Chapter 7: Ecology

Pencloe Wind Farm Extension

Pencloe Wind Energy Limited

Prepared by:

SLR Consulting Limited

SLR Project No: 405.V63266.00001

December 2024

Revision: 01

Table of Contents

Tables in Text

Acronyms and Abbreviations

ALAR	Abnormal Load Access Road
ALBAP	Ayrshire Local Biodiversity Action Plan
ART	Ayrshire Rivers Trust
AWI	Ancient Woodland Inventory
CEMP	Construction Environmental Management Plan
CIEEM	Chartered Institute of Ecology and Environmental Management
EAC	East Ayrshire Council
ECoW	Ecological Clerk of Works
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
GWDTE	Groundwater Dependent Terrestrial Ecosystem
HabMoS	Habitat Map of Scotland
HMP	Habitat Management Plan
JNCC	Joint Nature Conservation Committee
LNCS	Local Nature Conservation Site
LWS	Local Wildlife Site
MMU	Minimum Mapping Unit
MD-SEDD	Marine Directorate – Science Evidence Data and Digital
NCFT	Nith Catchment Fisheries Trust
NDSFB	Nith District Salmon Fisheries Board
NNR	National Nature Reserve
NPF4	National Planning Framework 4
NVC	National Vegetation Classification
oHMP	Outline Habitat Management Plan
OS	Ordnance Survey
PBA	Protection of Badgers Act
pLWS	Provisional Local Wildlife Site
PMP	Peat Management Plan
SEPA	Scottish Environment Protection Agency
SAC	Special Area of Conservation
SBL	Scottish Biodiversity List
SPP	Species Protection Plan
SSSI	Site of Special Scientific Interest
SWSEIC	South West Scotland Environmental Information Centre
TN	Target Note
WANE Act	Wildlife and Natural Environment (Scotland) Act, 2011 (as amended)

WOW	Weather Observation Website

7.0 Ecology

7.1 Introduction

7.1.1 This chapter assesses the likely impacts and effects of the Proposed Development with respect to ecology. The content within this chapter considers habitats and non-avian animal species. Birds are considered separately in **Chapter 8: Ornithology**.

7.1.2 As interrelationships exist between the assessment of effects on ecology and certain other disciplines, reference should also be made to the following chapters of the EIA Report:

- **Chapter 2: Description of the Proposed Development**;
- **Chapter 8: Ornithology**; **and**
- **Chapter 9: Geology, Hydrology, Hydrogeology and Soils.**

7.1.3 This chapter is supported by the following figures and technical appendices:

- Figures (**Volume 3**):
  - **Figure 7.1 Statutory and Non-Statutory Designated Non-Avian Nature Conservation Sites within 10 km and 2 km of the Site respectively**
- Technical Appendices (**Volume 4**):
  - **Technical Appendix 7.1: Habitat and Peat Condition Report;**
  - **Technical Appendix 7.2: Protected and Notable Species Report 2021;**
  - **Technical Appendix 7.3: Protected and Notable Species Report 2024;**
  - **Technical Appendix 7.4: Bat Survey Report 2021;**
  - **Technical Appendix 7.5: Bat Survey Report 2024;**
  - **Technical Appendix 7.6: Fish and Aquatic Macroinvertebrate Report 2021;**
  - **Technical Appendix 7.7: Fish and Aquatic Macroinvertebrate Report 2023; and**
  - **Technical Appendix 7.8: Outline Habitat Management Plan**
- Figures included within the Technical Appendices (**Volume 4**):
  - **Figure 7.1.1: Phase 1 Habitat Survey;**
  - **Figure 7.1.2: National Vegetation Classification Survey;**
  - **Figure 7.1.3: Potential Groundwater Dependent Terrestrial Ecosystems (GWDTE);**
  - **Figure 7.1.4: Peatland Condition Assessment;**
  - **Figure 7.4.1: Site Location and Static Detector Map 2021;**
  - **Figure 7.5.1: Site Location and Static Detector Map 2024; and**

- **Figure 7.8.1: Outline Habitat Management Plan.**

7.1.4 Throughout this chapter, scientific species names are presented when first referenced, followed by common names only thereafter.

7.2 Legislation, Policy and Guidance

7.2.1 **Table 7-1** presents the legislation and policy and guidance relevant to the assessment and details how their requirements have been considered within the context of this chapter.

Table 7-1: Relevant Legislation, Policy and Guidance with regard to Ecological Impact Assessment

Legislation / Policy / Guidance	Consideration within the EIA Report
Legislation	
The Conservation (Natural Habitats &c.) Regulations 1994 (as amended in Scotland) ('The Habitats Regulations')	Full details on how this legislation relates to ecological features considered within this chapter can be found in the relevant technical appendices (**Technical Appendices 7.1 – 7.7**).
The Wildlife and Countryside Act (as amended in Scotland)	
The Wildlife and Natural Environment (Scotland) Act 2011 (as amended) (WANE Act)	
Nature Conservation (Scotland) Act 2004 (as amended)	
The Protection of Badgers Act 1992 (as amended)	
Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003	
Policy	
National Planning Policy	
National Planning Framework 4 (NPF 4): • Policy 3 (Biodiversity) intends to protect biodiversity, reverse biodiversity loss, deliver positive effects and strengthen nature networks; and • Policy 5 (Soils) intends to protect carbon-rich soils, restore peatlands and minimise disturbance to soils from development.	Embedded and good practice mitigation measures that would be applied to reduce potential impacts and effects on ecological features are outlined in **Section 7.6**. Habitat compensation and biodiversity enhancement measures, and how these would be delivered, are summarised in **Section 7.9** with full details provided in the outline Habitat Management Plan (oHMP) (**Technical Appendix 7.8**).
Scottish Government Draft Planning Guidance: Biodiversity This guidance outlines the Scottish Ministers' expectations for implementing NPF4 Policy 3 and securing positive effects for biodiversity.	
The Scottish Biodiversity Strategy to 2045: The Scottish Biodiversity Strategy was developed around the ambition for Scotland to restore and regenerate biodiversity across the	

Legislation / Policy / Guidance	Consideration within the EIA Report
country by 2045, driving a sustainable economy and supporting thriving communities for which nature stewardship is a key focus. To achieve this, the Strategy highlights six main objectives: 1. Accelerate restoration and regeneration; 2. Protect nature on land and at sea, across and beyond protected areas; 3. Embed nature positive farming, fishery and forestry; 4. Protect and support the recovery of vulnerable and important species and habitats; 5. Invest in nature; and 6. Take action on indirect drivers of biodiversity loss.	
Scottish Biodiversity List (SBL)[1]	Habitats and species listed within the SBL that occur (or have potential to occur) within the Site are summarised in **Section 7.5,** with full details provided in **Technical Appendices 7.1** – **7.7**. Mitigation to reduce potential impacts to such habitats and species is outlined in Section 7.6, with compensation and enhancement measures detailed in **Section 7.9** and **Technical Appendix 7.8**.
Local Planning Policy	
East Ayrshire Local Development Plan 2 (LDP2)[2] The LDP2 sets out the Council's planning policy framework, which is used to guide, assess and determine planning applications. It has been updated to incorporate principles set out in NPF4. LDP2 policies of relevance to this chapter include: • NE4: Nature crisis; • NE5: Protection of areas of nature conservation interest (including reference to the Local Nature Conservation Sites Draft Non-Statutory Planning Guidance (EAC, 2024)); • NE6: Vulnerable, threatened and protected species; • NE8: Trees, woodland and hedgerows; • NE9: Woodland creation; • NE11: Soils; • NE12: Water, air, light and noise pollution;	The provisions of the relevant policies have been considered, as appropriate, throughout this chapter. Consideration of compliance with the relevant policies is provided in the separate Planning Statement.

[1] The Scottish Biodiversity List is a list of animals, plants and habitats that Scottish Ministers consider to be of principal importance for biodiversity conservation in Scotland. Publication of this list was a requirement of Section 2(4) of the Nature Conservation (Scotland) Act 2004.

[2] The East Ayrshire Local Development Plan 2 (LDP2) was adopted on 08 April 2024.

Legislation / Policy / Guidance	Consideration within the EIA Report
• RE1: Renewable energy; and • MIN7: Borrow pits.	
Ayrshire Local Biodiversity Action Plan (ALBAP) – priority habitats and species listed within Chapter 3 of East Ayrshire Council State of the Environment Report (East Ayrshire Council, 2016)[3].	Priority habitats and species listed within the former ALBAP have been considered within **Technical Appendices 7.1 – 7.5**.
Technical Guidance	
Chartered Institute of Ecology and Environmental Management (CIEEM) (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.2 - updated April 2022.	The CIEEM guidelines form the basis of the impact assessment presented within this Chapter.
CIEEM (2019) Advice Note: On the Lifespan of Ecological Reports and Surveys.	Addressed in **Technical Appendices 7.1** – **7.7**.
NatureScot (2023). Advising on Peatland, Carbon-rich Soils and Priority Peatland Habitats in Development Management.	The presence of, and approach to, peatland and carbon rich soils are addressed in **Technical Appendices 7.1** and **7.8**. Maps showing the distribution of peatland habitats within the Site are provided in **Figures 7.1.1** - **7.1.4**. Further details relating to peatland and carbon rich soils within the Site (soil type, peat depth and peat classification) are also provided in **Chapter 9: Geology, Hydrology, Hydrogeology and Soils.**
NatureScot (2021) Bats and Onshore Wind Turbines – survey, assessment and mitigation	Addressed in **Technical Appendices 7.4** and **7.5**.
Scottish Environment Protection Agency (SEPA) (2017). Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems. Land Use Planning System SEPA Guidance Note 31 (LUPS – GN31)	Addressed in **Technical Appendix 7.1** and **Chapter 9: Geology, Hydrology, Hydrogeology and Soils**.
Other relevant guidance	Other technical guidance of relevance to the ecological assessment is referenced within this chapter, as appropriate, and detailed in **Technical Appendices 7.1** – **7.8**.

[3] The ALBAP was written in 2007 to deliver national (UK Biodiversity Action Plan [UKBAP]) objectives at a local level, prioritise habitats for action and identify key habitats and species. The lifespan of ALBAP ended in 2010. Since 2010, a series of important plans have been developed, including the Scottish Biodiversity List, which effectively supersedes the UKBAP in Scotland. A list of ALBAP priority habitats, and associated species, that should be included in further LBAP updates is provided in a 'Status of the Environment Report' (East Ayrshire Council, 2016).

7.3 Consultation and Engagement

7.3.1 A scoping exercise was carried out in July 2024 to establish the scope of the EIA, including the methodology and approach to the ecological impact assessment. The Scoping Report (**Technical Appendix 4.1**) records the findings of the scoping exercise and details the technical guidance, standards, best practice and criteria being applied in the assessment, to identify and evaluate the likely significant effects of the Proposed Development on ecology. A Scoping Opinion (**Technical Appendix 4.2**) was adopted by the Scottish Ministers on 7 October 2024.

7.3.2 Consultation to inform this chapter, including a summary of comments raised in the formal Scoping Opinion, and other pre-application engagement, is summarised in **Table 7-2**, alongside a summary of how the Applicant's assessment has responded to this feedback.

Table 7-2: Consultation Summary Table

Consultee	Summary of Response	How comments have been addressed in this chapter
Scoping Report July 2024		
Energy Consents Unit (ECU)	• Marine Directorate – Science Evidence Data and Digital (MD-SEDD) provide generic scoping guidelines for onshore wind farm development, which outline how fish populations can be impacted during the construction, operation and decommissioning of a wind farm development and informs developers as to what should be considered in relation to freshwater and diadromous fish during the EIA process (Scottish Government, 2021). In addition to identifying the main waterbodies and watercourses within and downstream of the Proposed Development, developers should identify and consider and areas Special Areas of Conservation (SAC) where fish are a qualifying feature and proposed felling operations, particularly in acid sensitive areas. • MD-SEDD also provide standing advice with regard to fish and onshore wind farm developments, which outlines what information is expected in the EIA report (Scottish Government, 2020). The absence of such information may necessitate requesting additional information which may delay the process. Developers are therefore required to submit the completed checklist in advance of their application submission.	• A desk-based study carried out to inform the Scoping Report (**Technical Appendix 4.1**) for the Proposed Development identified that there are no SACs for which fish are a qualifying feature within 10 km of, or hydrologically connected to, the Proposed Development. • As per MD-SEDD guidance, this chapter assesses the direct and indirect effects on the Proposed Development on the water environment and aquatic species that utilise it (including Atlantic Salmon *Salmo salar* and brown trout *Salmo trutta*) (**Section 7.7**). • Information relating to fish species presence and population densities recorded in watercourses associated with the Site are summarised in **Section 7.5**, with full details provided in **Technical Appendices 7.6** and **7.7**. An overview of water quality and ecological status, based on results of aquatic invertebrate surveys, is also provided in **Section 7.5** and **Technical Appendices 7.6** and **7.7**. • A description of potential impacts on fish and aquatic invertebrates during construction, operation and decommissioning phases (prior to mitigation) is provided in **Section 7.7.** Proposed embedded and standard mitigation for reducing such impacts are provided in **Section 7.6.** • An assessment of potential cumulative effects on fish and aquatic invertebrates is provided in **Section 7.8.** • Proposals for pre-construction, during construction, and post-construction monitoring fish and aquatic invertebrate populations are provided in **Section 7.9.** Proposals for water quality monitoring are outlined in

Consultee	Summary of Response	How comments have been addressed in this chapter
		Chapter 9: Geology, Hydrology, Hydrogeology and Soils.
East Ayrshire Council (EAC)	Ecology • Proposed biodiversity enhancement measures should be separate to general habitat management measures included as compensation/ mitigation for the impacts of the Proposed Development. To ensure there is a clear distinction between mitigation of impacts and what is to be implemented over and above these to deliver biodiversity enhancement, the elements will require to be discussed separately and not amalgamated into a single document or set of proposals. This will provide clarity with regard to what measures are required to mitigate for the impacts of the development, and what further measures are proposed to deliver significant biodiversity enhancement. • Local Nature Conservation Sites (LNCS) should be addressed alongside other ecological designations such as SSSIs. • Consultation should be undertaken with the Nith District Salmon Fisheries Board (NDSFB) and Ayrshire Rivers Trust (ART), in addition to Marine Science Scotland (MSS) to agree on appropriate methodologies and scope of assessment in terms of fish and aquatic species.	• Habitat restoration/ compensation and biodiversity enhancement measures are detailed within an oHMP (**Technical Appendix 7.8**) and summarised in **Section 7.9**. Compensation and enhancement measures would be delivered together and it would therefore be impractical to produce separate oHMPs covering compensation and enhancement. However, compensation associated with habitat loss during construction of the Proposed Development has been clearly distinguished from measures proposed to deliver biodiversity enhancement within the oHMP and within **Section 7.9 (Table 7-13)** of this chapter. • Details of LNCS's within 2 km of the Site boundary have been provided in **Section 7.5**, with potential impacts summarised in **Section 7.7.** • Consultation with NDSFB has been carried out and responses summarised within this table. The Proposed Development lies outside the catchments covered by ART. Consultation with NDSFB was therefore considered sufficient to inform this assessment, in respect of fish and other aquatic species.
NatureScot	Protected Areas • NatureScot highlight the importance of assessing the direct and indirect impacts of the proposed development on protected areas and their notified features in the context of their site management statements. The assessment should be for the proposal both on its own and cumulatively with other plans or projects affecting the protected areas. • Regarding Muirkirk Uplands SSSI, NatureScot agree that the notified feature blanket bog has no hydrological connectivity to the	Statutory and non-statutory designated sites, and local conservation sites have been addressed within **Sections 7.5** and **7.7** of this chapter. With agreement from NatureScot, Muirkirk Uplands SSSI has been scoped out of further assessment within this chapter (**Section 7.5**).

Consultee	Summary of Response	How comments have been addressed in this chapter
	Proposed Development and can therefore be scoped out of further assessment.	
	Protected Species and Habitat Survey • NatureScot consider the protected species and habitat and vegetation survey approach to be appropriate. Should any potential impacts to protected species be identified, proposed mitigation measures should be outlined within a species protection plan. • Pre-construction protected species surveys should be carried out at an appropriate time of year, as outlined within current NatureScot guidance. For species that can be surveyed at any time of year, pre-construction surveys should be no more than three months prior to construction works commencing. • Monquhill Farmhouse is located within 250 m of the nearest turbine and has been assessed as high suitability to support roosting bats. Survey work to inform the EIA for Enoch Hill II wind farm identified that this structure serves as a small, mixed species non-maternity summer roost for common pipistrelle, soprano pipistrelle and bats of the genus *Myotis* (WSP, 2023). A single *Myotis* echolocation file was also recorded during hibernation surveys conducted at the farmhouse in the winter of 2021/ 2022, thus indicating potential for the structure to be utilised as a hibernation roost. The confirmed roost status of Monquhill Farmhouse should be factored into the assessment of impacts on bats within the EIAR. • The status of the Mammal Society's Ecobat website should be checked for further updates on system availability. In the interim, EIA reports should explain the unavailability of Ecobat and alternative analysis should attempt to infer the relative level of bat activity (e.g. by comparing target site activity data with that from	• Baseline information relating to the presence, or potential presence, of (non-avian) protected and notable[4] species is detailed in **Section 7.5** and **Technical Appendices 7.2 – 7.7**, with relevant mitigation measures provided in **Section 7.6**. Potential impacts are discussed in **Section 7.7**, with any additional mitigation described in **Section 7.9**. • Baseline information relating to habitat and vegetation communities is summarised in **Section 7.5** with full details provided in **Technical Appendix 7.1.** Embedded and best practice mitigation is summarised in **Section 7.6** and proposed compensation and enhancement measures for habitats are described in **Technical Appendix 7.8**. • The assessment of effects on bat species is provided in **Section 7.7**. Through evolution of the turbine layout, the nearest proposed turbine (T5) would be sited approximately 423 m from Monquhill Farmhouse. • In the absence of the Ecobat tool, and to allow comparison of relative bat activity levels, bat activity data recorded during 2023 has been compared to data recorded (and analysed using Ecobat) during the same seasons in 2021. For further details, please refer to **Section 7.5** and **Technical Appendix 7.4**.

[4] Notable species relate to those with conservation designations (e.g. SBL species, local priority species, or nationally rare/scarce species), but may not receive specific legal protection.

Consultee	Summary of Response	How comments have been addressed in this chapter
	similar surveys in comparable geographic locations and habitat types).	
	Peatland • Phase 2 peat probing and peatland assessment should be carried out in accordance with current NatureScot guidance (NatureScot 2023 and 2024b).	• Data relating to peat depth survey are provided in **Chapter 9: Geology, Hydrology, Hydrogeology and Soils**. • Baseline data relating to peatland condition assessment has been collected with reference to NatureScot (2023), for which the methodology and results are provided in **Technical Appendix 7.1**.
	Biodiversity Enhancement • NatureScot would welcome the inclusion of an outline Habitat Management Plan (oHMP) within the EIAR. This should address both compensation and enhancement requirements, in line with NPF4 Policy 3(b) to provide for positive effects for biodiversity. • The proximity of several non-statutory designated sites in relation to the footprint of the Proposed Development provides significant opportunities to enhance the condition of these sites and help improve their contribution to local nature networks, in line with the intent of Policy 3(b) of NPF4. • The scoping report explains that the EIA will focus on significant effects on important ecological features and measures to mitigate these. NatureScot advise that enhancement requires consideration of all biodiversity, not just significant effects that are a focus of the EIA. • Information relating to predicted losses, and proposed mitigation, compensation and enhancement measures should be clearly set out within the main body of the EIAR, as well as within the oHMP, so that these can be clearly understood by decision makers.	• An oHMP is provided as **Technical Appendix 7.8,** within which compensation and enhancement measures are defined. Measures associated with compensation are clearly separated from those associated with delivery of biodiversity enhancement. An overview of additional mitigation, compensation and enhancement measures proposed within the oHMP is also provided in **Section 7.9** of this chapter. • The measures set out in the oHMP all lie within the Site boundary making them easier to deliver and providing compensation closer to the areas of habitat that will be lost. Habitat restoration and enhancement would take place both within, and outside of, the boundary of Connel Burn/ Benty Cowan LNCS, which intersects the Site boundary. The measures proposed within the oHMP seek to provide biodiversity enhancement within the LNCS and improve habitat connectivity and nature networks within the wider landscape.
Fisheries Management Scotland	Fisheries Management Scotland highlight that the Proposed Development falls within the catchment relating to the NDFSB and Nith Catchment Fisheries Trust (NCFT). Full consultation with these organisations should therefore be carried out.	Consultation has been carried out with NDFSB and NCFT. The scoping response from NDSFB is summarised below. NCFT did not respond to the consultation.

Consultee	Summary of Response	How comments have been addressed in this chapter
Nith District Salmon Fisheries Board (NDSFB)	NDSFB has conducted the necessary surveys to inform the neighbouring consented Pencloe Wind Farm and holds some current information on fish and aquatic invertebrate populations of relevance to the Proposed Development. This is however limited to the lower parts of the footprint of the Proposed Development and associated access road. NDSFB does not hold information relating to the upper parts of the Proposed Development site which are drained by upper Connel and Carcow burns (which drain Ewe Hill). The board therefore request that these parts of the Proposed Development are surveyed to the same standard, prior to construction, and annually during construction and post-construction, to enable an assessment of the impacts on the aquatic environment to be made. Should construction of the adjacent consented Pencloe Wind Farm be completed before that relating to Proposed Development, responsibility for conducting aquatic surveys in the lower section of the catchment would be also passed to the Proposed Development.	The results of the fish and aquatic macroinvertebrate surveys conducted by NDSFB to inform the EIARs for, and discharge subsequent planning conditions associated with, the adjacent Pencloe Wind Farm and Pencloe Abnormal Load Access Road (ALAR), are presented in **Technical Appendices 7.6** and **7.7** and summarised in **Section 7.5**. The baseline data included in **Technical Appendices 7.6** and **7.7** provide a good indication of the fish and aquatic invertebrate populations in watercourses drained by the Site. It is also noted that the survey data coverage was sufficient for the Pencloe ALAR application, which covers a similar area. The data are therefore considered sufficient to inform the assessment of potential impacts and effects on fish and invertebrate populations for the purpose of this chapter. Details of proposed monitoring for fish and aquatic invertebrates are provided in **Section 7.10** . Monitoring would take place prior to construction (post consent), annually during construction and once post-construction. Monitoring would include sites on the upper Connel and Carcow Burns, as requested by NDSFB.
Scottish Forestry	Scottish Forestry noted that the proposal has no impact upon woodland and there will be no woodland loss.	The Site is comprised primarily of open upland habitat, with very limited tree cover (restricted to small scattered pockets of broadleaved woodland on steep banks adjacent to watercourses), as detailed in **Section 7.5** and **Technical Appendix 7.1**. No impacts to woodland habitat would occur as a result of the Proposed Development.
SEPA	Where proposals are on peatland or carbon rich soils, it should be clearly demonstrated that the assessment has informed careful project design, and ensured, in accordance with relevant guidance and the mitigation hierarchy in NPF4, that adverse impacts are first avoided before being minimised through best practice.	Information relating to peat depth, peat loss and proposed re-instatement is provided in **Chapter 9: Geology, Hydrology, Hydrogeology and Soils**. A Peat Management Plan (PMP) is provided in **Appendix 9.2,** with a GWDTE assessment provided in **Chapter 9: Geology, Hydrology, Hydrogeology and Soils** and outlined in

Consultee	Summary of Response	How comments have been addressed in this chapter
	To evidence this, SEPA require: a detailed map of peat depths and peat condition with all built elements overlain to demonstrate how the Proposed Development avoids areas of deep peat and other sensitive features such as Groundwater Dependent Terrestrial Ecosystems (GWDTEs); and a draft Peat Management Plan (PMP).	**Section 7.5**. Proposed peatland restoration and enhancement plans are summarised in **Section 7.9**, with full details provided in **Technical Appendix 7.8**.

