **minor permanent adverse effect** on a Local IEF. As M15b is



the typical M15 sub-community and widespread in the region the extent, structure and function, at the scale of the Proposed Development, is not likely to be affected to a level which is significant in EIA terms. In addition, habitat wetting measures intended for priority peatlands across the Proposed Development Site, plus reduction in M25 Molinia grassland (also intended as part of peat restoration) will aid development of the structure, function and extent of M15b over time. As such, effects on M15b <50 cm are not considered to be significant.

# M17 Trichophorum germanicum - Eriophorum vaginatum blanket mire Drosera rotundifolia – Sphagnum spp. sub-community

This habitat is of **County** value and aligns with the SBL habitat 'Blanket bog'. It also qualifies as an Annex I Habitat 'H7130 (Blanket bogs)'.

There will be no loss to this habitat community and therefore no effect.

# M18 Erica tetralix – Sphagnum papillosum raised and blanket mire Sphagnum magellanicum – Andromeda polifolia sub-community

This habitat is of **County** significance which qualifies as an Annex I Habitat 'H7110 Active raised bogs).

There will be no loss to this habitat community and therefore no effect.

#### M25 Molinia caerulea – Potentilla erecta mire on peat ≥ 50 cm

This habitat is of **Local** value and aligns with the SBL habitat 'Blanket Bog' when on peat 50 cm depth or more.

There will be loss of 0.45 ha; 0.17 ha of which will be permanent loss. The combined loss equates to 6.5% of the 9.04 ha recorded within the Proposed Development Site, which is considered to be a **minor adverse (non-significant) effect** on a Local IEF in the short term.

# M25a Molinia caerulea – Potentilla erecta mire, Erica tetralix sub-community on peat $\geq$ 50 cm

This habitat is of **Local** value and aligns with the SBL habitat, 'Blanket Bog' when on peat 50 cm depth or more. As such, not all M25a within the Proposed Development Site will meet this criterion. Peatland on the Proposed Development Site is degraded as evidenced by the ubiquity of this habitat and it is this habitat which forms the focus of peat restoration measures as described in the HMP.

This work will comprise drain blocking but also use of *Sphagnum* propagule placement, within *Molinia* swards. The HMP includes 88 ha of proposed restoration measures with the target habitat of M17 Blanket bog.

There will be loss of 7.52 ha, 2.39 ha of which will be permanent loss. The combined loss equates to 8.4 % of the 89.48 ha recorded within the Proposed Development Site. This is considered to be a **minor temporary adverse (non-significant) effect** on a Local IEF applies in the short term. This is not significant in EIA terms.



#### Fauna

#### Nyctalus spp.

Since there were no roosts recorded within the Proposed Development Site, it is unlikely that bats will be negatively affected by habitat loss during the construction phase.

The land subject to the development of infrastructure, which consists predominantly of open moorland, is of low value to bat species for foraging; the surrounding forestry which is more suitable habitat generally, will be unaffected during the construction phase.

It is also noted that no direct loss of trees or foraging habitat features (tree-lines, hedgerows watercourses) will occur and that the high-flying nature of these species will mean that most flights are likely to be above the construction zone. It is acknowledged, however, that the increase of activity on what is a remote site may have localised effects, and for this reason a **minor adverse effect** is considered likely on this **Regional** value IEF, which is **not significant in EIA terms**.

#### Otter

Otter is known to be using the Tarff water in the far east based on two signs found during surveys (one print and one spraint only). As otters are present in most of Scotland's watersheds, it is not unexpected that otters should be using this watercourse, although the evidence suggests that a permanent presence is unlikely.

Otters are likely to be moving through using the watercourse as a commuting/foraging route. As there will be no direct loss of riparian vegetation, potential effects would likely be restricted to disturbance impacts, but considering the low level of activity and absence of resting places recorded during surveys, no more than a **minor adverse effect** is considered likely on this **Local** value IEF, which is **not significant** in EIA terms.

It is noted that a pre-construction survey will be undertaken within 4 weeks of the start of construction covering suitable habitat within 200 m from construction areas. Should a resting place be found works will be halted and an appropriate buffer (as directed by the EnvCoW) implemented.

