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Introduction

- 8.1 This Chapter describes the current and future biodiversity, and in particular species and habitats protected under the Habitats Directive (Directive 92/43/EEC) (and Birds Directive (Directive 2009/147/EC)) within the Site and surrounding area. It goes on to present the assessment of the potential effects of the Proposed Development on biodiversity and, where necessary, to describe proposed mitigation, compensation and enhancement measures. This Chapter considers designated sites, biodiversity, habitats, plants and animals (excluding birds). Potential effects on birds are considered separately in **Chapter 9: Ornithology**. Together **Chapters 8** and **9** together provide an assessment of the potential effects of the Proposed Development on biodiversity.
- 8.2 The specific objectives of the Chapter are to:
- describe the current biodiversity baseline established from desk studies, site-specific surveys and feedback obtained during technical engagement with stakeholders;
 - describe the likely evolution of the biodiversity baseline without the implementation of the Proposed Development;
 - describe the assessment methodology, including any difficulties or uncertainties and significance criteria used in completing the impact assessment;
 - identify, describe and assess the potential effects, including direct, indirect, secondary, cumulative, transboundary, short-term, medium-term and long term, permanent and temporary positive and negative effects;
 - describe the mitigation measures proposed to address the likely significant effects;
 - identify, describe and assess the residual effects remaining following the implementation of mitigation and compensation; and
 - identify measures to conserve, restore and enhance biodiversity, in accordance with the requirements of National Planning Framework 4 (NPF4).
- 8.3 This Chapter is supported by the following Technical Appendices:
- **Technical Appendix 8.1: Habitat Survey Report;**
 - **Technical Appendix 8.2: Protected Species Survey Report;**
 - **Technical Appendix 8.3: Bat Survey Report;**
 - **Technical Appendix 8.4: Aquatic Habitat Assessment;** and
 - **Technical Appendix 8.5: Outline Habitat Management Plan (HMP).**

Legislation, Guidance and Policy

Legislation, Guidance and Policy

Legislative Context

- 8.4 The following legislation has been taken into consideration during the assessment of effects on terrestrial ecology:
- The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017, as amended;

- Conservation (Natural Habitats&c.) Regulations 1994 (as amended) (the 'Habitats Regulations');
- Wildlife and Countryside Act 1981 (as amended) (the 'WCA');
- Nature Conservation (Scotland) Act 2004 (ad amended);
- The Wildlife and Natural Environment (Scotland) Act 2011 (as amended) (WANE Act);
- Protection of Badgers Act 1992 (as amended by the Nature Conservation (Scotland) Act); and
- Statutory instrument 1143/2014 on invasive alien species (the Invasive Species Regulation) (as amended in Scotland).

Technical Guidance

8.5 Technical guidance of relevance to this assessment includes:

- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2022) (henceforth referred to as 'the CIEEM guidelines');
- Biodiversity Net Gain – Good Practice Principles for Development. A Practical Guide (CIRIA, 2019);
- Advising on Peatland, Carbon-rich Soils and Priority Peatland Habitats in Development Management (NatureScot, 2023);
- Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems (GWDTEs) (SEPA, 2017);
- Bats and onshore wind turbines – survey, assessment and mitigation (NatureScot 2021);
- Planning for development: What to consider and include in deer assessments and management at development sites (SNH, 2016);
- Circular 1/2017: Environmental Impact Assessment Regulations (Scottish Government, 2017);
- NatureScot pre-application guidance for onshore windfarms (NatureScot, 2024a); and
- Guidance on Establishing and Managing Local Nature Conservation Site (LNCS) Systems in Scotland – 2023 update (NatureScot, 2024b).

Policy Context

8.6 Policy guidance relevant to this assessment includes:

- National Planning Framework (NPF4) (Scottish Government, 2023);
- The Scottish Biodiversity Strategy to 2045;
- Dumfries and Galloway Council Local Development Plan 2 (LDP) (Dumfries and Galloway Council, 2019);
- Dumfries and Galloway Council Local Biodiversity Action Plan (LBAP) (Dumfries and Galloway Biodiversity Partnership, 2009);

- Dumfries and Galloway Council, Biodiversity Duty Report 2018-2020 (Dumfries and Galloway Council, 2020); and
- Scottish Biodiversity List (SBL).

Scope and Consultation

Scoping Responses

- 8.7 A Scoping Report (SLR, 2025) was submitted to Dumfries and Galloway Council in March 2025. Scoping responses containing comments related to biodiversity (excluding birds) were received from the following organisations:
- Galloway Fisheries Trust;
 - NatureScot;
 - Scottish Forestry; and
 - Scottish Environment Protection Agency (SEPA).
- 8.8 A summary of the key points from the relevant scoping responses and details of how comments have been addressed in the Environmental Impact Assessment (EIA) Report are provided in **Table 8-1**.