7.4 Assessment Approach and Methodology

Scope of Assessment

7.4.1 The scope of this assessment was defined through a review of existing ecological data gathered to inform historic environmental assessments associated with the Site (SLR, 2018; SLR, 2021), and consideration of consultee responses to the Scoping Report for the Proposed Development.

7.4.2 Details relating to ecological features that have been subject to a full assessment of likely effects as a result of construction, operation and decommissioning of the Proposed Development, and those that have been scoped out, are provided in **Section 7.5**.

Study Area

7.4.3 The 'study area' incorporates the area over which desk and field-based data were gathered to inform this ecological assessment. The study area differs according to each ecological feature concerned, based on good practice guidance and the proposed search areas set out within the Scoping Report. Specific study areas referred to in the assessment include:

- The Site (the area bounded by the Site boundary, including proposed access track, as shown on **Figure 2.1**);
- The Main Site[5] (the area bounded by the Site boundary, excluding the access track north of Ashmark Hill);
- Desk study search areas (10 km search radius from the Main Site boundary for sites of European and National importance, a 2 km radius for non-statutory designated sites and legally protected and notable species, which was extended to a 10 km search radius for bat records); and
- Field survey areas (incorporating the Main Site and associated survey buffer areas specific to each individual survey type), as indicated in figures within **Technical Appendices 7.1** – **7.7** and summarised in **Table 7-5**.

7.4.4 As discussed in **Chapter 3: Site Selection and Design Evolution**, the design of the Proposed Development has gone through multiple iterations (including amendments to the extent of the Site boundary), therefore the study area has been adjusted throughout the design phase to enable an adequate amount of data to be gathered, in order to inform the assessment of effects on ecological features.

[5] Desk and field survey data were obtained in relation to the Main Site only, which excludes the northern section of the Pencloe ALAR (north of Ashmark Hill). While the Proposed Development will utilise this section of the Pencloe ALAR, there will be no construction work associated with this access route as part of the Proposed Development.

Sources of Information

Desk Study

7.4.5 A desk-based study was carried out to gather information relating to a range of ecological features with the Site and surrounding area, including: statutory and non-statutory designated sites; legally protected or notable species; and habitats and botanical species of principal importance for biodiversity conservation. **Table 7-3** sets out key sources of desk study information and the associated spatial coverage searched[5].

Table 7-3: Ecological Data Sources

Ecological Feature	Description	Spatial Coverage	Data Source
Statutory designated nature conservation sites	Sites of European Importance: • Special Areas of Conservation (SACs); and • Wetlands of International Importance (Ramsar sites) Sites of National Importance: • Sites of Special Scientific Interest (SSSIs); and • National Nature Reserves (NNRs). Sites of Local Importance: • Local Nature Reserves (LNRs)	The Main Site and surrounding 10 km radius	NatureScot Sitelink online mapping tool[6]; and the Multi Agency Geographic Information for the Countryside (MAGIC) web-based mapping tool[7].
Locally designated nature conservation sites	• Local Nature Conservation Sites (LNCS)[8]	The Main Site and surrounding 2 km radius	South West Scotland Environmental Information Centre (SWSEIC)[9]
Legally protected species	Legally protected non-avian species and habitats, including those listed within: • The Habitats Regulations (Schedules II and IV); • Wildlife and Countryside Act 1981 (as amended in Scotland) (Schedules 5 and 8); and • Protection of Badgers Act 1992.		

[6] The NatureScot Sitelink website [online]. Available at: https://sitelink.nature.scot/map

[7] The Multi Agency Geographic Information for the Countryside (MAGIC) web-based mapping tool is available online at https://magic.defra.gov.uk/

[8] The term 'Local Nature Conservation Site' (LNCS) has been applied to align with the East Ayrshire Council Local Development Plan Supplementary Planning Guidance (EAC, 2024). It is understood that the LNCS identified within 2 km of the Site Boundary (**Table 7-7**) were formally referred to as provisional Local Wildlife Sites (pLWS) prior to adoption of 'LNCS' within the planning guidance.

[9] The SWSEIC website is available here: https://swseic.org.uk/

Ecological Feature	Description	Spatial Coverage	Data Source
Notable species	• Species listed on the SBL as species of principal importance for biodiversity conservation; • Species listed within the former ALBAP; or • Species classified as nationally rare or scarce.		
Legally controlled species	Non-native invasive species listed on Schedule 9 of the Wildlife and Countryside Act (1981) (as amended in Scotland).		
Habitats and other features of interest	Watercourses and waterbodies, woodland, heath and mire habitat. Habitats within the SBL and therefore of principal importance for biodiversity conservation in Scotland.	Main Site itself (plus 2 km radius for ancient woodland)	Habitat Map of Scotland (HabMoS)[10]; Google Maps[11] and Google Earth[12] Websites; Ancient Woodland Inventory (Scotland)[13]

7.4.6 Where available, data were also gathered from existing ecological records and field data obtained to inform previous planning applications covering parts of the Main Site and other nearby development projects. Sources of such data are detailed in **Table 7-4**.

Table 7-4: Additional Sources of Existing Ecological Data

Source	Baseline Information Provided
Jacobs (2015). Pencloe Wind Farm Environmental Statement	• Desk-based study covering: the application site for Pencloe Wind Farm, which lies adjacent to the Main Site to the east; a 10 km buffer for statutory designated sites; and a 2 km buffer for non-statutory designed sites and legally protected and/or notable species; • Phase 1 habitat survey and National Vegetation Classification (NVC) Report; • Protected species survey report; and • Bat survey report.
SLR Consulting (2018). Ashmark Hill Community Wind Farm EIAR	• Desk-based study covering: the application site for Ashmark Hill Wind Farm (much of which overlaps the Main Site); a 20 km buffer for sites of European designated

[10] The EUNIS Land Cover Scotland map data set is available online at: https://map.environment.gov.scot/sewebmap/?layers=eunisLandCoverScotland,natWoodSurvey,habmosNVCToAnnexIAndEUNIS,HabVegSurvey1,saltmarshSurvey1,habmos-OtherLanduse,coastalVegShingle1&extent=-245528,573191,665472,1169192 [Accessed in May 2024]

[11] Google maps available online at: https://www.google.co.uk/maps [Accessed in May 2024]

[12] Google Earth available online at: https://earth.google.com/web/ [Accessed in May 2024]

[13] The Ancient Woodland Inventory database [online] Available at: https://www.data.gov.uk/dataset/c2f57ed9-5601-4864-af5f-a6e73e977f54/ancient-woodland-inventory-scotland [Accessed in May 2024]

Source	Baseline Information Provided
	importance; a 10 km buffer for sites of National importance; and a 2 km buffer for non-statutory designed sites and legally protected and/or notable species; • Phase 1 habitat survey and NVC Report; • Protected species survey report; and • Bat survey report.
Sweco (2019). Pencloe Wind Farm EIAR	• Updated assessment of likely effects on non-avian ecology through comparison of findings of Jacobs (2015); and • Revised habitat loss calculations associated with a variation to the consented infrastructure layout.
SLR Consulting (2021). Pencloe Alternative Abnormal Load Access Option EIAR	• Desk study covering the application site for the Pencloe ALAR, which lies entirely within the Main Site, and associated 2 km buffer search area; • Phase 1 habitat survey and NVC Report; • Protected species survey report; and • Fish and aquatic invertebrate survey report, produced by NDSFB including sampling locations along the Connel Burn and Carcow Burn (included in **Technical Appendix 7.6**).
SLR Consulting (2022). Pencloe Wind Farm Discharge of Conditions	• Protected species survey report, covering part of the Main Site.
SLR Consulting (2022). Pencloe ALAR Discharge of Conditions	• Protected species survey report, covering part of the Main Site.
Amec Foster Wheeler (2015). Enoch Hill Wind Farm ES	• Desk based study covering: the application Site for Enoch Hill Wind Farm (which lies immediately to the north-west of the Main Site) and an appropriate search area radius for each ecological feature. • NVC survey report; • Protected species survey reports; • Bat survey reports; and • Fisheries and freshwater pearl mussel *Margaritafera margaritafera* reports.
Wood (2020) Enoch Hill Variation Application EIAR	• Assessment of likely significant effect on bats in light of variation to design of the Proposed Development (increasing rotor diameter, blade tip heights and operational period of wind turbines).
Wood (2021) Enoch Hill Wind Farm – Discharge of Condition 26: Bat Monitoring Strategy	• Post construction bat monitoring strategy required to discharge planning condition 26 associated with the consented Enoch Hill Wind Farm.
WSP (2023). Enoch Hill II Wind Farm EIAR	• Desk-based study covering: the application site for Enoch Hill II Wind Farm (positioned to the south-west of the Mian Site), and a 2 km buffer incorporating sites of European and National importance; non-statutory designed sites; and legally protected and/or notable species; • Phase 1 habitat survey and NVC report; • Protected species survey report; • Bat survey report; and

Source	Baseline Information Provided
	• Fish and aquatic invertebrate report.
NDSFB (2023). Aquatic Surveys to Assess Fish Populations and Aquatic Macroinvertebrate Communities in the Vicinity of The Pencloe Wind Farm Site, Volume 3. Pre-Construction Survey.	• Update 2023 fish and aquatic invertebrate survey report, produced by NDSFB including sampling locations along lower sections of the Connel Burn and Carcow Burn (included in **Technical Appendix 7.7**).

Field Surveys

7.4.7 A suite of baseline ecological surveys was initially carried out during 2021 to inform the EIA for the Proposed Development (e.g. **Technical Appendices 7.2** and **7.4**). Due to the time that has since elapsed, and following amendments to the Main Site boundary, additional field survey work was carried out in 2023 (**Technical Appendix 7.5**) and 2024 (**Technical Appendices 7.1** and **7.3**) to update baseline ecological data and maintain survey validity in accordance with best practice (CIEEM, 2019; NatureScot, 2024).

7.4.8 Details of each survey type (and associated survey area) carried out to inform this assessment are provided in **Table 7-5**.

Table 7-5: Ecological Field Surveys

Survey Type	Survey Area	Survey Timing	Figure Reference
Phase 1 habitat, NVC and peat condition survey	All land within the Main Site boundary and associated 250 m buffer (where accessible)	May and June 2024	**Figures 7.1.1** – **7.1.4** in **Technical Appendix 7.1**
Protected mammals	2021 Site boundary[14] and associated 250 m buffer	June 2021	**Figure 7.2.1** in **Technical Appendix 7.2**
Update protected mammal survey	All areas of suitable habitat within the Main Site boundary and associated 100 m buffer (where accessible). Extended to 200 m up and downstream for watercourses that intersect the Site boundary for otter *Lutra lutra* (where accessible). The survey also included an update assessment of habitat suitability for bats.	May 2024	**Figure 7.3.1** in **Technical Appendix 7.3**
Bats	A habitat suitability assessment for commuting, foraging and roosting bats was carried out within the 2021 Site boundary[14] and associated 250 m buffer. Bat activity surveys were carried out through static detector monitoring at four locations representative of the areas in	May – September 2021	**Figure 7.4.**1 in **Technical Appendix 7.4**

[14] The 2021 Site boundary provided to SLR by the Applicant (and thus survey area for protected mammals and bats) was considerably smaller in extent than the current proposed Site boundary. As such, the 2021 protected species survey did not include the Connel Burn and incorporated only part of the Carcow Burn, whereas the 2024 update survey included both watercourses.

Survey Type	Survey Area	Survey Timing	Figure Reference
	which turbines could be located[15], for a period of 10 nights per season (Spring, Summer and Autumn).		
Update bat survey	Bat activity surveys were conducted through static detector monitoring at five indicative turbine locations, for a period of 10 nights per season (Spring, Summer and Autumn).	May – September 2023	**Figure 7.5.1** in **Technical Appendix 7.5**

7.4.9 A summary of the methods applied to carry out field surveys and establish baseline conditions at the Main Site is provided below. For full details of survey methods, please refer to **Technical Appendices 7.1** – **7.7**.

Phase 1 Habitat Survey

7.4.10 A Phase 1 habitat survey was initially carried out in June 2021, in accordance with Joint Nature Conservation Committee (JNCC) guidance, to establish the pattern and distribution of habitat types present across the survey area (JNCC, 2010).

7.4.11 To accord with best practice guidance relating to the lifespan of ecological data (CIEEM, 2019; NatureScot, 2024) and obtain baseline habitat data for land within the extended Main Site boundary that had not previously been surveyed, further Phase 1 survey was carried out in May 2024.

7.4.12 During both surveys, broad habitat types were recorded onto Ordnance Survey (OS) maps using Phase 1 habitat codes. Target notes (TNs) were also recorded to provide further detail on habitats of nature conservation importance, communities that were too small to map, or those that occur as mosaics or transitional areas within the landscape.

National Vegetation Classification (NVC) Survey

7.4.13 The NVC is a detailed classification system for mapping and recording vegetation communities using plant species presence and abundance. An NVC survey was carried out in conjunction with the Phase 1 habitat surveys in June 2021 and May 2024, in accordance with standard methodology and guidelines (Rodwell, 1991 *et seq*, 5 volumes; and Rodwell, 2006). During the survey, NVC communities were mapped in the field by applying polygons around visible boundaries of homogenous vegetation. Where readily identifiable, stands were classified and mapped at sub-community level.

Groundwater Dependent Terrestrial Ecosystems

7.4.14 GWDTEs are wetland habitats that derive their water supply primarily from groundwater as opposed to being rain or surface water fed, often supporting diverse, botanically rich ground-flora communities (CONFOR, 2018). Following the

[15] Four locations were monitored in 2021 reflecting the maximum number of turbines under consideration at that time.

NVC survey, habitat communities recorded during the survey were assessed against SEPA guidelines for identifying potential GWDTEs (SEPA, 2017). A more detailed assessment of the likely groundwater dependence of these communities was then conducted as part of the hydrogeology assessment (**Chapter 9: Geology, Hydrology, Hydrogeology and Soils**).

Peatland Habitat Assessment

7.4.15 To accord with current guidance regarding peatland and carbon-rich soils (NatureScot, 2023; Scottish Government, 2023[16]), a site-specific assessment of peatland habitats was carried out in June 2024. The assessment recorded aspects associated with vegetative species, land management, and peat depth at specific infrastructure locations (proposed wind turbines, access tracks, and borrow pits) using standardised assessment criteria provided by NatureScot and guidance provided by Peatland Action (2016). The template used has been designed for NatureScot case officers, to assist in determining whether the impacts of a proposal could raise issues of national interest, and to determine whether seeking specialist advice is required.

7.4.16 Information was collected at a total of 33 survey locations within the Main Site, sampling all peatland habitats that lie within close proximity to the proposed infrastructure footprint. For full details, including a map showing locations of each sample point, please refer to **Technical Appendix 7.1**.

Protected Species Survey

7.4.17 A protected species walkover survey was originally carried out in June 2021 (**Technical Appendix 7.2**). The survey incorporated a search for field signs relating to otter, water vole *Avicola amphibius*, badger *Meles meles*, red squirrel *Sciurus vulgaris* and pine marten *Martes martes*. An update survey, encompassing the current Main Site boundary and relevant survey buffers, was carried out in May 2024 (**Technical Appendix 7.3**).

7.4.18 Each survey type was carried out with reference to standard methodologies and best practice guidance in place at the time that survey work was conducted. Full details of the methodology applied to carry out the protected species survey are provided in **Appendices 7.2** and **7.3**.

Bat Surveys

7.4.19 A programme of bat surveys was carried out within the Site during the years 2021 (**Technical Appendix 7.4**) and 2023 (**Technical Appendix 7.5**). Surveys incorporated a habitat suitability appraisal and bat activity monitoring using static bat detector units.

7.4.20 The habitat suitability appraisal involved a desk-based review of aerial imagery, followed by a walkover to assess the suitability of habitat types present within the

[16] The National Planning Framework 4 (NPF4) was adopted by Scottish Ministers on 13 February 2023. Protection of locally, regionally, nationally and internationally valued soils is addressed in Policy 5.

Site and surrounding area for supporting commuting and foraging bats. An assessment of potential roosting resource within the Site and 250 metre (m) buffer was also carried out. This was however high level only, recording stands of woodland or built structures with potential roost suitability as opposed to completing a detailed ground level assessment of each individual tree or built structure within the survey area.

7.4.21 Based on an indicative turbine layout provided by the Applicant, a programme of bat activity surveys using full spectrum static bat detector units was planned and carried out during the 2021 and 2023 active bat seasons (extending from April to mid-September in Scotland). Static detector units were placed at, or close to, each of the indicative wind turbine locations[17] under consideration at that time to provide a representative sample of bat activity at, or close to the proposed infrastructure.

7.4.22 Each static detector unit was set to record bat activity for a minimum period of ten consecutive nights per season (Spring – May/ June; Summer – July; Autumn – August/September), with each night of monitoring commencing approximately 30 minutes before sunset and ending 30 minutes after sunrise. Further information, including details of sonogram analysis, are contained within **Technical Appendices 7.4** and **7.5**.

Aquatic Ecology

7.4.23 Watercourses within, and surrounding the Site, have been surveyed at various times by NDSFB between the years 2015 and 2023. These surveys were conducted primarily to support applications for, and planning conditions associated with, the adjacent Pencloe Wind Farm.

7.4.24 An initial survey to assess fish communities and aquatic invertebrates within watercourses associated with Pencloe Wind Farm was conducted in 2015 (as referenced in **Technical Appendices 7.6** and **7.7**). This survey was repeated in 2020 to provide updated information and included a survey for freshwater pearl mussel (NDSFB, 2020). The addition of proposals for Pencloe ALAR gave rise to a further aquatic survey in 2021, incorporating watercourses that had not been captured by previous surveys that may be subject to inflow of drainage water from the proposed abnormal load access road (**Technical Appendix 7.6**). A full suite of aquatic surveys was then repeated during 2023 (in the same locations) to provide current information on the aquatic environment immediately prior to the commencement of construction of Pencloe Wind Farm (**Technical Appendix 7.7**). It should be noted that while each survey round incorporated an assessment of watercourses upstream (Glenhastel Burn), and immediately downstream of the Main Site (lower reaches of Connel and Carcow Burn), it did not include sample locations within the Main Site itself. However, baseline data included in **Technical Appendices7.6** and **7.7** provide a good indication of the fish and aquatic invertebrate populations in watercourses drained by the Main Site. It is also noted

[17] In 2021, an indicative layout incorporating four wind turbines was provided to SLR by the Applicant. In 2023, an indicative layout with five wind turbines was provided. As such, four static detector units were deployed during the 2021 active bat season, while five units were deployed during the 2023 active bat season.

that the survey data coverage was sufficient for the Pencloe ALAR application, which covers a similar area. The data are therefore considered sufficient to inform the assessment of potential effects on fish and invertebrate populations for the purpose of this chapter.

Survey Limitations

Habitat Survey

Land Access

7.4.25 Due to access limitations during the 2024 Site visit, it was not possible to map habitats within the 250 m buffer to the north-west of the Main Site. Despite this limitation, given that the Connel Burn provides a natural break in vegetative communities within the Main Site itself and edge of the survey buffer area and the distance between any proposed infrastructure and the Connel Burn, baseline data gathered are considered sufficient to inform the assessment in this chapter.

Survey Season

7.4.26 The 2024 habitat and vegetation survey was carried out early in the growing season, therefore some plants would not have been prominent in the sward until later in the season. during the second site visit in June, the surveyor revisited the main habitat areas and searched the more sensitive habitat types for indicator or significant species that may have been overlooked earlier in the season.

Peat Condition Assessment

7.4.27 The proposed site layout changed slightly following the peat condition surveys, therefore some of the detailed peat condition survey points no longer align precisely with the proposed site layout (see **Figure 7.1.4** in **Technical Appendix 7.1**). It is unlikely however, that results of the detailed peat condition survey would be different at any other location within the Site. Evidence for consistency of peat condition across the site is shown in the higher level peat condition survey that covered all peatland on Site, showing drained blanket bog across all peatland on Site (**Figure 7.1.4** in **Technical Appendix 7.1**), and in the detailed habitat surveys that describe the bog habitats in detail (**Technical Appendix 7.1**). The slight changes to the proposed site layout after the survey are therefore not considered to affect the conclusions of the peat condition assessment.

Protected Species Survey

Land Access

7.4.28 Due to access limitations and ongoing forestry operations in 2024, it was not possible to carry out a detailed protected mammal survey within parts of Pencloe Forest that intersect the 100 m survey buffer (extended to 200 m along watercourses) to the south-east and south-west of the Main Site. Instead, field notes on the likely suitability of woodland habitat for supporting species such as badger, red squirrel and pine marten were recorded. However, given that the

closest infrastructure associated with the Proposed Development (Turbine 5) would be located at least 200 m from the edge of the woodland, the risk of disturbance to any species that may utilise the forest is likely to be minimal, and therefore lack of access to this area is not considered a significant constraint to the study.

Weather Conditions

7.4.29 Climatic conditions within the two weeks prior to the 2024 update survey were rather unsettled with periods of heavy rainfall. It is therefore possible that field evidence relating to riparian mammals (such as spraints) may not have been as visible in comparison to surveys carried out after a period of drier weather. However, given the very wet spring and early summer of 2024 experienced in Scotland, the results are unlikely to have been significantly different for alternative survey dates. Furthermore, in combination with previous surveys in 2021 and for other nearby developments, it is considered that enough data has been obtained to provide an indication of the type and level of otter and water vole activity along watercourses within the survey area.

Field Evidence

7.4.30 An ecological survey provides only a "snapshot" of the conditions prevailing at the time of survey. Whilst it is considered unlikely that any significant evidence of protected or otherwise notable mammal species was overlooked during survey work, due to the nature of the subjects of ecological surveys it is feasible that species that use the survey area may not have been recorded by virtue of their seasonality, cryptic behaviour, habit or random chance. It is considered unlikely however, that additional surveys of the area would materially alter the conclusions of the baseline survey work. Pre-construction surveys for protected species are proposed (**Section 7.6**). These are intended to address any issues resulting from future changes in the distribution of protected species and provide detailed baseline data which can be used to inform the requirement for mitigation actions and support any future licence applications.

Bat Survey

7.4.31 With respect to bat survey work, a number of limitations were recognised (**Technical Appendices 7.4** and **7.5**). These relate to:

- Activity survey:
  - No bat passes were recorded at sample location L3 in the spring of 2021 and only one bat pass was recorded at sample location L4 in autumn of the same year. It was noted that the same microphone attachment was used in both instances. Although the lack of records may be genuine, it is also possible that lack of data at each location during these time periods may relate to a technical issue associated with microphone failure. In addition, no data were collected at static detector locations L1 and L5 during the 2023 summer survey period due to equipment malfunction. Whilst unfortunate, malfunctions are relatively common when using static detectors at such sites. Despite this limitation, it is considered that data

recorded from the other sample locations within the Main Site provides a suitable representation of bat activity during the affected survey periods.