The buffer will work within the 50 m micro-siting allowance, or in the case of a breeding holt, a derogation licence with Species Protection Plan from NatureScot may be required.

#### Badger

Four setts were found, the locations of which are not included here for reasons of confidentiality (see Volume 5, TA 6-6). A 50 m buffer will be maintained between these locations during works which will include boundary fencing.

Safe foraging access will be maintained to and from sett locations to the wider, area with badger gates within fencing if required - assuming setts are confirmed as active during the pre-construction survey. On this basis, **no significant effect** is considered likely on this **Local** IEF. This is not significant in EIA terms.

#### **Red Squirrel**

The Solar Development infrastructure has been moved to remain outwith 50 m from the two active red squirrel dreys identified in the east of the Proposed Development Site.



Whilst this distance is required around confirmed breeding dreys only, and breeding has not been confirmed, the buffer has been added as a precaution. On this basis, **no significant effect** is considered likely on this **Local** IEF. This is not significant in EIA terms.

#### Reptiles

Whilst noted that no reptile species were seen during surveys, species such as common lizard, they are likely to be present. As a precaution, the two hibernacula will not be removed during works and habitat will be retained to ensure adequate escape by reptiles from them, should they be present.

The EnvCoW will check them before works occur ensuring no disturbance, particularly during the hibernation period (October to early May). On this basis, **no significant effect** is considered likely on this **Local** IEF.

## 6.7.2 Operational Effects

During operation it is anticipated that impacts may arise from:

- Death, injury to bats from collision with wind turbines and displacement of bats from commuting routes by presence of infrastructure;
- Minor pollution events connected to machinery used for maintenance; and
- Inadvertent killing, injuring or disturbance of fauna from the movement of operational plant.

#### Habitats

Habitats are grouped given the lower potential magnitude of effects applicable at the operational stage. Whilst effects from construction on hydrologically sensitive habitats, may persist into operation, there are no new effects generated by the operational phase. Overall, **no significant effects** are considered likely.

Peat restoration, woodland, scrub and wildflower planting measures will have commenced by this time, which over time, will deliver significant positive effects.

#### Fauna

#### Nyctalus spp.

The overall median risk for this group was medium in 2023 and low in 2024, whereas maximum risk across detectors was high in 2023 and medium in 2024 (See **Tables 6-11 to 6-14, Figure 6-6**).

As the overall median level of risk associated with the species was medium throughout the entire Proposed Development Site during 2023, whereas the maximum level of associated risk was high, specifically at S2 (turbine 7) during the summer, it is reasonable to assume there was a peak of activity recorded at this location during the summer of that year.

Although the spring survey was not carried out in 2024, as only 33% of the number of calls from 2023 were recorded in 2024, 2023 is considered to include an atypical peak at S2 which presents a potential significant risk to this Regional value receptor. There were no nights of exceptional or high activity in 2024. On this basis, a **moderate adverse effect** is considered likely on this Regional value IEF, which is **Significant**, in EIA terms.

As such, further mitigation is necessary, as described in section 6.8



#### Otter, Badger, Red squirrel and Reptiles

As activity will be limited to occasional routine maintenance, and on the basis that a 15mph speed limit will be in place, **no significant effects** are likely on these **Local** value IEFs.

## 6.7.3 Decommissioning Effects

It is difficult to predict impacts which could arise from decommissioning and the confidence in all predictions is therefore considered to be less certain due to the length of the operational period (40 years) and changes in habitat and species assemblage therein.

It is assumed, however, that impacts are likely to be similar in nature to the construction phase but of lower magnitude, because the infrastructure will be in place to enable access to the Proposed Development.

IEFs are grouped as the lower magnitude of possible effects does not require splitting habitats, and fauna, into separate types or species as set out in the construction phase.

Once the Proposed Development Site ceases operation after the period of generation, all major equipment and structures will be removed or may be replaced with a new set of turbines subject to planning permission being obtained.

