

9 Ecology

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9. Ecology

9.1. Summary

- 9.1.1. This Chapter assesses effects of the Proposed Varied Development on ecological receptors, including protected species and designated sites. The majority of receptors are scoped out due to their evaluation at a local or less than local level importance (or the lack of any significant impacts being likely to arise as a result of the Proposed Varied Development). Bats and otter are scoped into this assessment.
- 9.1.2. Committed mitigation measures will offset effects to both bats and otter throughout construction, operation and decommissioning. Taking account of committed mitigation, residual effects are not considered to be significant.
- 9.1.3. Cumulative effects are considered in relation to bats. Given the low levels of bat activity in the local area and lack of significant effects and/or residual impacts from the developments and planning applications considered, no significant cumulative effects are anticipated.
- 9.1.4. Findings of this assessment in relation to the Proposed Varied Development are consistent with the findings of the Environmental Impact Assessment (EIA) that was produced to inform the Consented Development in 2018, supplemented with Additional Environmental Information (AEI) in 2019 and 2021. This is summarised in **Table 9.1**.

Table 9.1 – Summary of Conclusions – Proposed Varied Development and Consented Development

2018 Section 36 Application, supported by Additional Environmental Information I (2019) and Additional Environmental Information II (2021) - the Consented Development	2026 Section 36C Application - the Proposed Varied Development
The EIA scoped bats and otter into assessment.	The EIA scoped bats and otter into assessment. Other ecological receptors were considered to be of local or less than local importance (or with a lack of any significant impacts likely to arise from the Proposed Varied Development)
Potential effects in relation to bats included: habitat displacement (construction and decommissioning), roost loss (construction) and turbine collision (operation). With	Potential effects in relation to bats include: habitat displacement (construction and decommissioning), roost loss (construction) and turbine collision and barotrauma ¹

¹ Barotrauma is physical tissue damage caused by a pressure difference between an unvented space inside the body and surrounding gas or fluid. The damage is due to shear or overstretching of tissues. As a gas-filled space expands or contracts, it can cause damage to the local tissue.

mitigation in place, these were considered to be non-significant.	(operation). With mitigation in place, these are considered to be non-significant.
Potential effects in relation to otter included: disturbance (construction and decommissioning) and traffic collision related mortality (construction, operation and decommissioning). With mitigation in place, these were considered to be non-significant.	Potential effects in relation to otter include: disturbance (construction and decommissioning) and traffic collision related mortality (construction, operation and decommissioning). With mitigation in place, these are considered to be non-significant.
No significant residual effects.	No significant residual effects.
No significant cumulative effects.	No significant cumulative effects.

9.2. Introduction

- 9.2.1. This Chapter of the Environmental Impact Assessment (EIA) Report assesses the effects of the Proposed Varied Development on habitats and species and complements the assessment of ornithological effects presented in **Chapter 10: Ornithology**.
- 9.2.2. This Chapter describes the methods used to evaluate the habitat and species interest of the site. It considers the ways in which these ecological features may be affected by the Proposed Varied Development, and the significance of these effects. In making an assessment of impacts, this Chapter draws on information obtained through desk study, consultation, and field survey.
- 9.2.3. It supplements Chapter 9: Ecology of the EIA Report (Infinergy, 2018), Chapter 9: Ecology of the Additional Environmental Information (AEI) Report (Infinergy, 2019), and Section 4 of the AEI Report II (Infinergy, 2021), and should be read in conjunction with these.
- 9.2.4. The key element of the Proposed Varied Development is that turbine numbers are reduced, and the locations of three turbines (5, 6 and 7) are unchanged (within micro-siting allowance) from the Consented Development. Locations of most of the remaining turbines are within 200 m of a consented position, relocated to incorporate the constraints associated with larger turbines. Four turbines (1, 2, 4 and 11) are over 200 m from a consented turbine location; however, no turbine is over 500 m from a consented location and all turbines are located within the same habitat types as the Consented Development. No significant additional impacts are therefore predicted.
- 9.2.5. A suite of ecological survey data was gathered by Bear Environmental Limited and Arcus Consultancy Services Limited in 2018 to support the Consented Development's Section 36 Application, submitted in late 2018. The ecological impact assessment determined that no significant ecological impacts would arise from the Consented Development. Due to the age of the data collected in 2018, updated ecological surveys have been undertaken to support

the Proposed Varied Development, to determine if the conditions on site have remained unchanged.

- 9.2.6. BSG Ecology have been commissioned by SETT Wind Development Limited (the Applicant) to provide an updated terrestrial ecology Chapter of the EIA Report, as well as updated baseline habitat and protected species survey data for the site, to support the Proposed Varied Development. The assessment has been produced by BSG Ecology; fieldwork was undertaken by Solway Ecology on behalf of BSG Ecology.
- 9.2.7. Ornithological aspects are assessed by Natural Research Projects Limited (NRP) and the results are presented in **Chapter 10**.
- 9.2.8. This Chapter is broadly structured as follows:
- Legislation, policy and guidance;
 - Assessment methodology and significance criteria;
 - Baseline methodology;
 - Scoping responses and consultation;
 - Baseline conditions;
 - Assessment of ecological importance;
 - Embedded mitigation;
 - Ecological impact assessment;
 - Mitigation measures;
 - Residual effects
 - Assessment of cumulative effects; and
 - Summary.
- 9.2.9. Potential effects on ecology and designated sites for nature conservation are often interrelated with effects on ornithology, hydrology, geology, cultural heritage, and forestry. This Chapter should be read in conjunction with **Chapter 7: Forestry, Chapter 10: Ornithology, Chapter 11: Cultural Heritage, Chapter 12: Geology and Peat, and Chapter 13: Hydrology and Hydrogeology**.
- 9.2.10. The Chapter is supported by:
- **Appendix 9.1** – 2018 Extended Phase 1 Habitat Report (Bear Environmental 2018);

- **Appendix 9.2** – 2018 Protected Species Survey Report (Arcus 2018a);
- **Appendix 9.3** – 2018 Bat Report (Arcus 2018b);
- **Appendix 9.4** – 2018 Fisheries Survey Report (Galloway Fisheries Trust 2018);
- **Appendix 9.5** – 2024 Habitats Report;
- **Appendix 9.6** – 2024 Protected Species Report;
- **Appendix 9.7** – 2025 Bat Survey Report; and
- **Appendix 9.8** – 2026 Outline Habitat Enhancement and Management Plan (OHEMP).

9.2.11. Common, vernacular species names are presented in this Chapter (except with reference to species without such) followed by the scientific name (upon first use of the common name only).

9.2.12. The following terms are used within this Chapter to describe the Proposed Varied Development and various associated study areas:

- The Proposed Varied Development: the whole physical process involved in the development of Shepherds' Rig Wind Farm, including wind farm construction, operation and decommissioning (i.e. not a piece of land or area);
- The site boundary: the red line or application boundary;
- The site: the land within the site boundary available for turbine development and associated wind farm infrastructure;
- Desk Study Area: a variable radius around the site in which existing information and data have been considered;
- Survey Area: the area in which any given ecology survey has been undertaken; and
- Ecological Zone of Influence: This is the area over which ecological features may be subject to significant effects as a result of the Proposed Varied Development. The zone of influence varies for different ecological features depending on their sensitivity to environmental change.

9.3. Legislation, Policy and Guidelines

Legislation

9.3.1. The following is a summary of legislation of relevance to this Chapter:

- Council Directive 92/43/EEC (the 'Habitats Directive') (European Commission, 1992);

- Council Directive 2000/60/EC ('Water Framework Directive') (European Commission, 2000);
- Wildlife and Countryside Act 1981 (as amended) (UK Government, 1981);
- Conservation (Natural Habitats, & c) Regulations 1994 (the 'Habitat Regulations') (Scottish Government, 1994);
- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (the EIA Regulations);
- Conservation of Habitats and Species Regulations 2017 (UK Government, 2017);
- Wildlife and Natural Environment (Scotland) Act 2011 (Scottish Government, 2011);
- Protection of Badgers Act 1992 (UK Government, 1992);
- Nature Conservation (Scotland) Act 2004 (Scottish Government, 2004); and
- Salmon and Freshwater Fisheries Act 2003 (Scottish Government, 2003).

Policy and Guidance

9.3.2. In addition to the above legislation and the detailed survey guidance detailed below, the following is a summary of the key policy and guidance of relevance to this Chapter:

- National Policy Framework 4 (NPF4) (Scottish Government, 2023), in particular policy 3.
- Scottish Biodiversity Strategy to 2045 (Scottish Government, 2024);
- The Scottish Government, 2020 Challenge for Scotland's Biodiversity (Scottish Government, 2015);
- Scottish Biodiversity List (SBL) (Scottish Government, 2020);
- Onshore Wind Policy Statement 2022 (Scottish Government, 2022);
- Scottish Environment Protection Agency (SEPA) Guidance on Assessing the Impacts of Windfarm Development (SEPA, 2017a);
- Guidance on Assessing the Impacts of Developments on Groundwater Dependent Terrestrial Ecosystems (SEPA, 2024);
- Environmental Authorisation (Scotland) Regulations (Scottish Government, 2018);
- Good Practice During Wind Farm Construction (NatureScot, 2024);
- NatureScot General pre-application / scoping advice to developers of onshore wind farms (NatureScot, 2020);

- Dumfries and Galloway Local Development Plan 2 (LDP2), adopted 2019 (Dumfries and Galloway Council, 2019) including:
 - NE4: sites of international importance for biodiversity;
 - NE5: species of international importance;
 - NE6: sites of national importance for biodiversity and geodiversity;
 - NE7: forestry and woodland;
 - NE8: trees and development;
 - NE11: supporting the water environment;
 - NE12: protection of water margins
 - NE15: protection and restoration of peat deposits as carbon sinks
 - IN1: renewable energy
 - IN2: wind energy
- NatureScot Decommissioning and Restoration Plans for wind farms (SNH 2016); and
- Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment (EclA) (CIEEM, 2018).

9.3.3. In addition to the above, published guidance regarding the specific ecology aspects (such as survey methodology) are considered within this Chapter and associated appendices, with citations where relevant. Work has been carried out with reference to BS:42020 Biodiversity: Code of Practice for Planning and Development (BSBI Group, 2013).

9.3.4. NPF4 policy 3 states:

“a) Development proposals will contribute to the enhancement of biodiversity, including where relevant, restoring degraded habitats and building and strengthening nature networks and the connections between them. Proposals should also integrate nature-based solutions, where possible.

b) Development proposals for national or major development, or for development that requires an Environmental Impact Assessment will only be supported where it can be demonstrated that the proposal will conserve, restore and enhance biodiversity, including nature networks so they are in a demonstrably better state than without intervention. This will include future management. To inform this, best practice assessment methods should be used. Proposals within these categories will demonstrate how they have met all of the following criteria:

i. the proposal is based on an understanding of the existing characteristics of the site and its local, regional and national ecological context prior to development, including the presence of any irreplaceable habitats;

- ii. wherever feasible, nature-based solutions have been integrated and made best use of;*
 - iii. an assessment of potential negative effects which should be fully mitigated in line with the mitigation hierarchy prior to identifying enhancements;*
 - iv. significant biodiversity enhancements are provided, in addition to any proposed mitigation. This should include nature networks, linking to and strengthening habitat connectivity within and beyond the development, secured within a reasonable timescale and with reasonable certainty. Management arrangements for their long-term retention and monitoring should be included, wherever appropriate; and*
 - v. local community benefits of the biodiversity and/or nature networks have been considered.*
- c) Proposals for local development will include appropriate measures to conserve, restore and enhance biodiversity, in accordance with national and local guidance. Measures should be proportionate to the nature and scale of development. Applications for individual householder development, or which fall within scope of (b) above, are excluded from this requirement.*
- d) Any potential adverse impacts, including cumulative impacts, of development proposals on biodiversity, nature networks and the natural environment will be minimised through careful planning and design. This will take into account the need to reverse biodiversity loss, safeguard the ecosystem services that the natural environment provides, and build resilience by enhancing nature networks and maximising the potential for restoration.”*

9.3.5. NPF 4 policies 3b and 3b(iv) are of specific relevance to this assessment.

9.4. Consultation

9.4.1. Ecological consultation additional to that undertaken for the Consented Development is detailed in **Table 9.2**, which provides an overview of consultations undertaken with relevant statutory bodies, together with action undertaken by the Applicant in response to consultation comments.

Table 9.2 – Details of Consultation

Consultee	Key Consultee Comments	Application Action
Energy Consents Unit (ECU)	Standing advice from Marine Directorate - Science Evidence Data and Digital (MD-SEDD).	The MD-SEDD EIA Checklist has been completed and provided with the EIA Report for the Proposed Varied Development.

Consultee	Key Consultee Comments	Application Action
	In addition to identifying the main watercourses and waterbodies within and downstream of the Proposed Development area, developers should identify and consider, at this early stage, any areas of Special Areas of Conservation where fish are a qualifying feature and proposed felling operations particularly in acid sensitive areas.	Noted. Statutory designated sites, including Special Areas of Conservation, have been considered in this assessment, refer to Section 9.6 .
NatureScot – Scoping Response (29 August 2024)	State that they are broadly in agreement with the proposed scope of the surveys and the intention to scope out certain protected areas and species from the EIA due to a lack of connectivity, or other factor.	Noted.
	Comments that the proposed significant biodiversity enhancements measures, as required under National Planning Framework 4 (NPF4) and as stated in Section 7.8.4 of the Scoping Report, should be expanded on as part of the EIA.	Habitat creation, forest to bog restoration and re-stocking will take place across the site, including areas of broadleaved woodland, and habitat enhancement for woodland specialist bat species. Section 9.11 summarises additional enhancement. An Outline Habitat Enhancement and Management Plan is included as Appendix 9.8 .
	The Applicant should refer to our pre-application guidance for onshore wind farms.	Noted – the scope of work has been informed by this guidance.

Consultee	Key Consultee Comments	Application Action
NatureScot – Gatecheck 1 Response (17 February 2025)	Generally content that the Applicant appears to have taken on board the advice we have provided to date with regards to the scope of the EIA. We are pleased that GWDTE will be considered as part of the assessment.	Noted.
NatureScot – Updated Gatecheck 1 Response (6 May 2026)	Gatecheck 1 comments provided in February 2025 remain relevant. Understand that further design amendments have been undertaken.	Noted.
Scottish Environmental Protection Agency (SEPA) – Scoping Response (13 August 2024)	The Applicant should confirm that the new position for the infrastructure is still out with buffers of any groundwater dependent terrestrial ecosystems (GWDTEs) found on-site and other ecologically sensitive areas.	The project hydrologists, Fluid, have reviewed the habitats and determined that no GWDTE are present (refer to Chapter 13). This assessment is in line with the 2018 hydrology assessment which also recorded no GWDTEs on-site
	A National Vegetation Classification (NVC) survey should be undertaken for the Proposed Varied Development.	An NVC survey has been undertaken for the Proposed Varied Development, refer to Section 9.5 and Appendix 9.5 .
Fisheries Management Scotland – Scoping Response (1 August 2024)	The proposal should be conducted in consultation with the Dee District Salmon Fishery Board and Galloway Fisheries Trust.	Organisations consulted to inform the ecological impact assessment for the Consented Development included Dee District Salmon Fisheries Board via the Galloway Fisheries Trust. Feedback that was provided for the Consented Development has been

Consultee	Key Consultee Comments	Application Action
		considered for the Proposed Varied Development. Due to the relatively limited infrastructure amendments and the non-significant changes in the baseline habitats and protected species assessments since 2018, further consultation was not considered necessary.
	Fisheries Management Scotland guidelines for wind farm developments should be fully considered throughout the planning, construction and monitoring phase of the Proposed Varied Development.	Noted.
Dumfries & Galloway Council – Scoping Response (28 October 2024)	Provided no comments in relation to ecology.	Noted.

- 9.4.2. The following organisations (with potential to be relevant to ecology) were consulted via the Scoping process but did not provide a response: Crown Estate Scotland, Galloway Fisheries Trust, John Muir Trust, Scottish Wildlife Trust, Scottish Wild Land Group, Visit Scotland, Woodland Trust Scotland and Carsphairn Community Council.

9.5. Assessment Methodology and Significance Criteria

Scope of Assessment

- 9.5.1. The principle ecological issues considered within this Chapter include:

- Potential effects on statutory and non-statutory sites designated for nature conservation, located within 10 km of the site;

- Long-term or short-term direct habitat loss or damage due to land take during construction, operation and decommissioning of the Proposed Varied Development;
- Indirect disturbance effects, e.g. the displacement or disturbance of species as a consequence of construction, operation or decommissioning activities; and
- The potential mortality of species during construction, operation and decommissioning of the Proposed Varied Development.

Assessment Methodology

- 9.5.2. The approach taken to impact assessment follows the principles of the CIEEM guidance for EcIA (CIEEM, 2018).
- 9.5.3. Although this is widely considered to represent the industry standard for ecological assessment, the guidance itself recognises that the approach to Ecological Impact Assessment (EcIA) should not be prescriptive; it follows that the aim of the document is therefore to “...provide guidance to practitioners for refining their own methodologies”.

Important Ecological Features

- 9.5.4. A first step in EcIA is the determination of which ecological features (habitats, species, ecosystems and their functions/processes) are important. Important features should be subject to detailed assessment if they are likely to be affected by a proposed development. It is not necessary to carry out detailed assessment of features that are sufficiently widespread, unthreatened and/or resilient to project effects, such that there is no risk to their viability.
- 9.5.5. Ecological features can be important for a variety of reasons. Importance may relate, for example, to the quality or extent of designated sites or habitats, to habitat/species rarity, to the extent to which they are threatened throughout their range, or to their rate of decline.

Determining Importance

- 9.5.6. The importance of an ecological feature should be considered within a defined geographical context. The frame of reference detailed in **Table 9.3** has been used showing the CIEEM terminology for expressing importance, with EIA equivalent terminology shown in brackets alongside
- 9.5.7.** In certain circumstances particular receptors may be valued below the Site level. In these instances, they are described as being of negligible importance.