- Weather station data:
  - Due to technical issues associated with weather station data collection, the data for the spring and summer survey periods of 2021 and 2023 could not be obtained through an on-Site weather station. Instead, data were obtained through via the 'Craigfad' observation site (2021) and 'Near Sanqhuar' observation site (2023) on the Met Office Weather Observation Website (WOW) (located 22 km and 18 km from the Site respectively). While the on-Site weather station would have provided a more accurate representation of climatic conditions experienced, the data provided serves as an indication of conditions experienced within the local area, allowing correlations between bat activity and weather to be inferred, where relevant.
- Assessment of relative bat activity levels:
  - As the Ecobat online tool has been shut down for essential maintenance for several months (and remains offline at the time of writing), it was not possible to generate results for bat activity levels within the Main Site relative to those in the surrounding area, and collision risk scores for high-risk bat species recorded during 2023. To mitigate for this, the 2023 results have been compared with data collected during surveys carried out in 2021, with the aim of determining whether bat activity levels recorded in 2023 were broadly similar to those recorded in 2021 and therefore whether the collision risk assessment provided in the 2021 bat survey report remains valid.

Impact Assessment Methodology

7.4.32 The CIEEM Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal (CIEEM, 2018) (henceforth referred to as the 'CIEEM guidelines') form the basis of the impact assessment presented in this Chapter. The CIEEM guidelines have been endorsed by NatureScot. It is noted that some aspects of the CIEEM approach to impact assessment differ from the general impact assessment methodology set out in **Chapter 4: Approach to EIA.** The methodology followed in this chapter is set out below.

Importance of Features

7.4.33 In accordance with the CIEEM guidelines, only ecological features which are considered to be important and may be affected by the Proposed Development have been subject to detailed assessment. Ecological features can be important for a variety of reasons and the rationale used to identify them is explained here. Importance may relate, for example, to the quality or extent of the habitats within the Main Site; habitat and/or species rarity; the extent to which such habitats and/or species are threatened throughout their range, or to the habitats' and/or species' rate of decline. It is not necessary to carry out detailed assessment of features that are sufficiently widespread, unthreatened and resilient to impacts from the Proposed Development and will remain viable and sustainable.

7.4.34 The importance of identified ecological features has been assessed to place their relative nature conservation value within a defined geographical context. For this assessment the following geographic frame of reference has been used:

- International;
- National (i.e. Scotland);
- Regional (i.e. south-west Scotland)
- County (i.e. East Ayrshire);
- Local (i.e. within circa (c.) 10 km); and
- Less than local.

7.4.35 For designated sites, their importance reflects the geographical context of the designation. For example, a SSSI would normally be considered nationally important.

7.4.36 The value of habitats has been measured against published selection criteria and other relevant data where available. Examples of relevant criteria include Annex 1 of the Habitats Directive, the SBL and the former ALBAP.

7.4.37 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. Reference has therefore been made to published lists and criteria where available. Examples of relevant lists and criteria include: species of European conservation importance (as listed on Schedule II and IV of the Habitats Regulations), species listed within the SBL and therefore considered to be of principal importance for biodiversity conservation in Scotland, and priority species listed within the former ALBAP.

7.4.38 In accordance with CIEEM guidelines, detailed assessment is only required for important ecological features. For the purposes of this assessment only ecological features of local importance or greater and/or subject to legal protection that are potentially subject to effects resulting from the Proposed Development have been subject to detailed assessment. Effects on other ecological features are considered unlikely to be significant in legal or policy terms and have therefore been excluded from the assessment process.

Assessing Impacts and the Significance of Effects

7.4.39 The ecological impact assessment process involves the following steps:

- Identifying and characterising potential impacts[18];
- Incorporating measures to avoid and mitigate (reduce) these impacts (embedded design measures and standard good practice methods);

[18] In accordance with the CIEEM guidelines, for the purposes of this assessment impact is defined as ‘Actions resulting in changes to an ecological feature’. For example, the loss of a section of watercourse due to construction of a watercourse crossing. Effect is defined as ‘Outcome to an ecological feature from an impact’. For example, the effects on an otter population from loss of a section of watercourse.

- Assessing the significance of effects, assuming that all embedded design and applied mitigation measures are implemented;
- Identifying additional mitigation measures to reduce likely significant effects (if required and where possible);
- Assessing the significance of likely significant residual effects, following the implementation of additional mitigation measures (where appropriate);
- Identifying appropriate compensation measures to offset significant residual effects (if required); and
- Identifying opportunities for ecological enhancement.

7.4.40 When describing impacts, consideration has been given to the following, as appropriate:

- Adverse or beneficial;
- Direct or indirect (direct impacts are changes that are directly attributable to a defined action, e.g. the physical loss of habitat during the construction process. Indirect ecological impacts are attributable to an action, but which affect ecological resources through effects on an intermediary ecosystem, process or feature, e.g. the creation of tracks which cause hydrological changes, which could lead to the drying out of wetland habitats);
- Magnitude (quantified wherever possible, e.g. area of habitat lost, number of potential roost features affected, etc);
- Duration (specifically whether impacts would be permanent or temporary, and if temporary over what period);
- Frequency and timing (how frequently ecological features may be affected and at what times of year, times of day, etc); and
- Reversibility (i.e. whether impacts may be reversible and over what timescales, e.g. re-establishment of habitats following temporary loss or disturbance).

7.4.41 The concept of ecological significance is addressed in the CIEEM guidelines. Significance is a concept related to the weight that should be attached to effects when decisions are made. For the purpose of ecological impact assessment, a ‘significant effect’ is an effect that either supports or undermines biodiversity conservation objectives for ‘important ecological features’ or for biodiversity in general. Conservation objectives may be specific (e.g. for a designated site) or broad (e.g. national/local nature conservation policy) or more wide-ranging (enhancement of biodiversity). Effects can be considered significant at a wide range of scales from international to local and the scale of significance of an effect may or may not be the same as the geographic context in which the feature is considered important.

7.4.42 Paragraphs 5.29 – 5.34 of the CIEEM guidelines cover how significant effects are determined. To summarise:

- For designated sites – effects may be significant if they are likely to undermine the conservation objectives of the site; or beneficially or adversely affect the conservation status of species or habitats for which the site is

designated; or may affect the condition of the site or its interest/qualifying features.

- For ecosystems – effects may be significant if the project is likely to result in a change in ecosystem structure and function. Consideration should be given as to whether any processes or key characteristics will be removed or changed, if there will be an effect on the nature, extent, structure and function of component habitats or if there is an effect on the average population size and viability of component species.
- For habitats and species – consideration of conservation status is important for evaluating the effects of impacts on individual habitats and species and assessing their significance. Conservation status is defined as follows:
    - Habitats – conservation status is determined by the sum of the influences acting on the habitat that may affect its extent, structure and functions, as well as its distribution and its typical species within a given geographical area.
    - Species – conservation status is determined by the sum of influences acting on the species concerned that may affect its abundance and distribution within a given geographical area.

Avoidance, Mitigation, Compensation and Enhancement

7.4.43 The purpose of avoidance, mitigation and compensation measures are to reduce the magnitude of project impacts. The aim of these measures is to reduce the project's adverse impacts such that there is no net loss of biodiversity as a result of the project. Within EcIA, mitigation measures should be described clearly and their likely success assessed. In Scotland, there is currently no requirement within EcIA to quantify losses and gains, e.g. using a metric. There is, however, a need for projects to provide significant biodiversity enhancements, in addition to any proposed mitigation (NPF4 Policy 3b).

7.4.44 When seeking mitigation or compensation solutions, efforts should be consistent with the geographical scale at which an effect is significant. For example, mitigation and compensation for effects on a species population significant at a regional scale should ensure no net loss of the population at a regional scale. The relative geographical scale at which the effect is significant will have a bearing on the required outcome which must be achieved.

7.4.45 A sequential process has been adopted to avoid, mitigate and compensate for ecological impacts, as recommended in the CIEEM guidelines. This is often referred to as the 'mitigation hierarchy'. The mitigation hierarchy sets out a sequential approach beginning with the avoidance of impacts where possible, the application of mitigation measures to minimise unavoidable impacts and then compensation for any remaining impacts. Once avoidance and mitigation measures have been applied residual effects are then identified along with any necessary compensation measures, and incorporation of opportunities for enhancement.

7.4.46 It is important for the EIA to clearly differentiate between avoidance, mitigation, compensation and enhancement, the terms of which area defined as follows:

- Avoidance is used where an impact has been avoided e.g. through changes in scheme design;
- Mitigation is used to refer to measures to reduce or remedy a specific adverse impact *in situ*, for example timing restrictions during construction to avoid key periods for certain species;
- Compensation describes measures taken to offset residual effects, i.e. where mitigation in situ is not possible, for example, creation of new habitats to compensate for habitats lost; and
- Enhancement is the provision of new benefits for biodiversity that are additional to those provided as part of mitigation or compensation measures, although they can be complementary.

Cumulative Effects Assessment

7.4.47 Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a particular location.

7.4.48 For (non-avian) ecological features potential cumulative impacts are only likely to be significant for other developments which:

- Are directly adjacent or very close to the Main Site and may affect the same habitats and species;
- Are located within the same hydrological sub-catchment(s) so may be affected by water-borne sedimentation or pollution events; or
- Are located within the regular range of more mobile species, e.g., bats and otter.

7.4.49 Other developments considered in the cumulative assessment were therefore restricted to other development projects within 2 km, or within the same hydrological sub-catchments and within 5 km, that could impact upon the areas immediately downstream of the watercourses that drain the Proposed Development, or within Core Sustenance Zones (CSZ)[19] of the most widely ranging bat species recorded at the Main Site (i.e., 8 km, based on a 4 km CSZ, which is because a roost located 4 km from the Main Site could also be affected by other developments located 4 km in the opposite direction from the roost). The cumulative assessment is based on consideration of residual effects, assuming that proposed mitigation and compensation measures for other projects are implemented.

7.4.50 The cumulative effects assessment includes other projects under construction; consented projects which are not yet under construction and projects for which planning applications have been submitted. Operational wind farm projects located within the relevant CSZ for bats have also been included as part of the cumulative assessment for bats only (operational wind farms are unlikely to result in

[19] A core sustenance zone, as applied to bats, refers to the area surrounding a communal bat roost within which habitat availability and quality will have a significant influence on the resilience and conservation status of the colony using the roost.

cumulative effects for other (non-avian) ecological features). Minor developments such as individual dwellings, extensions, driveways and forestry tracks are excluded from the cumulative assessment.

7.4.51 The significance of potential cumulative effects has been determined using the same method adopted in the assessment of effects for the Proposed Development considered on its own. Cumulative effects are therefore considered likely to be significant if they undermine conservation objectives for important ecological features. Cumulative effects can be considered significant at a wide range of scales from international to local. For example, a likely significant cumulative effect on a regional population of a species is likely to be of regional significance.

7.5 Baseline Conditions

7.5.1 A summary description of ecological features identified through desk and field-based baseline studies is provided below. For full details, please refer to **Technical Appendices 7.1 – 7.7**.

Statutory Designated Sites

7.5.2 There are no statutory sites designated for non-avian nature conservation purposes within the boundary of the Proposed Development or within a surrounding 2 km radius.

7.5.3 There is one statutory designated site notified for non-avian ecological features located within 10 km of the Main Site boundary[5], as detailed in **Table 7-6** and shown in **Figure 7.1**.

Table 7-6: Non-Avian Statutory Designated Nature Conservation Sites within 10 km

Site Name	Designation	Qualifying/ Notified Features	Approximate Distance and Direction from Site Boundary[5]
Muirkirk Uplands	SSSI	This site is notified for supporting blanket bog and a diverse upland habitat assemblage. It is also notified for a range of ornithological features and forms part of Muirkirk and North Lowther Uplands Special Protection Area (see **Chapter 8**)	7.1 km north-east

Non-statutory Designated Sites

7.5.4 A total of five non-statutory designated sites are present within 2 km of the Main Site boundary[5], details of which are displayed in **Table 7-7** and **Figure 7.1.**

Table 7-7: Non-Statutory Designated Sites within 2 km

Site Name	Designation	Description	Approximate Distance and Direction from Site Boundary[5]
Connel Burn/ Benty Cowan	LNCS	Acid and marshy grassland, blanket bog, species-rich ledges and numerous flushes. There is also a small, semi-natural valley woodland comprising ash *Fraxinus excelsior*, birch *Betula sp.* and alder *Alnus glutinosa* with diverse ground flora.	0 km – located within and immediately adjacent to the northwestern site boundary, which is defined by the Connel Burn.
Glen Afton	LNCS	The LNCS includes semi natural valley woodland, scrub and semi-improved grassland. Predominantly alder and birch with diverse shrub and ground layers.	Approximately 450 m north-east.
Afton Uplands	LNCS	An extensive upland site that encompasses a range of upland mire, montane heath and grassland habitats. Supports alpine clubmoss *Diphasiastrum alpinum* and juniper *Juniperus juniperus*. The montane sedge *Carex bigelowii* is also frequent over the summit of Craigbraeneoch and Blackcraig (East Ayrshire Council, 2016).	Approximately 1.5 km south-east.
Riggfoot/ Lanemark Bogside Wetland	LNCS	The site comprises a mosaic of improved, poor semi-improved and marshy grassland, with scattered broadleaved trees, scrub and waterbodies.	Approximately 1.9 km north-west.
Galloway and Southern Ayrshire Biosphere Reserve	Biosphere Reserve (a non-statutory area, which was designated in 2012 by UNESCO to promote and demonstrate a balanced relationship between people and nature)	The Galloway and Southern Ayrshire Biosphere Reserve covers more than 5,200 km^2 of south-west Scotland and includes iconic wildlife and natural habitats of which are recognised of being of international importance. Biosphere Reserves have three main functions: to promote conservation, learning / research and sustainable development.	0 km – overlaps the entire Site.

Ancient Woodland

7.5.5 Two stands of woodland listed within the Ancient Woodland Inventory[20] are located within 2 km of the Site. Both stands are located approximately 450 m north-east of the Main Site, adjacent to the Carcow Burn.

Habitats

7.5.6 Habitats within the Main Site are dominated by a mixture of modified bog (NVC community M20 *Eriophorum vaginatum* blanket mire), mostly in the south-west of the Site, and marshy grassland (a mix of NVC communities M25 *Molinia caerulea - Potentilla erecta* mire and M23 *Juncus effusus/acutiflorus* rush pasture) dominating sloping ground to the north and south the Site. Upland acid grassland (NVC communities U4 *Festuca ovina - Agrostis capillaris - Galium saxatile* grassland, U5 *Nardus stricta - Galium saxatile* grassland and U6 *Juncus squarrosus - Festuca ovina* grassland) is frequent along the hill tops. Patches of bracken (NVC U20 *Pteridium aquilinum - Galium saxatile* community), flushes (NVC M6 *Carex echinata - Sphagnum recurvum/auriculatum* mire) and small pockets of calcareous grassland (NVC CG10a *Festuca ovina - Agrostis capillaris - Thymus polytricus* grassland), are interspersed throughout.

7.5.7 In addition, several small watercourses drain the central ridge within the Main Site, which flow into the Carcow Burn or Connel Burn.

7.5.8 No invasive non-native species were identified during habitat surveys carried out in 2021 or 2024.

Groundwater Dependent Terrestrial Ecosystems

7.5.9 The results of the habitat and vegetation surveys also highlighted that the Main Site supports several vegetation communities considered to have potential to be GWDTEs (based on SEPA, 2017 guidance), as follows:

Moderate potential GWDTE

- U6 *Juncus squarrosus - Festuca ovina* grassland;
- M23 *Juncus effusus/acutiflorus - Galium palus*tre rush-pasture[21] and M25 *Molinia caerulea - Potentilla erecta* mire communities;
- MG9 *Holcus lanatus - Deschampsia cespitosa* grassland and MG10 *Holcus lanatus – Juncus effusus* rush pasture communities; and
- M15 *Scirpus cespitosus-Erica tetralix* wet heath.

[20] In Scotland, Ancient Woodland is defined as land that is currently wooded and has been continually wooded, at least since 1750. The Ancient Woodland Inventory is available to download here: Ancient Woodland Inventory - Natural Spaces - NatureScot (snh.gov.uk)

[21] The M23 *Juncus effusus/acutiflorus - Galium palustre* rush-pasture community was found in large expanses of habitat across the Main Site as a result of drainage and agricultural modification. Stands of M23 were therefore considered unlikely to be GWDTE and were downgraded from high potential groundwater dependency to moderate.

High Potential GWDTE

- CG10 *Festuca ovina - Agrostis capillaris - Thymus polytricus* grassland; and
- M6 *Carex echinata – Sphagnum fallax/denticulatum* mire.

7.5.10 Further detailed hydrogeological assessment has confirmed that all the NVC communities listed above are in fact fed by incident rainfall and surface water runoff as opposed to being groundwater dependent and GWDTE are therefore not considered further in this chapter. For further details, please refer to **Chapter 9: Geology, Hydrology, Hydrogeology and Soils.**

Notable Species

7.5.11 The nationally scarce plant hairy stonecrop *Sedum villosum* was previously identified on an access track during surveys carried out to inform the Ashmark Hill EIAR (SLR Consulting, 2018). This species was recorded again during surveys to inform the Pencloe ALAR EIA (SLR, 2021). This location in which this species was previously recorded was however situated outside the area in which infrastructure associated with the Proposed Development would be located. No evidence of hairy stonecrop was recorded during the 2024 update habitat walkover.

Peatland Condition Assessment

7.5.12 Peatland habitats within the Main Site were formed primarily of species-poor hare's-tail cottongrass *Eriophorum vaginatum* dominated vegetation, assigned to the NVC community M20 *Eriophorum vaginatum* blanket mire. The areas did not support the peat forming *Sphagnum* species listed in JNCC guidance (JNCC 1994). Instead, they contained a system of drainage ditches, with evidence of browsing by herbivores throughout. Using the criteria provided in the template from NatureScot (2023), all peatland habitats were assigned the result 'advise mitigation measures'. This result indicates the presence of low-quality peatland that does not meet the requirements for achieving potential national interest. While some areas of peatland were situated 'within a continuous unit of blanket bog >25 ha', the condition of such habitats did not meet JNCC criteria for extensive blanket bog, which should comprise 'patterned bogs with peat forming capability'. In addition, while all areas of peatland habitat passed the criterion for 'absence of invasion by woodland/scrub', this criterion alone was not sufficient for peatland habitats on Site to be considered 'good'.

7.5.13 All peatland habitats within the Main Site were classified as 'drained' under peatland assessment guidance set out by Peatland Action (Peatland Action, 2016).

Evaluation of Habitats and Vegetative Communities

7.5.14 Phase 1 habitat types and associated NVC communities present within the Main Site are summarised within **Table 7-8**. Maps illustrating the distribution of Phase 1 habitats and NVC communities are provided in **Figures 7.1.1 – 7.1.3** in **Technical Appendix 7.1**. Habitat types identified within the 250 m survey buffer (where

accessible) are excluded from **Table 7-8,** however are illustrated in **Figures 7.1.1** and **7.1.2** with descriptions for each provided in **Technical Appendix 7.1.**

7.5.15 **Table 7-8** also summarises the nature conservation status of each broad habitat type and associated NVC community and evaluates its importance in a geographical context.

Table 7-8: Phase 1 Habitats and Corresponding NVC Communities Recorded within the Site and Evaluation of their Importance

Phase 1 Habitat Type	NVC Community	Conservation Status	Evaluation and Justification
A1.1.1 Broadleaved semi-natural woodland (<0.01 ha)	W11 *Quercus petraea* – *Betula pubescens* – *Oxalis acetosella* woodland	SBL (Upland birchwood)	Local A stand of mature broadleaved semi-natural woodland supporting alder *Alnus glutinosa*, rowan *Sorbus aucuparia*, birch *Betula sp*., ash *Fraxinus excelsior*, willow Salix sp. and hawthorn *Crataegus monogyna*, is present within the north-western corner of the Site, a very small area of which encroaches into the Main Site itself. This habitat type is listed within the SBL and as such is of principal importance for biodiversity conservation in Scotland and has therefore been assessed as local importance despite its small size.
A1.2.2 Coniferous woodland – plantation (0.33 ha)	N/A	N/A	Less than local Stands of coniferous plantation, dominated by mature Sitka spruce *Picea sitchensis* were recorded within the east, south-east, south and south-west of the survey area. Coniferous plantation is generally considered to have limited ecological value owing to a dominance of non-native species and low botanical diversity.
B1.2 Acid grassland – semi-improved (50.45 ha)	U4a *Festuca ovina* – *Agrostis capillaris- Galium saxatile* grassland, Typical sub-community	N/A	Less than local Semi-improved acid grassland was recorded in patches throughout the Main Site, in association with shallower soils on hilltops and slopes, where grazing pressure was higher. It was also recorded as part of complex mosaics with the M23 and M25 marshy grassland communities. Species richness in the U4a and U4b stands was found to be low with limited conservation interest. A slightly more diverse sward was exhibited within the U4c sub-community, identified as two small pockets in mosaic with marshy grassland and other acid grassland communities in the north of the Site. However, as per other sub-communities, this area was also heavily grazed. The NVC community U4 generally has no priority or protection status (with the exception of some highly species rich stands, which, in some cases, may be conform to the Annex I habitat '6230 Species-rich *Nardus* grassland on siliceous substrates in mountain areas' - however this does not apply to habitats within the Main Site).
	U4b *Festuca ovina* – *Agrostis capillaris- Galium saxatile* grassland, *Holcus lanatus-Trifolium repens sub-community*		
	U4c *Festuca ovina* – *Agrostis capillaris- Galium saxatile* grassland, *Lathyrus montanus-Stachys betonica* sub-community		

Phase 1 Habitat Type	NVC Community	Conservation Status	Evaluation and Justification
	U5a *Nardus stricta* – *Galium saxatile* grassland, species poor sub-community	SBL (*Nardus stricta-Galium saxatile* grassland)	Less than local Species-rich stands of acid grassland dominated by mat-grass *Nardus stricta* (NVC community U5) and heath rush *Juncus squarrosus* (NVC community U6) have SBL priority habitat status. However, both acid grassland communities at the Main Site were found to comprise limited species diversity within the sward and do not support the characteristics required for priority status. These communities are therefore considered to support limited conservation interest and as such have been assessed as less than local importance.
	U5b *Nardus stricta* – *Galium saxatile* grassland, *Agrostis canina-Polytrichum commune* sub-community		
	U6a *Juncus squarrosus* – *Festuca ovina* grassland, *Sphagnum spp*. sub community	SBL (*Juncus squarrosus* – *Festuca ovina* grassland)	
	U6d *Juncus squarrosus* – *Festuca ovina* grassland, *Agrostis capillaris-Luzula multiflora* sub-community		
B3.2 Calcareous grassland – semi-improved (Area included as mosaic with B1.2)	CG10a *Festuca ovina-Agrostis capillaris-Thymus praecox* grassland, *Trifolium repens-Luzula campestris* sub-commnity	SBL (Upland calcareous grassland)	Local Small pockets of calcareous grassland habitat were recorded in mosaic with acid grassland. Calcareous grassland occurred in areas of steeply sloping ground, often associated with rock outcrops with thinner soils. The areas are grazed frequently, resulting in a sward short with more neutral grassland herbs and none of the rarer calcareous grassland species. Due to a lack of species diversity in the sward, the CG10 grassland community identified during the survey does not conform to the Annex I habitat '6230 Species-rich *Nardus* grassland on siliceous substrates in mountain areas.' However, given that this vegetation community supports a more diverse range of species in general, it has been assessed as Local importance.
B5 Marsh/ Marshy	M23a *Juncus effusus/acutiflorus-Galium palustre* rush-pasture,	N/A	Less than local