Upon decommissioning of the Proposed Development, the wind turbines would be disassembled in reverse order to how they were erected. All above ground turbine components would be separated and removed off-site for recycling.

Tracks and crane hardstands will remain and be grassed over or reseeded. Underground cables will be de-energised and left in place. Turbine foundations will be buried, and the area will be reseeded.

It is estimated that this process will take up to 12 months.

A Decommissioning Plan will be prepared prior to any decommissioning, which will be agreed with DGC. The plan will provide details of the methodologies that will be adopted, the environmental controls that will be implemented, the Emergency Response Procedure, methods for reviewing compliance and an indicative programme of decommissioning works.

#### Habitats

As removal of infrastructure may occur where habitat restoration has occurred, for example cable ducting and turbine removal, should this be the case the work will be overseen by an EnvCoW.

As the principle of restoration assumes higher value habitats over time, and on a precautionary basis, it is assumed that the Local IEFS identified above will be Local-County IEFs given the 40-year interval between restoration and decommissioning.

As a result of EnvCoW guidance, as detailed in the HMP (**Technical Appendix 6-6** in **Volume 3** of this EIA Report), a minor adverse effect, which is not significant in EIA terms, is possible.



#### Fauna

**No significant effects** are considered likely on identified IEFs included in this chapter as works will be a significantly scaled down version of those associated with construction occurring at discrete locations and at specific times.

It is noted that a pre-works survey will be undertaken within 4 weeks of the start of works covering suitable habitat within 200 m from these areas.

## 6.7.4 Cumulative Effects

Cumulative effects can occur where impacts from one development, which may not be significant at the population level itself, when combined across many developments could result in a detrimental effect on a wider scale.

This could mean habitat loss, disturbance to species (for example of several wind farms adjacent to each other were to be in construction either simultaneously or consecutively) or impacts across connected receptors, such as watercourses which form part of one river system. Developments described below are shown on **Figure 1-4** in **Volume 4** of this EIA Report.

#### Wind Farm Developments

Several wind farm developments occur within 10 km, and these are listed in sequential order of proximity to the Proposed Development in **Table 6-17**. The distances may overestimate proximity as they relate to distance between the red line boundary of the Proposed Development to the edge of the listed site boundary but not necessarily to infrastructure locations within either development.

Site Name	Planning Application Reference	Status	No. of Turbines	Tip Height	Distance from Proposed Development
Trostie Farm	11/E/2/0015	Approved	1	66.5 m	1.4 km
Chapel Cottage	Unknown	Operational	1	Unknown	4.1 km
Ingelston Farm	10/P/2/0491	Approved	2	45.5 m	7.1 km
Little Sypland	12/P/2/0296	Approved	1	74 m	7.5 km
Garrocher Farm	11/E/1/0089	Scoping	1	67 m	8 km
Mark Farm	14/E/1/0021 (10/P/1/0491)	Scoping	2 (11 in initial proposal)	78 m	8.1 km

#### Table 6-17: Cumulative Wind Farm Developments within 10 km

None of the proposed or constructed wind farm developments within 10 km of the Site were deemed of significant scope to require a full Environmental Impact Assessment. It is therefore considered that there would be no potential for cumulative significant ecological effects due to the separation and limited scale of the pre-existing wind turbine developments or planned developments and of the Proposed development.

#### Non-Wind Farm Developments

**High Nunton Farm – Solar Farm & Battery Storage (Application submitted)** – 7.6 km from Proposed Development Boundary, Planning application ref.: 21/2490/FUL



The EIA relating to this project has identified bats, badgers and several GWDTE habitats which are present in the development area as potentially sensitive receptors to the development. These receptors are also present in the Proposed Development.

The High Nunton Farm EIA rated the impact of that development on GWDTEs and Annex I habitats as not significant. This is because only very small sections of the Annex I communities surveyed such as fen-basin mire and fen valley mire with purple moor grass were due to be impacted at all by the development. This was also paired with restoration works which were recommended to improve the overall habitat quality on site.

The overall effects of this site on badger populations were deemed to be local, shortterm and of low magnitude. A Species Protection Plan was put in place to mitigate any potential effects of the development on badgers.