Table 9.3 – Geographic Context of Important Ecological Features

Level of Importance	Example of Definition	Equivalent EIA Terminology
International	An internationally designated site (e.g. a Special Area of Conservation [SAC]) or a site meeting criteria for international designations. Species in internationally important numbers (> 1 % of biogeographic populations).	Very High
National (UK)	A nationally designated site (e.g. a Site of Special Scientific Interest [SSSI]) or a site meeting criteria for national designations. Species present in nationally important numbers (> 1% UK population). Large areas of priority habitats listed on Annex I of the Habitats Directive and smaller areas of such habitats that are essential to maintain the viability of that ecological resource.	High
Regional (Scotland)	Species present in regionally important numbers (> 1% Scottish population). Sites not meeting criteria for SSSI selection but of greater than the local criteria below.	High
County (Dumfries & Galloway)*	Scottish Wildlife Trust (SWT) Reserves and Local Nature Reserves (LNRs). Local Biodiversity Action Plan (LBAP) priorities, where they occur in sufficient abundance to maintain the local resource. Areas of habitat or species considered to appreciably enrich the ecological resource within the local context.	Moderate
Local	Up to a 20 km radius of the Site.	Low
Site Level	Usually widespread and common habitats and species.	Minor

*Features falling below County importance will not be considered in detail within the assessment process (except where predicted effects on features are significant in respect of local policies, as set out in CIEEM 2024 guidance, see **Section 9.5.12**).

Characterising and Quantifying Effects and Significance

- 9.5.8. The CIEEM guidelines state that ecological effects or impacts should be characterised in terms of ecosystem structure and function and reference should be made *as required* to: beneficial, adverse or neutral effects; extent; magnitude; duration; reversibility; timing and frequency; and cumulative effects. The guidelines provide a list of "*aspects of ecological structure and function to consider when predicting impacts and effects*" (Box 17). The terms impact and effect are used within this chapter in accordance with the following definitions (as provided by the guidelines):
- Impact: Actions resulting in changes to an ecological feature. For example, the construction activities of a development removing an area of woodland.
 - Effect: Outcome to an ecological feature from an impact. For example, the effects on a bat population from loss of an area of woodland.
- 9.5.9. Following the characterisation of effects, an assessment of their ecological significance is made. The guidelines promote a transparent approach in which a beneficial or adverse effect is determined to be significant or not, in ecological terms, in relation to the integrity of the defined site or ecosystem(s) and/or the conservation status of habitats or species within a given geographical area, which relates to the level at which it has been valued.

Significant Effects

- 9.5.10. Box 3 (Significant Effects) in the EclA guidelines states that "*Significance is a concept related to the weight that should be attached to effects when decisions are made. For the purpose of EclA, '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*".
- 9.5.11. A significant effect is an effect that is sufficiently important to require assessment and reporting so that the decision maker is adequately informed of the environmental consequences of permitting a project. In broad terms, significant effects encompass impacts on structure and function of defined sites, habitats or ecosystems and the conservation status of habitats and species (including extent, abundance and distribution).
- 9.5.12. The EclA guidelines also state that: "*A significant effect does not necessarily equate to an effect so severe that consent for the project should be refused planning permission. For example, many projects with significant adverse ecological effects can be lawfully permitted following EIA procedures*" and "*Significant effects should be qualified with reference to an appropriate geographic scale. For example, a significant effect on a Site of Special Scientific Interest or Natural Heritage Area is likely to be of national significance. European case law is*

specific regarding significance in relation to European sites and Annexed habitats. However, the scale of significance of an effect may not be the same as the geographic context in which the feature is considered important (Chapter 4). For example, an effect on a species which is on a national list of species of principal importance for biodiversity may not have a significant effect on its national population. Examples of other relevant scales include regional and county. It should be noted that effects may be significant at the local scale, particularly in view of policies for no net loss of biodiversity”.

- 9.5.13. The significance of effects is, therefore, qualified with reference to an appropriate geographic scale (based on the same frame of reference for determining importance, above) considering the extent and type of impacts, and populations of the affected receptor. The assessment of significance is based on professional judgement taking into account the nature and characteristics of the impact on the receptor.

Mitigation

- 9.5.14. Where significant effects have been identified, the mitigation hierarchy has been taken into account, as suggested in the CIEEM guidelines, which set out a sequential approach of avoiding significant effects where possible, applying additional mitigation measures (beyond embedded and designed-in mitigation) to minimise unavoidable significant effects and then compensating for any remaining significant effects. Once avoidance and mitigation measures, and any necessary compensation measures, have been applied, and opportunities for enhancement incorporated, residual significant effects are then identified.
- 9.5.15. Where mitigation and compensation has been proposed, this is proportionate with the geographical scale at which an effect is significant. *“For example, mitigation and compensation for effects on a species population significant at a county scale should ensure no net loss of the population at a county scale. The relative geographical scale at which the effect is significant will have a bearing on the required outcome which must be achieved”.*

Ecological Zone of Influence

- 9.5.16. The Ecological Zone of Influence (EZoI) is defined as the area within which there may be ecological features subject to effects from the Proposed Varied Development. Such effects could be direct, e.g., habitat loss resulting from land-take, or indirect, e.g., noise or visual disturbance causing a species to move out of the EZoI. The EZoI was determined through:
- Review of the baseline conditions based on desk study results, field surveys and information supplied by consultees;
 - Identification of sensitivities of ecological features, where known;
 - The outline design of the Proposed Varied Development and approach to construction; and

- Through liaison with other technical specialists involved in the assessment, including the project hydrologists.

9.5.17. For bats, the area around a bat roost in which habitat availability and quality could have an influence on the resilience and conservation status of that roost is of particular importance. For UK bat species, this can range from approximately 1 to 4 km (Matthews *et al*, 2016) although individual flights can be longer. Given the long distances that can be travelled by bats a zone of influence of 10 km for bat species is considered appropriate for the Proposed Varied Development. This distance is supported by current guidance on assessing impacts of wind farms on bats (NatureScot, 2021a), which suggests that relevant bat information within 10 km of a proposed wind energy site is obtained as well as the location, number and size of turbines in other wind energy developments within the surrounding 10 km.

9.5.18. A 10 km EZoI is considered to be precautionary for all receptors with the exception of bats, as the identified impact mechanisms are unlikely to extend this far (as the cause effect pathway diminishes over distance). Any impacts arising because of pollution events are unlikely to extend beyond 5 km of the site (see **Chapter 13**, Section 5). The typical ranging distance of all protected and notable species considered in this assessment (including bats) is less than 10 km. Otter (*Lutra lutra*) are the exception with ranges covering up to 32 km for males in freshwater environments (NatureScot, 2024b); however, 5km is considered a sufficient desk study radius in this circumstance where potential impacts do not extend beyond the Site level.

Residual Effects

9.5.19. Following assessment of effects, which take into account embedded mitigation, attempts will be made to avoid and mitigate any remaining significant effects, through specific ecological mitigation. Upon finalisation of mitigation specific to any significant effects, assessment of the residual effects of the proposal on ecological features will be undertaken.

Cumulative Effects

9.5.20. Cumulative effects can result from individually not significant but collectively significant effects or actions taking place over a period of time or concentrated in a location. Within EcIA, cumulative effects are particularly important as many ecological features are exposed to background levels of threat or pressure and may be close to reaching critical thresholds where further impact could cause irreversible decline. It is recognised that different actions can cause cumulative effects as follows:

- *Additive/incremental effects*: multiple activities/projects may give rise to a significant effect due to their proximity in time and space. These may be additive or synergistic effects; and
- *Associated / connected*: a development activity enables another development activity e.g. phased development as part of separate planning applications. Associated developments

may include different aspects of the project which may be authorised under different consent processes.

Desk Study Methodology

- 9.5.21. A desk study was conducted in 2024 with the aim of identifying nature conservation sites in both the local and wider environment and to obtain historical records of ecological features. The desk study searched for records of non-statutory and statutory site of nature conservation interest, protected species, and priority habitats and species for nature conservation. Data from the desk study is less than 2 years old and given that the site has not changed significantly in character since then (and since 2018) there is no particular reason to update the desk study.
- 9.5.22. A 5 km study area was considered to be proportionate for protected species records, increasing to 10 km for bats, taking into account the size of the proposal and the habitats surrounding. The South-West Scotland Environmental Information Centre (SWSEIC) was contacted in December 2024 to obtain records of protected species and habitats, as well as non-statutory designated sites, within the desk study area. Records were reviewed critically alongside field survey results to assist with the evaluation as opposed to relying on them as the sole basis for the evaluation.
- 9.5.23. The desk study area was increased to 10 km for bat records in line with the 10 km EZol detailed in guidance (NatureScot, 2021a).
- 9.5.24. Non-statutory site locations are shown on **Figure 9.1a**. Information publicly available on MAGIC Map was also consulted to search for national statutory designated sites within 10 km and international designations within 20 km (see **Figure 9.1b and c**) to ensure zones of influence for all species and impact risk zones for designated sites were accounted for.
- 9.5.25. Resources used to complete the desk study are summarised below in **Table 9.4**.

Table 9.4 – Data Sources Referenced in the Assessment

Data Source	Date Last Accessed / Received	Notes
MAGIC ²	Accessed December 2024. Most recently accessed June 2026	A 10 km desk study area was adopted for national Statutory-designated sites, increased to 20 km for international designations. Scotland data for European protected species licences and Great Crested Newt <i>Triturus cristatus</i> pond survey results 2017 – 2019 is not available.

² Multi Agency Geographic Information for the Countryside (MAGIC).

Data Source	Date Last Accessed / Received	Notes
Scottish Ancient Woodland Inventory (AWI)	Accessed August 2024. Most recently accessed June 2026	AWI selected from online mapping database layers.
South-West Scotland Environmental Information Centre (SWSEIC)	December 2024	A 5 km desk study area was adopted as proportionate, and data was requested on protected species and designated non-statutory wildlife sites. A 10 km buffer was requested for bat species data. The data is less than 2 years old and is considered to remain valid for EIA purposes.
Bing Maps	Accessed December 2024. Most recently accessed June 2026	A search was made for ponds and watercourses within 500 m of the Site. Habitats were assessed using aerial imagery.

Baseline Survey Methodology

9.5.26. Baseline ecology surveys were undertaken in 2024 by the following ecologists resourced by Solway Ecology:

- Habitats: Phase 1 surveys and National Vegetation Classification (NVC) were undertaken by Robert Mansbridge BSc ACIEEM of Solway Ecology on behalf of BSG. Robert has over nine years of professional experience in ecological consultancy and is competent in a wide range of surveys, including habitat assessment.
- Protected species including bat surveys were undertaken by Rozanna Shah ACIEEM, Robert Mansbridge ACIEEM and Sarah Parkin ACIEEM. The survey team have a wide range of protected species survey experience, including all target species, on a variety of renewables projects in England and Scotland.

9.5.27. An overview of the ecology survey methods undertaken to provide baseline data is summarised below. Further details, including Figures, are presented in **Appendices 9.5** and **9.8**.

Habitat Survey

9.5.28. A Phase 1 Habitat survey of the site was undertaken on 21 June, 23 July and 24 July 2024 following standard Joint Nature Conservation Committee (JNCC) survey methodology (JNCC, 2010) (**Appendix 9.5**). Phase 1 habitat survey is a standard technique for classifying and mapping British habitats. The extent of the survey area is shown in **Figure 9.2**. Phase 2

surveys were informed by the Phase 1 habitat survey work completed to inform the 2018 EIA (Bear Environmental, 2018).

- 9.5.29. The surveyors assigned all areas of distinct habitat at the site to plant communities within the NVC (Rodwell, 1991 & Rodwell, 1992). Plant communities were determined by reference to the community descriptions and keys provided. NVC habitats are mapped in **Figure 9.3**.
- 9.5.30. The habitat surveys were undertaken at the optimal time of year, in suitable weather conditions. No significant limitation to the characterisation and assessment of habitats has been identified in the context of informing the preliminary habitat survey.

Protected Species Survey (excluding bats)

- 9.5.31. Protected species surveys at the site were undertaken in 2018 to inform the original proposals. This work included otter, water vole (*Arvicola amphibius*), red squirrel (*Sciurus vulgaris*) and pine marten (*Martes martes*) surveys.
- 9.5.32. Surveys were updated in 2024 by Solway Ecology as detailed in **Appendix 9.6** (**Figure 9.4** of this Chapter is reproduced from Appendix 9.6 and shows the survey extent). This provides an update on baseline surveys conducted in 2018 (Arcus, 2018). Design changes in late 2025 led to survey in May 2026 by BSG Ecology for otters on the Water of Ken.
- 9.5.33. The following protected species surveys were undertaken:
- Otter surveys of all on-site watercourses and terrestrial habitat were undertaken following guidance from Natural England and Defra (2014) and NatureScot (2024c). The surveys comprised a walked transect that followed the watercourses onsite and looked for signs of the species including droppings, spraints, anal jelly, feeding remains (such as discarded fish bones or crustacean shells), slides, haul-outs, footprints, and potential resting sites. Watercourses 1-6 were surveyed in 2024 (watercourse locations shown on **Figure 9.5**). The 2026 surveys encompass the Water of Ken and tributaries only (watercourse 7 on **Figure 9.5**). These additional surveys were required in 2026 due to a design change, re-locating a turbine closer to the watercourses and necessitating survey.
 - Water vole surveys were undertaken following guidance from Dean *et al* (2016). The surveys were undertaken alongside the otter surveys and comprised a walked transect of the watercourses on-site to search for signs of the species including droppings, latrines, feeding remains (such as vegetation chewed at a 45° angle), footprints and burrows. As with the otter surveys, watercourses 1-6 were surveyed in 2024 with a survey of watercourse 7 completed in 2026 (watercourse locations shown on **Figure 9.5**).
 - Red squirrel surveys comprising a walked transect of suitable habitats (primarily mature conifer plantation) following survey guidance set out in Cresswell *et al* (2012) and Gurnell, Lurz and Pepper (2009). Surveyors searched for field signs of the species including

sightings of both red and grey squirrels, stripped pinecones and piled scales (feeding remains), footprints, and squirrel dreys in trees (potential breeding and resting sites).

- Pine marten surveys comprised a walked transect of suitable habitats (primarily mature conifer plantation and marshy grassland rides) following survey guidance set out in Cresswell *et al* (2012). Surveyors searched for field signs of the species including sightings, scats, footprints, and features suitable for den creation (potential breeding and resting sites).

Consideration of potential limitations to methods

- 9.5.34. The primary potential baseline survey limitation was that surveys did not extend beyond the boundary of the site due to access restrictions at the time. This is not a limitation for habitat surveys. In respect of protected species, the positioning of turbines and infrastructure is away from the edges of the site. Along the eastern boundary there is upward of 200 m separation from the edge of the site to the closest turbine. On the western boundary the closest works will be at least 50 m from the edge. This is an adequate distance for survey of badger and red squirrel.
- 9.5.35. The recommended survey distance for pine marten is 250 m. This was not followed in the west of the site where only onsite habitat was surveyed (here the site boundary is 50 m from the works area, as opposed to the recommended 250 m survey area). Consequently, a portion of off-site land within the recommended survey buffer was not subject to survey. However, this is not considered to be a significant limitation as the off-site land does not comprise woodland and is therefore less suitable for den creation than the on-site plantation. As a result no significant limitation to the survey is likely to have arisen.

Bat Surveys

- 9.5.36. Bat Surveys at the site were undertaken in 2018 to inform the Consented Development. This work included both night-time bat walkovers and remote static activity surveys on-site, with specific focus on proposed turbine locations. These results are summarised within this Chapter to inform the evaluation and impact assessment sections. 2018 results in full are available in the report compiled to inform the original 2018 EIA Report Chapter (Arcus, 2018b).
- 9.5.37. Bat activity data for the site was updated in 2024 and 2025. Surveys involved the deployment of 13 static bat detectors for a period of 10 nights in each season (spring, summer and autumn) with reference to Bat Conservation Trust (BCT) survey guidelines (Collins, 2023) and guidance set out in NatureScot (2021a). All survey work in 2024 was undertaken by Solway Ecology on behalf of BSG Ecology, as detailed in **Appendix 9.7**.

Night-time Bat Walkovers

- 9.5.38. Walked transects throughout the Site were undertaken as part of the 2018 survey work, but were not repeated in 2024 or 2025. NatureScot (2021a) does not recommend the use of

walked bat transects in certain cases, and the application of this method is discretionary and species-specific. A review of the results of the 2018 surveys suggested that activity of bat species of high vulnerability to wind turbine developments (per guidance from NatureScot *et al* (2021)), was low overall. In addition, the location of edge habitats (such as woodland edges and rides) had not significantly changed since the 2018 bat surveys were undertaken, and it was therefore considered that bat flight lines would not be likely to have significantly changed since the 2018 surveys. Consequently, the 2018 walkover results in combination with a 2024 remote static survey update were considered sufficient to inform this impact assessment.

Remote Static Surveys

- 9.5.39. To inform the 2018 assessment, remote static surveys were undertaken; a total of nine Titley Scientific Anabat bat detectors were deployed at ground level for a minimum of five consecutive nights per season³ across a range of habitat types (Arcus, 2018b).
- 9.5.40. Current industry standard guidance as set out in NatureScot *et al* (2021) recommends that static bat detectors are deployed at all turbine locations for wind farms of up to ten turbines, with one additional detector for every three turbines thereafter. A total of 13 Wildlife Acoustics Song Meter Mini-Bat 2 detectors were therefore deployed in 2024 and 2025 (refer to **Figure 1 of Appendix 9.3**).
- 9.5.41. Static detectors were deployed in spring, summer and autumn 2024³, for a minimum of ten consecutive nights of data collection per season and programmed to record nightly commencing 30 minutes before sunset and cease recording 30 minutes after sunrise.
- 9.5.42. Ultrasonic recordings were analysed with reference to Russ (2012), to enable identification of bat species.

Assessing Bat Activity

- 9.5.43. The NatureScot *et al.* (2021) assessment of potential risk involves consideration of habitat and development related features, the relative vulnerability of each species of bat potentially at risk, and the bat activity output from the online EcoBat tool⁴.
- 9.5.44. A measure of relative bat activity was obtained using the secure online tool EcoBat, which compares activity recorded on Site to EcoBat's own reference data set. Meaningful comparison can only be made where EcoBat's reference data set is large enough (minimum 2000+ survey nights). All species recorded during the 2024 and 2025 surveys had a reference data set above this minimum, therefore all comparisons are considered valid. The full EcoBat report and summary of data is provided in **Appendix 9.3**.