Phase 1 Habitat Type	NVC Community	Conservation Status	Evaluation and Justification
Grassland (242.54 ha)	*Juncus acutiflorus* sub-community		M23 rush pasture is common across damp agricultural grassland areas throughout Scotland, displaying variation in species diversity and conservation value. This community can support a wide array of species, however occurrences within the survey area were found to be dominated by sharp flowered rush *Juncus acutiflorus*, soft rush *Juncus effusus*, and purple moor grass *Molinea caerulea* with a low diversity of herb species (generally limited to lesser celandine *Ficaria verna*, buttercup species *Ranunculus sp*, thistle *Circium sp.* and common sorrel *Rumex acetosa.)* Due to the lack of species diversity exhibited within the survey area and therefore generally low botanical value, this community is not considered to correspond with the SBL priority habitat 'purple moor grass and rush pasture' or the Annex I habitat '6230 Species-rich *Nardus* grassland on siliceous substrates in mountain areas.' Instead, it serves as a representation of habitat that has developed though a history of land modification and drainage. On this basis the feature has been assessed as having less than local importance.
	M23b *Juncus effusus/acutiflorus-Galium palustre* rush-pasture, *Juncus effusus* sub-community		
	M25a *Molinia caerulea-Potentilla erecta* mire, *Erica tetralix* sub-community		Less than local Purple moor-grass dominated marshy grassland occurs throughout the survey area and was one of the most common communities recorded within the Main Site. Most areas are species-poor (M25a and M25b), with an overwhelming dominance of purple moor-grass and few other species in the sward, these areas do not meet the requirements for the SBL priority habitat 'purple moor grass and rush pasture'. Given the low species-richness and low protection of these habitats, they have been classified as 'less than local' importance.
	M25b *Molinia caerulea-Potentilla erecta* mire, *Anthoxanthum odoratum* sub-community		
	MG9a *Holcus lanatus-Deschampsia cespitosa* grassland, *Poa trivialis* sub-community	N/A	Less than local Small stands of MG9 habitat were identified across the Main Site, usually in mosaic with purple moor grass and rush pasture habitats. The habitat was characterised by the high dominance of tufted hairgrass *Deschampsia cespitosa* with a mix of rushes and damp loving herbs such as cuckooflower *Cardamine pratensis* and meadowsweet *Filipendula ulmaria* throughout, though in general species diversity was low.
	MG10a *Holcus lanatus-Juncus effusus rush pasture*, typical sub-community	N/A	Less than local An area of MG10a was recorded within an area of more intensively grazed pasture within the north of the Main Site, in mosaic with acid grassland. The stand was dominated by soft rush

Phase 1 Habitat Type	NVC Community	Conservation Status	Evaluation and Justification
			with Yorkshire fog *Holcus lanatus* and a mix of neutral herbs through the sward, with open patches of grazed semi-improved acid grassland. Given that there are only small stands of this community present within the survey area, with low species diversity and therefore low botanical value, this feature has been assessed as less than local value.
C1.1 Continuous bracken (2.27 ha) C1.2 Scattered bracken (0.34 ha)	U20 *Pteridium aquilinum-Galium saxatile* community	N/A	Less than local Stands of bracken *Pteridium aquilinum* were recorded on the sloping ground and within gullies on the Main Site. Bracken is a species poor, widespread and abundant habitat. The small stands present within the survey are considered to be of less than local value.
E1.7 Wet modified bog (38.73 ha)	M20a *Eriophorum vaginatum* blanket and raised mire, species poor sub-community M20b *Eriophorum vaginatum* blanket and raised mire, *Calluna vulgaris-Cladonia spp*. sub-community Transitional habitat: M20a *Eriophorum vaginatum* blanket and raised mire, species poor sub-community – M25a *Molinia caerulea-Potentilla erecta* mire, *Erica tetralix* sub-community	SBL (Blanket mire)	County The blanket bog within the Main Site has been categorised as wet or dry modified bog, with all areas showing signs of modification to some degree through drainage ditches dug throughout the area and sheep grazing. While blanket bog can qualify as a priority habitat under Annex I of the 'Habitats Directive', due to the heavily modified nature and the lack of peat forming *Sphagnum* species recorded on Site, the modified bog present is not considered to meet criteria as Annex I habitat or qualify as a peatland of national interest. In accordance with NatureScot (2023), while modified bog within the Main Site may not classify as an 'issue of national interest', it still classifies as 'priority peatland' for which the mitigation hierarchy outlined in NPF4 should be followed. As such, this habitat has been assessed as County level value.

Phase 1 Habitat Type	NVC Community	Conservation Status	Evaluation and Justification
	M25 *Molinia caerulea-Potentilla erecta* mire	SBL (Blanket mire)	Local Wet modified bog categorised as M25 purple moor-grass dominated communities are of no more than local importance. While there is some shallow peat still present in the substrate, the heavily modified nature, the poor species diversity and the lack of peat forming *Sphagnum* species recorded, these areas have little prospect for restoration.
E1.8 Dry modified bog (65.34 ha)	M20a *Eriophorum vaginatum* blanket and raised mire, species poor sub-community	SBL (Blanket mire)	County As per description for E1.7.
	M20b *Eriophorum vaginatum* blanket and raised mire, *Calluna vulgaris-Cladonia spp*. sub-community		
E2.1 Acid/ neutral flush (0.60 ha)	M6c *Carex echinata-Sphagnum fallax/auriculatum* mire, *Juncus effusus* sub-community	SBL (Upland flushes, fens and swamps)	Local Acid flushes were recorded as narrow, species-poor stands on sloping ground across the Main Site, often in mosaic with purple moor grass and rush pasture habitat. Given the priority status of these habitat communities, but noting their relatively small extent and species-poor status, they have been assessed as having Local importance.
	M6d *Carex echinata-Sphagnum fallax/auriculatum* mire, *Juncus acutiflorus* sub-community		
G2 Running water	N/A	SBL (Rivers)	Local A number of watercourses pass close to, or within, the Main Site, including: Connel Burn, with tributaries Polga Burn and Small Burn; and Carcow Burn, with associated tributary Auchincally Burn. Rivers are an SBL priority habitat and as such have been assessed as having Local value.

Protected and Notable Species

7.5.16 Details relating to protected and notable species identified to occur, or potentially occur, within the Site and surrounding area are summarised below.

Otter

Desk Study

7.5.17 The data search carried out by SWSEIC in July 2024 returned no otter records submitted within the last 15 years within 2 km of the Main Site.

7.5.18 Field surveys conducted to inform the EIAR for the adjacent Pencloe Wind Farm (Jacobs, 2015) recorded evidence of otter activity along Glenhastel Burn, Glanshalloch Burn, the head of the Sandy Syke tributary and head of the Lochingerroch Burn.

7.5.19 Evidence of otter were also identified along the Afton Water during surveys associated with Pencloe ALAR (SLR, 2021) and discharge of conditions for Pencloe Wind Farm (SLR 2022). This off-site watercourse was considered to offer suitable habitat for otter resting site creation, with ideal conditions for commuting and foraging.

Field Survey

7.5.20 While no field evidence indicating recent activity by otter was recorded within the 2021 survey area[22], the Carcow Burn was noted to be suitable for commuting and foraging purposes.

7.5.21 During the 2024 update survey, evidence of otter activity (spraints and resting sites) was identified along the Connel Burn and adjoining Small Burn. No confirmed evidence of otter activity was identified along the Carcow Burn, however one potential resting site was identified on the northern bank of the watercourse near the north-eastern boundary of the Main Site.

Water vole

Desk Study

7.5.22 The data search carried out by SWSEIC returned no records of water vole submitted within last 15 years within 2 km of the Main Site.

7.5.23 Data relating to water vole field signs recorded during field survey work to inform nearby development projects was very limited (i.e. very little evidence was obtained). An active water vole population was however recorded within the upper

[22] The 2021 Site boundary provided to SLR by the Applicant (and thus survey area for protected mammals) was considerably smaller in extent than the current proposed Site boundary. As such, the 2021 otter and water vole survey did not include the Connel Burn and incorporated only part of the Carcow Burn (See **Appendix 7.2**), whereas the 2024 update survey included both watercourses.

reaches of Sandy Syke and Glenhastel and Lochingerroch Burns during surveys associated with Pencloe Wind Farm (Jacobs, 2015).

Field Survey

7.5.24 No signs of water vole were recorded during either the 2021 or 2024 surveys and habitat suitability for water vole within the Main Site was generally considered to be low.

Badger

Desk Study

7.5.25 The data search carried out by SWSEIC returned no records of badger within 2 km of the Main Site, submitted within last 15 years.

7.5.26 No information relating to badger were identified through a review of historic field data gathered to inform nearby development projects.

Field Survey

7.5.27 No signs of badger were identified during the field surveys carried out in 2021 and 2024. The open upland landscape within the Main Site was generally considered to provide limited opportunities for sett creation and foraging.

7.5.28 Suitable badger habitat, in the form of coniferous plantation, was however identified immediately adjacent to the south and south-west of the Main Site boundary (Pencloe Forest).

Pine Marten

Desk Study

7.5.29 No records pertaining to pine marten, recorded within the last 15 years, were returned by SWSEIC. Evidence of pine marten (a single scat) was identified during field surveys to inform Pencloe Wind Farm Discharge of Conditions (SLR Consulting, 2022). The report concluded that pine marten should be considered present within Pencloe Forest, albeit in low numbers.

7.5.30 Evidence of pine marten (a single scat) was identified during field surveys to inform Pencloe Wind Farm Discharge of Conditions (SLR Consulting, 2022). The report concluded that pine marten should be considered present within Pencloe Forest, albeit in low numbers.

Field Survey

7.5.31 No evidence of pine marten was recorded during field surveys carried out in 2021 and 2024.

Red Squirrel

Desk Study

7.5.32 Desk study data returned from SWSEIC contained six records of red squirrel, recorded within the last 15 years, within 2 km of the Main Site.

7.5.33 No information relating to red squirrel field signs was obtained through a review of historic field data gathered to inform nearby development projects.

Field Survey

7.5.34 No evidence of red squirrel was recorded during field surveys carried out in 2021 or 2024. The Main Site itself is considered unsuitable for supporting red squirrel due to the abundance of open upland habitat and lack of woodland present.

Brown Hare *Lepus europaeus*

Desk Study

7.5.35 Desk study data returned from SWSEIC contained one of brown hare recorded within the last 15 years, within 2 km of the Main Site.

7.5.36 Incidental sightings of brown hare were recorded during field-based surveys conducted to inform the EIA for Ashmark Wind Farm (SLR, 2018) and Pencloe ALAR (SLR, 2021).

Field Survey

7.5.37 A single sighting of brown hare was recorded in an agricultural field associated with Ashmark Farm during the 2021 protected mammal survey. No sightings of brown hare were however recorded within the Main Site itself.

7.5.38 No field evidence pertaining to brown hare was recorded during the 2024 field survey.

Bats

Desk Study

7.5.39 Desk study data returned from SWSEIC contained records of at least eight species of bat within 2 km of the Main Site, including common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmeaus*, whiskered *Myotis mystacinus*, Natterer's *Myotis nattereri,* brown long-eared *Plecotus auritus*, Daubenton's *Myotis daubentonii*, Leisler's *Nyctalus leisleri* and noctule bat *Nyctalus noctula*.

7.5.40 Bat survey work conducted to inform environmental assessments for nearby development projects confirmed the presence of at least five species of bat utilising habitats surrounding the Main Site, including common and soprano pipistrelle, *Myotis* species, *Nyctalus* species and brown long-eared bat.

7.5.41 Emergence and re-entry surveys carried out to inform Enoch Hill II Wind Farm EIA (WSP, 2023) identified the presence of low numbers of roosting bats (common and soprano pipistrelle and *Myotis* species) at Monquhill Farmhouse, located approximately 180 m south-east of the Main Site boundary but over 250 m from the maximum area in which turbines could be located. A single *Myotis* echolocation file was also recorded during hibernation surveys conducted at the farmhouse in the winter of 2021/ 2022, thus indicating potential for the structure to be utilised as a hibernation roost.

Field Survey

Habitat Suitability Assessment

7.5.42 Based on broad habitat types present within the Main Site, commuting and foraging suitability for bats was generally considered to be low, with greatest opportunities focused around the northern and southern boundary of the Main Site (woodland edge habitat) and along the Carcow and Connel Burns.

7.5.43 As the Main Site is formed of exposed upland habitat with very little woodland cover, bat roost suitability within the Main Site itself is considered to be very low. Suitable and confirmed roosting resource is however present in the wider area.

Bat Activity Survey

7.5.44 Bat activity monitoring through application of static bat detectors at, or close to, proposed turbine locations identified at least six species of bats utilising the Main Site:

- Common pipistrelle;
- Soprano pipistrelle;
- *Pipistrellus* species;
- *Nyctalus* species (including noctule and Leisler's bat);
- *Myotis* species; and
- Brown long-eared bat.

7.5.45 Bat species and genera utilising the Main Site were found to be the same during both the 2021 and 2023 surveys. Bat activity levels in 2021 were found to be low to moderate, for all species, compared with reference range data using the online Ecobat tool. Overall, recorded levels of bat activity recorded were broadly similar in 2023 to those recorded in 2021.

Reptiles

Desk Study

7.5.46 No data pertaining to reptile species, recorded within the last 15 years, were returned by SWSEIC.

7.5.47 One incidental common lizard sighting was recorded during field surveys to inform the EIA for Enoch Hill II Wind Farm (WSP, 2023). No further reptile records were made during surveys to inform nearby development projects.

Field Survey

7.5.48 No field signs pertaining to reptiles were recorded incidentally during other surveys carried out in 2021.

7.5.49 During the 2024 field survey, two common lizard observations were recorded incidentally within modified bog habitat, in the south-east of the survey area.

Fish and Aquatic Invertebrates

Desk Study

7.5.50 No data pertaining to freshwater fish or aquatic invertebrates, recorded within the last 15 years, were returned by SWSEIC in July 2024.

7.5.51 Field surveys relating to freshwater fish and aquatic invertebrates were carried out by NDFSB in years 2015, 2020, 2021 and 2023. For the purpose of this assessment, the two most recent survey reports (2021 and 2023) have been summarised below.

2021

7.5.52 Aquatic surveys to inform the EIA for Pencloe ALAR were carried out in 2021 (SLR, 2021). The survey incorporated seven sample locations, which were sited along the Laglaff Burn, Connel Burn and Afton Water.

7.5.53 Despite the severe drought experienced during summer 2021, salmonids were recorded in all watercourses surveyed within the Main Site.

7.5.54 No evidence for freshwater pearl mussel (*Margaritafera margaritafera*) were identified during surveys completed during 2021.

7.5.55 Invertebrate surveys identified healthy populations of aquatic invertebrates present at all seven sites surveyed, with results indicating excellent water quality.

2023

7.5.56 A full suite of aquatic surveys (excluding freshwater pearl mussel as this species were considered absent in 2021) were also carried out in 2023 to provide current information on the aquatic environment immediately prior to construction of Pencloe Wind Farm (NDSFB, 2023). A total of 19 sites were surveyed for fish and 15 for aquatic invertebrates. It was noted that three sample sites (Lochingerroch Burn, Glenhastel Burn, and a tributary of the Carcow Burn) contained no fish.

7.5.57 Within the Carcow Burn itself, densities of salmon fry were classified as ‘absent’ or ‘very poor’, while ‘very poor’ to ‘excellent’ densities of trout parr and fry were recorded.

7.5.58 Three sample locations positioned on the lower reaches of the Connel Burn identified varying densities of trout fry and parr, ranging from ‘good’ (upstream of the confluence with Langlaff Burn) to ‘poor’ (upstream of culvert above Knockshinnoch).

7.5.59 The density and composition of aquatic invertebrate communities were found to be comparable to previous years. Of the 15 sites surveyed for aquatic invertebrates, 13 received a score of ‘good’ or ‘high’ ecological status, while the remaining two sites received a score of ‘moderate’ ecological status.

7.5.60 Overall, fish and invertebrate population data collected during 2023 were generally comparable to those gathered during previous years’ monitoring.

Field Survey

7.5.61 Field survey work relating to fish has not been carried specifically for the Proposed Development. Instead, data gathered to inform the EIAR for Pencloe ALAR and discharge of planning conditions associated with Pencloe Wind Farm have been used to inform this chapter (see Desk Study section above).

Evaluation of Protected and Notable Species

7.5.62 An evaluation of non-avian protected and notable species, which are known to be present, or considered likely to be present within the Main Site, is provided in **Table 7-9.**

Table 7-9: Protected and Notable Species Evaluation

Feature	Legal/Conservation Status	Evaluation and Justification
Otter	HabRegs2; SBL	Local Otter is a European Protected Species and is listed within the SBL as a species of principal importance for biodiversity conservation in Scotland. With such protection, the otter has become widespread locally and nationally, with the Scottish population current estimated to be around 8,000 (NatureScot, 2020b). Results of the baseline surveys indicate that otter utilise the two main watercourses within the Main Site (Connel Burn and Carcow Burn) for foraging and commuting, with suitable habitat for resting located within the lower reaches of watercourses within the survey area. Given field evidence indicating species presence on Site, coupled with the widespread availability of suitable connected habitat within the surrounding landscape (e.g. Afton Water), the otter population at the Site has been assessed as local value.
Brown hare	SBL	Less than local Brown hare declined in number during much of 20th century, mainly due to changes in farming practice. The current trend is less clear, however the population appears to have stabilised (NatureScot 2020a). An incidental sighting of brown hare was recorded within an agricultural field within Ashmark Farm during the 2021 field survey. No sightings were however recorded within the Main Site itself during 2021 or 2024. As this species is generally associated with agricultural areas (mixed crops, hedgerows, strips of woodland or set-aside land), the dominance of marshy grassland and modified bog within the Main Site would be considered largely unsuitable for this species. Given the lack of suitable habitat for brown hare within the Main Site, and widespread availability of agricultural habitat within the wider area, this feature is assessed as having less than local importance.
Bats (Commuting and foraging)	HabRegs2; SBL	Local Bats are a European Protected Species (EPS). They receive legal protection under The Habitats Regulations and several species are also listed within the SBL as species of principal importance for biodiversity conservation in Scotland. Bat activity data obtained during 2021 and 2023 indicates that the Main Site is utilised for commuting (and likely foraging) purposes by at least six species of bat. The Site is therefore considered to be of local importance for commuting and foraging bats.

Feature	Legal/Conservation Status	Evaluation and Justification
Bats (Roosting)		Local The Main Site comprises open upland habitat with very few trees and no built structures with suitability for supporting roosting bats. Coniferous woodland surrounds the southern peripheries of the Main Site and roost suitability within this habitat is low. However, a confirmed roost, supporting low numbers of *Pipistrellus* and *Myoti*s species, exists within Monquhill Farmhouse (located approximately 180 m southeast of the Main Site boundary) and this feature has been assessed as having Local importance.
Reptiles (common lizard, adder, slow worm)	WCA, SBL	Local Much of the Main Site contains suitable habitat for common lizard. These habitats (heathland, mire and grassland) are generally widespread and relatively common in the surrounding area. Common lizard is described as being widespread throughout Scotland, with the exception of the Central Lowlands and the Northern Isles (NatureScot 2020e). Given the known presence of common lizard within the Site, coupled with the size of the Site, but given the abundance of suitable habitat in the surrounding area, this feature has been assessed as local importance. Although not recorded, it is also possible that adder occur within the Main Site, due to the presence of suitable habitat such as heathland and mire. Adder is described as being widespread across the Scottish mainland. Given the widespread nature of this speci.es, and the abundance of suitable habitat in the surrounding area, any adder population is not likely to be of higher than local value, should it be present. Similarly, it is also possible for slow-worm to occur within the Main Site, given the presence of suitable woodland edge habitat. Slow worm is described as quite common across Scotland. Given its status, and the availability of connected suitable habitat in the wider area, any slow worm population is also not likely to be of higher than local value, should it be present.
Fish (Atlantic salmon and brown trout) and aquatic invertebrates[23]	Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act (SFFA), 2003; SBL	Local Areas of suitable spawning habitat have been identified within watercourses that form the Main Site boundaries (i.e. the lower reaches of Connel and Carcow Burns). Both Atlantic salmon and brown trout have been recorded within the Carcow Burn, with brown trout also recorded in Connel Burn. Both species

[23] For the purposes of assessment, fish and aquatic invertebrates have been grouped together. Reasoning for this lies with the fact that both features were surveyed at the same time, the impact pathways for each feature are the same, and results of the survey are reported together in **Appendices 7.6** and **7.7**.

Feature	Legal/Conservation Status	Evaluation and Justification
		have also been recorded further downstream within Afton Water. Both salmon and trout are defined as species of principal importance for biodiversity conservation within the SBL and as such, the Site is considered to support a locally important population of salmonid fish species. Results of aquatic invertebrate surveys carried out in conjunction with electrofishing surveys during 2021 and 2023 identified healthy populations of invertebrates at almost all sites surveyed, resulting in 'good' ecological status for almost all sample sites. As such, the Site is considered to support a locally important population of aquatic invertebrates.
Terrestrial invertebrates	SBL (some species)	Less than local The Main Site is unlikely to support legally protected terrestrial invertebrate species based on the habitats present and the known range of such species. However, the range of habitats present (open heath, bog and marshy grassland habitat) has potential to support a variety of other invertebrate species, potentially including some notable species. Given the habitats have been modified by drainage and relatively high levels of grazing (see **Table 7.8**) and the presence of extensive similar habitats within the wider area, the Site is considered unlikely to support important populations and has been assessed as having less than local importance for terrestrial invertebrates.
HabRegs2 – The Conservation (Natural Habitats c.) Regulations 1994 (Schedule 2); **SBL** – Scottish Biodiversity List, defining species of principal importance for biodiversity conservation; **WCA** – Wildlife and Countryside Act 1981(as amended in Scotland)		

Future Baseline

7.5.63 As part of the assessment of ecological effects, it is important to assess the likely environmental conditions that would exist in the absence of the Proposed Development. This is known as the 'do nothing' future scenario. Establishing a 'do nothing' scenario requires identifying the process of change (e.g. natural processes or future land management) that may influence the character of the Site and its surrounds, in turn allowing differentiation from those changes that may occur as a result of the Proposed Development.