The bat populations recorded at the site included several species including Myotis spp., Nyctalus spp. and brown long-eared bats; which are features observed at the Lairdmannoch Proposed Development that have been brought forward for assessment.

It was determined that that development would not significantly impact bat populations, as the more suitable bat habitats such as forestry are not affected by the infrastructure development.

**Barwhillantry House, Barwhillantry Estate – Solar Array (Permission granted)** – 9.8 km from Proposed Development Boundary, Planning application ref.: 23/1872/FUL

This development was considered to have too small a footprint to warrant the production of a full EIA report.

#### Interactions with the Proposed Development

Based on the IEFs found in relation to the Proposed Development Site and based upon review of ecological reporting in respect of the above developments, where this information is available, the following broad IEF groups are considered.

#### Bats

For there to be a cumulative effect on the Proposed Development, effects on bats within those other projects would need to have been larger. The sites within 10 km are relatively small developments of either one or two turbine arrays. **The base level of effects on bat species is already fairly low therefore any negative affect from the Proposed Development, in EIA terms, is unlikely to have a significant cumulative effect.** 

#### Habitats

The land footprint and number of turbines in the development sites within the vicinity of the Proposed Development means there is little negative cumulative impacts on habitat currently from those projects.

As encountered at the Proposed Development Site, much of the blanket bog encountered at these projects is in a degraded state following historic grazing and burning. Across these projects (with the predicted gains encompassed in these plans), is expected to see an overall improvement of blanket bog resource within and in the vicinity of the Proposed Development Site.



As the identified projects in the vicinity of the Proposed Development are much smaller, and because the Proposed development will comprise an overall benefit to peatland habitats, **there is not considered to be a cumulative effect on priority peatlands from the Proposed Development**.

## 6.8 Residual Effects

Following mitigation measures described in section 6.6, one significant effect will remain, namely a moderate adverse effect for *Nyctalus* species (Leisler's bats and/or Noctule bats) which are Regional value IEFs. As a result a programme or target curtailment will be undertaken.

#### Curtailment

In response to the discovery of high concentrations of *Nyctalus* sp. bats, noctule and Leisler's during the summer and autumn of 2023, the following regime will be put in place. This would be reviewed to determine the appropriate next steps (i.e. whether more or less mitigation is required).

Based upon academic research, bat activity is affected by two factors, wind speed above 5.99 m/s and temperature below 11°C (Collins, 2023) (Lintott & Mathews, 2018) (Mathews, Lintott, Richardson, & Hosken, 2019).

Analysis of the 2023 dataset identified that the species was significantly more active during the summer and autumn months, from 1<sup>st</sup> of June until 31<sup>st</sup> October, compared to the spring, 1<sup>st</sup> of April until 31<sup>st</sup> May. Furthermore, a significant proportion of activity around this turbine was recorded within 2 hours of sunset and sunrise during the summer and autumn, see (see TA 6-3, Graph 6-3-21).

The curtailment strategy, therefore, recommends that turbine 7 (static location S2) is inactive under optimal weather conditions from 1<sup>st</sup> of June until 31<sup>st</sup> October inclusive during two periods of the night, from sunset until two hours after sunset and from 2 hours prior to sunrise until sunrise.

For operational reasons it may be necessary to amend the curtailment operating definition e.g. IT issues, equipment malfunction or other unforeseen circumstance. In such circumstance, the reasonable endeavours will be taken to ensure compliance with the spirit of the curtailment strategy to ensure the risk to bats is managed.

#### Post-Construction Monitoring

Post-construction monitoring is recommended for a minimum of the first five years of operation in order to adjust the mitigation strategy iteratively during years two to five; it is assumed that by year five an optimum level of avoidance will have been determined and would be perpetuated for the lifetime of the Proposed Development.

These survey schedule would take place from 1<sup>st</sup> of June until 31<sup>st</sup> of October for the first five years of operation and will consist of the following:

- Nightly recording of bat activity at each turbine location by static detectors, and
- Monthly carcass searches around each turbine location.