³ Spring is defined as April and May, summer as June to mid-August inclusive, and autumn as mid-August to October inclusive in industry standard guidance.

⁴ Available at <https://mammal.org.uk/current-research/bat-recording-tools> [Accessed: 12 March 2025]

Consideration of potential limitations to methods

2025

- 9.5.45. In January 2026, the design of the Proposed Varied Development was amended to reduce the number of turbines to 11, and some turbine positions were slightly altered (see **Figure 1** of **Appendix 9.3**). Consequently, one detector (Detector 8) is redundant (as the associated turbine was removed from the layout during the design iteration process). Nonetheless, the data collected from this detector has been considered in the assessment of bat activity at the site as it is located within habitats representative of other (retained) turbine locations.
- 9.5.46. The alteration of turbine positions has resulted in some bat detector locations being further separated from the associated turbine centres. This is not considered to be a significant constraint, as survey guidance (NatureScot, 2021) acknowledges that turbine locations are often subject to change. Guidance therefore recommends that statics are deployed at the most representative areas possible, where habitat and topographic features align closely with the foreseen final turbine locations. In addition, the habitats at the turbine locations are likely to be different during operation of the Proposed Varied Development to those present at baseline (as felling of turbine 'keyholes' in afforested areas will be required). This will result in the creation of open ground and new woodland edge habitats that will be used differently by commuting and foraging bats. The deployed statics capture representative habitat types and features (including existing woodland edge and clear-fell) and it is therefore considered that the data they present is a representative sample for bat activity on site as a whole.

2024

- 9.5.47. Several bat detectors failed to record data during the 2024 recording periods. Detectors recorded 71 nights of data in spring, 9 nights of data in summer and 26 nights of data in autumn. No data was collected for detector 13. The successful static bat detectors collected a total of 921 hours of data in 2024, and sampled all major habitats found on-site (mature, immature/semi-mature and felled coniferous plantation and marshy grassland rides).
- 9.5.48. Bat detector failures during 2024 were considered to be a potential limitation. Therefore, the survey effort was repeated in 2025 to compensate for this.
- 9.5.49. The 2018 assessment did not report on *Nathusius' pipistrelle*. It is assumed that no *Nathusius' pipistrelles* were recorded in 2018. As small numbers of *Nathusius' pipistrelle* passes have since been recorded on site in 2024, it is likely that the species uses the site in very low numbers, and it is assumed that the species went undetected in 2018 (see **Table 9.13, Section 9.6**). Additionally, the 2018 assessment did not report on the common/*Nathusius' pipistrelle* and noctule/Leisler's confusion groups. This is considered to be as a result of different sound analysis classification methods. The bat species assemblage recorded between years is therefore considered to be comparable.
- 9.5.50. Bat calls recorded in 2024 that could only be identified to genus level as a result of overlapping call parameters (with the exception of *Myotis* species) are not considered in this assessment

of relative activity using the EcoBat tool (see **Table 9.14, Section 9.6**), as EcoBat's reference range for these species is comparatively small (albeit still above the minimum recommended 2000 nights). This has the effect of skewing the relative activity level on site higher than expected. Activity levels recorded in 2024 for these species is considered unlikely to represent higher than low activity in reality.

- 9.5.51. The weather station deployed alongside the static detectors failed to record weather data for all nights of deployment. Historic weather data was gathered from Ventusky (2025) to address gaps in data. This is not considered to be a significant limitation to the assessment because Ventusky is based on automatically gathered meteorological data and models provided by Deutscher Wetterdienst, and is accurate to 7 km. At 7 km resolution, the Ventusky models would be expected to provide a reasonable representation of locally prevailing weather (notably given the size of the site) and can be correlated with the 2024 bat data.

Fisheries Surveys

- 9.5.52. Formal electrofishing surveys were undertaken by the Galloway Fisheries Trust in September 2018. Based on the 2018 results it was not considered proportionate to repeat surveys for the Proposed Varied Development, and the basis of this is detailed in **Section 9.6**.

9.6. Baseline Conditions

Desk Study Results

Statutory Designated Sites

- 9.6.1. A review of MAGIC identified three sites of (non-avian) nature conservation value (a SSSI) within the 10 km of the Site (see **Table 9.5**). The location of these SSSIs are shown on **Figure 9.1b**. SSSIs are of National Importance, this reflects the role of SSSIs in providing the best examples of the UK's flora, fauna, or geological or physiographical features (notified under the Wildlife and Countryside Act 1981). No internationally designated sites were recorded within 10 km of the site, internationally designated sites within 20 km are mapped on **Figure 9.1c**. Special Protection Areas (SPAs) and Special Areas of Conservation (SACs) within 20 km of the site are of international importance.

Table 9.5 – Statutory Designated Sites within 10 km

Site Name	Designation	Approximate Distance and Direction	Description
Cleugh	SSSI	4 km south	Best example of unimproved lowland neutral grassland in the region.

Site Name	Designation	Approximate Distance and Direction	Description
Hannaston Wood	SSSI	8.5 km south-west	Designated due to the presence of lowland neutral grassland, upland oak woodland and its lichen assemblage.
Water of Ken Woods	SSSI	9.5 km south-west	Designated due to its upland oak woodland and lichen assemblage.

9.6.2. Impacts on Cleugh SSSI and its qualifying feature (unimproved lowland grassland), are unlikely to occur because of the Proposed Varied Development's distance from the SSSI and absence of any examples of the notified features within the site. Similarly, impacts on Hannaston Wood and Water of Ken Woods are not anticipated due to their offset from the Proposed Varied Development and lack of hydrological connectivity (see **Chapter 13**). Consequently, SSSIs are not considered further in this assessment.

9.6.3. Internationally designated sites between 10 and 20 km from the site (mapped in **Figure 9.1c**) include:

- Merrick Kells SAC, located approximately 10.2 km west. Designated due to the presence of wet heath, alpine and boreal grassland and active blanket bog.
- Lock Ken and River Dee Marshes SPA, located approximately 13 km south. Ornithological designation.
- Silver Flowe Ramsar, located approximately 14.9 km south-west. Designated due to the presence of upland blanket bog and depressions on peat substrates.
- Upper Nithsdale Woods SAC, located approximately 15.4 km east. Designated due to the presence of Tilio-Acerion forests of slopes, screes and ravines.
- Muirkirk and North Lowther Uplands SPA, located approximately 19.2 km south-west. Ornithological designation.
- Tynron Juniper Wood SAC, located approximately 19 km east. Designated due to the presence of Juniperus communis formations on heaths or calcareous grasslands.

9.6.4. Due to the distance between the Proposed Varied Development and any internationally designated sites and lack of hydrological connectivity (the hydrological study area is limited to 10 km, see **Chapter 13**), international designated sites are not considered further in this assessment. The SPAs within 20 km are designated due to bird interest, which is assessed independently in **Chapter 10**.

Non-Statutory Designated Sites

- 9.6.5. Non-statutory designated sites found within the Desk Study Area include two Local Wildlife Sites (LWS) and a potential LWS (pLWS). Details are provided in **Table 9.6** and mapped in **Figure 9.1a**. LWS are of County Importance reflecting their designation by local authorities.

Table 9.6 – Non-Statutory Designated Sites

Site Name	Approximate Distance and Direction	Description
Island Block Oak Woodland (LWS)	0.7 km south	Ancient semi-natural woodland gorge woodland, conifer plantation and semi-natural oak woodland. The site hosts bluebell (<i>Hyacinthoides non-scripta</i>), a UK Conservation Concern (CC), Local Priority Species (LPS), and Local Biodiversity Action Plan (LBAP) species. Buzzard (<i>Buteo buteo</i>) is also present and is a CC, LCC (species of Local Conservation Concern), and LBAP species.
Polmaddy (LWS)	3.4 km south-west	Extensive bog, unimproved acid, neutral, and marshy grassland. Site contains ancient remains and monument. Nationally rare and declining species such as spignel (<i>Meum athamanticum</i>) and whorled caraway (<i>Carum verticillatum</i>) (LBAP species). Other LBAP species present include Rock-rose (<i>Helianthemum nummularium</i>) and meadow pipit (<i>Anthus pratensis</i>). Whorled caraway and meadow pipit are also UKBAP Conservation Concern species.
Afton Uplands (pLWS)	4.8 km north	Potential local wildlife site, comprising large open areas of heathland and bog. Polach Burn and Afton Water run through the site.

- 9.6.6. The LWSs are all beyond the boundary of the site, and remote from the Proposed Varied Development footprint. The closest LWS, Island Block Oak Woodland, is located approximately 1.5 km south of the closest proposed turbine. Coniferous plantation dominates the site, this is not representative of the selection criteria for any of the LWS sites within 5 km. Impacts are unlikely to occur and these sites are not considered further in this assessment.

Protected and Notable Species Records

- 9.6.7. Biological records were returned by SWSEIC, and included data from: Dumfries and Galloway Bat Group, Red Squirrels in South Scotland, Scottish Wildlife Trust Galloway Fisheries Trust

and Nith District Salmon Fisheries Board. **Tables 9.7** and **9.8** provide a summary of protected or notable species recorded within the Desk Study Area, as returned by the SWSEIC and a search of publicly available records. The following abbreviations are used in Table 5: Scottish Biodiversity List (SBL), Local Biodiversity Action Plan (LBAP), Wildlife and Countryside Act (WCA) and Invasive Non-Native Species (INNS).

Table 9.7 – Bat Records within 10 km of the Site

Vulnerability	Species	Number of Records Returned	Records on Site
Low	Daubenton's bat <i>Myotis daubentonii</i>	6	0
	Natterer's bat <i>Myotis nattereri</i>	11	2
	Brown long-eared bat <i>Plecotus auritus</i>	5	0
Low/Medium	Unidentified Myotis bat species	20	0
Medium	Whiskered/Brandt's bat <i>Myotis mystancus/brandtii</i>	5	0
High	Common pipistrelle <i>Pipistrellus pipistrellus</i>	41	3
	Soprano pipistrelle <i>Pipistrellus pygmaeus</i>	53	2
	Nathusius' pipistrelle <i>Pipistrellus nathusii</i>	1	0
	Unidentified pipistrelle bat species	30	3
	Noctule <i>Nyctalus noctula</i>	5	0
	Leisler's bat <i>Nyctalus leisleri</i>	12	0
	Unidentified nyctalus bat species	2	0
N/A	Unidentified bat species	6	0

Table 9.8 – Other Protected and Notable Species Records within Desk Study Area

Species	Latin Name	Date of Most Recent Record Supplied	Total No of Records	Conservation Status	Record in Closest Proximity to Site
Badger	<i>Meles meles</i>	2024	4	WCA, LBAP	3.6 km west
Otter	<i>Lutra lutra</i>	2019	40	WCA, LBAP, SBL	On-site
Red squirrel	<i>Sciurus vulgaris</i>	2024	126	WCA, SBL, LBAP	0.7 km east
Adder	<i>Vipera berus</i>	2024	24	WCA, SBL, LBAP	1 km south
Common toad	<i>Bufo bufo</i>	2022	13	SBL	On-site
Brown hare	<i>Lepus europaeus</i>	2024	7	WCA, SBL, LBAP	4 km south
Mountain hare	<i>Lepus timidus</i>	2022	1	SBL, LBAP	Accurate location not supplied
American Mink	<i>Neovison vison</i>	2017	2	INNS	3.3 km south-west
Signal crayfish	<i>Pacifastacus leniusculus</i>	2019	5	INNS	On-site

Phase 1 Habitat Survey Results

- 9.6.8. A summary of the Phase 1 habitats recorded within the Survey Area is provided in **Table 9.9** below, with mapped habitats presented in **Figures 9.2 and 9.3**. Information regarding the survey results is also presented in **Appendix 9.5**. Habitat area calculations are based on the total estimated area of the site of 752 ha, with area numbers rounded up to one decimal point. Estimates of area are based on visual observation by the surveyor, which were then digitised with GIS.
- 9.6.9. Within the site, habitats are overwhelmingly dominated by coniferous plantation of various ages, which makes up approximately 67% of the habitat recorded. Wetland habitats recorded within the site were limited to streams running throughout the Site, marshy grassland and the remnant degraded modified bog which underlies the coniferous plantation.

- 9.6.10. Wetland vegetative communities may have potential for groundwater dependency, dependent on the underlying hydrogeological setting. SEPA assigns preliminary levels of ground water dependence (negligible, low, moderate, high) based on hydrological characteristics determined by NVC classification. Marshy grassland has a moderate GWDTE score whilst the degraded modified bog that has been planted with coniferous forestry is low. The project hydrologists, Fluid, have reviewed the habitats present within the site boundary and determined that no GWDTE are present (refer to **Chapter 13**). This assessment concurs with the 2018 hydrology assessment which also recorded no GWDTEs on-site.
- 9.6.11. The 2024 habitat survey findings are largely consistent with the 2018 assessment with the following principal differences:
- Active forestry operations have caused an increase in the extent of felled woodland.
 - One quarry recorded in 2018 has since been re-profiled and is now mapped as acid grassland.

Table 9.9 – Summary of Habitats Recorded in the Survey Area

Habitat (JNCC Code)	NVC (if appropriate)	Description	Area* (ha)	Area as a % of Survey Area
Coniferous woodland plantation (A1.2.2)	Parts of the plantation, principally in the south-west of the northern part of the site, is planted over remnant degraded mire characteristic of NVC community M17 (<i>Scirpus cespitosus</i> – <i>Eriophorum vaginatum</i>) blanket mire (degraded) in wetter areas. Underlying marshy grassland and dry Heath/acid grassland NVC	Canopy diversity is limited with dominant Sitka spruce (<i>Picea sitchensis</i>) and European larch (<i>Larix decidua</i>). Extensive felling and re-planting had been undertaken throughout the site, and the age and understorey flora vary considerably. Mature plantation woodland (accounting for approximately 194.75 ha of the total area) generally contained no ground flora or was dominated by mosses (<i>Bryophyta</i> spp). In young to semi-mature woodland (297.57 ha of the total habitat area), the ground flora varied and was predominantly species poor wet / marshy grassland. Mosses and remnant degraded mire were also recorded. Ground flora within the youngest plots of plantation woodland was akin to a neutral grassland, with primarily tufted hairgrass (<i>Deschampsia cespitosa</i>) and soft rush (<i>Juncus effusus</i>). Woodland rides throughout the Site are dominated by purple moor-grass (<i>Molinia caerulea</i>) and marshy grassland with indications of modified/degraded mire. This was notable in woodland in more inundated areas, notably in the southwest of the northern survey area, where the water table was high and more riparian channels were present. Some areas (see the location of Target Note 3 in the 2018 Phase 1 habitat report (Bear Environmental, 2018) are described as blanket mire beneath coniferous woodland). Historically, such parts of the plantation woodland were mire habitat,	492.33	65.29

Habitat (JNCC Code)	NVC (if appropriate)	Description	Area* (ha)	Area as a % of Survey Area
	communities are noted below.	which has since degraded due to drainage and planting with coniferous woodland. Where the water table is higher, some remnant bog species are present, including red bog moss (<i>Sphagnum capillifolium</i>), papillose bog-moss (<i>Sphagnum papillosum</i>), red stemmed feathermoss (<i>Pleurozium schreberi</i>), bog haircap moss (<i>Polytrichum strictum</i>) and magellanic bog moss (<i>Sphagnum magellanicum</i>). Parts support hare's-tail cotton-grass (<i>Eriophorum vaginatum</i>) and deergrass (<i>Trichophorum germanicum</i>) and is still characteristic of degraded / planted-over bog habitat.		
Felled plantation woodland (J5)	N/A	Extensive areas of felled woodland were present on-site, largely within the northern parcel. In these areas vegetation was limited, ground cover was predominantly brash. Vegetative species present included: soft rush, tufted hair-grass, fox glove <i>Digitalis purpurea</i> and bent grasses (<i>Agrostis</i> spp.).	196.99	26.13
Marsh/marshy grassland (B5)	M23 <i>Juncus</i> – <i>Galium</i> rush pasture	Marshy grassland is present within the plantation woodland understorey. This has a limited species diversity, dominated by soft rush and tufted hair grass with abundant purple moor grass. The species composition indicates that the habitat is wet, acidic and poorly drained. Other species recorded include bracken (<i>Pteridium aquilinum</i>), dock species <i>Rumex</i> sp. and marsh thistle (<i>Cirsium palustre</i>). In wetter areas, notably woodland rides and edges, the species assemblage is more varied and remnants of the historic, now degraded / modified, bog are present. Moss species include: red-stemmed feather moss (<i>Hylocomium splendens</i>), sphagnum moss and common haircap (<i>Polytrichum commune</i>). Mosses were recorded frequently in areas of felled plantation. Other flora present in areas not dominated by soft rush include: creeping buttercup (<i>Ranunculus</i>	31.05	4.11

Habitat (JNCC Code)	NVC (if appropriate)	Description	Area* (ha)	Area as a % of Survey Area
		<i>repens</i>), rough meadow grass (<i>Poa trivialis</i>), heath rush (<i>Juncus squarrosus</i>), sweet vernal (<i>Anthoxanthum odoratum</i>), tormentil (<i>Potentilla erecta</i>), Yorkshire fog (<i>Holcus lanatus</i>), ling heather (<i>Calluna vulgaris</i>) bell heather (<i>Erica cinerea</i>), and deer fern (<i>Blechnum spicant</i>). Rare incidences of sneezewort (<i>Achillea ptarmica</i>), common spotted orchid (<i>Dactylorhiza fuchsia</i>), and foxglove were also recorded. Heathland characteristics, such as the presence of ling heather and bell heather indicate a mosaic of wet and dry areas is present. The mix of dominant wetland species, alongside heathland plants and occasional rarer species, indicates a dynamic habitat with plants adapted to wet, acidic, and nutrient-rich conditions.		
Hardstanding (J5)	N/A	Hardstanding forestry roads are present throughout the Site. Since the previous 2018 botanical survey, these had been extended in the northern section of the Site, causing the loss of a small portion of marshy grassland. Marginal species on either side of the track include: birds foot trefoil (<i>Lotus corniculatus</i>), dock species, ribwort plantain (<i>Plantago lanceolata</i>), broad leaved plantain (<i>Plantago major</i>), selfheal (<i>Prunella vulgaris</i>) and heather, reflective of the adjacent dry heath/acid grassland habitat.	7.8	1.04
Dry heath/acid grassland-dry heath mosaic (D5)	H12 – U2 Mosaic <i>Calluna vulgaris</i> – <i>Vaccinium myrtillus</i> heath – <i>Deschampsia</i>	A mosaic of dry heath with patches of acid grassland was recorded in small stretches, predominantly adjacent access tracks and verges. The habitat is fractured due to felling activities; however, a larger extent is present than was recorded in the 2018 habitat survey. Heather was dominant, with blaeberry (<i>Vaccinium myrtillus</i>), pleurocarpous mosses, rush species, bog haircap moss (<i>Aulacomnium palustre</i>), red-stemmed	4.4	0.58