Other Developments

7.5.64 In the absence of the Proposed Development, changes to the ecological baseline are expected from construction of the consented Pencloe ALAR and associated borrow pits. The consented route measures approximately 5.4 km in length, utilising an existing farm track to a sheepfold at Ashmark Hill, before intersecting the Main Site and traversing across Corby Knowes, Lamb Hill, Ewe Hill then leading downslope towards Carcow Burn before joining Pencloe Forest. The EIAR for the ALAR predicted the loss of approximately 0.30 ha of wet modified bog, 1.21 ha of dry modified bog, 0.27 ha of unimproved acid grassland, 0.5 ha of semi-improved acid grassland, 0.04 ha of neutral grassland and 1.5 ha of marshy grassland within the Main Site through construction of the access track and borrow pit excavation.

7.5.65 Construction of the Pencloe ALAR began in June 2024, following completion of baseline habitat and vegetation surveys for the Proposed Development. As such, the baseline conditions and associated area measurements for broad habitat types recorded within the Main Site (and reported within **Section 7.5)**, are already likely to have altered. This doesn't affect the assessment, however, and the predicted habitat loss associated with construction of Pencloe ALAR (and associated borrow pits), has been accounted for within the habitat loss calculations for the Proposed Development, as detailed in **Section 7.7** of this assessment.

7.5.66 Three other wind farm developments are located immediately adjacent to the Main Site. At the time of writing, two of these (Pencloe and Enoch Hill) are in the construction phase of development, while the other is in planning (Enoch Hill II). Potential effects on the baseline due to these other developments are considered within the cumulative assessment in **Section 7.8**.

Natural Variation

7.5.67 In the absence of the Proposed Development, natural variation in the ecological baseline may also occur as a result of climate change, changes in land use policy or management practices (such as grazing intensity) or simply natural variation. However, in the absence of any detailed, quantifiable information, in respect of natural variation it has been assumed that the baseline conditions will remain largely as they are for the purpose of the assessment.

7.5.68 To allow for possible changes in the distribution of protected species, pre-construction surveys for protected mammal species would be undertaken to ensure legislative compliance during construction, as detailed in **Section 7.6**.

Summary of Important Ecological Features

7.5.69 Important ecological features (i.e. those with a value of local level or above) identified through baseline information, which have been scoped in for further assessment include:

- Connel Burn/ Benty Cowan LNCS;
- Wet modified bog;
- Dry modified bog;
- Flush acid/neutral;
- Running water;
- Otter;
- Bats (commuting and foraging);
- Bats (roosting);
- Reptiles; and
- Fish and aquatic invertebrates.

Ecological Features Scoped Out of Further Assessment

7.5.70 Following review of baseline ecological data collected through desk and field-based studies, the ecological features listed in **Table 7-10** have been excluded from further assessment for at least one of the following reasons:

- The feature has been assessed as likely absent from the Main Site.
- The feature is not considered 'important' at a local level or above;
- The feature is to remain unaffected as a result of the Proposed Development.

Table 7-10: Ecological Features Scoped Out of Assessment

Ecological Feature	Justification for Scoping Out of Assessment
Statutory Designated Sites	
Muirkirk Uplands SSSI	Muirkirk Uplands SSSI is a site of national importance for biodiversity conservation, located approximately 7.1 km north-east of the Main Site boundary. However, due to the distance between the SSSI and the Main Site boundary, it is considered that there is no direct habitat connectivity between the two locations. Potential effects on this site have therefore been scoped out of further assessment.
Non-statutory Designated Sites	
Glen Afton LNCS	This site is located approximately 450 m north-east of the Main Site boundary. The woodland itself is not connected to the Main Site directly and

Ecological Feature	Justification for Scoping Out of Assessment
	therefore considered to be at a distance for which potential effects on notable features are considered unlikely.
Afton Uplands LNCS	This site is located approximately 1.5 km south-east of the Main Site boundary and has been assigned as a LNCS due to the range of upland mire, heath and grassland habitat it supports. Given the distance between the LNCS and Main Site boundary, it is considered that there is no direct habitat connectivity between the two locations. Potential effects on this site have therefore been scoped out of further assessment.
Riggfoot/ Lanemark Bogside Wetland LNCS	The site is located aproximately 1.9 km north-west of the Main Site boundary and has been assigned as a LNCS due to the mosaic of improved and poor semi-improved grassland, marshy grassland, woodland, scrub and waterbodies it supports. Given the distance between the LNCS and Main Site boundary, it is considered that there is no direct habitat connectivity between the two locations. Potential effects on this site have therefore been scoped out of further assessment.
Galloway and Southern Ayrshire Biosphere Reserve	The Proposed Development would not clash with the main functions of the Biosphere Reserve and would instead contribute positively towards functions involving nature conservation, sustainable development and economic and community development. As such, this feature has been scoped out of further assessment.
Other Sites of Importance for Nature Conservation	
Ancient woodland	Two stands of ancient woodland[24] are located approximately 500 m north-east (downgradient) of the Main Site boundary, adjacent to the Carcow Burn. While scattered trees are present between the area defined as ancient woodland and the Site boundary, there is no direct habitat connectivity and the distance from the Site boundary exceeds that at which impacts and effects could potentially be experienced. This feature has therefore been scoped out of further assessment.
Habitats	
Broadleaved semi-natural woodland	A stand of mature, native semi-natural broadleaved woodland is present near the south-western corner of the Main Site. While this habitat has been classified as local importance for nature conservation, there is no direct connectivity between the woodland and proposed infrastructure. Given that there will be no land take of broadleaved woodland during construction or operation of the proposed development, this feature has been scoped out of further assessment.
Coniferous woodland	Stands of coniferous plantation are present immediately south-east, south and south-west of the Main Site boundary. While coniferous plantation is generally considered to have limited ecological value, it can support a range of protected species, such as red squirrel *Sciurus vulgaris*, pine marten *Martes martes*, and badger *Meles meles.* However, given that no loss of coniferous plantation is planned as part of the Proposed Development, this feature has been scoped out of further assessment.

[24] In Scotland, ancient woodland is defined as land that is currently wooded and has been continually wooded, at least since 1750. The Ancient Woodland Inventory is available online here: https://map.environment.gov.scot/sewebmap/

Ecological Feature	Justification for Scoping Out of Assessment
Acid grassland (U4a, b, and c; U5a and b; U6a and d)	Acid grassland habitats within the Main Site were found to be heavily grazed with fairly limited species diversity in the sward, thus representing habitats of limited ecological value. The Proposed Development would not result in any land take associated with acid grassland communities. Given this habitat type has been assessed as less than local value and will remain unaffected by the Proposed Development, acid grassland has been scoped out of further assessment.
B3.2 Calcareous grassland	Calcareous grassland (NVC community CG10 – recorded in mosaic with acid grassland community U5b) – is located approximately 60 m from the nearest proposed infrastructure (proposed temporary construction compound) and therefore will not be impacted by the Proposed Development. There is no direct hydrogeological connection between this vegetation community and working areas associated proposed infrastructure. This vegetation community is also located outwith the habitat management area proposed within the oHMP and therefore not subject to further modification (**Technical Appendix 7.8**). In light of reasoning above, this vegetation community has therefore not been taken forward for further assessment.
Bracken (U20)	Small, scattered stands of bracken were recorded adjacent to Carcow and Connel Burn, and as pockets at slightly higher elevations south-eastern facing slopes within the Main Site. As the nature conservation value of bracken is limited, and stands that are present will remain unaffected by the Proposed Development, this habitat has been scoped out of further assessment.
Marsh/marshy grassland (M23a, b; M25a, b; MG9a; MG10a)	Due to the lack of species diversity exhibited within the survey area and therefore generally low botanical value, this community is not considered to correspond with the SBL priority habitat 'purple moor grass and rush pasture' or the Annex I habitat '6230 Species-rich *Nardus* grassland on siliceous substrates in mountain areas'. Instead, it serves as a representation of habitat that has developed though a history of land modification and drainage. On this basis the feature has been assessed as lees than local importance and has not been taken forward for further assessment.
Notable Plants	
Hairy Stonecrop	This nationally scarce plant was previously identified on an access track during surveys carried out to inform Ashmark Hill EIAR (SLR Consulting, 2018) and Pencloe ALAR EIAR (SLR, 2021). However, no evidence of hairy stonecrop was recorded during the 2024 update habitat walkover. Given the unconfirmed presence of this species during the 2024 habitat survey, and that its historic location is approximately 98 m from the closest proposed infrastructure (so will not be affected by the Proposed Development), this plant species has not been taken forward for further assessment.
Invasive non-native species (INNS)	No evidence of INNS was identified during the 2021 or 2024 field surveys. As such, INNS have been scoped out of further assessment.
Protected and notable species	
Badger	Badgers and their setts are afforded legal protection under the Protection of Badgers Act 1992 (as amended). However, no signs of badger were identified on Site during field surveys in 2021 and 2024. While coniferous woodland habitat surrounding the south-east, south and south-west boundary of the Site is considered suitable for supporting badger foraging, commuting and sett creation, the open upland landscape within the Main Site itself is generally

Ecological Feature	Justification for Scoping Out of Assessment
	considered to provide limited opportunities for sett creation and foraging. As such badger has been scoped out of further assessment.
Red Squirrel	While the 2024 desk study returned six records of red squirrel within 2 km of the Main Site in the last 15 years (2010 – 2024), no evidence of red squirrel was recorded within the Main Site during field-based surveys in 2021 and 2024. While coniferous woodland habitat surrounding the south-east, south and south-west boundary of the Main Site is considered suitable for supporting foraging and drey creation, the Proposed Development has been designed to avoid any loss of this woodland. In addition, the Main Site itself is generally considered to provide very limited habitat opportunity for red squirrel. As such red squirrel has been scoped out of further assessment.
Pine marten	No records of pine marten were returned from the 2024 desk study and no evidence of pine marten were recorded within the Main Site during field-based surveys in 2021 and 2024. While coniferous woodland habitat surrounding the south-east, south and south-west boundary of the Main Site is considered suitable for supporting foraging, commuting and den creation, the open upland landscape within the Main Site itself is generally considered to provide very little opportunity for such activities. As such pine marten has been scoped out of further assessment.
Water vole	No signs of water vole were recorded during field surveys and habitat suitability for water vole within the Main Site was generally considered to be low. Given the lack of desk and field-based evidence obtained, water vole is considered likely absent from the Main Site and has therefore been scoped out of further assessment.
Brown hare	Given the lack of suitable habitat within the Main Site itself, the highly mobile nature of brown hare, and the area of land take being small in comparison with the extensive availability of similar habitats in the wider area, significant adverse effects on such species are considered unlikely. As such, this species has been scoped out of further assessment.
Terrestrial Invertebrates	Due to the area of land take being small in comparison with the availability of similar habitats in the wider area, significant adverse effects on invertebrate species are not considered likely. As such, this feature was assigned as less than local and has been scoped out of further assessment.

7.5.71 While the ecological features listed above have been scoped out of further assessment, steps to further avoid and mitigate any potential effects on such features, and conforming with industry best practice, are detailed within **Section 7.6.**

7.6 Environmental Design and Impact Avoidance Measures

7.6.1 This section sets out measures by which adverse effects on important (non-avian) ecological features are controlled by embedded design measures, or by standard practice methods secured through the section 36 process. The assessment of effects set out in **Section 7.7** assumes that these measures will all be implemented.

Embedded Mitigation

7.6.2 The Proposed Development has been designed, as far as possible, to avoid and minimise impacts and effects to important ecological features through the process of design development, and by embedding mitigation measures into the design. Further details are provided in **Chapter 3: Site Selection and Design Evolution** and a summary of embedded mitigation relevant to this chapter is provided below.

- Site infrastructure has been designed, as far as reasonably practical, to reduce land take. This has been achieved by planning the layout of infrastructure around use of the ALAR for the adjacent consented Pencloe Wind Farm. Utilising the ALAR thereby reduces the requirement for construction of further extensive access track networks within the Site, in turn minimising habitat disturbance, fragmentation and / or loss.
- The Proposed Development has been designed to extend one of the borrow pits (Borrow Pit A) consented under the planning application for construction of Pencloe ALAR (Ashmark Hill). The second consented borrow pit (Borrow Pit B) for construction of the ALAR (Lamb Hill), will be utilised for the positioning and construction of T1, thereby minimising the requirement for additional land take and potential for habitat loss and/or fragmentation.
- Construction of a substation within the Site is not required. Instead, the Proposed Development has been designed to connect into the substation at the adjacent consented Pencloe Wind Farm. This in turn minimises the area of land take within the Site and potential for habitat loss and/or fragmentation.
- The layout of proposed infrastructure locations has been informed by baseline Phase 1 habitat, NVC, and peatland condition assessment data (**Technical Appendix 7.1**). Important habitats, specifically those on peat, such as modified bog, have been avoided as far as practicably possible. In areas where it has not been possible to avoid modified bog habitat, infrastructure has been designed to avoid areas of deeper peat as far as possible.
- The Proposed Development has been designed to avoid all watercourses within the Site, thereby precluding the requirement for watercourse crossing points and minimising the risk of environmental impacts such as pollution/siltation events and avoiding aquatic habitat loss and/or fragmentation.
- To accord with current guidance relating to bats and wind turbine developments (NatureScot *et al*., 2021) the Proposed Development has been designed so that turbine blades would be situated at least 50 m from the nearest woodland or other key habitat features that may be utilised by commuting and foraging bats (such as wetlands), in turn reducing the risk of collision. Site-specific stand-off distances were estimated using the following formula:

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

(Where b= buffer distance; bl = blade length; hh = hub height; fh = feature height, in metres)

- Based on a blade length of 67 m, turbine hub height of 83 m and estimated feature heights of 20 m (woodland edge habitat) and 0 m (wetlands, e.g. watercourses) respectively, the minimum required stand-off distance from turbine base to habitat features is 98.59 m for woodland and 83 m for

watercourses. All turbines are therefore sited at least 99 m from woodland edge habitat and 83 m from mapped watercourses to ensure the minimum stand-off distance between infrastructure and features that may be used by commuting and foraging bats is maintained.

Standard Mitigation Measures

Good Practice Measures

- Full details of construction mitigation measures would be provided in a Construction Environmental Management Plan (CEMP). An outline CEMP is included as **Technical Appendix 2.3** and a Peat Management Plan (PMP) is included as **Technical Appendix 9.2**.
- Good practice measures in relation to pollution risk and sediment management to be adopted during the construction and operation phases are set out in **Chapter 9: Geology, Hydrology, Hydrogeology, and Soils.**
- Micro-siting of project elements will be used to avoid important ecological features, where possible, as set out in **Section 2.3** of **Chapter 2: Description of the Proposed Development**.
- Good practice measures to protect retained habitats from dust deposition would be contained within the CEMP.
- Good practice measures relating to biosecurity, to minimise the risk of inadvertent spread of INNS, would be contained within the CEMP.
- During the construction phase, good practice techniques with respect to peatland environments, including the handling and storage of peat, as contained within NatureScot (2024), would be implemented. Good construction practice and methodologies to prevent peat instability within areas that contain peat deposits would be implemented as detailed in **Chapter 9: Geology, Hydrology, Hydrogeology, and Soils** and **Technical Appendix 9.1: Peat Landslide Hazard Risk Assessment**.
- Good practice vegetation and habitat reinstatement techniques would be adopted and implemented on areas subject to disturbance during construction as soon as is practicable. This would include taking care to separate excavated materials (turves, topsoil, soils and peat layers) and store appropriately. Reinstatement would ensure that turves are replaced on the surface, with surface vegetation facing upwards. Following completion of construction, all equipment and other temporary infrastructure would be removed from Site and any temporary storage areas would be reinstated.

Pre-Construction Surveys

7.6.3 Due to the time that would have elapsed since the last surveys and commencement of construction, the possibility that protected mammal species activity could have altered in the intervening period, and to align with the scoping response provided by NatureScot, a pre-construction protected species survey (incorporating a search for otter, water vole, badger, red squirrel, and pine marten) would be carried out no more than three months prior to commencement of works, or during the last available season for species which can only be surveyed at certain times of year (e.g. water vole). This would cover all suitable habitat within 250 m of proposed infrastructure and working corridors. The results of the pre-

construction surveys would inform the need for further mitigation in respect of working practices, where required or further consultation with NatureScot.

Environmental Clerk of Works

7.6.4 A suitably qualified Environmental Clerk of Works (EnvCoW) would be employed for the duration of the construction and reinstatement periods, although it may not be a full-time role throughout, to ensure ecological interests are safeguarded. The role of the EnvCoW would include (but not be limited to) the following tasks:

- provide toolbox talks to all staff on-site to inform staff of ecological sensitivities on Site, best practice working methods, and the legal implications of not complying with such working practices;
- agree and monitor measures designed to minimise damage to retained habitats, including marking out sensitive habitats and/or vegetation, where appropriate;
- demarcate suitable works exclusion zones around any resting sites used by protected species;
- undertake pre-construction surveys and advise on ecological issues, where required; and
- carry out pre-construction inspections of areas which require species-specific mitigation and supervision of relevant mitigation measures, including supervision during habitat clearance for reptiles, as detailed within Species Protection Plans (SPPs).

7.6.5 The EnvCoW would also pursue additional roles such as assisting with hydrological measures and checking for nesting birds (see **Chapter 8: Ornithology** and **Chapter 9: Geology, Hydrology, Hydrogeology and Soils**).

Lighting

7.6.6 Temporary construction lighting would be restricted to the minimum required for safety reasons, which would be required for any external construction activities during hours of darkness and low natural light. This lighting would be designed to minimise illumination, glare or light spillage to nearby ecological features (e.g. woodland edge habitat or watercourses potentially utilised by commuting and foraging bats). Construction lighting details would be provided in the CEMP.

7.6.7 Any lighting required in areas of likely bat activity, would be established in line with current guidance (ILP, 2023).

Standard Mitigation Measures for Protected Species

7.6.8 Species Protection Plans (SPP) would be prepared for relevant faunal groups to ensure compliance with legislation. These would include details of pre-construction surveys to check for the presence/ potential presence of protected species and the requirement for incorporation of appropriate works exclusion zones around confirmed resting sites (noting that no such resting sites are expected to be affected based on current survey data). Where works may be

required within such exclusion zones, a licence would be required from NatureScot prior to further commencement.

7.6.9 As part of the SPPs, the contractor would keep a log of incidental sightings and road kills, which would be reported to the EnvCoW to advise on appropriate action, as required. SPPs would form part of the final CEMP and protected species licence applications (if required). Further details are provided below.

Otter

7.6.10 The following best practice measures would be applied to reduce disturbance to otter during construction and operation of the Proposed Development:

- During construction, site speed limits of 15 mph would reduce the likelihood of accidental injury / killing of otter or other mammal species by construction traffic. A site speed limit of 15 mph would also be in place during operation.
- Where works near watercourses are required, these would adhere to measures outlined within the CEMP to reduce the risk of pollution, siltation or erosion.
- During construction, all excavations greater than 1 m depth would either be covered at night or designed to include a ramp to allow otters and other animals a means of escape should they fall in.
- All potentially dangerous substances or materials within construction compounds, or used during maintenance activities during operation, would be carefully stored to prevent harm to otters or other mammal species which may enter compounds at night.
- In the unlikely event that an otter or its resting site should be encountered during construction, all works within 30 m would pause until the ECoW is contacted, who would advise on how to proceed.

Reptiles

7.6.11 In order to comply with the Wildlife and Countryside Act 1981 (as amended in Scotland), mitigation would be employed to reduce the chances of inadvertently killing or injuring individual reptiles during construction works. Given the low numbers of reptiles likely to be present, the large areas of suitable habitat that would remain unaffected by the works, and the large spatial scale of the works, fencing and translocation are not considered appropriate. The following mitigation measures would however be applied during construction to reduce the risk of reptile killing or injury:

- A suitably qualified EnvCoW would maintain presence on Site during the construction period, including vegetation clearance and soil excavation stages, to provide an advisory role with regard to reptiles.
- As advised by the EnvCoW, and where practically possible, cutting of vegetation (by strimming or flailing) to a height of 10 cm will be conducted in all areas of suitable reptile habitat during the reptile active period of April to October, prior to works starting. All places of shelter shall be moved and checked for the presence of reptiles – log piles, rock piles etc. by hand where

possible, with use of machinery only where objects are too heavy or unwieldy to move by hand and only under direct supervision of the EnvCoW.

- In exceptional cases, if work must start between November and March in areas that were not cut prior to the end of October, the vegetation should be cut under the supervision of the EnvCoW, taking care to locate and not to disturb any potential refugia. If refugia are present, they would be searched by the EnvCoW prior to their removal. If any reptiles are found, they would only be moved during suitable weather conditions and would not be moved when in a state of torpor.
- Any trenches left overnight would be covered or provided with ramps to prevent reptiles falling into the trenches and being trapped. Excavations left overnight should be checked prior to filling.

7.6.12 Good practice mitigation during the operational phase of the Proposed Development would be employed to reduce the likelihood of bat mortality. This would involve the process of 'feathering', whereby turbine blades would be pitched out of the wind to reduce rotation speeds (to below 2 rpm) while idling. The reduction in speed created through feathering compared with idling alone may reduce bat fatality rates by up to 50% (NatureScot *et al*., 2021).

7.7 Assessment of Likely Impacts and Effects

7.7.1 This section describes the likely impacts and effects during the construction, operation and decommissioning of the Proposed Development on relevant ecological features that are considered to be 'important' (as summarised in **Table 7-11.**

7.7.2 The assessment of the likely significant effects of the Proposed Development has been based on the implementation of both embedded and standard mitigation measures summarised in **Section 7.6**.

Construction

7.7.3 During construction of the Proposed Development, in the absence of mitigation, it is anticipated that impacts may arise from:

- Direct loss and temporary and/ or permanent damage to habitats relating to construction of access tracks, construction compounds and turbine hardstanding areas. This includes impacts relating to drainage and changes in hydrological connectivity of mire habitats, or airborne pollution (i.e. dust).
- Temporary disturbance to legally protected and / or notable fauna through impacts of noise, human presence and artificial light.
- Temporary and / or permanent loss of protected and / or notable fauna commuting and foraging habitat, and loss or damage to resting sites and food resource.
- Direct, permanent impact in the form of injury/ mortality to protected and / or notable fauna from collision with vehicular traffic or other construction activity.
- Temporary disturbance or displacement of commuting and foraging bat species as a result of noise, vibration and artificial light.

- Sedimentation or pollution of watercourses (e.g. through ground excavation and associated dewatering processes, hydrocarbon spills/ leaks, or overflow/ leaking of concrete washout areas, and movement of vehicular traffic), leading to impacts to aquatic species and/or hydrologically connected designated sites.

7.7.4 Construction effects associated with each important ecological feature are assessed below.

Designated Sites

Connel Burn/ Benty Cowan LNCS

7.7.5 Connel Burn/ Benty Cowan LNCS intersects the north-western boundary of the Main Site, overlapping with approximately 95 ha of the Main Site itself. The layout of the Proposed Development has been designed to avoid construction of infrastructure within this LNCS as far as possible. Turbine 5 and associated infrastructure is, however, located just inside the boundary of the LNCS. Construction of T5 and associated infrastructure would therefore result in loss of the following:

- direct, permanent loss of 0.46 ha of wet modified bog (associated with T5 and development of new access track); and
- indirect loss or damage to 1.26 ha of wet modified bog (within 10 m of working areas).