As a result of curtailment at turbine 7 (static location S2) within the conditions described, no residual effect is considered to remain as a result of the Proposed Development.



## 6.9 Conclusions

## Table 6-18: Summary of Residual Effects of the Proposed Development

	contor Evolucition				
Receptor	Evaluation	carried out	Construction	Operational	Decommissioning
Designated Sites					
Galloway Oakwoods SAC	International	No	N/A	N/A	N/A
Woodhall Loch SSSI	National	No	N/A	N/A	N/A
Carstramon Wood SSSI	National	No	N/A	N/A	N/A
Threave and Carlingwark Loch SSSI	National	No	N/A	N/A	N/A
Killiegowan Wood SSSI	National	No	N/A	N/A	N/A
River Dee (Parton to Crossmichael) SSSI	National	No	N/A	N/A	N/A
Ardwall Hill SSSI	National	No	N/A	N/A	N/A
Cairnsmore of Fleet SSSI; NNR	National	No	N/A	N/A	N/A
Airds of Kells Wood SSSI	National	No	N/A	N/A	N/A
Skyreburn Grasslands SSSI	National	No	N/A	N/A	N/A
Loch Ken and River Dee Marshes Ramsar	National	No	N/A	N/A	N/A
Habitats					
M15b Trichophorum germanicum- Erica tetralix wet heath (Blanket Bog (50 cm or more))	Local	Yes	Minor temporary adverse effect – Not significant	No significant effect	Minor temporary adverse effect – Not significant
M15b Trichophorum germanicum- Erica tetralix wet heath (Wet Heath (below 50 cm)	Local	Yes	Minor permanent adverse effect – Not significant	No significant effect	Minor adverse effect – Not significant
M17 Trichophorum germanicum- Eriophorum vaginatum blanket mire	Local	Yes	None	No significant effect	Minor adverse effect – Not significant
M18 Erica tetralix- Sphagnum	County	Yes	None	No significant	Minor adverse effect – Not



		Detailed			
Receptor	Evaluation	carri <u>ed out</u>	Construction	Operational	Decommissioning
papillosum raised and blanket mire				effect	significant
M23 Juncus effusus/acutiflorus - Galium palustre rush-pasture	Local	No	N/A N/A		N/A
M25 Molinia caerulea– Potentilla erecta mire (above 50 cm)	Local	Yes	Minor temporary adverse effect – Not significant	No significant effect	Minor adverse effect – Not significant
M25a Molinia caerulea– Potentilla erecta mire (above 50 cm)	Local	Yes	Minor temporary adverse effect – Not significant	No significant effect	Minor adverse effect – Not significant
M25 Molinia caerulea– Potentilla erecta mire (above 50 cm)	Local	Yes	Minor temporary adverse effect – Not significant	No significant effect	Minor adverse effect – Not significant
M25b Molinia caerulea– Potentilla erecta mire (below 50 cm)	Local	No	N/A	N/A	N/A
S8 Scirpus lacustris spp. lacustris swamp	Local	No	N/A	N/A	N/A
S9 Carex rostrata swamp	Local	No	N/A	N/A	N/A
Fauna					
Amphibians	N/A	No	N/A	N/A	N/A
Reptiles	Local	Yes	No significant effect	No significant effect	No significant effect
Bats	Regional	Yes	Minor adverse effect – Not significant	Minor adverse effect (after curtailment)	No significant effect
Water vole	N/A	No	N/A	N/A	N/A
Otter	Local	Yes	Minor adverse effect – Not significant	No significant effect	No significant effect
Red Squirrel	Local	Yes	No significant effect	No significant effect	No significant effect
Badger	Local	Yes	No significant effect	No significant effect	No significant effect



Receptor	Evaluation	Detailed assessment carried out	Construction	Operational	Decommissioning
Fish	N/A	No	N/A	N/A	N/A

## 6.10 Summary and Statement of Significance

As a result of the design mitigation and further mitigation/monitoring in relation to bats and habitats, **no residual effects have been identified.** The Ecological Impact Assessment is therefore concluded with a finding of no significant adverse impacts in terms of the EIA Regulations should the Proposed Development go ahead.

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