Habitat (JNCC Code)	NVC (if appropriate)	Description	Area* (ha)	Area as a % of Survey Area
	<i>flexuosa</i> acid grassland mosaic	feather moss , and tormentil present. Bell heather was noted rarely. Species frequent in areas of acidic grassland were limited to wavy hair grass (<i>Deschampsia flexuosa</i>). Indicators of more neutral grassland were also recorded, such as Yorkshire fog and foxglove, which may be indicative of the influence of disturbance and imported rock from the access tracks impacting the marginal habitat. In places, scrub was encroaching, consisting of bracken and willow (<i>Salix</i> spp.).		
Broadleaved woodland plantation (A1.1.2)	Plantation	All broadleaved plantation woodland on-site is young with tree guards still in place. Tree species consist of oak <i>Quercus</i> spp., common alder (<i>Alnus glutinosa</i>), rowan (<i>Sorbus aucuparia</i>), and silver birch (<i>Betula pendula</i>).	20.07	2.66
Quarry (I2.1)	N/A	Four quarries are present in the north of the site, all consisting of bare rock with negligible vegetation cover.	0.65	0.09
Running Water (G2)	N/A	Three named watercourses are present on-site: Blackburn, Goat burn and Craigengillan Burn. All of which have connectivity to the Water of Ken, located off-site to the east. Multiple small burns and ditches were recorded across the site, notably in plantation woodland under dense canopy, a majority of which were concentrated in the southern section of plantation woodland in the northern site area.	N/A	N/A

Habitat (JNCC Code)	NVC (if appropriate)	Description	Area* (ha)	Area as a % of Survey Area
Wall (J2.5)	N/A	Limited lengths of drystone wall and sheepfold were present within the southern site area and at the south-western mature plantation within the northern site area. Vegetation on the walls was limited to bryophytes including red stalked feather moss.	N/A	N/A

Protected Species Survey Results

Otter

2018 Result Summary

- 9.6.12. A summary of the results of the 2018 otter surveys is presented below in **Table 9.10**. The 2018 surveys targeted the watercourses on the site and within 200 m, full results are provided in the 2018 assessment (**Appendix 9.2**). Watercourse locations are shown in **Figure 5**.

Table 9.10 – Summary of 2018 Otter Survey Results

Watercourse	Description at time of survey	Suitable habitat	Species evidence
1	Slow flowing, shallow burn passing through mature plantation woodland. Partially dry. Bankside vegetation was sparse.	Yes	None
2 (Dry Burn)	Shallow burn with a slow to moderate flow rate, passing through mature plantation and felled woodland. Bankside vegetation was sparse.	Yes	Otter spraint; NX 62569 91732 (on-site)
3 (Black Burn)	Slow flowing, shallow burn with some deeper pools passing through marshy grassland, mature and felled woodland. Bankside vegetation present in grassland areas.	Yes	Otter spraint (on-site); NX 63179 93730 NX 61987 93077 NX 61987 93077
4 (Craigengillian Burn)	Moderate to fast flowing burn passing through marshy grassland with vegetated banks along the majority of the watercourse. Bankside vegetation is absent where the burn passes through felled and mature plantation woodland.	Yes	Otter spraint (on-site); NX 63335 93821 NX 62921 94011 NX 62841 94053 Otter feeding remains (on-site); NX 63318 93842 NX 63166 93920
5	Very shallow slow-flowing burn with high steep bank sides. Mosses dominate the bankside vegetation.	Yes	None

Watercourse	Description at time of survey	Suitable habitat	Species evidence
6	Very shallow slow-flowing burn flowing through open areas as well as felled and mature plantation woodland. High density of vegetation in open sections. Signal crayfish (an otter food resource) are present.	Yes	None
7 (Water of Ken and tributaries)	Slow to moderate flowing river with variable channel depth. Marshy grassland and rocks present along bankside. Signal crayfish and brown trout <i>Salmo trutta</i> observed.	Yes	Otter spraint (off-site): NX 63265 96219 NX 63460 95733 Otter feeding remains (off-site): NX 63265 96219 (Poldores Burn) NX 63460 95733 (Polifferie Burn) NX 63484 93852 NX 63509 93816 NX 63502 93515 NX 63491 93006 NX 63519 92952 NX 63502 95504 Otter couches (off-site): NX 63502 95504 (Polifferie Burn) Otter holt (off-site): NX 63500 92882

9.6.13. The 2018 otter surveys found signs of otter presence on watercourses 2, 3, 4 and 7, watercourse locations are shown on **Figure 9.5**. Watercourse 7 is located off-site. All watercourses on-site (1– 6) have potential to support commuting otter. Watercourses 2, 4, 5, and 6 on-site were found to have populations of juvenile fish, predominantly brown trout *Salmo trutta* (refer to **Appendix 9.4**). Other small watercourses on-site were considered unlikely to support sufficient fish populations to provide an important resource for foraging otter. Signal crayfish (*Pacifastacus leniusculus*) (a viable otter food resource) were present within watercourses 6 and 7 in 2018. Due to the invasive nature of signal crayfish, their range on-site is likely to have increased since 2018 and they are also now likely to be present in other connected watercourses on-site.

9.6.14. Watercourse 7, located off-site within 200 m (and 650 m from the closest proposed works area), was suitable for otter foraging and commuting due to the river's moderate flow, surrounding terrestrial vegetation suitable for holt building otter, variable bank structure and profile providing suitable access points; as well as the confirmed presence of prey

items such as brown trout and signal crayfish. One otter couch and an otter holt were also found on the banks of Polifferie Burn and The Water of Ken respectively in 2018. The couch is located over 1 km northeast of any proposed works and the holt is offset by approximately 800 m east; neither structure will be impacted directly by the Proposed Varied Development, and a survey update was not considered proportionate.

2024 Results

- 9.6.15. The 2024 update surveys found no evidence of otter on the watercourses on-site (1 to 6). Watercourse characteristics were observed to be as recorded in the 2018 baseline surveys with no significant deviation in flow rate, depth or bank side vegetation. Habitat suitability for the species was therefore concluded to be as recorded in the 2018 surveys.

2026 Results

- 9.6.16. A summary of the results of the 2026 otter surveys are presented below in **Table 9.11**. The 2026 survey of the Water of Ken found evidence of otter (spraints, feeding remains and potential couches) throughout the course of the river. The river measured up to approximately 4 - 6 m wide with an average depth at time of survey of 30 cm. Deeper pools and shallow riffles were present. The substrate was dominated by cobbles, with boulders also present. The bank sides measured an average of 1 m in height and formed cliffs with overhanging grassy vegetation in places. Adjacent habitat was grazed and dominated by soft rush.
- 9.6.17. No holts were located during the survey. The previous holt identified in 2018 was no longer present, as the supporting bank had subsided prior to the 2026 survey. Forestry woodland located to the west of the Water of Ken is suitable for otter holt creation with a number of fallen trees; however, no holt was recorded at time of survey.

Table 9.11 – Summary of 2026 Otter Survey Results

Watercourse	Description at Time of Survey	Suitable Habitat	Species Evidence
7 (Water of Ken and tributaries: Polifferie Burn and Poldores Burn)	Slow to moderate flowing river with variable channel depth. Grassland and rocks present along bankside which varies in gradient from shallow to near vertical. Signal crayfish and brown trout <i>Salmo trutta</i> observed.	Yes	Otter spraint (off-site); NX 63409 95977 (Polifferie Burn) NX 63412 95996 (Polifferie Burn) NX 63261 96209 (Polifferie Burn) NX 63486 93535 NX 63496 93524 NX 63516 93499 NX 63469 93369 NX 63468 93357

Watercourse	Description at Time of Survey	Suitable Habitat	Species Evidence
			NX 63442 93227 NX 63448 93168 NX 63472 93044 NX 63507 92886 NX 63504 92744 NX 63434 92283 NX 63435 92277 NX 63297 91884 NX 63254 91839 Otter feeding remains (off-site); NX 63503 92892 NX 63506 92698 NX 63435 92286 NX 63294 91888 Potential otter couch (off-site): NX 63487 93695 NX 63489 93413 NX 63461 93360

- 9.6.18. Detailed survey results are presented in **Appendix 9.6**. A summary showing the location of findings is presented in **Figure 9.4** (see Figures in Appendix 9.6 for more detail).

Water Vole

2018 Result Summary

- 9.6.19. A summary of the results of the 2018 water vole surveys is presented below in **Table 9.12** and mapped with further detail in the 2018 assessment (**Appendix 9.2**). The 2018 surveys targeted the watercourses on-site and within 200 m of the Site boundary. The locations of numbered watercourses in relation to the Proposed Varied Development footprint are presented on **Figure 9.5**.

Table 9.12 – Summary of 2018 Water Vole Survey Results

Watercourse	Description at Time of Survey	Suitable Habitat	Species Evidence
3 (Black Burn)	Slow flowing, shallow burn with some deeper pools passing through marshy grassland, mature and felled woodland. Bankside vegetation present in grassland areas.	Yes	Potential water vole feeding remains (on-site); NX 62025 93081
5	Very shallow slow-flowing burn with high steep bank sides. Mosses dominate the bankside vegetation.	Yes	None
6	Very shallow slow-flowing burn flowing through open areas as well as felled and mature plantation woodland. High density of vegetation in open sections. Signal crayfish present.	Yes	None
7 (Water of Ken and tributaries)	Slow to moderate flowing river with variable channel depth. Marshy grassland and rocks present along bankside. Signal crayfish and brown trout <i>Salmo trutta</i> observed.	Yes	None

9.6.20. Watercourses 1, 2 and 4 did not support suitable habitat for the species due to fast flowing water, lack of suitable terrestrial vegetation, and/or the presence of bedrock banks unsuitable for burrow creation.

9.6.21. Watercourses 3, 5, 6 and 7 have suitability for water vole foraging and burrow creation due to their favourable bank profiles, bankside vegetation, and slow flow rates. The 2018 surveys also found potential water vole feeding remains at Watercourse 3 in the form of vegetation chewed at a 45° angle. However, no other supporting evidence of water vole was recorded, and presence of the species was therefore not confirmed in 2018.

2024 Results

9.6.22. The 2024 update surveys found no evidence of otter or water vole on the watercourses on-site (1 to 6). Watercourse characteristics were observed to be as recorded in the 2018 baseline surveys with no significant deviation in flow rate, depth or bank side vegetation. Habitat suitability for the species was therefore concluded to be as recorded in the 2018 surveys.

2026 Result Summary

9.6.23. The 2026 survey of the Water of Ken and its tributaries (Polifferie Burn and Poldores Burn) found no evidence of water vole. The Water of Ken is approximately 4 – 6 m wide and flows over bedrock boulders and gravel substrate. The banks were approximately 2 m high and consisted of a mix of steep and gentle slopes vegetated with rush, heath and grassland habitats. Scattered hazel and alder scrub was also present. The flow of the river was slow to moderate, with a mix of broken waves and ripples in areas of faster flow.

9.6.24. Detailed survey results are presented in **Appendix 9.6**.

Red Squirrel

2018 Result Summary

9.6.25. The 2018 baseline surveys recorded evidence of potential red squirrel feeding remains throughout the mature coniferous plantation woodland. However, no red squirrels or squirrel dreys were observed on-site.

9.6.26. The mature coniferous woodland on-site was optimal for foraging and breeding red squirrel. The other habitats on-site were unsuitable due to the lack of foraging resource.

9.6.27. It was concluded that red squirrel were likely present on-site based on the evidence found (limited to feeding remains), extent and suitability of habitats on-site and records of the species in the area found during the 2018 desk study.

2024 Results

9.6.28. Detailed survey results are presented in **Appendix 9.6**.

9.6.29. The mature coniferous woodland on-site remains optimal for red squirrel foraging and breeding; however, recent routine felling operations in 2024 have reduced the availability and continuity of this habitat resource across the site. No evidence of red squirrels was recorded during the 2024 update surveys, and they are assumed to be absent from the site.

Pine Marten

2018 Result Summary

9.6.30. The 2018 baseline surveys recorded no evidence of pine marten on-site.

9.6.31. The felled woodland, mature coniferous and mixed plantation woodland habitats on-site were considered to provide suitable foraging habitat for pine marten. The plantation and mixed woodland were also considered to provide suitable den creation habitat, particularly where wind-blown trees with exposed root plates were present.

2024 Results

- 9.6.32. Detailed survey results are presented in **Appendix 9.6**.
- 9.6.33. Habitat remained suitable throughout the 2024 survey update. Potential pine marten scat was also located in 2024. Whilst samples were unsuitable for genetic testing due to their age, the scats were considered likely to be of pine marten due to their location, prominence, composition and musk. No potential dens were located in the 2024 survey; however, due to the presence of scat, pine marten likely commute through and forage on-site.

Badger

2018 Result Summary

- 9.6.34. No evidence of badgers (*Meles meles*) was recorded during the 2018 baseline surveys, although their presence was not ruled out due to the occurrence of suitable habitats and the difficulty associated with thoroughly accessing the mature coniferous plantation woodland to check for setts.
- 9.6.35. The site was considered to be of low suitability for badgers. Although the mature coniferous plantation woodland on-site presents opportunities for badger sett creation, the surrounding felled woodland and bog habitats (both on-site and in the wider area) were considered to limit the site's overall suitability.

2024 Results

- 9.6.36. Detailed survey results are presented in **Appendix 9.6**.
- 9.6.37. During the 2024 survey update, signs of badger presence were limited to feeding signs, a latrine and footprints in the western edge of the site. The mature coniferous plantation woodland presents suitable sett creation habitat for the species, though none were located.

Reptiles

- 9.6.38. A formal reptile survey of the site was not undertaken in 2018 or 2024 in line with NatureScot (2020) guidance for wind farms. However, observations of reptiles made during habitat and other targeted survey work at the site in both 2018 and 2024 were recorded.

2018 Result Summary

- 9.6.39. A single common lizard (*Zootoca vivipara*) was recorded during the 2018 baseline surveys near watercourse 2 (Dry Burn) (NX 62708 91952). The felled woodland, woodland rides and grassland habitats along the tracks were considered suitable for common lizard and adder (*Vipera berus*), presenting suitable foraging, refuge and hibernation resource.

2024 Results

- 9.6.40. Detailed survey results are presented in **Appendix 9.6**
- 9.6.41. The marshy grassland, felled woodland and woodland rides were considered suitable for reptile foraging, refuge and hibernation. This is consistent with the 2018 surveys. Additionally, three sections of dry-stone wall found on-site were assessed as providing a suitable reptile basking and hibernation resource.
- 9.6.42. Due to historic presence and records in the vicinity, it is assumed that common lizard remain on-site. Based on the habitat assessment and desk study records it is possible adder are present on-site.

Amphibians

2018 Result Summary

- 9.6.43. No targeted amphibians survey was undertaken in 2018. Several incidental observations of both common frog (*Rana temporaria*), common toad (*Bufo bufo*) and five unidentified newts were made on-site. No great crested newt (*Triturus cristatus*) (GCN) were recorded incidentally on-site and the absence of ponds on-site ruled out the potential for breeding GCN.

2024 Results

- 9.6.44. Detailed survey results are presented in **Appendix 9.6**.
- 9.6.45. Wet habitats on-site, including marshy grassland and bog, remain suitable for common amphibians, although none were recorded incidentally in 2024. No ponds were recorded on-site in 2024.

Bats

2018 Result Summary

- 9.6.46. The 2018 baseline surveys were undertaken prior to the issue of current industry standard guidance for wind farms (NatureScot *et al*, 2021). The 2018 baseline surveys employed a methodology based on Collins (2016) which included use of static detectors and walked transect surveys (the latter was not repeated in the 2024 and 2025 updated surveys). The results of the 2018 surveys are considered below.

Remote Static Detector Surveys

- 9.6.47. A total of nine AnaBat Express bat detectors were deployed during the 2018 baseline survey in spring, summer and autumn³, recording for a total of five nights in suitable weather conditions per season. The 2018 detector locations are displayed in **Appendix 9.3**. A total of 9,522 bat passes and 1,251 hours of data were collected during the 2018 static surveys.

9.6.48. The 2018 static detector surveys found low levels of bat foraging and commuting activity across the site throughout the year. This activity was dominated by common pipistrelle (*Pipistrellus pipistrellus*) and soprano pipistrelle (*Pipistrellus pygmaeus*). Activity was concentrated in the central areas of the site where clear felling had created a mosaic of felled, mature and immature coniferous woodland close to linear features (such as marshy grassland rides and watercourses) that provided connectivity to the wider area. It was concluded that the lack of these features in the northern and southern parts of the site was a contributing factor to the reduced activity recorded in these areas.

9.6.49. Pipistrelle species (common and soprano pipistrelle) were consistently recorded in low numbers in all three survey periods (spring, summer and autumn) with a spike in soprano pipistrelle activity in the summer period. Both Leisler's bats (*Nyctalus leisleri*) and noctule bats (*Nyctalus noctule*) were only recorded in summer and autumn, in very low numbers. Brown long-eared bats (*Plecotus auritus*) and *Myotis* species were recorded in very low numbers across all three periods.

Activity Transect Surveys

9.6.50. The 2018 static detector surveys were supported with seasonal activity transect surveys with five-minute spot counts, in spring, summer and autumn 2018 in suitable weather conditions. The transect route is displayed in **Appendix 9.3**. The transect kept to established rides and tracks within the site.

9.6.51. The seasonal transect activity surveys in 2018 recorded a total of 284 bat passes across all three surveys, 68% of which was recorded during the autumn period.