7.7.6 In total the area within the LNCS affected by direct and indirect habitat loss or damage is 1.72 ha.

7.7.7 In the absence of mitigation, construction activities also have the potential to adversely impact water and habitat quality as a result of pollution events (chemical/ fuel spills and or concrete washout contamination) or increased sediment load (via dust, run-off and erosion) during construction.

7.7.8 In light of the direct and indirect loss or damage to wet modified bog within the LNCS outlined above a **significant adverse effect** on the LNCS is predicted as a result of construction of the Proposed Development. The LNCS is important at a County level and therefore the adverse effect is **significant at a County level**.

7.7.9 With the implementation of good practice pollution prevention measures (detailed in **Section 7.6**), the likelihood of a potential pollution and/or sedimentation event affecting water quality and habitats of interest within this site are considered to be low. With such mitigation in place, **no significant effects** upon the watercourse features, or surrounding habitats, of the LNCS are predicted.

Habitats

The Proposed Development would result in permanent habitat loss due to land take associated with the construction of wind turbine foundations, hardstanding lay-down areas, the construction compound, borrow pit, spur roads to turbines from the consented ALAR and other associated infrastructure.

7.7.10 displays the area of direct and indirect/temporary habitat loss for each important habitat type within the Main Site, whereby:

- Direct habitat loss - this includes habitats present within the footprint of the Proposed Development.
- Indirect/temporary habitat loss or damage – this includes areas within the working corridor (including construction laydown areas) that will be disturbed / damaged during construction, and reinstated following construction, where feasible. Indirect loss or damage has also been calculated for modified bog habitat that lies within 10 m of infrastructure[25], to allow for drying effects and vegetation changes due to construction works. For all other habitats, a buffer of 5 m has been included to allow for temporary loss or damage during construction.

7.7.11 For the purposes of the assessment, a precautionary approach has been taken which assumes that direct habitat loss from permanent infrastructure, temporary loss of habitats from the working corridor, and indirect loss of bog and other wetland habitats due to drainage effects all represent a permanent, irreversible adverse effect, although in practice some areas temporarily affected will be able to be restored, e.g. during reinstatement following construction.

7.7.12 **Table 7-11** details the estimated direct and indirect / temporary loss for habitats with local or greater value[26]. An assessment of the significance of effects on each habitat / vegetation community as a result of such habitat loss is also detailed in **Table 7-11**.

[25] While a buffer of up to 30 m can be required to accord with NatureScot guidance (NatureScot, 2023), the bog habitat within the Main Site has already been heavily modified by drainage so is unlikely to be adversely affected by drainage impacts resulting from the Proposed Development at distances of up to 30 m. As such, the buffer for indirect loss of bog habitat used in the assessment has been reduced to 10 m.

[26] In addition to loss of habitats assigned greater or local value, the following habitats would also be subject to direct loss as a result of construction of the Proposed Development: 0.37 ha of acid grassland (comprising NVC communities U4, U5 and U6); and 0.51 ha of marshy grassland (NVC communities M23, M25, MG9 and MG10).

Table 7-11: Summary of Habitat Loss by Phase 1 Habitat/ NVC Community Type (for Habitats of Local or Greater Value)

Phase 1 Habitat Type	NVC Community	Habitat Loss from Permanent Infrastructure (ha)	Infrastructure Causing Direct Habitat Loss	Temporary / Indirect Loss / Damage (ha)	Total Loss (ha)	Assessment of Significance
E1.7 Wet modified bog	M20a; M20b; M20a - M25b; M20b – M25a	0.49	Access tracks; turning heads; crane hardstandings; blade storage areas.	0.58	1.08	Four of the five turbine locations (T2 – T5) are located within modified bog habitat (NVC community M20), with the remaining turbine (T1) situated within the existing borrow pit at Lamb Hill. Given the importance attributed to such habitat, the loss of modified bog (wet and dry modified bog combined) is assessed as **significant at a County level**.
E1.8 Dry modified bog	M20a; M20b	2.67	Access tracks; turning heads; crane hardstandings; blade storage areas.	3.53	6.20	
E2.1 Flush and spring – acid/ neutral	M6c; M6d	0	N/A	0	0	Areas of flush were too small to map during the habitat surveys. Whilst it is possible that some of these may be lost or degraded during construction, the area affected is likely to be very small. Any resulting effect would therefore be considered **not significant**.
G2 Running water	N/A	0	N/A	0	0	This habitat is of local value. There will be no direct or indirect loss as a result of construction of the Proposed Development and therefore **no effect** in relation to habitat loss.

7.7.13 In the absence of mitigation, there is also potential for temporary, indirect adverse effects to each of the habitat types listed in **Table 7-11** resulting from diffuse pollution or sedimentation events. However, through implementation of the proposed standard mitigation measures outlined in Section 7.6, the magnitude of any impact is considered likely to be low and the resulting effect not significant

Protected and Notable Species

Otter

7.7.14 In the absence of mitigation, potential for disturbance to commuting, foraging and resting otter as a result of noise, vibration, artificial lighting or human presence during the construction phase exists. However, infrastructure associated with Proposed Development has been designed to be located sufficiently far enough away from watercourses that disturbance effects on otter populations that utilise watercourses within the Site are considered unlikely. There is one mapped watercourse within 12.5 m of proposed infrastructure close to Borrow Pit A, although the watercourse in question is very small and unlikely to be used by otters. All other watercourses are situated over 50 m from proposed infrastructure and the closest proposed turbine is located 180 m from a watercourse). In addition, otters that utilise freshwater habitats are primarily nocturnal (Chanin, 2003). As construction work would be carried out primarily during daylight hours (with appropriate mitigation applied in the case that night-time working was required), disturbance to otter during their most active hours is considered unlikely. Furthermore, otters are widespread both locally and nationally, are known to occupy very large home ranges (approximately 32 km for males and 20 km for females[27]) and can adapt to a certain level of human disturbance (Chanin, 2003). These factors, together with an abundance of good quality otter habitat within the immediately surrounding landscape (e.g. Afton Water), indicates that the potential for otter disturbance would be very low, and the overall effect considered **not significant.**

7.7.15 In the absence of mitigation, potential for otter injury or mortality as a result of collision with machinery or becoming trapped in excavations, may also exist. However, given the distance between the Connel and Carcow Burns and closest proposed infrastructure, an impact involving otter death or injury is considered very unlikely. In addition, with implementation of a 15 mph speed limit, together with other good practice measures outlined in Section 7.6, the risk of otter injury or mortality as a result of traffic collision or becoming trapped in excavations is considered low, and likely effect considered **not significant**.

7.7.16 In terms of construction activities and potential for fragmentation of otter habitat, the layout of the Proposed Development has been designed to sit at higher elevations within the Site, avoiding any requirement for watercourse crossing

[27] Information relating to otter home ranges s available online at https://www.nature.scot/plants-animals-and-fungi/mammals/land-mammals/otter#:~:text=Otters%20that%20live%20in%20freshwater,including%20man%2Dmade%20ones

points or work within riparian zones. As such, **no effect** relating to fragmentation of otter habitat and resulting restrictions on movement of otter across territories are predicted.

Bats

Commuting and Foraging

7.7.17 In the absence of mitigation, there is potential for temporary disturbance and / or displacement of commuting and foraging bats as a result of increased noise and artificial lighting during hours of darkness during the construction phase.

7.7.18 However, as construction work would be carried out primarily during daylight hours (with appropriate mitigation applied in the case that night-time working was required), disturbance to foraging or commuting bats during their active hours is considered unlikely. The potential for disturbance impacts is therefore low and the overall effect on populations of commuting and foraging bats is considered **not significant**.

Roosting

7.7.19 The construction phase is not anticipated to involve any works that would directly, or indirectly, impact the known bat roost at Monquhill Farmhouse. The farmhouse is located approximately 180 m from the Site boundary and 423 m from the closest proposed infrastructure (Turbine 5). Given the intervening distance **no effect** is predicted.

Reptiles

7.7.20 The Site is known to support common lizard and has some potential to support adder and slow worm. Construction would result in direct loss of approximately 3.5 ha of open upland habitat (acid grassland and modified bog) that is suitable for these species. Based on the small number of existing and incidental records, reptile populations at the Site are likely to be relatively small and given the abundance of suitable habitat across the rest of the Site and surrounding area, significant effects in the form of habitat loss or fragmentation are unlikely to occur. As such, the loss of 3.5 ha of suitable reptile habitat is unlikely to affect the conservation status of reptile populations that may inhabit the Site and is therefore considered **not significant**.

7.7.21 Indirect / temporary loss of habitat has not been considered here, as it is anticipated that areas subject to drying or other temporary damage would still be used by reptiles for activities such as basking and potentially foraging (following habitat reinstatement).

7.7.22 In the absence of mitigation, a potential impact relating to reptile injury or mortality resulting from collision with machinery, or becoming trapped in excavations, exists. However, through implementing the proposed good practice mitigation measures aimed at reptiles during the construction phase (**Section 7.6**), the risk of

inadvertent injury or killing individuals would be low and the likely effect on the conservation status of reptile populations is considered **not significant**.

Fish and Aquatic Invertebrates

7.7.23 In the absence of mitigation, there is potential for indirect, temporary impact in the form of degradation of suitable fish and aquatic invertebrate habitat resulting from pollution and / or siltation events during the construction phase. However, given the lack of proposed watercourse crossing points, there would be no direct loss of fish and aquatic invertebrate habitat through construction of the Proposed Development. In addition, infrastructure associated with Proposed Development has been designed to be located sufficiently far enough away from watercourses that habitat degradation as a result of pollution or sedimentation events is unlikely (with the exception of a small watercourse within 12.5 m of Borrow Pit A (too small to support fish) all watercourses are situated over 50 m from proposed infrastructure). Through implementation of good practice measures associated with pollution prevention (**Section 7.6**), the risk of adverse impacts would be low and any effect on the conservation status of fish and aquatic invertebrate populations is considered **not significant**.

Operational Effects

7.7.24 During operation of the Proposed Development, in the absence of mitigation, it is anticipated that impacts may arise from:

- Temporary disturbance and displacement of protected or notable fauna in relation to vehicular traffic, noise and presence of site operatives;
- Mortality of protected or notable fauna as a result of traffic related collisions;
- Direct injury/ mortality of bat species as a result of collision with wind turbines or barotrauma; or
- Environmental incidents and accidents (e.g. spillages) into freshwater habitats, impacting fish and aquatic invertebrates and subsequent prey availability for other protected or notable species.

7.7.25 Operational effects (assuming the embedded measures and stated good practice mitigation measures are implemented), are addressed for important ecological features below.

Designated Sites

Connel Burn/ Benty Cowan LNCS

7.7.26 The operational phase is not anticipated to involve any work that would directly or indirectly impact the Connal Burn/ Benty Cowan LNCS and associated habitats. Any potential risks during operation are likely to be limited to localised pollution or sedimentation events arising from maintenance works to wind turbines and/or associated infrastructure. To avoid and/or mitigate such incidents, a risk assessment for required works would be developed and suitable pollution/

sedimentation control measures implemented, in line with best practice, for the duration of required maintenance works. Through implementation of such measures, potential effects on the LNCS would be minimal and considered **not significant**.

Habitats

7.7.27 During the operational phase, no adverse impacts on retained habitats and plant species are predicted. Infrastructure would be in place and any vehicle movement on site would be limited to constructed access tracks. The potential for incidents and spillages affecting important habitats is considered to be very low. In addition to this, good practice measures would be implemented further reducing the risk of an incident occurring. Therefore, the effect on retained habitats during operation would be negligible and **not significant**.

Protected and Notable Species

Otter

7.7.28 During the operational phase, infrastructure would already be in place, most of which would be located over 50 m[28] from watercourses. As such, no disturbance to watercourses or riparian areas likely to support otter is predicted during the operational phase.

7.7.29 Human presence would be low and localised in extent, occurring mainly during daylight hours when otters are less active. In addition, any vehicle movements would be limited to existing access tracks, for which a speed limit would apply. During maintenance events, temporary storage of hazardous chemicals may occur on the Site, however this would be subject to implementation of standard pollution prevention control measures.

7.7.30 Given the small-scale and localised nature of human and vehicular presence during the operational phase, with no activity proposed near watercourses likely to be used by otters, the risk of disturbance to commuting, foraging or resting otter would be very low. Assuming good practice measures are implemented, the risk of killing or injury to otter though traffic collisions or maintenance operations, and the risk of disturbance to or degradation of aquatic and riparian habitats occurring, is also very low, with effects considered **not significant.**

Bats - Commuting and Foraging

7.7.31 Risks to commuting and foraging bats during the operational phase of the Proposed Development include:

[28] There is one mapped watercourse within 12.5 m of proposed infrastructure close to Borrow Pit A, although the watercourse in question is very small and unlikely to be used by otters. All other watercourses are situated over 50 m from proposed infrastructure and the closest proposed infrastructure turbine is located 180 m from a watercourse

- Direct collision with operational turbine blades, resulting in injury or mortality; and
- Barotrauma (whereby sudden changes in air pressure around moving turbine blades results in internal haemorrhaging of the lungs, leading to serious injury and/or mortality).

7.7.32 In accordance with guidance outlined in NatureScot *et al*, (2021), bat activity data confirmed that at least four species of bat classified as 'high risk' of collision with turbines utilise the Site:

- Common pipistrelle;
- Soprano pipistrelle;
- *Pipistrellus* species (echolocation sequences relating to common or soprano pipistrelle, or common or Nathusius' pipistrelle, for which call parameters overlap); and
- *Nyctalus* species (including both noctule and Leisler's bat).

Common pipistrelle

7.7.33 The results of the 2021 collision risk assessment (**Technical Appendix 7.4**) indicate that during periods of both typical (most frequent) and peak (highest) activity levels ascertained from Ecobat, the collision risk calculated for common pipistrelle was 'medium' at sample locations L1 (near T1) and L3 (located between T3 and T4). At sample locations L2 (located between T2 and T3) and L4 (near T5), this risk was assessed as 'low' during typical levels of activity, increasing to 'medium' during peak levels of activity.

7.7.34 In a comparison of data obtained during 2021 and 2023, the overall collision risk to common pipistrelle recorded during spring and summer of 2023 was considered likely to be no greater than the risk calculated for the 2021 data. Slightly increased activity levels exhibited in autumn 2023 compared to those in 2021 suggest that collision risk may be slightly greater than predicted in 2021. However, given that a precautionary assessment of 'medium' collision risk was assigned in 2021, and with an assessment based on peak levels of activity as opposed to typical activity levels, it is unlikely that the overall collision risk for common pipistrelle increased significantly between 2021 and 2023.

7.7.35 Based on activity levels and associated collision risk assessed for each sample location, and through applying a precautionary approach, in the absence of mitigation, the overall collision risk for common pipistrelle during both typical and peak activity levels has been classified as 'medium'[29].

[29] It should be noted that, in general, data submitted to Ecobat within a 200km radius of the Site largely relates to baseline data collected for other renewable energy projects. The locations of such development projects are often situated on upland sites, out-with key bat commuting, foraging and roosting habitat that is often associated with lowland habitat. Therefore, based on the data available within the Ecobat tool, the output resented for relative bat activity levels within the region are likely to be slightly overestimated and should be treated as precautionary.

Soprano pipistrelle

7.7.36 The results of the 2021 collision risk assessment indicate that during periods of both typical and peak activity levels ascertained through Ecobat, the collision risk to soprano pipistrelle calculated for sample locations L1 and L4 was 'medium'. At sample locations L2 and L3, this risk was assessed as 'low' during typical levels of activity, increasing to 'medium' during peak levels of activity at both locations.

7.7.37 When comparing activity data obtained during 2021 and 2023, average passes per night were slightly greater during the spring and autumn 2023 survey periods compared with data recorded in 2021. However, soprano pipistrelle activity was higher in summer 2021 than 2023 (one pass per night compared with no passes). The data for summer 2023 may however have been influenced by a technical issue associated with a lack of data collection at sample locations L1 and L5. Overall, however, the collision risk relating to soprano pipistrelle activity recorded during 2023 was considered likely to be no greater than the risk predicted using 2021 data.

7.7.38 Based on activity levels and associated collision risk assessed for each sample location, and through applying a precautionary approach, in the absence of mitigation, the overall collision risk for soprano pipistrelle during periods of both typical and peak activity levels was classified as 'medium'.

Pipistrellus species

7.7.39 The results of the 2021 collision risk assessment indicate that during periods of both typical and peak activity levels, the risk for all *Pipistrellus* species combined[30] was 'medium' at sample locations L1, L3 and L4. At sample location L2 this risk was assessed as 'low' during both typical and peak activity levels.

7.7.40 When comparing activity data recorded during 2021 with 2023, it was noted that, in both years, passes attributed to the genus *Pipistrellus* were only recorded during autumn. Average passes per night also measured less than one in both years. Overall activity levels were however slightly lower in 2023 when compared to 2021. As such, the overall collision risk for 2023 is likely to be no greater than the risk calculated in relation to 2021 data.

7.7.41 Based on activity levels and associated collision risk assessed for each sample location, and through applying a precautionary approach, in the absence of

[30] The Ecobat tool acts to sum all passes relating to the genus *Pipistrellus* (i.e. all passes attributed to common, soprano, Nathusius and *Pipistrellus* species) or Nyctalus (Noctule and Leisler's bat). However, in some cases, the sum of total *Pipistrellus or Nyctalus* passes, and thus relative activity level, may be underestimated due to an error in the calculation tool (Mammal Society Information Officer, *personal communication*). This occurs on survey nights where passes attributed to genus level only have not been recorded, while passes attributed to individual pipistrelle species have. Those assigned to species level subsequently are not included in the total count of passes for that genus. The data provided by Ecobat for genus level activity (*Pipistrellus* and *Nyctalus*) should therefore be treated as an approximate indication only.

mitigation, the overall collision risk for *Pipistrellus* species during periods of both typical and peak activity levels was classified as 'medium'.

Nyctalus species

7.7.42 The 2021 collision risk assessment results indicate that during periods of both typical and peak activity levels, the collision risk for all *Nyctalus* species combined[30] was 'medium' at all four sample locations.

7.7.43 In a comparison of 2021 and 2023 data[31], activity exhibited by *Nyctalus* species during spring was found to be similar, with an average of less than one pass per night recorded in both years. Overall activity during summer and autumn was greater in 2021 than 2023.

7.7.44 Given that overall activity levels relating to *Nyctalus* species were slightly lower during 2023 than 2021, the overall collision risk to *Nyctalus* species was therefore considered to be no greater than the 'medium' collision risk calculated for the 2021 results.

Assessment of operational effects on commuting and foraging bat species at 'high risk' of collision with turbines

7.7.45 Embedded and standard practice mitigation measures associated with commuting and foraging bat species (i.e. maintaining a minimum stand-off distance between turbines and habitat features that may be utilised by commuting and foraging bats and applying a 'feathering' regime to operational turbines) are outlined in **Section 7.6**. However, given that turbine infrastructure will be located a minimum of 180 m from key commuting and foraging features (watercourses and woodland edge habitat), maintaining a minimum stand-off distance between turbines and habitat features that may be utilised by commuting and foraging bats is unlikely to reduce the overall collision risk determined for each species. While feathering may reduce fatalities by up to 50% and noting that there is a level of uncertainty as to the level of potential impacts, given collision risk has been determined to be 'medium' for all high risk species, a precautionary approach has been applied in this assessment. As such, in the absence of additional mitigation, operation of the Proposed Development has the potential to result in a significant adverse effect to populations of high-risk bat species. This would be considered to be a **significant negative effect at a Local level**. Additional monitoring and mitigation measures (if required) for bats are therefore proposed in **Section 7.9**.

Bats - Roosting

7.7.46 The Main Site is formed of exposed upland habitat with very little woodland cover. As such, bat roost suitability within the Main Site itself is very low.

[31] For the purpose of data comparison between years, total and average number of passes relating to Noctule, Leisler's and *Nyctalus* species recorded in 2021 were combined into the genus *Nyctalus*.

7.7.47 Suitable roosting resource is however known to be present in the wider area (SLR, 2024). Monquhill Farmhouse, an abandoned building, is located within commercial forestry plantation approximately 180 m from the Main Site boundary and 423 m south-east of the nearest infrastructure associated with the Proposed Development (T5). This built structure has been confirmed to support a small, mixed species non-maternity summer roost for common pipistrelle, soprano pipistrelle and bats of the genus *Myotis*. Results of hibernation surveys collected in the winter of 2021 - 2022 also indicate potential for the structure to be utilised as a hibernation roost by *Myotis* species (WSP, 2023).

7.7.48 Given that Monquhill Farmhouse supports a small, mixed species non-maternity roost (as opposed to a larger maternity roost), the considerable distance between the building and closest proposed turbine infrastructure, and that the building itself will remain unaffected by the Proposed Development, adverse impacts to roosting bats during the operational phase, other than via impacts while commuting or foraging which are covered above, are considered unlikely. As such, the resulting effect on roosting bats during the operational phase is considered **not significant**.

Reptiles

7.7.49 During operation, only minimal operational and maintenance traffic would be present on the Site, of which would be restricted to driving along on-Site access tracks within an applied speed limit. As a result of this, the risk of killing or injuring reptiles is considered low, and no further loss or damage of reptile habitat is predicted to occur during the operational phase. **No significant effect** is therefore predicted upon reptiles during operation.

Fish and Aquatic Invertebrates

7.7.50 During the operational phase, infrastructure would already be in place, most of which would be located at least 50 m from watercourses[28]). As such, no disturbance to riparian areas or aquatic habitat during the operational phase is predicted.

7.7.51 During maintenance events, temporary storage of hazardous chemicals may occur on the Site, however this would be subject to implementation of standard pollution prevention control measures.

7.7.52 Given the small-scale and localised nature of human and vehicular presence during the operational phase, with little or no activity proposed near watercourses, the risk of damage or degradation of riparian and aquatic habitat, and thus impacts to freshwater fish and aquatic invertebrates, is very low. Likely effects on populations of freshwater fish during the operational phase would be negligible and therefore considered **not significant.**

Decommissioning

7.7.53 During decommissioning of the Proposed Development, potential effects on nature conservation interests would be expected to be similar in nature (although not

necessarily in extent or intensity, and there would be no habitat loss) to those during the construction phase and similar embedded and good practice mitigation measures would be likely to be employed. In the absence of any further habitat loss and assuming that similar mitigation measures would be employed and there has been no significant alteration in the environmental conditions at the Site, no significant effects are predicted for any important ecological feature during decommissioning.

7.7.54 Any new legislation or guidance published prior to decommissioning would be incorporated within a Decommissioning and Restoration Plan prior to decommissioning taking place. Elements for incorporation within the Decommissioning and Restoration Plan would include:

- ecological surveys to update baseline data for the Site;
- approach to habitat reinstatement and restoration; and
- mitigation measures to avoid potentially significant adverse effects on protected or notable species accounting for potential colonisation of mobile species that were not present prior to construction of the Proposed Development (e.g. water vole and badger).

7.8 Assessment of Cumulative Effects

7.8.1 As set out in **Section 7.4**, the assessment of cumulative effects has been limited to ecological features of local value or above for which there is a potential effect for the Proposed Development alone and a clear route to potential cumulative effects in conjunction with developments that:

- Are directly adjacent and may affect the same habitats;
- Are located within the same hydrological sub-catchment(s) so may be affected by water-borne sedimentation or pollution events; or
- Are located within the regular range of more mobile species (e.g., bats and otter).

7.8.2 Summary details of each development considered within the assessment of cumulative effects are provided in **Table 7-12**, i.e. those which meet the parameters set out in **Section 7.4** and summarised above, are listed in **Table 7-12.**

Table 7-12: Development Projects Considered within the Assessment of Cumulative Effects

Wind Farm Name	Development Details	Status	Distance from Main Site (km)	Important Ecological Features for which Cumulative Effects are Possible	Assessment Details for Relevant Features (Residual effects)
Projects Considered in Cumulative Assessment for All Important Ecological Features Identified within this Chapter (i.e. adjacent or overlapping developments or developments within 5 km within the same hydrological sub-catchment)					
Pencloe ALAR	Access track measuring 7.8 km in length, leading from Afton Road, via Laight Farm and Ashmark Hill into Pencloe Forest.	Under construction	0 km (within the Site)	Connel Burn/ Benty Cowan LNCS; Wet and dry modified bog; flush; watercourses; otter; bats; reptiles (common lizard); and fish	Ecology chapter produced by SLR (2021). Construction Phase Connel Burn/ Benty Cowan LNCS Following implementation of appropriate mitigation measures, likely effects on the nature conservation status of the LNCS during construction were considered not significant. Habitats Construction of the ALAR would result in direct loss of approximately 0.30 ha of wet modified bog and 1.21 ha of dry modified bog. With implementation of appropriate mitigation, the overall residual effect of such habitat loss was however assessed as **not significant**. Protected Species With the implementation of appropriate mitigation measures, residual effects on populations of otter, bats; reptile and fish species were considered **not significant.** Operational Phase No likely significant residual effects relating to habitats or protected species were predicted during the operational phase. Decommissioning Phase **No likely significant residual effects** relating to habitats or protected species were predicted during the decommissioning phase.

Wind Farm Name	Development Details	Status	Distance from Main Site (km)	Important Ecological Features for which Cumulative Effects are Possible	Assessment Details for Relevant Features (Residual effects)
Enoch Hill	16 turbines with blade tip height of 149.9 m	Under construction	<1 (Immediately adjacent)	Otter and herptofauna (2015 ES); and bats (2020 Variation EIAR)	Construction Prior to, and following, implementation of appropriate mitigation measures, effects to populations of otter, herpetofauna and bats during the construction phase were considered **not significant.** Operation No likely significant effects to otter or herpetofauna during the operational phase were predicted within the 2015 ES (Amec Foster Wheeler, 2015) or 2020 EIAR (Wood, 2020). While the increase in rotor diameter proposed within the 2020 Variation EIAR would pose an increased risk of direct collision or barotrauma for bats, the low bat activity levels recorded and embedded mitigation measures meant that the overall effect on the conservation status of bat populations as a result of the development would be **not significant**. Decommissioning **No likely significant effects** to otter, herpetofauna or bats were predicted for the decommissioning phase.
Enoch Hill II	Two turbines with blade tip height of 149.9 m	Application Stage	<1 (Immediately adjacent)	Connel Burn/ Benty Cowan LNCS; Otter; bats; and fish	Construction Construction of Enoch Hill II would result in direct loss of 0.02 ha of acid grassland (NVC community U5a), 0.19 ha of modified bog (M20), 0.018 ha of flush and modified bog mosaic (M6b/M20). This loss was however considered to be low in magnitude likely effects considered not significant. With the implementation of appropriate mitigation measures, effects to populations of otter, fish species, or bats (commuting, foraging and roosting) were considered **not significant** (WSP, 2023)**.**

Wind Farm Name	Development Details	Status	Distance from Main Site (km)	Important Ecological Features for which Cumulative Effects are Possible	Assessment Details for Relevant Features (Residual effects)
					Operation **No likely significant effects** to habitats of the LNCS, fish species or bats during the operational phase were predicted. Decommissioning **No likely significant effects** to habitats of the LNCS, or protected species, during decommissioning were predicted.
Pencloe	19 turbines with blade tip height of 149.9 m	Under construction	<1 (Immediately adjacent)	Running water; otter; bats; reptiles; and fish	The initial Environmental Statement (ES) for Pencloe Wind Farm (Jacobs, 2015) was based on a layout of 21 turbines. Following submission of the ES, the layout was subsequently reduced to 19 turbines, for which turbine tip height increased from 125 – 149.9 m and turbine blade length increased from 50 to 67 m. Two of the consented turbines were also relocated within the site. Construction Habitats Likely residual effects to watercourses as a result of construction were considered **not significant**. Protected species With the implementation of appropriate mitigation measures, effects to populations of fish species, otter, reptiles and bats were considered **not significant.** Operation **No likely significant effects** to habitats or protected species as a result of operational phase were predicted. Decommissioning **No likely significant effects** to habitats or protected species as a result of decommissioning were predicted.

Wind Farm Name	Development Details	Status	Distance from Main Site (km)	Important Ecological Features for which Cumulative Effects are Possible	Assessment Details for Relevant Features (Residual effects)
Development Projects Considered in Cumulative Assessment for Bats Only					
High Park	Single turbine, with tip height of 75 m	Operational	1.3	Bats	No relevant information found.
Afton	25 turbines with blade tip height of 120 m	Operational	2	Bats	**No likely significant effects** to populations of bat species as a result of construction, operation or decommissioning were predicted RPS (2004).
Windy Standard II	30 turbines with blade tip height of 120 m	Operational	2.8	Bats	No information found.
Sanquhar II	44 turbines with blade tip height of 150 - 200 m	Consented	2.9	Bats	With implementation of appropriate mitigation, impacts to bats were considered to be low in magnitude and overall effects of **minor significance** during construction, operation and decommissioning phases (Community Windpower, 2019).
Windy Standard III	20 turbines with blade tip height of 180 m	Consented	3.1	Bats	Potential (unmitigated and mitigated) impacts to bats were considered to be low in magnitude during the both construction and operational phases, and likely effects **not significant** (Natural Power, 2015).
Auchingee	Three turbines with tip height of 20 m	Operational	3.3	Bats	No relevant information found.

Wind Farm Name	Development Details	Status	Distance from Main Site (km)	Important Ecological Features for which Cumulative Effects are Possible	Assessment Details for Relevant Features (Residual effects)
Hare Hill	20 turbines	Operational (since 1999)	3.3	Bats	No information found,
South Kyle	50 turbines with blade tip height of 150 m	Operational	3.2	Bats	**No likely significant residual effects** to populations of bat species as a result of construction, operation or decommissioning were predicted (Mackenzie Bradshaw Environmental Consulting, 2013).
Hare Hill Extension	39 turbines with blade tip height of 91 m	Operational	3.8	Bats	**No likely significant residual effects** to bat species as a result of construction, operation or decommissioning were predicted (SPR, 2007).
Windy Standard	36 turbines with blade tip height of 54 m	Operational	3.8	Bats	No information found.
Greenburn	16 turbines with blade tip height of 149.9 m	Consented	4.0	Bats	No information found.
North Kyle Energy Project	49 turbines with blade tip height of 149.9 m	Under construction	5.17	Bats	<u>Construction</u> **No likely significant effects** relating to bats as a result of the construction phase were predicted (Brockwell Energy, 2019). <u>Operation</u> In the absence of additional mitigation, the potential risk of collision or barotrauma related injuries to common pipistrelle, soprano pipistrelle and *Nyctalus* bat species during the operational phase was high. With additional mitigation applied however (i.e. stand-off distances between

Wind Farm Name	Development Details	Status	Distance from Main Site (km)	Important Ecological Features for which Cumulative Effects are Possible	Assessment Details for Relevant Features (Residual effects)
					woodland edge and watercourses, implementation of a bat mitigation monitoring plan, curtailment of turbines during certain times of year, and post construction carcass search monitoring), the residual effects were assessed as **not significant**. <u>Decommissioning</u> **No likely significant effects** relating to bats during decommissioning were predicted.
Lethans	22 turbines with blade tip height of 200 m	Consented	5.9	Bats	No relevant ecological information found.
Benbrack Variation	18 turbines with blade tip height of 150 m	Operational	6.4	Bats	Though implementation of embedded and best practice mitigation measures, likely residual effects on bat populations during construction, operation and decommissioning of the development were considered **not significant** (Wood, 2019).
Over Hill	10 turbines with blade tip height of 180 m	Consented	6.5	Bats	Ecology chapter of EIA not available online (technical appendices only).
Euchanhead	21 turbines with blade tip height of 230 m	Application stage	6.6	Bats	<u>Construction</u> **No likely significant effects** to bats as a result of construction were predicted (SPR, 2020). <u>Operation</u> In the absence of additional mitigation, the potential risk of collision or barotrauma related injuries to Pipistrellus and *Nyctalus* bats during the operational phase was high. With additional mitigation applied however (i.e. stand-off distances between suitable commuting and foraging

Wind Farm Name	Development Details	Status	Distance from Main Site (km)	Important Ecological Features for which Cumulative Effects are Possible	Assessment Details for Relevant Features (Residual effects)
					features, curtailment of turbines during certain times of year, and carcass searches to monitor the success of curtailment), the residual effects were **not significant**.
Sandy Knowe Extension	6 turbines with blade tip height of 149.9 m	Application stage	7.4	Bats	With the implementation of appropriate mitigation measures, **no likely significant residual effects** to populations of bat species were predicted for construction, operation, or decommissioning phases (ERG, 2022).

Designated Sites (Connel Burn/ Benty Cowan LNCS)

7.8.3 The Connel Burn/ Benty Cowan LNCS overlaps with the Main Site, Enoch Hill and Enoch Hill II Wind Farm. While no information relating to assessment of effects on the LNCS was identified within the Enoch Hill ES or EIA chapter (Amec Foster Wheeler, 2015 and Wood, 2020), residual effects resulting from construction and operation of Enoch Hill II windfarm were considered not significant (WSP, 2023).

7.8.4 Given that both the Proposed Development, Enoch Hill and Enoch Hill II Wind Farms overlap with the LNCS, there is potential for cumulative effects on the LNCS due to construction of each development. Although not assessed in the Enoch Hill Wind Farm EIA, a cumulative effect due to habitat loss is likely given that Enoch Hill includes infrastructure within the LNCS. For Enoch Hill II Wind Farm, whilst there will be a loss of habitat within the LNCS, the habitats are heavily modified and no significant adverse effect was predicted. Loss of habitat within the LNCS was considered to be significant for the Proposed Development considered alone and is therefore also considered to represent a **significant cumulative adverse effect on a feature of County importance**. The adverse effect resulting from the Proposed Development will be offset by the compensation measures set out in the oHMP (see **Section 7.9** and **Technical Appendix 7.8**), however.

7.8.5 The Proposed Development, Enoch Hill and Enoch Hill II Wind Farms and the Pencloe ALAR could result in a cumulative effect on hydrological features within the Connel Burn, if they were constructed at the same time. This is unlikely however, as two of the other developments are currently under construction. Even if construction periods did overlap, following the implementation of the proposed mitigation measures for each project, **no significant cumulative effects are likely**.

Habitats

7.8.6 Of the development projects identified in **Table 7-12**, only one contains terrestrial habitats that are connected to the Main Site (Pencloe ALAR, which overlaps the Main Site and also affects priority peatland). All other projects are either distant from the Main Site or separated by watercourses (e.g. Connel Burn and Carcow Burn) so would not affect the same terrestrial habitats. Three other developments are connected to the Main Site through aquatic habitats (Enoch Hill, Enoch Hill II and Pencloe).

7.8.7 The ecology chapter submitted as part of the application for the Pencloe ALAR outlined that through implementation of appropriate mitigation measures, no likely significant residual effects relating to loss of priority peatland were predicted. When considering both the Proposed Development and the Pencloe ALAR together, habitat loss within the Main Site would however be slightly greater than for one development alone, although, the overall extent of habitat loss has been reduced by combining infrastructure associated with both developments (i.e. the Pencloe ALAR also forms the main access route for the Proposed Development). Loss or damage to modified bog was considered to be significant for the Proposed Development considered alone and is therefore also considered to represent a

significant cumulative adverse effect on a feature of County importance. The adverse effect resulting from the Proposed Development will be offset by the compensation measures set out in the oHMP (see **Section 7.9** and **Technical Appendix 7.8**), however.

7.8.8 In terms of cumulative effects on aquatic habitats (watercourses), each of the three other wind farm developments concluded that through implementation of appropriate mitigation measures, no likely significant residual effects relating to degradation of the aquatic environment were predicted. In addition, with two sites currently under construction (Enoch Hill and Pencloe), it is unlikely that the construction phase of the Proposed Development would coincide with the construction phase of those other wind farms, and therefore and therefore the risk of combined pollution and/or sedimentation events discharging into the same catchment is low. Even if Enoch Hill II was constructed at the same time as the Proposed Development, following the implementation of the proposed mitigation measures for each project, **no significant cumulative effects are likely**.

Protected and Notable Species

Otter

7.8.9 Hydrological connectivity, and thus habitat connectivity for commuting, foraging and resting otter, exists between watercourses bordering the Main Site and four nearby development projects: Pencloe ALAR (Connel and Carcow Burn), Pencloe Wind Farm (Carcow Burn, Glenhastel and Glenshalloch Burn); Enoch Hill (Connel Burn and Polga Burn); and Enoch Hill II (Carcow Burn and Small Burn).

7.8.10 All four ecology chapters outlined that with appropriate mitigation measures, no likely significant residual effects relating to otter (through impacts relating to injury or mortality, disturbance, or degradation of riparian and aquatic environments) were predicted. In addition, with three sites currently under construction, the construction phase of the Proposed Development is unlikely to coincide with that of those three other wind farms, and therefore the risk of combined otter disturbance or impacts to prey availability as a result of habitat degradation is considered low. If and / or when construction of Enoch Hill II would commence, is however uncertain at this stage. Therefore, the possibility of construction timescales for Enoch Hill II and the Proposed Development coinciding, and the risk of cumulative effects on aquatic habitat as a result of construction, cannot be fully ruled out.

7.8.11 Otter is a highly mobile species that is known to occupy a large home range (approximately 32 km for males and 20 km for females)[32]. Watercourses within the Main Site form tributaries of the Nith River Catchment and flow directly into Afton Water, a watercourse that has been noted as highly suitable for supporting populations of commuting, foraging and potentially resting, otter (SLR, 2021). As

[32] Information relating to otter home range obtained from the NatureScot website: https://www.nature.scot/plants-animals-and-fungi/mammals/land-mammals/otter#:~:text=Otters%20that%20live%20in%20freshwater,including%20man%2Dmade%20ones).

such, the proportion of an otter home range that would be affected, both as a result go the Proposed Development alone, and in combination with other connecting developments, would be very small.

7.8.12 Through implementation of embedded and best practice mitigation outlined in **Section 7.6** and those proposed within the EIARs for adjacent developments, and with knowledge of otter home range size and the abundance of alternative suitable habitat within the Nith catchment, cumulative effects to populations of otter are considered unlikely and **not significant** during all phases of development.

Bats

7.8.13 The assessment of cumulative effects regarding bats is based on the CSZ (i.e. the commuting and foraging range) of each high-collision risk species identified to utilise the Main Site. Reported CSZs for each high-collision risk species identified to utilise the Main Site are as follows:

- Common pipistrelle – 2 km (the assessment of cumulative effects has been extended to 4 km as a roost located 2 km from the Main Site could also be affected by other development projects located 2 km in the opposite direction). A total of eight other wind farm development projects that assessed bats as important ecological feature[33] were identified within 4 km of the Main Site.
- Soprano pipistrelle – 3 km (extended to 6 km). A total of nine other development projects that assessed bats as an important ecological feature[34] were identified within 6 km of the Main Site.
- Noctule – 4 km (extended to 8 km). A total of 12 other development projects that assessed bats as an important ecological feature[35] were identified within 8 km of the Main Site; and
- Leislers – 3 km (extended to 6 km).

7.8.14 A review of ecology assessments for each of the other developments considered in the cumulative assessment for bats (where relevant data could be found), identified that through implementation of appropriate mitigation, likely residual effects to populations of all bat species listed above were considered not significant for all other developments.

7.8.15 It is noted however, due to high levels of Leisler's / *Nyctalus* species activity recorded during the summer of 2013 at Enoch Hill (located immediately adjacent

[33] Of the eight wind farm developments identified, at the time of writing, two are operational, three are under construction, two have received planning consent and one is at planning application stage. No data relating to important ecological features was identified for six other development projects within 4 km, listed in **Table 7-122**.

[34] Of the nine wind farm developments identified, at the time of writing, two are operational, three are under construction, three have received planning consent, and one is at planning application stage. No data relating to important ecological features was identified for seven other development projects within 6 km, listed in **Table 7-122**.

[35] Of the 12 wind farm developments identified, at the time of writing, nine are operational, three are under construction, five have received planning consent, three are at planning application stage, and two are at scoping stage. No data relating to important ecological features was identified for eight development projects within 8 km, listed in **Table 7-122**.

to the Main Site to the west), additional mitigation in the form of turbine curtailment and post-construction monitoring (static detectors and carcass searches), for a period of three years, was proposed within the application for variation consent (Wood, 2020).

7.8.16 Similar levels of additional mitigation were also recommended within the EIAR for Euchanhead Wind Farm (SPR, 2020), located approximately 6.6 km from the Main Site. Following an assessment of relative bat activity levels using the Ecobat tool (which indicated that the proposed development presented 'medium' collision risk score for *Pipistrellus* and *Nyctalus species* in the absence of additional mitigation), recommendations for turbine curtailment and a programme of bat activity and carcass monitoring were provided.

7.8.17 Adopting a precautionary approach, in the absence of additional mitigation, a potentially significant adverse effect on bats is predicted for the Proposed Development (**Section 7.7**). However, the cumulative assessment is based on consideration of proposed additional mitigation (**Section 7.9**), with which no significant residual effects are predicted (**Section 7.10**). On that basis and provided the additional mitigation measures outlined within this chapter (**Section 7.9**) and the EIARs for nearby developments are adhered to, cumulative effects on populations of *Pipistrellus* and *Nyctalus* bat species are likely to be **not significant**.

Reptiles

7.8.18 Three development projects are connected to the Main Site through habitat types suitable for supporting reptiles[36] (Enoch Hill, Pencloe and Enoch Hill II). For all three projects, no likely significant residual effects on populations of reptiles were predicted. Considering of the widespread nature of suitable habitat types for reptiles in surrounding area and provided appropriate mitigation measures for reptiles are implemented across all development projects, cumulative effects on populations of reptiles are considered **not significant**.

Fish

7.8.19 As per the cumulative effects assessment for otter, hydrological connectivity exists between the Main Site and four nearby development projects: Pencloe ALAR (Connel and Carcow Burn), Pencloe Wind Farm (Carcow Burn, Glenhastel and Glenshalloch Burn); Enoch Hill (Connel Burn and Polga Burn); and Enoch Hill II (Carcow Burn and Small Burn). The possibility for an adverse cumulative effect on watercourses and fish populations through pollution or sedimentation events during construction (adverse effects during the operational phase) therefore exists. With three sites already currently under construction, the construction phase of the Proposed Development is unlikely to coincide with that of those three other wind farms, and therefore the risk of combined pollution or sedimentation effects is low. Even where construction could overlap, through implementation of appropriate

[36] Suitable reptile habitat present within the Main Site includes: heathland; grassland; and wetland areas (Edgar *et al*., 2010)

mitigation measures for each scheme, the potential for combined impacts to watercourses and fish populations, would be significantly reduced, and any events that may occur would be minor and short-lived. As such, cumulative effects on fish populations are considered **not significant**.

7.9 Additional Mitigation, Compensation and Enhancement

Construction

7.9.1 Embedded mitigation and standard good practice mitigation measures are detailed in **Section 7.6**. No additional mitigation measures are required during the construction phase.

Proposed Compensation and Enhancement

7.9.2 To compensate for the significant residual effects upon modified bog habitats, and to provide significant enhancement, a range of habitat creation, restoration and management is proposed. This section summarises the habitat compensation and enhancement measures which would be provided via delivery of the HMP (as outlined in **Technical Appendix 7.8**). The assessment has been completed on the basis that compensation does not remove a significant adverse effect but may offset it, such that the compensation can represent a significant beneficial effect (definitions of mitigation, compensation and enhancement are provided in **Section 7.4**).

7.9.3 **Table 7-13** summarises the losses and gains for important habitats, indicates what represents compensation and what represents enhancement, and provides a justification of the extent and nature of the compensation and enhancement areas proposed (see **Technical Appendix 7.8** for further details).

Table 7-13: Summary of Proposed Compensation and Enhancement

Feature	Predicted Change	Compensation/ Enhancement	Summary
Modified bog	The Proposed Development would result in direct and indirect loss of 7.28 ha of wet and dry modified bog. This would be compensated for through restoration of 62.9 ha of modified bog habitat (via ditch blocking, grazing management, management of purple moor grass and, where possible, *Sphagnum* translocation) with the long-term aim of achieving active blanket bog. Further compensation would be provided by the restoration of 15.7 ha of wet heath, flush or upland grassland (via ditch blocking, grazing management, management of purple moor grass).	Compensation	Current guidance (NatureScot, 2023) recommends a compensation ratio in the order of 1:10 in terms of blanket bog restoration, with additional restoration required to deliver significant biodiversity enhancement (in the region of an additional 10% of the baseline assessment of the extent of priority peatland habitat) to comply with the NPF4 guidance (Scottish Government, 2023). The oHMP proposes restoration of 62.9 ha of modified blanket bog within the Main Site (equating to a ratio of just under 1:9 of bog habitat lost/affected: directly restored). This is slightly lower than the 1:10 compensation ratio recommended by NatureScot. However, the area proposed for habitat compensation represents all the areas within the Main Site for which peatland restoration is feasible. In addition, 15.7 ha of wet heath, flush and upland grassland, in mosaic with the modified bog, would also benefit from the proposed restoration and management measures. Taken together, the total area proposed for habitat restoration is 78.6 ha, which represents a ratio of 1:10.8 of habitat lost to habitat restored. Although the complete success of all restoration areas can never be guaranteed in any bog restoration scheme, the bog restoration areas proposed within the oHMP incorporate areas that are deemed to have good deliverability and a high chance of restoration success, based upon survey data and use of recognised techniques. Overall, it is considered that the bog and wet heath/ flush restoration proposals would provide adequate compensation for the loss of / impact to modified bog habitat.

Feature	Predicted Change	Compensation/ Enhancement	Summary
Broadleaved woodland - plantation (native)	Creation of at least 2 ha of native riparian woodland.	Enhancement	Creation of at least 2 ha of new native riparian woodland would serve to increase connectivity of native woodland habitat in the local area and provide ecosystem services such as bank erosion and flood control. The proposed planting would also align with consented plans for adjacent wind farm development projects (e.g. WSP, 2024), thereby acting to strengthen habitat connectivity in the area. Establishment of native woodland within riparian zones would also enhance habitat for fish and aquatic invertebrates (increased shading, regulation of thermal regimes, and sediment control) and otter (additional opportunities for shelter and enhanced prey abundance).