9.6.52. The seasonal transect surveys recorded bat activity at all spot count locations, with no obvious spatial variation in activity evident across the site. Most activity was recorded at habitat features suitable for foraging and commuting bats such as watercourses and woodland edge habitats.

9.6.53. Soprano pipistrelle accounted for 68% of all activity recorded during the transect surveys, followed by common pipistrelle (19%) and unidentified pipistrelle species (7%). *Myotis* species, noctule and Leisler's bats were rarely recorded and made up the remainder of the activity.

2024 Results

9.6.54. NatureScot *et al* (2021) have assessed the vulnerability of each bat species to turbine collision according to their risk of collision and their rarity in Scotland. This is presented below in **Table 9.13**.

Table 9.13 – Bat Vulnerability to Wind Turbines

Species Rarity (Scotland)	Low Collision Risk	Medium Collision Risk ⁵	High Collision Risk
Common species	None	None	Common pipistrelle Soprano pipistrelle Medium vulnerability
Rarer species	Brown long-eared bat Daubenton's bat Natterer's bat Low vulnerability	None	None
Rarest species	Whiskered bat Brandt's bat Medium vulnerability	None	Nathusius' pipistrelle Noctule Leisler's bat High vulnerability

9.6.55. Detailed survey results are presented in **Appendix 9.7**. A summary of seasonal bat activity per species for 2018, 2024 and 2025 is provided in **Table 9.14**.

⁵ Scotland is beyond the known range of species considered to have a medium collision risk, including barbastelle and serotine bats.

Table 9.14 – Bat Activity (P/h) Per Species

Species / Species Group	Spring Bat Activity			Summer Bat Activity			Autumn Bat Activity		
	2018	2024	2025	2018	2024	2025	2018	2024	2025
Common pipistrelle	0.9	6.18	5.15	2.47	0.96	11.56	1.15	0.13	0.58
Soprano pipistrelle	1.16	6.49	8.55	9.71	5.25	17.24	4.09	5.86	4.55
Nathusius' pipistrelle	0	<0.01	<0.01	0	0	0	Not recorded	0	0
Myotis sp.	0.04	0.23	0.52	0.04	0.16	0.72	0.08	0.03	0.19
Brown long-eared	<0.01	0.01	<0.01	<0.01	0.03	0.06	<0.01	0.01	0.02
Noctule	0	0.02	0.05	0.1	0.03	0.04	0.03	0.01	0.06
Leisler's bat	0	0.02	0.01	0.18	0.16	0.01	0.11	0.01	<0.01
Noctule / Leisler's bat	0	0.01	0	0	0.01	0	0	<0.01	0
Common / Nathusius' pipistrelle	0	0.03	0	0	0	0	0	0	0
Common / soprano pipistrelle	0.37	6.49	0	2.83	0.06	0	2.64	0.03	0

- 9.6.56. Static detectors recorded a total of 921 hours of survey time across spring, summer and autumn 2024.
- 9.6.57. The 2024 bat surveys showed no significant change in baseline bat activity since the 2018 assessment, and overall bat activity levels on-site were low. A total of 9,260 bat calls were recorded across a minimum of seven species⁶: common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle (*Pipistrellus nathusii*), brown long-eared bat, noctule, Leisler's bat and myotis species. This is a comparable number of calls to the number recorded in 2018 (total of 9,522). The species assemblage recorded between years was also comparable, with one additional species recorded in 2024 over 2018 (Nathusius' pipistrelle, albeit in very low numbers of passes). As in 2018, the highest levels of activity in 2024 were recorded along woodland edge habitats.
- 9.6.58. Soprano pipistrelle was the most frequently recorded species in 2024, accounting for 61% of all passes recorded, followed by common pipistrelle (35%) and *Myotis* species (1%). The remaining species all accounted for <1% of all passes recorded. This is consistent with the findings of the 2018 baseline surveys which found similar levels of bat activity per hour for these species.
- 9.6.59. The overall bat activity recorded during the 2024 surveys in bat passes per hour (P/h) for each species recorded is presented in **Table 9.15** below. The table also presents the level of bat activity per species in the form of a median percentile relative to EcoBat's reference data set. The size of the EcoBat database (in nights) against which the relative activity recorded for each species has been compared is also shown. Note that the analysis undertaken by EcoBat does not include nights in which no passes were recorded.

Table 9.15 – 2024 Bat Activity (P/h) per Species

Species ⁷	Average Activity (P/h)	Median Percentile	Reference Range
Common pipistrelle	2.42	0	1,534,338
Soprano pipistrelle	5.87	5	409,908
Nathusius' pipistrelle	<0.01	8	3,146
Myotis sp.	0.14	1	84,072
Brown long-eared	0.02	1	23,110
Noctule	0.02	0	67,862
Leisler's bat	0.06	0	58,988

- 9.6.60. The median percentile attributed by EcoBat to the 2024 data indicates a low level of activity of bats throughout the sampling period for all species.

⁶ Due to the groupings of myotis species.

9.6.61. A summary of activity per species in 2024 is provided in **Appendix 9.7**.

2025 Results

9.6.62. Static bat detectors recorded a total of 2,932 hours of survey time across spring, summer and autumn 2025. A total of 43,769 bat calls (14.93 overall) were recorded across a minimum of seven species, the same assemblage as was recorded in 2024.

9.6.63. Soprano pipistrelle was the most frequently recorded species, accounting for 62% of all passes recorded, followed by common pipistrelle (34%) and Myotis species (3%). The remaining species all accounted for <1% of all passes recorded. This is consistent with the findings of the 2024 survey.

Noctule (high collision risk, high vulnerability species)

9.6.64. Noctule were recorded in low numbers throughout the site across all periods, with activity remaining uniform across all periods between 0.25 and 0.01 P/h. This is consistent with the findings of the 2024 survey.

9.6.65. EcoBat analysis determined that noctule activity did not exceed 'Low' on any survey night at any detector or period in 2025.

9.6.66. Noctules were most frequently recorded at Detector 6, which captures edge habitat between felled and mature conifer plantation. This contrasts from the 2024 survey which captured peak noctule activity at Detector 4, but given the low numbers of noctule calls recorded overall, the change may simply be due to incidental movements of noctule throughout the site in response to external factors such as routine felling. Both detectors capture suitable foraging / commuting habitat for the species (Collins, 2023).

9.6.67. A total of eight passes were recorded between five and 18 minutes after sunset, which is during the typical emergence time for the species, as set out in Andrews and Pearson (2022). The early calls were recorded during the spring and autumn deployments at Detectors 6, 10, 12 and 13.

9.6.68. Early calls recorded in 2025 do not show any seasonal or spatial trend. Given the lack of early passes recorded in 2024, and the low number of early passes recorded in 2025, it is considered that the site may provide an incidental noctule roosting resource only.

Leisler's bat (high collision risk, high vulnerability species)

9.6.69. Leisler's bats were recorded in low numbers throughout the site across all periods (0.01 P/h or below), with activity showing no seasonal or spatial trend. This is a slight reduction in activity compared to the results of the 2024 survey.

9.6.70. EcoBat analysis determined that Leisler's bat activity did not exceed 'Low' on any survey night at any detector or period in 2025.

9.6.71. A total of four passes were recorded between 21 and 33 minutes after sunset, which is during the typical emergence time for the species. All of the calls occurred at Detector 9 in the autumn period, three of which were within one minute on the same night (and therefore likely to be the same bat). Given this and the fact that no early calls were

recorded during the 2024 survey, it is considered that there may be an incidental Leisler's roosting resource near Detector 9.

Nathusius' pipistrelle (high collision risk, high vulnerability species)

- 9.6.72. One Nathusius' pipistrelle pass was also recorded during the entire 2025 survey (at Detector 5 during the spring deployment period).
- 9.6.73. EcoBat analysis determined that Nathusius' pipistrelle activity did not exceed 'Low' on any survey night at any detector or period in 2025.
- 9.6.74. The Nathusius' pipistrelle pass was recorded 96 minutes after sunset, which is later than the typical emergence time for the species and does not suggest that the bat roosted locally. This is consistent with the findings of the 2024 survey.

Common pipistrelle (high collision risk, medium vulnerability)

- 9.6.75. Common pipistrelle activity levels in spring (5.51 P/h) were consistent with the 2024 survey, but overall activity peaked in summer (11.56 P/h) rather than declining after spring. Activity once again fell in autumn (0.58 P/h). Spatially, Detector 5 recorded the highest number of passes, consistent with the 2024 survey.
- 9.6.76. Activity throughout the night was consistent with the 2024 surveys, with activity peaking at Time Codes 6 and 8.
- 9.6.77. EcoBat analysis indicates that eight nights of 'moderate' common pipistrelle activity were recorded: six of which were at Detector 5 and two at Detector 6, all within the summer period. Activity levels on all other nights were determined to be below moderate.
- 9.6.78. A total of 287 passes were recorded during typical emergence times for the species (Andrews and Pearson, 2022), at all locations except Detectors 3 and 11. Early passes show no discernible seasonality. The earliest recorded pass was 7 minutes before sunset, at Detector 1 in the autumn period.
- 9.6.79. Common pipistrelle typically select buildings (of which there are none within the site) for their larger roosts but can also roost in crevices in trees. The coniferous woodland on-site is unlikely to be an important roosting resource, although it may provide roosting opportunities for a smaller number of individuals (Collins, 2023). Early passes and the timings of the peaks in common pipistrelle activity indicate that there may be infrequent local roosting of small numbers of bats near the site.

Soprano pipistrelle (high collision risk, medium vulnerability)

- 9.6.80. Unlike the 2024 survey results, soprano pipistrelle activity in 2025 was highest during the summer period (17.24 P/h). Spatially, Detector 5 recorded the highest number of passes, consistent with the 2024 survey.
- 9.6.81. Activity throughout the night was elevated over the 2024 survey across all time codes but overall showed similar bimodal distribution, with peaks occurring at Time Codes 3 and 10 (both slightly earlier than in 2024).

- 9.6.82. EcoBat analysis identified 10 nights of 'Moderate/High' soprano pipistrelle and 23 nights of 'Moderate' activity, which could have been due to a single bat foraging near the detector.. Activity on all other nights was below 'Moderate'.
- 9.6.83. A total of 1,919 passes were recorded during the typical emergence times for the species (Andrews and Pearson, 2022), at all locations. The majority of early passes were recorded in autumn. The earliest recorded pass was 24 minutes before sunset, at Detector 12 in the spring period.
- 9.6.84. Soprano pipistrelles typically select buildings (of which there are none within the site) for their larger roosts but can also roost in crevices in trees. The coniferous woodland on-site is unlikely to be an important roosting resource, although it may provide roosting opportunities for a smaller number of individuals (Collins, 2023). Early passes and the timings of the peaks in soprano pipistrelle activity indicate that there is some roosting resource on the site, but the majority of soprano pipistrelle activity is resultant from bats commuting onto the site, possibly from a local roost near the site.

Myotis species (low collision risk, medium/low vulnerability)

- 9.6.85. Myotis species were again recorded in low numbers at all locations sampled within the site in 2025, including Detector 1. Myotis bats were recorded most at Detectors 6 and 12, which include mature coniferous woodland edge habitat. Activity was generally too low to discern a seasonal trend but did decline in autumn.
- 9.6.86. EcoBat analysis identified four nights of 'Moderate' myotis activity: one night in spring at Detector 1, one night in summer at Detector 6. one night in summer at Detector 11, and one night in spring at Detector 12. Activity on all other nights was below 'Moderate'.
- 9.6.87. A total of 107 passes were recorded at or before typical emergence times for the species, at all locations except Detector 3. Early passes showed no seasonal trend. The earliest recorded pass was 32 minutes after sunset, at Detector 13 in the summer period.
- 9.6.88. Although activity was broadly consistent between years, the survey results suggest that incidental myotis roosting resource is available throughout the site given that low numbers of early passes were recorded at all locations (considering both 2024 and 2025 surveys).

Brown long-eared bat (low collision risk, low vulnerability)

- 9.6.89. Brown long-eared bats were recorded in low numbers across the habitat types on site throughout the survey period. In 2025, however, most brown long-eared passes were recorded at Detector 5, which is located at edge habitat between felled and mature coniferous plantation, with direct connectivity to watercourses leading off-site.
- 9.6.90. Only one pass was recorded during the typical emergence time for the species: a pass at Detector 4, 52 minutes after sunset in the autumn period. There may be infrequent roosting resource for brown long-eared bat near Detector 4.

Fisheries

2018 Result Summary

- 9.6.91. Nine distinct points of the watercourses on and near site were sampled. Juvenile brown trout were recorded in varying densities and age classes in Watercourses 1 - 7 (see **Figure 9.5**). No Atlantic salmon were recorded.
- 9.6.92. Signal crayfish were recorded at Watercourses 6 and 7.
- 9.6.93. In-stream habitat quality for salmonids was of a good to moderate standard, but numbers of fish recorded did not reflect the habitat quality. This was considered likely due to competition from signal crayfish and the presence of the Kendoon Dam downstream of the site, significantly restricting migratory salmonid access to the entire catchment.
- 9.6.94. Based on the 2018 results it was not considered proportionate to repeat surveys at this time for the following reasons:
- The findings of the 2018 survey data indicated that the watercourses are not accessible to migratory salmonids due to the presence of a dam. The dam remains, and no other route allows salmonids access to site.
 - The population of invasive North American signal crayfish on-site in 2018 is likely to have spread, increasing competition and further reducing the on-site suitability of watercourses for salmonids.
- 9.6.95. As part of the consultation for the Consented Development, the Galloway Fisheries Trust confirmed that there was no potential for migratory salmonids, and that signal crayfish are present in the catchment. This situation is highly unlikely to have changed positively.
- 9.6.96. Given that the site is cut off from migratory salmonids and the population of North American signal crayfish is likely to have grown, thereby reducing the habitat suitability for salmonids, the conclusions of the 2018 baseline fisheries surveys are considered to be representative for the purposes of this assessment.

9.7. Assessment of Ecological Importance

- 9.7.1. The following Section evaluates the nature conservation importance of the habitats and species present within or in the immediate vicinity of the site. Each ecological feature has been assigned a level of importance in accordance with the geographical scale outlined in **Table 9.3**. Where nature conservation sites have designations at different levels (international/ national/ regional/ county/ local/ site), the highest level of importance is assigned. **Table 9.16** below summarises the importance of ecological features identified with potential for impact from the Proposed Varied Development and concludes by scoping features in / out of further assessment. Some legally protected ecological receptors that are nonetheless of low conservation importance and / or assumed to be locally present or in small numbers, such as badger and reptiles, are scoped out of further impact assessment. However, they are then given consideration within the mitigation section to ensure measures are put in place to avoid impacts to individuals and legal compliance.

Table 9.16 – Assessment of Importance of Ecological Features

Ecological Feature	Evaluation Rationale	Reason	Importance	Scoped In/Out
Nationally and Internationally Designated Statutory Sites				
Cleugh SSSI	Best example of unimproved lowland neutral grassland in the region. As this is a nationally designated site, it is considered of national importance. Scoped out of further assessment as its qualifying feature (unimproved lowland grassland) is unlikely to be impacted by the Proposed Varied Development, due to the distance separating the SSSI from the site and lack of connectivity.	Nationally Designated	National (High)	Scoped Out
On-Site Habitats				
Coniferous woodland plantation (A1.2.2) –	Coniferous woodland is the most abundant habitat recorded during baseline surveys and accounted for 65.29% of the total land area of the site, which was actively being felled at the time of survey. The woodland is dominated by Sitka spruce and European larch. Coniferous plantation habitat is of low conservation value; however, it is included as priority habitat within the DGLBAP, where priority actions involve the targeted conversion of coniferous plantation to broadleaf woodland, as well as expanding areas of long-term retention within conifer plantations. Parts of the coniferous woodland are planted on degraded modified bog – particularly in the south-west part of the northern part of the site (see habitat plan in	Although it is the dominant habitat type within the Proposed Varied Development site, the coniferous plantation is at various stages of harvesting and is of low ecological value. Bog on-site is significantly degraded and not currently active, therefore it does not match the Habitat Directive	Site (Minor)	Scoped Out

Ecological Feature	Evaluation Rationale	Reason	Importance	Scoped In/Out
	the 2018 Habitat Survey Report (Bear Environmental, 2018)). Although modified bog exists within this area and in other parts of the coniferous woodland it is localised and isolated, the overriding habitat classification is coniferous woodland plantation. Based on the hydrological assessment, due to the habitat's presence within an area of active forestry, close to watercourses and rides, as well its relationship with the topography and the underlying geology of the Site (see Chapter 12 and 13), this habitat is assessed to be surface and rain water fed, and therefore not a GWDTE. Blanket bog is a priority habitat within the DGLBAP. Restoring degraded bogs is a priority action, which can be achieved through blocking of grips and drains. Coniferous plantation woodland is a common and widespread habitat throughout Scotland and Dumfries and Galloway, and within the site this habitat is dominated by non-native commercial tree species of low ecological value and generally low biodiversity, therefore the habitat is considered of site level importance and is scoped out of further assessment.	Annex 1 blanket bog definition.		
Felled woodland plantation (J5)	Felled coniferous plantation accounted for 26.80% of the total land area of the site. Although of negligible conservation value, woodland edge habitats created by felled plantation may provide localised value to commuting bats. Brash and tree stumps may provide suitable foraging and basking habitat for reptiles, as well as rodent prey species to support local predator	Habitat is of Site level importance.	Site (Minor)	Scoped Out

Ecological Feature	Evaluation Rationale	Reason	Importance	Scoped In/Out
	populations, notably raptors. These potential benefits are considered to be both temporary and localised, and are therefore considered of limited importance. Localised areas of felled woodland will be lost to the Proposed Varied Development to accommodate keyholed areas for wind turbines. In light of the above, this habitat is considered to be of Site level importance, and is scoped out of further assessment.			
Marsh/marshy grassland (B5)	Marshy grassland is very limited within the site, and constituted only 4.20% of the total site area. The habitat was species-poor, dominated by soft rush and tufted hair grass with abundant purple moor grass. It is considered of low biodiversity importance and of low ecological potential. Within the habitat assessment, marshy grassland was considered to be a potential GWDTE of moderate dependency, but based on a hydrological assessment, due to the habitat's presence in close proximity to watercourse and forest rides, as well its relationship with the topography and the underlying geology of the site (see Chapters 12 and 13), this habitat is assessed to be surface water fed, and therefore not a GWDTE. Marshy grassland is not listed on the DGLBAP. It is a common and widespread habitat throughout Scotland and Dumfries and Galloway, and is both very limited and localised within the site, and is therefore considered of Site level importance and is scoped out of further assessment.	Marshy grassland is a common and widespread habitat, very limited within the site, and of low ecological value.	Site (Minor)	Scoped Out

Ecological Feature	Evaluation Rationale	Reason	Importance	Scoped In/Out
Hardstanding (J5)	This habitat comprises access tracks and is considered to be of very low biodiversity potential and ecological value. Hardstanding is scoped out of further assessment.	Habitat of very low ecological value.	Negligible (Negligible)	Scoped Out
Dry Heath/acid grassland-dry heath mosaic (D5)	Although dry heath mosaic has the potential to support fauna such as invertebrate and reptile populations, due to its very localised and fragmented occurrence within the site it is considered to have relatively low biodiversity potential and low ecological value. Upland heath is listed on the GDLBAP as a priority habitat for restoration. This habitat is a common and widespread habitat throughout Scotland and Dumfries and Galloway, and is both very limited and localised within the site, and is therefore considered of Site level importance and is scoped out of further assessment.	Habitat is of Site level importance.	Site (Minor)	Scoped Out
Broadleaved woodland plantation (A1.1.2)	Broadleaved plantation accounted for 2.66% of the total land area of the site. The woodland has been instated since the 2018 surveys therefore it is juvenile with tree guards still in place. Broadleaved plantation woodland is listed on the GDLBAP as a priority habitat for creation in line with the forest network. However, this habitat is common and widespread throughout Scotland and Dumfries and Galloway, and is both very limited and localised within	Habitat is of Site level importance and will not be significantly affected by the Proposed Varied Development.	Site (Minor)	Scoped Out

Ecological Feature	Evaluation Rationale	Reason	Importance	Scoped In/Out
	the site, and is therefore considered of Site level importance. No broadleaved woodland plantation will be lost as a result of the Proposed Varied Development. Therefore, it is scoped out of further assessment.			
Quarry (I2.1)	Botanical diversity within the quarry is limited, although it does have potential to support sheltering and basking common and widespread reptile species. However, this habitat is very localised within the site and is generally of low biodiversity potential and limited ecological value. A limited extent of quarry will be lost as a result of the Proposed Varied Development. In light of the above, this habitat is considered of Site level value, and is scoped out of further assessment	This habitat is very localised and of limited ecological value.	Site (Minor)	Scoped Out
Running Water (G2)	Watercourses within the site include tributaries of Water of Ken and the Water of Deugh, and a number drainage ditches, likely to be associated with plantation forestry. This habitat has localised potential to support otter as well as brown trout, and signal crayfish. The assemblage of watercourses on-site is reflective of that in the wider area; the local catchment is fed by a number of watercourses, many of which are tributaries of the Water of Ken. In light of the above, running water habitats are considered to be of Local importance, and they will not be significantly affected by the Proposed Varied Development and are scoped out of further assessment.	This habitat is localised and of moderate ecological value.	Local (Low)	Scoped Out

Ecological Feature	Evaluation Rationale	Reason	Importance	Scoped In/Out
Wall (J2.5)	Dry stone wall habitat is very localised within the site, and generally considered of low biodiversity potential and limited ecological value, although it may offer localised suitable sheltering and basking habitat for common and widespread reptile species. In light of the above, this habitat is considered of Site value only. None of this habitat will be lost to development related works. It is scoped out of further assessment.	This habitat is very localised and of limited ecological value.	Site (Minor)	Scoped Out
Protected and Notable Species within the Site				
Bats	All bats in Scotland are European Protected Species (EPS) and are afforded protected under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended). Bats species are also listed as priority species in the LBAP and the SBL. The site is dominated by conifer plantation, generally considered to be of low value to bats. However, localised areas of higher foraging and commuting habitat are present, and connected to further high value foraging habitats off-site, such as the Water of Ken. This region of Scotland is known to support populations of <i>Nyctalus</i> bat species, and <i>Nathusius'</i> pipistrelle (based on desk study assessment, detailed in Section 9.6), considered at high risk from wind farm development, and these species were recorded on-site,	Bat species utilise habitats within the site and surrounding environment, with the local populations containing low numbers of regionally important species.	County (Moderate)	Scoped In

Ecological Feature	Evaluation Rationale	Reason	Importance	Scoped In/Out
	albeit very occasionally in very low numbers. It is considered that due to the lack of suitable habitats for the species, which are known to primarily utilise mature broadleaved woodland for foraging and roosting, the Site is of low value to <i>Nyctalus</i> species. Only one Nathusius' pipistrelle call was recorded, suggesting that the site is infrequently utilised by this species and is not an important resource. Despite the low numbers of common species, all bats are protected, and high-risk species have been recorded on-site, albeit in low numbers. For this reason, a precautionary evaluation of importance at the County level is made and bats are scoped in for further assessment.			
Otter	Otter is a EPS, as well as a priority species in the DGLBAP, categorised as 'Near Threatened' in the International Union of Conservation of Nature (IUCN) Red List (IUCN, 2016), and is listed on the SBL. Otters have been recorded using habitats within the site and surrounding environment. Although the habitats present on-site are broadly considered to be of lower value to those in the wider area, such as the Water of Ken, some habitats within the site are considered to be of moderate value to local otter populations as an occasional or seasonal resource.	Otters utilise habitats within the Proposed Varied Development site and surrounding environment.	County (Moderate)	Scoped In

Ecological Feature	Evaluation Rationale	Reason	Importance	Scoped In/Out
	In light of the above, otters are evaluated as being of County level importance and are scoped in for further assessment within this Chapter.			
Pine marten	Pine martens and their dens are protected under the Wildlife and Countryside Act 1981 (as amended) and the Nature Conservation Act 2004 and are listed on the SBL. Pine martens are distributed throughout much of mainland Scotland, with continued expansion and population recovery, including an established presence in southern Dumfries and Galloway (Birks 2017). Pine marten are likely to utilise on-site habitat for foraging and commuting, however, no dens or features with potential were located. Based on desk assessment only, habitat more suited to den creation is located outside of the site, such as mature deciduous woodland where tree cavities are more likely to form than in the coniferous and immature deciduous woodland on-site. Due to the active forestry operations and lack of mature deciduous trees, opportunities for den building pine marten on-site are limited. As such, pine marten are considered of local value and are scoped out of further assessment (although scoped in for the purposes of precautionary mitigation).	Potential pine marten presence on-site limited to commuting and foraging.	Local (Low)	Scoped Out
Badger	Badger and their setts are protected under the Protection of Badgers Act 1992 and the Wildlife and Countryside Act 1981 (as amended). Badger are not listed on the SBL.	Utilise the site for commuting and foraging; habitat connectivity will not	Local (Low)	Scoped Out

Ecological Feature	Evaluation Rationale	Reason	Importance	Scoped In/Out
	During the 2024 survey update, signs of badger presence were recorded including: feeding signs, a latrine and prints. The mature coniferous plantation woodland on site presents suitable sett creation habitat for the species, though none were located. Habitat connectivity will be retained within the Proposed Varied Development, allowing badger to continue commuting over the landscape. Badgers are not protected for their conservation interest (rather, they are protected on welfare grounds). Their presence on the site is likely to be of Local level importance only and they are scoped out of further assessment (although scoped in for the purposes of precautionary mitigation).	be impacted by the Proposed Varied Development.		
Water vole	Water vole is listed on Schedule 5 of the Wildlife and Countryside Act 1981(as amended), as well as the SBL, and is a Priority Species listed in the SAF for Scotland. No evidence of water vole was recorded during baseline surveys or the desk study, and habitats recorded on-site were largely of low suitability to support the species. Although some limited suitability was recorded, and the site lies within the regional range of the species, the presence of American mink in the locality (based on desk study results), known as a primary reason for the decline of the species, the presence of water vole is considered unlikely.	Water voles are not present within the site, and riparian habitats will not be impacted by the Proposed Varied Development.	Site (Minor)	Scoped Out

Ecological Feature	Evaluation Rationale	Reason	Importance	Scoped In/Out
	In light of the above, water vole is considered to be absent from site or present in very low numbers and is evaluated on a precautionary basis as important at Site level. Watercourses will not be impacted by the Proposed Varied Development, and therefore water vole (if present) will not be affected. Consequently, water vole are scoped out of further assessment (although scoped in for the purposes of precautionary mitigation).			
Red squirrel	Red squirrel and their dreys are protected under the Wildlife and Countryside Act 1981 (as amended) and are listed as a priority species both on the DGLBAP, and on the SBL. Signs of red squirrels were recorded during baseline surveys and during the desk study, although no dreys were recorded. Although conifer plantations provide suitable habitat for red squirrel, these habitats within the site were dominated by Sitka spruce, a tree species considered less favourable to the species, compared to other coniferous species, and coniferous woodlands with as greater species diversity. Large areas of the site were clear felled or recently replanted woodland, and therefore considered unsuitable to support red squirrel foraging and drey construction. In light of the above, red squirrel is considered of Site level importance, and is scoped out of further assessment (although scoped in for the purposes of precautionary mitigation).	Red squirrel are potentially present within the site, but habitats are of limited suitability.	Local (Low)	Scoped Out

Ecological Feature	Evaluation Rationale	Reason	Importance	Scoped In/Out
Fish Species	Habitats suitable to support juvenile salmonids were identified in the watercourses draining land within the site, however, fish populations recorded were dominated by low densities of resident brown trout, with no legally protected fish species, such as Atlantic salmon, or lamprey species recorded. No watercourses draining land on-site are classified as Marine Scotland; Scottish Salmon Rivers⁸, and no connectivity to such classified areas (such as the southern aspects of the Water of Ken) is possible due to dams on Loch Kendoon, which likely form a barrier to salmon migration. Additionally, the presence of signal crayfish is likely to reduce on-site watercourse suitability for fish populations. In light of the above, fish species are considered of Site level value, and therefore are scoped out of further assessment.	No protected fish species were recorded, with only low densities of common and widespread fish species recorded.	Site (Minor)	Scoped Out
Reptiles	No reptiles were recorded during the 2024 surveys. Previously, common lizard was recorded on-site, with adder records also returned by desk study within the last decade. Both of these species are protected under the Wildlife and Countryside Act 1981 (as amended) against intentional or reckless killing and injuring. Both	Reptiles historically present, continued presence is assumed. Suitable habitat is present and the site is within the known range.	Site (Minor)	Scoped Out

⁸ <https://marinescotland.atkinsgeospatial.com/nmpi/>

Ecological Feature	Evaluation Rationale	Reason	Importance	Scoped In/Out
	reptile species are all included on the SBL, and adder is included the DBLBAP. Localised areas within the site included rough grassland, heathland and felled plantation habitats considered suitable for foraging, sheltering and basking for reptiles; however, the majority of the site was dominated by active forestry operations, not considered suitable to support reptiles. In light of the above, reptiles are assumed present and considered of Site value, and are scoped out of further assessment. Micro-siting and suitable working methods at the construction stage should be utilised to protect individuals.			
Amphibians	Common frog and common toad are not listed under the LBAP. Common toad is listed on the SBL. Although the lack of ponds and waterbodies meant the site was unsuitable for breeding amphibians, localised areas within the site such as bog, marshy grassland and riparian habitats, were considered suitable for foraging amphibians, however the majority of the site was dominated by coniferous plantation, a habitat not considered suitable to support amphibians. In light of the above, amphibians are considered of Site level value, and therefore are scoped out of further assessment.	No amphibian species were recorded on-site and a majority of habitats on-site were unsuitable to support amphibians.	Site (Minor)	Scoped Out

9.7.2. The following are scoped out of assessment on the basis of their evaluation at local or less than local importance and / or the lack of any significant impacts being likely to arise therefore no potential for significant impact from the Proposed Varied Development:

- Designated sites;
- Coniferous plantation woodland;
- Marshy grassland;
- Dry heath/acid grassland mosaic;
- Broadleaved woodland plantation;
- Running water;
- Quarry habitat;
- Pine marten;
- Badger;
- Water vole;
- Red squirrel;
- Fish species;
- Reptile species; and
- Amphibian species.

9.7.3. Although the above ecological receptors are scoped out for assessment within this Chapter, mitigation measures are included to ensure legislative compliance and adherence to best practice, including: pine marten, badger, water vole, reptiles, amphibians and red squirrel.

9.7.4. Ecological features scoped into the assessment are limited to:

- Bats; and
- Otter.

9.8. Standard Mitigation

Embedded Mitigation

9.8.1. The assessment process assumes the application of standard mitigation measures. A range of embedded measures have already been applied as part of the iterative design process (see below and **Chapter 3: Alternatives and Scheme Evolution**). This

assessment assumes adherence to current environmental protection policies and guidance, including but not limited to:

- Good Practice During Wind Farm Construction (NatureScot, 2024);
- Water Use Guidance – Construction Regulatory Guide –WAT-SG-75 (SEPA, 2021);
- Guidance on Assessing the Impacts of Developments on Groundwater Dependent Terrestrial Ecosystems (SEPA, 2024);
- Environmental Authorisation (Scotland) Regulations (Scottish Government, 2018).⁹

9.8.2. The development of a site Construction Environmental Management Plan (CEMP), in consultation with stakeholders will also be implemented, and will include:

- Appointment of a suitably qualified and experienced Ecological/Environmental Clerk of Works (ECoW) to oversee application of the CEMP.
- A pre-construction programme of ecological checks to feed into the CEMP and other operational plan documents (notably in relation to mobile species such as otter, badger and pine marten).
- Use of method statements during construction, to include current good practice and prescribed use of low noise and vibration plant to limit disturbance and displacement effects. Method statements will also set out timing restrictions for some elements of the work (such as felling) to reduce impacts on species.
- If lighting is required during the construction phase it will be designed in accordance with industry guidance (and following Institute of Lighting Professionals and Bat Conservation Trust 2023) with input from a consultant ecologist. Bats will be key considerations of the lighting strategy.

9.8.3. Watercourses will be protected during the construction phase through the adoption of a range of mitigation measures which are provided as an Outline CEMP (**Appendix 4.1**), measures include the following:

- All construction activity to be limited to clearly defined areas.
- Avoidance of natural water features with a 50 m stand-off where possible.
- Drains, silt traps, check dams and barriers to prevent silt-laden run-off from entering watercourses.
- Provision of temporary/permanent drainage routes, including cross-drainage at access tracks.

⁹ See also guidance provided by SEPA at <https://www.sepa.org.uk/environment/land/planning/guidance-and-advice-notes/> accessed June 2026

- Sensitive design of drainage ditches to avoid potentially silt-laden run-off flowing directly into natural channels.
- The application of best practice in accordance with Guidance for Pollution Prevention (GPP)¹⁰.
- Sensitive location and containment of storage areas and stockpiles; and
- Refuelling will only take place on hard standings.

9.8.4. Pre-construction survey work and checks for the presence of otter holts, water vole burrows, red squirrel dreys, pine marten dens and badger setts will take place at appropriate times of year (generally between April and September inclusive) prior to the commencement of construction. The aim of these surveys will be to update the baseline information regarding use of affected areas by these species, and to inform the relevant content of a CEMP. As these species are subject to legal protection, and some works that have the potential to cause disturbance of animals or may result in damage or destruction of their places of shelter, pre-construction survey may result in the requirement for an appropriate licence to be issued by NatureScot before such works can proceed.

9.8.5. Decommissioning mitigation will broadly follow measures proposed for construction of the Proposed Varied Development. Mitigation will be tailored to avoidance of impacts (through disturbance and displacement) on those species that breed, roost or forage within the site at that time.

Mitigation Through Design

9.8.6. Throughout the design process, an informed approach has been taken when determining the Proposed Varied Development layout, to mitigate potential for impact to ecological features through design. Where possible, care has been taken to avoid ecological receptors. Ecology specific mitigation by design includes:

- Turbines (specifically the blade tips) will have a 50 m separation distance between higher-value bat habitats, such as riparian features and forest edges, to reduce bat-strike;
- The increase in turbine height above the adjacent tree canopy will reduce the risk of bat strike (Nature Scot *et al*, 2021).
- Retention of existing young deciduous woodland; and
- Avoidance of areas of bog to minimise impacts to the deeper peat deposits and limit the number of watercourse crossings, as described further in **Chapter 13**.

¹⁰ Available at: <https://www.netregs.org.uk/tools/guidance-for-pollution-prevention-gpp-documents/> Accessed January 2025.

9.9. Potential Effects

- 9.9.1. Construction phase and operational phase effects are assessed. Decommissioning effects would be similar to or less than construction phase effects, and therefore a detailed assessment of decommissioning effects has not been carried out.

Bats

- 9.9.2. The difference between the Consented Development and the Proposed Varied Development layout and infrastructure proposals are minor; and the results of the 2024-2025 bat survey work are reflective of the 2018 data. In addition, the hub height (and rotor swept zone) are higher than previously, which is generally favourable for most bats. This takes into account the average flight heights of the species recorded on-site¹¹ and a hub height of 138.5 m with an 81.5 m blade length. The rotor swept area is also well above tree canopy height. Taking all of this into account, the impact assessment for bats remains largely unchanged from the original 2018 EIA Report Ecology Chapter.
- 9.9.3. Bat activity across the Site in 2024 and 2025 was generally low, comparable to bat activity in 2018 (as shown in **Table 9.13**).
- 9.9.4. The lack of broadleaved woodland habitats probably accounts in part for the low levels of woodland specialist species on the site (*Myotis* and *Nyctalus* spp.). Nathusius' pipistrelle, noctule and Leisler's bats are assessed as high vulnerability species by NatureScot due to their high collision risk and their rarity within Scotland (NatureScot, 2021). More generalist species such as common pipistrelle and soprano pipistrelle account for the majority of activity on the site. Common pipistrelle and soprano pipistrelle are at medium risk of collision in accordance with NatureScot guidance (NatureScot, 2021).
- 9.9.5. Overall, low levels of commuting and foraging bats were recorded across the site in 2018 and in 2024-2025, with a low likelihood of roost presence due to the dominance of coniferous and immature deciduous trees. The Proposed Varied Development has potential, in the absence of mitigation, to result in both direct operational effects such as mortality due to turbine collision; and indirect impacts, including displacement and disturbance during construction due to noise and lighting.