Operation

7.9.4 Proposed monitoring and additional mitigation (if required) for bats during the operational phase are detailed below. Embedded mitigation and standard good practice mitigation measures for other important ecological features are detailed in **Section 7.6**. With the exception of bats, no additional mitigation measures relating to other important ecological features are required during the operational phase.

7.9.5 Bat monitoring would be undertaken based on NatureScot *et al*. (2021) guidelines. Monitoring would include:

- Monitoring of bat activity during wind farm operation, using similar methods to those employed during pre-application surveys, i.e. using full spectrum static bat detectors close to turbine bases, set to record for a minimum of ten nights per season (spring, summer and autumn) to allow comparison of data.
- Monitoring to detect bat carcasses, in sample locations across the Main Site, using specially trained search dogs is widely accepted to be the most effective way of detecting casualties (Mathews *et al*., 2013; NatureScot *et al*., 2021) at this time. However, due to the rapidity with which technology is progressing, it is possible that new, more effective methods for monitoring collision risk will emerge in the meantime. The precise methodology to be used would therefore be determined nearer the time.

7.9.6 Post-construction bat activity monitoring will start in year one of wind farm operation and will take place annually for the first three years of operation. The need for further monitoring will be reviewed at the end of year three.

7.9.7 In the event that collision monitoring identified potentially significant effects on bats, the results of the monitoring would be used to inform the development of additional mitigation proposals (such as curtailment of specific turbines during high-risk periods[37], or other methods considered to represent best practice at that time). Further details will be provided in a bat monitoring and mitigation strategy to be produced and agreed with EAC and NatureScot prior to the commencement of wind farm operation.

7.10 Assessment of Residual Effects

7.10.1 Residual effects relate to those that remain following incorporation of all mitigation measures.

Construction Residual Effects

7.10.2 Where possible, the Proposed Development has been designed to avoid loss of important ecological features. However, direct and indirect loss or damage to 7.28

[37] Current NatureScot *et al*. guidelines endorse curtailment but recommend that curtailment is restricted to times and weather conditions when bats are at high risk of collision. In order to minimise down time, the guidelines note that site-specific threshold values at which turbine curtailment is employed should be determined, informed by bat activity at that location. They go on to state that as an indication, curtailment thresholds are likely to be in the range of wind speeds between 5.0 and 6.5 m/s, as measured at the nacelle and at temperatures above approximately 10 or 11°C.

ha of wet and dry modified bog would constitute a **significant adverse effect at a County level**.

7.10.3 Of the 7.28 ha modified bog to be lost through construction of the Proposed Development, 1.73 ha of such loss will occur within Connel Burn/Benty Cowan LNCS, thereby constituting a likely **significant adverse effect** on the conservation status of the LNCS at a **County Level**.

7.10.4 These significant adverse effects would however be compensated for through restoration and management of 62.9 ha of modified bog and 15.7 ha of wet heath, flush and upland grassland habitat elsewhere within the Main Site (constituting 10.8 times the area lost or damaged), as set out in the oHMP (**Appendix 7.8**). The oHMP also provides details of additional biodiversity enhancement (riparian woodland establishment), that would represent **a significant beneficial effect at a Local level**.

7.10.5 With the embedded mitigation and good practice mitigation measures in place, **no significant residual effects** are predicted upon any other important ecological features during the construction phase.

Operational Residual Effects

7.10.6 With good practice mitigation measures in place, as well as additional monitoring and mitigation measures required for bats, **no significant residual effects** are predicted upon any important ecological features during the operational phase.

Cumulative Residual Effects

7.10.7 Significant cumulative adverse effect on modified bog habitat and Connel Burn/ Benty Cowan LNCS are predicted, both of which would be **significant at a County level**. However, the adverse effect resulting from the Proposed Development will be offset by the compensation measures set out in the oHMP. Following the incorporation of mitigation measures, **no significant cumulative residual effects** are predicted for any other important ecological features as a result of the Proposed Development.

Further Survey Requirements and Monitoring

Habitat Monitoring

7.10.8 Monitoring would be undertaken as part of the HMP to identify progress toward achieving its goals and objectives and to inform active management. This would include botanical and condition monitoring, water table monitoring and ditch blocking checks. Further details regarding the proposed scope and timing of proposed monitoring, and the methodologies that would be used, are provided in the oHMP (**Technical Appendix 7.8**).

Fish and Aquatic Invertebrate Monitoring

7.10.9 To accord with the scoping response provided by NDSFB, fish and aquatic invertebrate monitoring would be carried out during the year prior to commencement of construction, annually during construction and once again during year one post-construction.

7.10.10 Monitoring would follow similar methods to those used for the monitoring at Pencloe Wind Farm and for the Pencloe ALAR, but with additional monitoring points included to capture the higher reaches of Connel Burn and Carcow Burn. Monitoring results would be used to identify the need for remedial measures, if required. Further details will be provided in a fish and aquatic invertebrate monitoring plan, which would be agreed with NDSFB, SEPA and EAC prior to construction commencing.

7.11 Implementation of Environmental Measures

7.11.1 **Table 7-14** describes the environmental measures identified within this assessment and the means by which they would be secured.

Table 7-14: Summary of Environmental Measures to be Implemented

Environmental Measure	Responsibility for Implementation	Compliance Mechanism
Good practice pollution and sediment management	Contractor	CEMP (secured by planning condition)
Good practice dust management	Contractor	
Good practice storage and management of peat layers	Contractor	Peat Management Plan (part of CEMP)
Pre-construction surveys	Applicant	Planning condition
Environmental Clerk of Works	Applicant	Planning condition
Construction lighting specification requirements (minimise faunal disturbance)	Applicant	CEMP
Species Protection Plans	Applicant	Planning condition
On-site speed limit (15 mph)	Applicant and Contractor	CEMP
Habitat compensation, creation and enhancement	Applicant	Habitat Management Plan (secured by planning condition)
Post-construction bat activity and carcass monitoring	Applicant	Bat monitoring and mitigation strategy (secured by planning condition)
Fish and aquatic invertebrate monitoring	Applicant	Fish and aquatic invertebrate mitigation and monitoring plan (secured by planning condition)

7.12 Summary of Assessment

7.12.1 **Table 7-15** provides a summary of the likely significant effects on important ecological features associated with the Proposed Development.

Table 7-15 Summary of Effects on Important Ecological Features

Important Ecological Feature	Predicted Impact (pre-additional mitigation and/or compensation)	Significance	Additional Mitigation and/or Compensation or Enhancement	Residual Significance
Construction				
Connel Burn/ Benty Cowan LNCS	Permanent loss of 0.46 ha, and indirect loss/damage to 1.26 ha, of wet modified bog within the LNCS	**Significant adverse effect at County level**	Restoration of 62.9 ha of modified blanket bog habitat and 15.7 ha of wet heath / flush / upland grassland within the Main Site (10.8 times the area lost during construction).	**Significant adverse effect at a County level** but offset through compensatory bog and other upland habitat restoration measures, as detailed within **Technical Appendix 7.8**.
	Habitat degradation resulting from pollution and/ or sedimentation events	**Not significant**	No further mitigation beyond embedded and standard mitigation measures detailed in **Section 7.6**.	**Not significant**
Broadleaved woodland - plantation	N/A	N/A	Creation of at least 2 ha of native broadleaved riparian woodland within the Main Site, as detailed in **Appendix 7.8**.	**Significant beneficial effect at a Local level**
Wet modified bog (M20a, b, M25)	Permanent loss 0.49 ha and indirect loss/damage to 0.58 ha of wet modified bog	**Significant adverse effect at County level**	Restoration of 62.9 ha of modified blanket bog habitat and 15.7 ha of wet heath / flush / upland grassland within the Main Site (10.8 times the area lost during construction).	**Significant adverse effect at a County level**, but offset through compensatory bog and other upland habitat restoration measures, as detailed within (**Technical Appendix 7.8**).
Dry modified bog (M20a, b)	Permanent loss 2.67 ha and indirect loss/damage to 3.53 ha of dry modified bog			
Flush spring – acid/ neutral	Areas of flush were too small to map. Whilst it is possible that some of these may be lost or degraded during construction, the area affected is likely to be very small.	**Not significant**	No further mitigation beyond embedded and standard mitigation measures detailed in **Section 7.6**.	**Not significant**

Important Ecological Feature	Predicted Impact (pre-additional mitigation and/or compensation)	Significance	Additional Mitigation and/or Compensation or Enhancement	Residual Significance
Rivers	Habitat degradation resulting from pollution and/ or sedimentation events	**Not significant**	No further mitigation beyond embedded and standard mitigation measures detailed in **Section 7.6** and **Chapter 9: Hydrology, Hydrogeology; Geology and Soils.**	**Not significant**
Otter	Disturbance and/ or displacement of commuting, foraging or resting otter	**Not significant**	No further mitigation beyond embedded and standard mitigation measures detailed in **Section 7.6** and **Chapter 9: Hydrology, Hydrogeology; Geology and Soils.**	**Not significant**
	Injury or mortality			
	Habitat fragmentation			
	Decline in habitat quality and/ or prey abundance resulting from pollution and/or sedimentation incidents			
Bats (foraging and commuting)	Disturbance and/ or displacement of commuting and foraging bats	**Not significant**	No further mitigation beyond embedded and standard mitigation measures detailed in **Section 7.6**.	**Not significant**
Bats (roosting)	Disturbance and/ or displacement of roosting bats			
Reptiles	Habitat fragmentation	**Not significant**	No further mitigation beyond embedded and standard mitigation measures detailed in **Section 7.6**.	**Not significant**
	Injury or mortality			
Fish	Habitat degradation and/or reduction in populations resulting from pollution and/ or sedimentation events	**Not significant**	Monitoring of fish and aquatic invertebrate populations would take place during the year prior to construction, during construction and for one year post-construction to assess potential effects of	**Not significant**

Important Ecological Feature	Predicted Impact (pre-additional mitigation and/or compensation)	Significance	Additional Mitigation and/or Compensation or Enhancement	Residual Significance
			the Proposed Development and identify the need for remedial measures if required.	
Operation				
Bats (foraging and commuting)	Injury or mortality	Potentially **significant adverse effect at a Local level**	A programme of post-construction bat activity monitoring and carcass searches to be carried out for a period of at least three years. If monitoring indicates any significant issues mitigation (e.g. curtailment) to be implemented.	**Not significant**
All other important ecological features	Temporary disturbance and displacement of protected or notable fauna	**Not significant**	No further mitigation beyond embedded and standard mitigation measures detailed in **Section 7.6**.	**Not significant**
	Injury or mortality of protected or notable fauna			
	Environmental incidents and accidents (e.g. spillages) into freshwater habitats			
Decommissioning				
Effects expected to be similar in nature (although not necessarily in extent or intensity, and there would be no habitat loss) to those during the construction phase and similar embedded and good practice mitigation measures would be employed, under a Decommissioning and Restoration Plan. No significant residual effects are anticipated.				

7.13 References

Amec Foster Wheeler (2015) Enoch Hill Wind Farm Environmental Statement.

BCT (2016) Core Sustenance Zones: Determining Zone Size. Available online at: https://cdn.bats.org.uk/uploads/pdf/Resources/Core_Sustenance_Zones_Explained_04.02.16.pdf?v=1550597495&_gl=1*1irzyn0*_ga*MTkzMTE3OTI2NS4xNzI3MjU5MDk0*_ga_G28378TB9V*MTczMDE5MTg0My41LjAuMTczMDE5MTg0My4wLjAuMA

Brockwell Energy (2019). North Kyle Energy Project Environmental Impact Assessment Report, Volume 2: Main Report.

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

CIEEM (2019) Advice Note: On the Lifespan of Ecological Reports & Surveys. April 2019. Available online: https://cieem.net/resource/advice-note-on-the-lifespan-of-ecological-reports-and-surveys

CIEEM (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine, version 1.2 – updated April 2022. Chartered Institute of Ecology and Environmental Management, Winchester.

Community Windpower (2019). Sanqhuar II Community Wind Farm, Volume 1b EIA Report.

Confederation of Forest Industries (CONFER) (2018) Practice guide for forest managers to assess and protect Groundwater Dependent Terrestrial Ecosystems when preparing woodland creation proposals. [online] Available at: https://www.confor.org.uk/media/246950/practice-guide-on-ground-water-dependent-terrestrial-ecosystems.pdf [Accessed in June 2024]

East Ayrshire Council (2024). Local Development Plan 2: Local Nature Conservation Sites Draft Non-Statutory Planning Guidance. Available online at https://www.east-ayrshire.gov.uk/Resources/PDF/P/planning-nspg-local-nature-conservation-sites.pdf. [Accessed November 2024]

East Ayrshire Council (2016). State of the Environment Report. Chapter 3 Ecology and Nature Conservation. Available online at https://www.east-ayrshire.gov.uk/Resources/PDF/P/Planning-SoE-Chapter-3-Ecology-&-Nature-Conservation.pdf

Edgar, P., Foster, J., Baker, J (2010*). Reptile Habitat Management Handbook*. Amphibian and Reptile Conservation, Bournemouth.

ERG (2022). Sandy Knowe Wind Farm Extension Environmental Impact Assessment, Chapter 6: Ecology

Institution of Lighting Professionals (ILP) (2023). Bats and Artificial Lighting at Night. Guidance Note GN08/23. Available online at https://www.bats.org.uk/news/2023/08/bats-and-artificial-lighting-at-night-ilp-guidance-note-update-released

Jacobs (2015). Pencloe Wind Farm Environmental Statement

JNCC (2010). Handbook for phase 1 habitat survey – a technique for environmental audit. Joint Nature Conservation Committee, Peterborough.

Mackenzie Bradshaw Environmental Consulting (2013). South Kyle Wind Farm Environmental Statement, Chapter 12: Ecology.

Mathews, F., Swindells, M., Goodhead, R., August, T. A., Hardmann, P., Linton, D.M. & Hosken, D.J. (2013). Effectiveness of search dogs compared with human observers in

locating bat carcasses at wind-turbine sites: A blinded randomized trial. Wind Energy and Wildlife Conservation. Wildlife Society Bulletin.

Natural Power (2015) Brockloch Rig III (Windy Standard III) Environmental Statement, Volume 2.

NatureScot., Natural England., Natural Resources Wales., RenewableUK., Scottish Power Renewables., Ecotricity Ltd., the University of Exeter., BCT (2021). *Bats and onshore wind turbines – survey, assessment and mitigation.* Available online at https://www.nature.scot/doc/bats-and-onshore-wind-turbines-survey-assessment-and-mitigation.

NatureScot (2020a). Brown hare. Available at: https://www.nature.scot/plants-animals-and-fungi/mammals/land-mammals/hares-and-rabbits [Accessed August 2024].

NatureScot (2020b). Otter. Available at: https://www.nature.scot/plants-animals-and-fungi/mammals/land-mammals/otterAccessed in August 2024]

NatureScot (2020c) Pine marten. Available online at: https://www.nature.scot/plants-animals-and-fungi/mammals/land-mammals/pine-marten [Accessed in August 2024]

NatureScot (2020d) Red squirrel. Available at: https://www.nature.scot/plants-animals-and-fungi/mammals/land-mammals/red-squirrel [Accessed August 2024]

NatureScot (2020e) Scotland's native reptiles and amphibians. Available at: https://www.nature.scot/plants-animals-and-fungi/amphibians-and-reptiles/scotlands-native-reptiles-and-amphibians [Accessed in August 2024]NatureScot (2024f) Water voles. Available online at https://www.nature.scot/plants-animals-and-fungi/mammals/land-mammals/water-voles

NatureScot (2023). Advising on peatland, carbon rich soils and priority peatland habitats in development management. Available online at: https://www.nature.scot/doc/advising-peatland-carbon-rich-soils-and-priority-peatland-habitats-development-management#:~:text=Peatlands%20are%20known%20to%20be,water%2C%20and%20reducing%20peak%20flows

NatureScot (2024a) Good Practice During Wind Farm Construction. Available online at https://www.nature.scot/doc/good-practice-during-wind-farm-construction

NatureScot (2024b). Pre-Application Guidance for Onshore Wind Farms. Available at https://www.nature.scot/doc/naturescot-pre-application-guidance-onshore-wind-farms

Newson, S.E., Evans, H.E., Gillings, S., Jarrett, D, Wilson, M.W. (2017). A survey of high risk bat species across southern Scotland. Scottish Natural Heritage Commissioned Report No. 1008. Available online at https://www.nature.scot/sites/default/files/2017-10/Publication%202017%20-%20SNH%20Commissioned%20Report%201008%20-%20A%20survey%20of%20high%20risk%20bat%20species%20across%20southern%20Scotland.pdf

NDSFB (2020). Aquatic Surveys to Assess Fish Populations, Aquatic Macroinvertebrate Communities, and Freshwater Pearl Mussels in the Vicinity of Pencloe Wind Farm Site.

Peatland Action, 2016. Peatland Condition Assessment, Inverness: NatureScot. Available online at https://www.nature.scot/sites/default/files/2023-02/Guidance-Peatland-Action-Peatland-Condition-Assessment-Guide-A1916874.pdf

Rodwell, J.S. (2006) *NVC Users' Handbook*. ISBN 978 1 86107 574 1.

Rodwell, J.S. (1991 *et seq*) *British Plant Communities*. Cambridge University Press.

RPS (2004). Afton Wind Farm Proposal Environmental Statement

Scottish Government (2023). National Planning Framework 4. Available online at https://www.gov.scot/binaries/content/documents/govscot/publications/strategy-plan/2023/02/national-planning-framework-4/documents/national-planning-framework-4-revised-draft/national-planning-framework-4-revised-draft/govscot%3Adocument/national-plannin

Scottish Government (2021). Freshwater and diadromous fish and fisheries associated with onshore wind farm and transmission line developments: generic scoping guidelines. Available online at: https://www.gov.scot/publications/freshwater-and-diadromous-fish-and-fisheries-associated-with-onshore-wind-farm-and-transmission-line-developments-generic-scoping-guidelines/

Scottish Government (2020). Marine Directorate – Science Evidence Data and Digital (MD-SEDD) advice on freshwater and diadromous fish and fisheries in relation to onshore wind farm developments.

SEPA (2017). Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems. Land Use Planning System SEPA Guidance Note 31 (LUPS – GN31). Version 3 Issued 11 September 2017. [online] Available at: https://www.sepa.org.uk/media/144266/lups-gu31-guidance-on-assessing-the-impacts-of-development-proposals-on-groundwater-abstractions.pdf [Accessed in June 2024]

SLR Consulting (2018). Ashmark Hill Community Wind Farm EIAR.

SLR Consulting (2022). Pencloe Wind Farm Discharge of Conditions.

SLR (2021). Pencloe Abnormal Load Access Option Environmental Impact Assessment Report.

SPR (2020). Euchanhead Renewable Energy Development. Chapter 8 Ecology.

SPR (2007). Hare Hill Extension Environmental Statement, Chapter 7 Ecology and Nature Conservation.

SWECO (2019). Pencloe Wind Farm EIAR

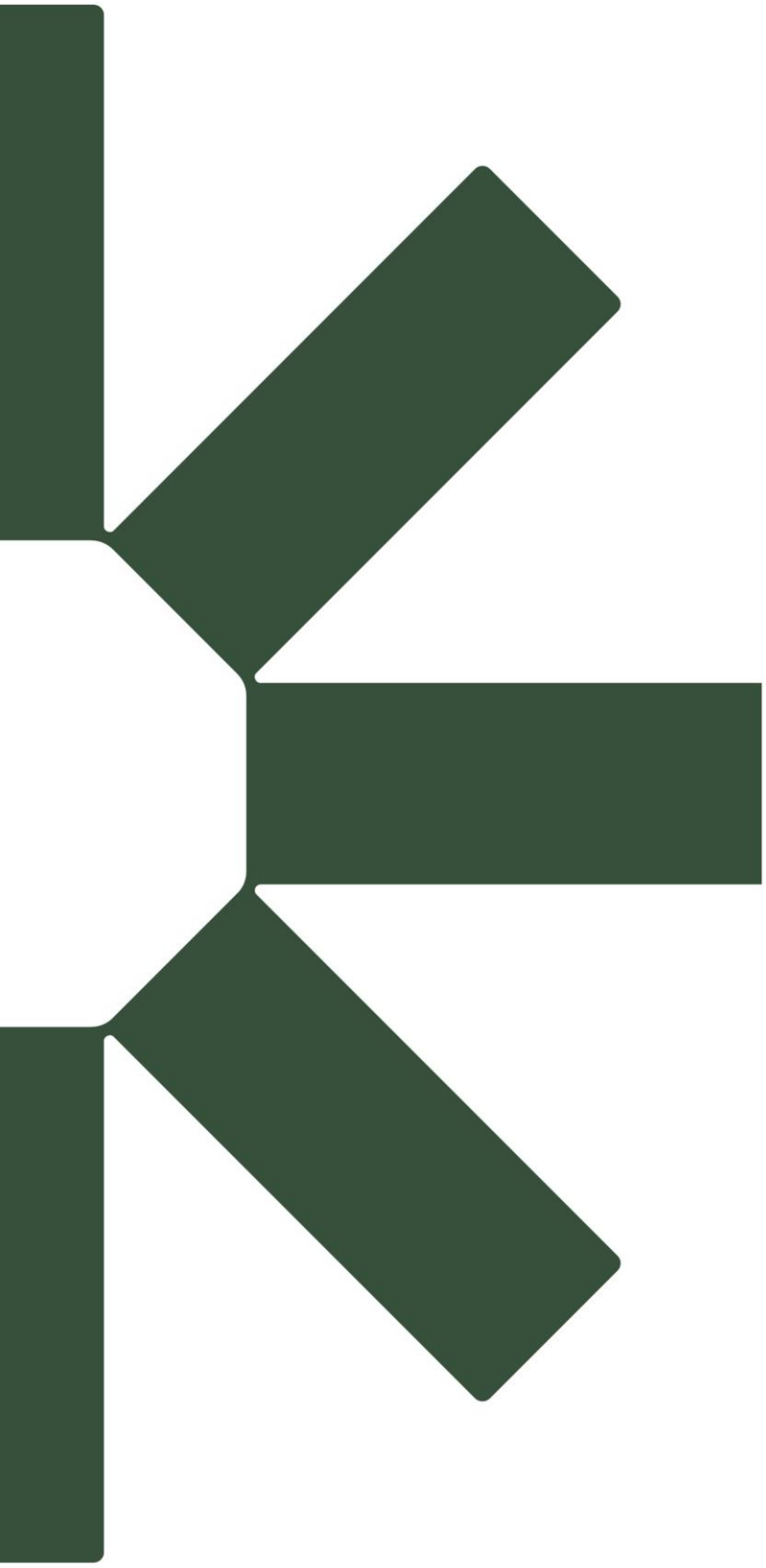
Wood (2019) Benbrack Wind Farm Environmental Impact Assessment Report, Chapter 11 Ecology.

Wood (2020). Enoch Hill Application - Main Report.

Wood (2021). 15/0004/S36 Enoch Hill Wind Farm – Discharge of Condition 26: Bat Monitoring Strategy.

WSP (2023). Enoch Hill II Environmental Impact Assessment Report.

WSP (2024). Enoch Hill II Wind Farm Outline Habitat Management Plan.



Making Sustainability Happen