Construction: Habitat Displacement

- 9.9.6. The clearance of coniferous plantation is required to facilitate the Proposed Varied Development. Coniferous plantation has limited roosting opportunities for bats but forest edges, suitable for foraging and commuting individuals, will remain. Taking into account the extent of similar habitat that will be retained, the resulting effect on bats due to coniferous woodland loss is likely to be similarly small, and potentially negligible. The effect of the impact is not considered to be significantly greater than the habitat changes that result from normal active forestry operations.
- 9.9.7. Losses of coniferous woodland habitat required to facilitate the Proposed Varied Development are to be offset in the normal course of ongoing forestry management on-site and there will be compensatory off-site planting. Phased felling may create additional

¹¹ Bat Conservation Trust: <https://www.bats.org.uk/> Accessed January 2025.

edge habitats suitable for foraging bats in the short term. In the longer term, habitat creation and re-stocking will take place across the site, including areas of broadleaved woodland; presenting a habitat enhancement for woodland specialist bat species.

- 9.9.8. If construction phase lighting is required it will be designed in accordance with industry guidance (BCT, 2023). This will include careful consideration of the location of lighting, the type of lighting and the design of the lighting scheme to minimise the potential for impacts on bats.
- 9.9.9. Without mitigation, the impact of displacement due to lighting on bats is adverse. However, with the adoption of embedded mitigation measures, the effect of displacement due to lighting is considered to be adverse but of low magnitude and is assessed as potentially significant at no more than the level of the **Site** (minor adverse).

Construction: Roost Loss

- 9.9.10. Bats on the site may be impacted through the direct loss of bat roosts or via direct harm or indirect disturbance to roosting bats as a result of felling activities and associated noise and vibration. Habitat subject to felling is limited to the coniferous plantation which offers limited opportunities for roosting bats. Data collected (low activity-levels for all species) do not suggest the presence of a roost on the site. It is possible that a small number of unrecorded, isolated features with bat roosting potential may be lost. Whilst unlikely, such features are likely to be ephemeral within commercially managed conifer forestry and the loss of roosting opportunities is assessed as a potentially adverse impact which is potentially significant at no more than the level of the **Site** (minor adverse).

Operation: Turbine Collision and Barotrauma

- 9.9.11. Operational effects of the Proposed Varied Development are limited to accidental mortality or injury to bats (including barotrauma) in flight through direct collision with moving turbine blades. A study undertaken by the University of Exeter on behalf of the UK Government Department for Environment, Food and Rural Affairs (DEFRA) indicated the mortality rate of bats at wind turbines in the UK ranged from 0 to 5.25 bats per turbine per month across 46 sites sampled over a three-year period (Matthews *et al*, 2016). It also demonstrated that bat fatality could not be correlated with activity levels; i.e. higher levels of baseline activity do not necessarily result in a higher risk to bats. The study indicated that the UK bats that were most likely to be killed at wind farm sites were common and soprano pipistrelle and noctule bats.
- 9.9.12. **Table 9.17** provides a summary of current knowledge of the UK population sizes and the known collisions of common pipistrelle, soprano pipistrelle, and noctule. It is based on mortality data collated by Dürr (2026), and UK population estimates provided by Matthews *et al*. (2018). *Myotis* sp. bats are considered to be at low risk of collision, and collision-related impacts on this species group are unlikely to occur.

Table 9.17 – UK Bat Population Sizes

Species	Known collisions in Europe to date (UK component in brackets)	UK population estimate
Leisler's	892 (0)	10,000
Noctule	1,834 (11)	656,900 (excl. Scotland)
Nathusius' pipistrelle	1,906 (1)	4,000
Common pipistrelle	3,812 (46)	3,040,000
Soprano pipistrelle	543 (52)	4,670,000

9.9.13. To determine the risk posed to bats by the operational wind farm, guidance set out by NatureScot *et al* (2021) has been applied (**Table 9.18**). The site is categorised as a “moderate site risk” (risk level = 3) according to the supporting definitions of low habitat risk and medium project size set out by NatureScot *et al*. (2021). The rationale is as follows:

- Turbine numbers (11 total) meet the definition of a medium scheme.
- There are 24 operational, under construction, consented or proposed wind farm developments located within approximately 10 km of the Proposed Varied Development.
- The height of the turbines within the Proposed Varied Development (220 m to tip) exceeds the defined height (for medium project size), but the number of proposed turbines is fewer, and at the lowest end of the medium definition.
- The Proposed Varied Development conforms most readily to a medium-sized project based on scale.
- Habitat quality for bats has been assessed as moderate. The site has no buildings and all trees on-site are immature deciduous (still in tree guards) or coniferous trees, and part of active forestry operations – neither of which are optimal for roosting bats. Riparian corridors and woodland edges provide connectivity for bats locally but activity levels of all bat species were low during survey work in 2018, 2024 and 2025.

Table 9.18 – Descriptions of habitat risk and project size categories used to inform the Site risk level for bats (from NatureScot *et al*, 2021).

Habitat Risk	Description
Low	Small number of potential roost features, of low quality. Low quality foraging habitat that could be used by small numbers of foraging bats.

Habitat Risk	Description
	Isolated site not connected to the wider landscape by prominent linear features.
Moderate	Buildings, trees or other structures with moderate-high potential as roost sites on or near the site. Habitat could be used extensively by foraging bats. Site is connected to the wider landscape by linear features such as scrub, tree lines and streams.
High	Numerous suitable buildings, trees (particularly mature ancient woodland) or other structures with moderate-high potential as roost sites on or near the site, and/or confirmed roosts present close to or on the site. Extensive and diverse habitat mosaic of high quality for foraging bats. Site is connected to the wider landscape by a network of strong linear features such as rivers, blocks of woodland and mature hedgerows. At/near edge of range and/or on an important flyway. Close to key roost and/or swarming site.
Project Size	Description
Small	Small scale development (≤ 10 turbines). No other wind energy developments within 10 km. Comprising turbines < 50 m in height.
Medium	Larger developments (between 10 and 40 turbines). May have some other wind developments within 5 km. Comprising turbines 50-100 m in height.
Large	Largest developments (> 40 turbines) with other wind energy developments within 5 km. Comprising turbines > 100 m in height.

- 9.9.14. As described in **Section** □, the Proposed Varied Development design has ensured that turbines have a minimum separation distance of 50 m to high value bat habitats (including woodland and riparian corridors). This distance is considered sufficient to reduce turbine collisions as they will be sited away from suitable habitat edges where bats are most likely to commute. Additionally, the average flight height for pipistrelle bats is 2-10 m¹² and the majority of bats are unlikely to fly at rotor height. This means that they are at little risk of collision.
- 9.9.15. *Nyctalus* bats fly at higher altitude than *Pipistrellus* species and are more likely to utilise open habitats (such as those surrounding turbines). *Nyctalus* were recorded at low levels

¹² BCT available online: <https://www.bats.org.uk/about-bats/what-are-bats/uk-bats/common-pipistrelle#:~:text=Common%20pipistrelle%20habitat&text=They%20generally%20emerge%20from%20their,wing%20by%20%27aerial%20hawking%27>. Accessed January 2025.

of activity throughout the site. This finding is in line with NatureScot research (Newson *et al*, 2017), which places the site in an area of low occurrence of both Leisler's and noctule bats and in an area of lowest "exposure to windfarms" (this prediction is based on occurrence, activity levels and maximum known foraging radius).

- 9.9.16. JNCC also report that the bat species that account for most of the activity on-site (noctule¹³, Leisler's¹⁴, common pipistrelle¹⁵ and soprano pipistrelle¹⁶) are considered to be stable in terms of population numbers and range, and to have a favourable conservation status.
- 9.9.17. Although it is considered unlikely to occur, the risk of bat fatality due to turbine collision or barotrauma cannot be completely ruled out. If turbine mortality does occur, impacts are likely to be too minor to adversely affect local bat populations, and the effect of such an impact would be assessed as adverse but of low magnitude. As a result, they are considered potentially significant at no more than the level of the **Site** (minor adverse).

Decommissioning

- 9.9.18. Decommissioning activities will be of a similar nature to construction; however, potential impacts to bats are considered less likely and on a significantly smaller scale due to the lack of felling required at decommissioning. Consequently, effects are considered unlikely to arise and be not significant.

Otter

- 9.9.19. Because of the consistency of habitat and otter-specific survey results between 2018 and 2026 and minimal changes to infrastructure placement, the ecological impact assessment for otter remains largely unchanged from the original 2018 EIA Report Ecology chapter.

Construction: Disturbance

- 9.9.20. Where access tracks are proposed to cross existing watercourses, there is potential for temporary disturbance to otter during construction. No resting places were recorded on-site in 2024, but otter are a mobile species and may establish new resting places in the vicinity of the Proposed Varied Development. Construction will result in a localised increase in noise, vibration, traffic and human presence which has potential to disturb commuting and foraging otter. Habitat that could support otter is present on-site and directly adjacent to the site, and the effects of this impact, if it arises, would be considered detrimental but of low magnitude. As a result they are considered potentially significant at no more than the level of the **Site** (minor adverse).

Operation: Collision Related Mortality and Injury

- 9.9.21. In addition to the increase in traffic throughout construction, a direct increase in vehicle movements throughout the site will occur during the operational phase of the Proposed

¹³ Available at: <https://jncc.gov.uk/jncc-assets/Art17/S1312-UK-Habitats-Directive-Art17-2019.pdf> Accessed January 2025.

¹⁴ Available at: <https://jncc.gov.uk/jncc-assets/Art17/S1331-UK-Habitats-Directive-Art17-2019.pdf> Accessed January 2025.

¹⁵ Available at: <https://jncc.gov.uk/jncc-assets/Art17/S1309-UK-Habitats-Directive-Art17-2019.pdf>. Accessed January 2025.

¹⁶ Available at: <https://jncc.gov.uk/jncc-assets/Art17/S5009-UK-Habitats-Directive-Art17-2019.pdf>. Accessed January 2025.

Varied Development. Increased traffic may result in an increase of collision risk and accidental otter fatality, notably if construction works are scheduled to take place during low light levels of winter months when visibility is poor.

- 9.9.22. The potential for collision is most significant at the proposed watercourse crossings at the Craigengillan and Black Burns. However, due to the temporary nature of construction, this is considered to be a potential impact of low risk, and unlikely to impact more than a small number of otters (if any). The impact is considered potentially significant at no more than the level of the **Site** (minor adverse).
- 9.9.23. Operational maintenance will require occasional movement of vehicles and personnel throughout the site. This activity will be limited to infrastructure associated with the Proposed Varied Development, with no disturbance to the surrounding habitats (including riparian habitat) expected. Due to the infrequency and localised nature of operational activities, effects are considered to be of negligible magnitude, potentially significant at no more than the level of the **Site** (minor adverse).

Decommissioning

- 9.9.24. Decommissioning activities are considered to be similar in nature to those of construction. Potential exists to disturb otter, particularly where decommissioning works are required in close proximity to riparian habitats. Decommissioning activities may result in a localised increase in noise, vibration, traffic and presence of people, all of which have potential to disturb commuting and foraging otters. This impact is considered low magnitude, potentially significant at no more than the level of the **Site** (minor adverse).

9.10. Existing Planning Conditions

- 9.10.1. Annex 2 of the Shepherds' Rig Wind Farm (the Consented Development) Decision Letter outlines the Conditions attached to the Deemed Planning Permission. The following conditions relate to ecology and all remain applicable to the Proposed Varied Development:

Condition 14: Ecological Clerk of Works

(1) There shall be no Commencement of Development unless the terms of appointment of an independent and suitably qualified Ecological Clerk of Works (ECoW) by the Company have been submitted to, and approved in writing by the Planning Authority, in consultation with NatureScot and SEPA.

(2) The terms of appointment shall:

- a. *impose a duty on the ECoW to monitor compliance with the ecological, ornithological and hydrological commitments provided in the EIA Report, AEI and AEI II lodged in support of the application and the Construction Environmental Management Plan, Peat Management Plan, Biodiversity Plan, Species Protection Plan(s), Breeding Bird Protection Plan, Water Construction Environmental Management Plan, Biosecurity Plan and other plans approved in terms of the conditions of this permission (the ECoW Works);*

- b. *advise on micro-siting proposals issued pursuant to condition 15;*
- c. *require the ECoW to report to the nominated construction project manager any incidences of non-compliance with the ECoW Works at the earliest practical opportunity and stop the job where any breach has been identified until the time that it has been reviewed by the construction project manager; and d) require the ECoW to report to the Planning Authority any incidences of non-compliance with the ECoW Works at the earliest practical opportunity.*

(3) The ECoW shall be appointed on the approved terms during the establishment of the Habitat Management Plan and throughout the period from Commencement of Development to completion of post construction restoration works and aftercare phase of the Development.

(4) No later than 18 months prior to decommissioning of the Development or the expiry of the section 36 consent (whichever is the earlier), details of the terms of appointment of an ECoW by the Company throughout the decommissioning, restoration and aftercare phases of the Development shall be submitted for the written approval of the Planning Authority.

(5) The ECoW shall be appointed on the approved terms throughout the decommissioning, restoration and aftercare phases of the Development. Reason: To secure effective monitoring of and compliance with the environmental mitigation and management measures associated with the Development during the decommissioning, restoration and aftercare phases.

Condition 18: Construction Environmental Management Plan

There shall be no Commencement of Development unless a Construction and Environment Management Plan (CEMP) has been submitted to and approved in writing by the Planning Authority, in consultation with NatureScot, HES, SEPA, the roads authority and the council's Environmental Health Officer (EHO). The CEMP shall integrate best practice methods for the Scottish / UK wind farm industry with the mitigation measures identified in the EIA and AEI reports.

Condition 24: Biodiversity Plan

(1) There shall be no Commencement of Development unless a Biodiversity Plan setting out proposals for the monitoring, restoration, enhancement and management of the peatland habitat of the site during construction, operation and decommissioning, has been submitted to and approved in writing by the Planning Authority.

(2) The Biodiversity Plan shall be implemented in accordance with the approved details unless otherwise agreed in writing by the Planning Authority.

Condition 30: Breeding Bird Protection Plan

(1) There shall be no Commencement of Development unless a breeding bird protection plan (BBPP) has been submitted to and approved in writing by The Planning Authority, in consultation with NatureScot and Royal Society for the Protection of Birds.

(2) The BBPP shall set out survey methods for the identification of sites used by protected and sensitive birds during construction and shall detail operational protocols to prevent or minimise disturbance of birds during construction of the Development.

(3) The BBPP approved under part (1) shall be implemented during construction works.

9.11. Additional Mitigation and Enhancement

9.11.1. In line with NPF4 (Scottish Government, 2023), the Onshore Wind Policy Statement (Scottish Government, 2022a), and the Scottish Biodiversity Strategy to 2045 (Scottish Government, 2022b), consideration has been given to how the Proposed Varied Development can deliver enhancements to biodiversity over its lifetime.

9.11.2. Enhancement measures are proposed throughout the site, these are set out in the Outline Habitat Management Plan (OMHP) (**Appendix 9.8**) and shown in **Figure 1** of the OMHP. The following measures are included:

- Blanket bog restoration of areas totalling approximately 66.75 ha that have been degraded through activities associated with coniferous plantation management. Blanket bog is on the Dumfries and Galloway LBAP (Dumfries and Galloway Council 2009), the UK Biodiversity Action Plan Priority Habitat (Brigg 2008) and a Habitat Directive Annex I habitat (7130 Blanket Bogs). The plantation woodland will be removed, and forestry activities will cease, from targeted areas of deep peat mostly along the western edge of the site. These areas retain indicator species for bog habitats including *sphagnum* moss. Blanket bog and bog woodland regeneration will be encouraged through the blocking of grips and drains to raise ground water levels in these areas. Bog habitat creation will benefit a number of species including invertebrates, pine martens and black grouse (*Tetrao tetrix*);
- Creation of a dry heath / acid grassland mosaic totalling approximately 8.83 ha in areas of shallow or no peat within keyholed areas (85 m radius of the wind turbines) and importantly along access tracks which will provide connectivity throughout the site. Upland heath is listed on Dumfries and Galloway's LBAP and is a UK Biodiversity Action Plan Priority Habitat (Brigg, 2008) and is a Habitat Directive Annex I habitat (4030 Dry Heaths). New dry heath / acid grassland is proposed in areas currently subjected to active forestry operations. Creation of this habitat will benefit a number of species including invertebrates, mountain hare, pine marten and black grouse;
- Creation of additional deciduous woodland (approximately 35.82 ha) of native flowering/fruited trees with a scrub understorey. The species composition will reflect local native woodland and species with benefit to black grouse will be included, notably: rowan *Sorbus aucuparia*, hazel *Corylus avellana* and birch *Betula pubescens*. The low density planted areas will avoid blanket bog habitats, and will be

created with uneven feathered edges to provide a transition between the woodland and surrounding habitats; and

- Enhancement of over 11 ha of riparian corridors through additional bankside planting, and management of vegetation, following SEPA's good practice guide (SEPA, 2009). River headwaters are listed on the Dumfries and Galloway LBAP as a habitat of priority action. Measures will include the removal of conifers and long-term scrub control, supplementary planting of broad-leaved species, and promotion of open areas to develop as a heath and grassland mosaic.

Construction Phase Mitigation

- 9.11.3. The following sections outline the mitigation of Proposed Varied Development impacts, particularly to ensure the safeguarding of protected species during construction and operation (including those scoped out of impact assessment). It is anticipated that relevant elements will be included in the CEMP and protection plans, as part of the wider environmental management of construction and operation phases.
- 9.11.4. The appointment of an Ecological Clerk of Works (ECoW) is already identified as a requirement in the previously described embedded measures section. They will provide ecological and environmental advice during construction, including the monitoring of compliance with the recommendations of this EIA Report and subsequent planning conditions. The ECoW will also be informed by the project hydrologist.
- 9.11.5. Before construction begins, the ECoW and project hydrologist will undertake a review of design and drainage plans to inform the requirement for micro-siting, to minimise the potential for direct effects to habitats of conservation concern, and to assist in the identification of appropriate locations for commencement of habitat restoration works. Where possible, the ECoW will provide input to drainage design to minimise hydrological disruption and reduce the risk of scour and erosion. The ECoW will also monitor the implementation of pollution prevention and good working practices throughout construction, to protect terrestrial and aquatic ecosystems from accidental pollution.
- 9.11.6. Prior to construction, the ECoW will also undertake a walkover to check for the presence of otter resting places and holts, water vole burrows, red squirrel dreys, pine marten dens and badger setts within the construction footprint or directly adjacent. The walkover will take place at an appropriate time of year (between April and September inclusive) prior to the commencement of construction. The aim of these surveys will be to confirm / update the baseline information about use of affected areas by these species, and to inform the relevant content of a CEMP. As these species are subject to legal protection, if located, works that have the potential to cause disturbance of animals or which may result in damage or destruction to their places of shelter, would only proceed after an appropriate licence from NatureScot has been issued, and in line with the method statement that forms part of such a licence.

Invasive Species

- 9.11.7. Where works are to take place in or close to watercourses, particularly where proposed access tracks cross watercourses where North American signal crayfish have been

recorded in previous years, such as the Craigengillan Burn, potential exists for this invasive species to be accidentally spread or released.

- 9.11.8. Although there is little information concerning interactions between signal crayfish and salmonid fish, preliminary studies by the Fisheries Research Services (FRS) have shown that North American signal crayfish can exclude juvenile salmon from shelters during winter, which would increase the vulnerability of wild salmon to predators. Signal crayfish are also known to compete with salmonid fish populations for refuges. Additionally, there is anecdotal evidence of signal crayfish burrows forming complex underground matrices impacting riverbank integrity and increasing erosion with potential implications for flooding and subsidence.
- 9.11.9. It is therefore feasible that the continued spread of this species could detrimentally impact salmonid fish species utilising the Site and watercourse in the wider area. To mitigate this potential risk and to help ensure development works are legally compliant in respect of the spread of American crayfish, a Construction Biosecurity Plan (CBP) will be written and implemented ahead of the commencement of the construction phase. The CBP will be subject to approval by the local planning authority and contain measures that aim to ensure works do not facilitate the spread of signal crayfish. The implementation of the CBP will be monitored by the ECoW.

Habitats

- 9.11.10. Provision of a “key-holed” area consisting of an 85 m buffer from the turbine to the retained forest edge to reduce the risk of bat-strike. The key holed area will be a heath and grassland mosaic with no trees present. By keeping the ‘key-holed’ area free of trees through management, a heath and grassland mosaic will be allowed to develop.
- 9.11.11. The coniferous plantation within the site has been planted on areas of peat and peaty soils, and remnant modified bog habitats occur in localised areas where stocking density is low or there are breaks in the canopy. Mitigation will be implemented to reduce potential for indirect effects (including further drying of adjacent peat resources). Such measures include leaving roots of felled trees in situ, the blocking of commercial forestry drainage ditches and good practice for the management and storage of peat (including appropriate use of vegetated turves) to ensure effective re-use as part of reinstatement works.

Operational mitigation

- 9.11.12. Best practice mitigation measures will be adopted to minimise the risk of bats colliding with operational turbines, in accordance NatureScot (2021a). Turbines (specifically the blade tips) will have a 50 m separation distance to high-value bat habitats, such as riparian features and forest edges. This offset has been included in the design of the Proposed Varied Development, and it will be maintained throughout the operational life of the Proposed Varied Development, such as by ensuring tree regeneration does not take place within this offset buffer.
- 9.11.13. NatureScot *et al.* (2021) guidance recommends that, wherever it is practically possible, turbine blades are pitched out of the wind (feathered) to reduce their rotation speeds to below 2 rpm when idling. This is only applied when the turbines are not generating a

commercial output and it may reduce fatality rates by up to 50 % (NatureScot *et al.*, 2021). The feathering of blades when idling is also a mitigation measure proposed in the Action Plan for the Conservation of All Bat Species in the European Union 2018-2024 (Barova & Streit, 2018). Therefore, it is proposed that the turbines at the site will be feathered when not generating a useable output.

- 9.11.14. NatureScot *et al.*, (2021) indicates that post-construction monitoring is “*normally only required where the mitigation involves curtailment*”. However, there is increasing evidence (e.g. Mathews *et al.*, 2016) to suggest that collision fatality is difficult to predict and does not align with baseline levels of bat activity. Therefore, monitoring of bat activity, along with carcass searching, will be undertaken for three years post-development to determine operational-phase bat activity, and confirm the predicted residual collision effects on bats.
- 9.11.15. The potential for operational effects of accidental collision and barotrauma on bats has been recognised. In accordance with NatureScot guidance on bats and wind farms (NatureScot, 2021a), operational monitoring is required for a minimum of three years post-construction. Monitoring will be developed to identify and minimise the risk of collision by bats. The programme of post-construction monitoring will be detailed within a bat monitoring and mitigation plan and treated as a live document throughout the operation of the Proposed Varied Development, to account for any further changes in guidance or baseline conditions.

Mitigation at decommissioning

- 9.11.16. Decommissioning activities are anticipated to be of a similar nature to those of Proposed Varied Development construction; therefore, the embedded mitigation outlined above is also considered relevant to the decommissioning phase.

9.12. Residual Effects

- 9.12.1. Following implementation of mitigation, no significant adverse residual effects are predicted. Beneficial residual effects are possible due to proposed habitat creation measures increasing foraging, commuting and potential bat roosting resources throughout the site.

9.13. Cumulative Assessment

- 9.13.1. The EIA Regulations require the cumulative effects of the Proposed Varied Development with other relevant projects or plans to be assessed. NatureScot guidance on assessing cumulative effects has been followed (NatureScot, 2021c).
- 9.13.2. Cumulative effects are most likely to occur on those receptors for which a significant residual effect is predicted, particularly if the core range of these receptors includes other planned, consented or built development. The likelihood of this can be assessed through an analysis of the species assemblage that is present within the Proposed Varied Development and by examining the likely range and territory size of those species. There is also potential for cumulative effects to occur if the conservation status of habitats is affected by the combined loss or harm to those habitats.

- 9.13.3. This assessment considers that cumulative effects can result from effects that were individually assessed as non-significant, but in combination with effects or actions taking place over time, or across a wider spatial range (such as where the Zone of Influence of other developments or actions may overlap that of the Proposed Varied Development) non-significant effects may cumulatively be considered significant. Ecological features that require cumulative assessment are those for which there was some indication of a potential effect because of the Proposed Varied Development, which may be exacerbated cumulatively. The Zone of Influence for ecological receptors has been defined as 10 km. The primary cumulative effect of multiple wind farms is considered to be increased collision risk for bats (and subsequent direct effects on population size).
- 9.13.4. Given the low level of importance assigned to ecological features scoped out of the assessment, with consideration also given to the limited magnitude of any perceptible impact on these features and the likely zone of influence, consideration of combined effects in a cumulative context would not sufficiently increase the scale of impacts to allow any potential effect to be considered cumulatively significant.
- 9.13.5. All identified residual effects of the Proposed Varied Development on ecological features are predicted to be of either negligible or of significance at the level of the Site (minor), and therefore not significant in EIA terms. In addition, the nature of these impacts is considered to be spatially or temporally limited. Effects will largely occur where the Proposed Varied Development works overlap with habitats suitable for these species. For example, for otter the effects are limited to areas close to suitable watercourses. Of all protected mammal species recorded, bats are most likely to be affected by additional wind farm development because of the distances travelled by some species of bat and the cumulative risks to bat populations that may result from collision with wind turbines during operation. Therefore, the cumulative assessment has been limited to effects on bats.
- 9.13.6. All developments that are currently operational, under construction, consented or within the planning process, within 10 km of the site, were considered as part of the assessment of cumulative impacts for bats. Within this search area there are a total of eight developments have been included in the cumulative impact assessment (see **Table 9.19**).

Table 9.19 – Bat Assessments on Consented Wind Farm Developments and Ongoing Planning Applications with 10 km of the Site

Site Name	Approximate Distance and Direction from Site*	Status	Significance of Effects
Quantans Hill	0.75 km west	In Planning	No significant effect predicted.
Windy Rig	3.3 km north	Operational	No significant effect predicted.
Manquhill	4.1 km east	Consented	No significant effect predicted.

Site Name	Approximate Distance and Direction from Site*	Status	Significance of Effects
Cornharrow	4.1 km east	Consented	No assessment required, bats scoped out of assessment.
Cornharrow (revised scheme)	4.1 km east	In Planning	No assessment required, bats scoped out of assessment.
Windy Standard II	5.1 km north	Operational	No assessment required, No bat survey or assessment undertaken.
Glenshimmeroch (revised scheme)	5.3 km south-east	Consented	No significant effect predicted.
Windy Standard I	5.5 km north	Operational	No significant effect predicted.
Windy Standard I Repower	5.5 km north	Consented	No significant effect predicted.
Windy Standard III	6.1 km north-west	Under Construction	No significant effect predicted.
Troston Loch	6.2 km east	Consented	No significant effect predicted.
Afton	6.3 km north	Operational	No assessment required, no bat activity surveys undertaken.
Lorg (revised scheme)	6.3 km north	Consented	FEI Report indicates effects on bats not significant.
Wether Hill	6.3 km east	Operational	No significant effect predicted.
Margree	7.4 km south-east	Consented	No significant effect predicted.
Euchanhead	7.5 km north-east	In Planning	No significant effect predicted.

Site Name	Approximate Distance and Direction from Site*	Status	Significance of Effects
Divot Hill	7.7 km south-east	Consented	No significant effect predicted.
South Kyle	7.8 km north-west	Operational	No significant effect predicted.
Sanquhar II	8.3 km north-east	Under Construction	Effect of minor significance (positive).
Benbrack	9.1 km north-west	Under Construction	No significant effect predicted.
Pencloe	9.3 km north	Under Construction	No significant effect predicted.
Torrs Hill	9.5 km south-west	Operational	EIA documentation not publicly available.
Knockman Hill	9.7 km south-east	Consented	No significant effect predicted.
Appin	10.1 km north-east	In Planning	No significant effect predicted

*Measurements taken from nearest infrastructure elements.

- 9.13.7. The Section 37 Application for the proposed Lorg Grid Connection Overhead Line (OHL) intersects the site. The proposals consist of overhead cabling, pylons and associated wayleaves which includes a section that passes through the centre of the site. Considering the proposed works, the location it crosses the site and the habitats present in this area, the impacts include minor loss of commercial plantation on-site, with limited potential to support bats. No residual impacts are predicted as a result of this development, and therefore cumulative effects are not likely to occur.
- 9.13.8. Quantans Hill wind farm application is directly west of the site. The closest Quantans Hill wind turbine to the site is approximately 0.75 km west (over 1 km from the closest on-site wind turbine). Bat species and activity levels recorded at Quantans Hill are comparable to those recorded on the Proposed Varied Development site with no bat roosts located. Mitigation measures in relation to bat mortality through collision, including turbine mitigation protocol and monitoring are in line with mitigation recommendations for the site; when implemented residual effects are predicted to be non-significant.
- 9.13.9. EIA information for several development was not readily / publicly available at the time of writing and therefore they cannot be assessed further.

9.13.10. Where information is available for the larger schemes it generally indicates that the bat communities are similar to those of the Proposed Varied Development. Significant cumulative effects are unlikely because of:

- The sites chosen for wind farm development: in the context of the landscape, these tend to provide poor foraging and roosting habitat for bats, being elevated and exposed and having limited habitat diversity. Higher levels of activity would be expected in the lowland, where the most significant foraging and roosting resources are likely to be.
- Empirical data demonstrating low levels of activity at the above sites (with the exception of Lorg, Eucharhead and Divot Hill wind farms). Bat survey data for wind farms within 10 km of the Proposed Varied Development indicate that activity across these upland sites is generally low. On the reasonable assumption that turbines are located away from habitat features, risk to bats will be substantially designed-out or mitigated.
 - In the case of Lorg wind farm, habitat is predominantly moorland; however, it is utilised as a commuting corridor between areas of more suitable habitat (notably that in the south of the site at a confirmed pipistrelle roost within a farmhouse). Overall impact to bats was not considered significant.
 - Habitat at Divot Hill wind farm is predominantly coniferous plantation woodland. Two soprano pipistrelle bat roosts were located within structures on-site. Elevated levels of bat activity were recorded on woodland edges and riparian corridors, notably surrounding roost locations. Higher activity levels were attributable to common pipistrelle, soprano pipistrelle and *Nyctalus* sp. Overall bat impacts were not considered significant.
 - Eucharhead recorded moderate activity levels for common pipistrelle, soprano pipistrelle and *Nyctalus* sp. Habitats are dominated by conifer plantation. However, two structures on-site supported bat roosts, including a soprano pipistrelle maternity roost. Elevated activity levels are predominantly in locations in proximity to the roosts and forest edges. Upon implementation of a mitigation and monitoring plan, no significant residual effects were identified.
- The flight range of bat species meaning that individuals regularly flying over multiple sites is unlikely. Range is very variable (with some flying substantial distances between winter and summer roosts), but most species tend to forage within ~5 km of their roost (BCT, 2020). Wind farm applications with elevated levels of bat activity (Lorg, Divot Hill and Eucharhead) are all beyond 5 km of the site.
- Where higher-risk species are present, notably *Nyctalus* sp. and *Nathusius* pipistrelle, they were generally recorded in low numbers accounting for a limited percentage of activity over the sites.

- There are no predicted effects on the ability of bats to move through the landscape. The inter-connectivity of woodland in this area will not be meaningfully affected by the wind farms, and so the general connectivity of the landscape to bats is unlikely to be significantly reduced.

9.13.11. The effects on bats was not considered significant for any wind farm within 10 km of the site. All sites consisted largely of habitats sub-optimal for anything other than occasional foraging and commuting of common and widespread bat species. It is considered unlikely that there will be a measurable population level effect on bat species from the cumulative effects of the schemes assessed, and the cumulative effect on the conservation status of bats as a receptor will be not significant.

9.14. Summary

9.14.1. An assessment has been made of the potential for significant effects of the Proposed Varied Development on habitats and non-avian species based on the 2018 baseline and subsequent 2024-2026 survey updates. In line with the 2018 EIA findings, this assessment did not identify potential significant residual effects (in terms of the EIA Regulations) on any receptors during the construction, operation and decommissioning of the Proposed Varied Development.

9.14.2. By applying effective embedded mitigation measures, mainly through the design and following best practice guidelines during construction, the residual effects of the Proposed Varied Development both alone and in combination with other schemes are assessed as non-significant in terms of the EIA Regulations.

9.14.3. The Proposed Varied Development provides an increase in proposed biodiversity enhancements over the Consented Development. The Consented Development largely focused on embedded mitigation to retain habitats in an 'as was' condition rather than providing any significant post-construction enhancement.

9.14.4. The Proposed Varied Development proposes to remove targeted areas (consisting of deep peat with restoration potential) from commercial forestry operations and manage these areas for the restoration of historic blanket bog and bog woodland (refer to the outline Habitat Management Plan included as **Appendix 9.8**). Drier areas around turbine bases and along access tracks will be removed from commercial operations and used to create dry heathland and acid grassland. Areas that are not viable for commercial forestry will be planted with broadleaved woodland which will enhance the riparian corridors on-site.

9.14.5. These measures are predicted to increase the potential value of the site for a number of species including pine marten, black grouse, bats, terrestrial invertebrates and a wide range of bird species.

Table 9.20 – Summary of Effects

Description of Effect	Significance of Potential Effect		Mitigation and/or Enhancement Measure	Significance of Residual Effect		Change to Consented Development Conclusion
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse	
Construction						
Habitat displacement (bats)	Minor / Site level	Adverse	Implementation of HEMP pre-work checks by ECoW	Not significant	Beneficial	None
Roost loss (bats)	Minor / Site level	Adverse	CEMP and pre-work checks by ECoW	Not significant	Adverse	None
Disturbance (otter)	Minor / Site level	Adverse	CEMP and pre-work checks by ECoW	Not significant	Adverse	None
Collision related mortality and injury (otter)	Minor / Site level	Adverse	CEMP	Not significant	Adverse	None
Operation						
Turbine collision and barotrauma (bats)	Minor / Site level	Adverse	Mitigation through design; turbine height, separation from key features and design of keyholed areas.	Not significant	Adverse	None

Description of Effect	Significance of Potential Effect		Mitigation and/or Enhancement Measure	Significance of Residual Effect		Change to Consented Development Conclusion
	Significance	Beneficial/Adverse		Significance	Beneficial/Adverse	
			feathering curtailment. and			
Decommissioning						
Effects considered similar to those throughout construction (although as tree felling is unlikely to be required effects are on a smaller scale)						

Table 9.21 – Summary of Cumulative Effects

Receptor	Effect	Cumulative Developments	Significance of Cumulative Effect	
			Significance	Beneficial/Adverse
No significant cumulative effects anticipated.				

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Abbreviations

Abbreviations	Definition
<i>AWI</i>	<i>Scottish Ancient Woodland Inventory</i>
<i>BCT</i>	<i>Bat Conservation Trust</i>
<i>CBP</i>	<i>Construction Biosecurity Plan</i>
<i>CC</i>	<i>Conservation Concern</i>
<i>CEMP</i>	<i>Construction Environmental Management Plan</i>
<i>CIEEM</i>	<i>Chartered Institute of Ecology and Environmental Management</i>
<i>ECow</i>	<i>Ecological Clerk of Works</i>
<i>EIA</i>	<i>Environmental Impact Assessment</i>
EPS	European Protected Species
ES	Environmental Statement
EZoI	Ecological Zone of Influence
FRS	Fisheries Research Services
GCN	Great Crested Newt
GWDTE	Ground Water Dependent Terrestrial Ecosystem
INNS	Invasive Non-Native Species
JNCC	Joint Nature Conservation Committee
P/h	Passes per hour
LBAP	Local Biodiversity Action Plan
LNR	Local Nature Reserve
LPS	Local Priority Species
LWS	Local Wildlife Site
NVC	National Vegetation Classification
pLWS	Potential Local Wildlife Site
SAC	Special Area of Conservation
SBL	Scottish Biodiversity List

SWT	Scottish Wildlife Trust
SSSI	Site of Special Scientific Interest
SWSEIC	South-West Scotland Environmental Information Centre
WCA	Wildlife and Countryside Act