Table 8-1 Scoping Responses

Consultee and Date	Issue Raised	Response / Action Taken
Galloway Fisheries Trust (GFT) Undated	GFT stated that if the Fish Habitat Survey results indicate that lamprey species, European eel and salmonids could be supported onsite (at either juvenile or adult life stages) then electrofishing surveys should be undertaken.	Fish habitat survey results found a lack of suitable habitat to support lamprey, European eel or salmonids onsite (see paragraphs 8.76 to 8.78), therefore no electrofishing surveys were undertaken.
	GFT state that the Kirtle Water is an important water course supporting a number of protected fish species and is covered by the Annan DSFB working area.	Downstream impacts on fish are discussed in paragraph 8.156 to 8.159.
NatureScot 5 June 2025	NatureScot stated that the impact of solar array placement on White Moss and peatland habitat should be considered including interruption of the natural hydrology and reduction of light levels due to the presence of panels. They advise referencing the NatureScot pre-application guidance for solar farms (NatureScot, 2025).	It is confirmed that infrastructure forming the Proposed Development has avoided areas of peat >1m deep. Potential impacts on peat and hydrology within the Site are discussed in Chapter 10: Hydrology, Hydrogeology and Geology . As per NatureScot pre-application guidance for solar farms, UKHab and NVC surveys were undertaken, results are summarised in Table 8-3 . Impacts on habitats due to reduction of light (as a result of

		solar photovoltaic (PV) modules) are discussed in this chapter.
	NatureScot state that the EcoBat tool is available for use and recommend any bat data collected should make use of the tool as part of data analysis.	The Ecobat tool was used to analyse bat activity data recorded. Results of this analysis is summarised in paragraphs 8.108 to 8.113. See Technical Appendix 8.3: Bat Survey Report for full details.
	NatureScot recommend that the Habitat Management Plan is well developed at application stage in order to ensure that it is possible to 'ascertain the efficacy of biodiversity enhancement measures at this stage'.	The outline Habitat Management Report is summarised in paragraphs 8.187 to 8.190. Full details are found within Technical Appendix 8.5: Outline HMP .
Scottish Forestry 14 May 2025	Scottish Forestry stated that the initial Scoping Report did not include specific reference to forestry or impact on woodland, however noted that trees and woodland will be impacted by the Proposed Development and stated that they expect it to see it referenced in the scope of the EIA.	The Proposed Development would result in the loss of approximately 0.33km of treelines onsite. See Table 8-8 for details of habitat loss. Technical Appendix 8.5: Outline HMP provides detail of proposed new tree planting, as part of the Proposed Development.
	Scottish Forestry stated that, as outlined in NPF4, there should be a presumption not to approve developments that would negatively impact woodland habitats that carry a greater level of protection, such as ancient woodland and ancient semi natural woodlands. Scottish Forestry recognise that in the case of the Proposed Development only a small area of woodland and hedgerows would be affected, however state that regardless they should not be excluded from scope.	The Proposed Development would result in the loss of 0.33km of tree lines, and 0.09km of native hedgerow (see Table 8-8 for details of habitat loss). Technical Appendix 8.5: Outline HMP provides detail of proposed new tree planting, as part of the Proposed Development
SEPA 13 May 2025	SEPA encourage the undertaking of an NVC survey in order to assist in determination as to whether any groundwater dependent terrestrial ecosystems are present onsite and reference their guidance (SEPA, 2024) and NatureScot construction good practice guidance (NatureScot, 2024).	Full details of the NVC survey undertaken are provided in Technical Appendix 8.1: Habitat Survey Report . Areas of potential Groundwater Dependent Terrestrial Ecosystems (GWDTE) are presented in Figure 10.9 of Chapter 10 . Results in relation to potential GWDTE are summarised in Table 8-3 and paragraphs 8.154 and 8.155. A full assessment of GWDTE is provided in Chapter 10: Hydrology, Hydrogeology and Geology .
	SEPA state that while they accept the UK Habitat Classification System (UKHab) as an alternative to Phase 1 habitat survey,	Both a UKHab survey and an NVC survey were undertaken. Full details of methodologies are

	they do not accept the use of UKHab as an alternative to NVC.	provided in Technical Appendix 8.1: Habitat Survey Report .
	SEPA state that a comparison of the environmental effects of alternative locations of infrastructure may be required. They state that they seek absolute avoidance of development on sensitive habitats including near natural peatland. Where this can't be avoided, SEPA state that adequate justification should be provided for the proposed layout, and that any justification should include how impacts are considered in relation to the mitigation hierarchy.	Details of design evolution are provided in Chapter 2: Site Design and Design Evolution . Details of habitat loss as a result of the Proposed Development are provided in Table 8-8 . Potential impacts as a result of this habitat loss are assessed in paragraphs 8.147 to 8.153. Details of mitigation, compensation and enhancement measures are detailed within paragraphs 8.187 to 8.190, with full details provided in Technical Appendix 8.5: Outline HMP .
	SEPA state that it should be clearly demonstrated that the assessment has informed project design and ensured, in accordance with relevant guidance and the mitigation hierarchy in NPF4, that adverse impacts are first avoided and then minimised through best practice.	Details of design evolution are provided in Chapter 2: Site Design and Design Evolution . Details of mitigation, compensation and enhancement measures are detailed within paragraphs 8.187 to 8.190, with full details provided in Technical Appendix 8.5: Outline HMP .
	SEPA state that, where complete avoidance of peat is not possible, justification should be provided to adequately demonstrate why this is the case, and drawings should demonstrate that a) Development proposals avoid any near natural peatland and deepest areas of peat; b) All proposed excavation on peat is <1m deep where feasible c) The volumes of peat extracted are reduced as much as possible, first through layout and then by design, making use of techniques such as floating tracks.	Details of design evolution are provided in Chapter 2: Site Design and Design Evolution . No peatland habitat would be impacted by the Proposed Development. Table 8-8 details the potential habitat loss due to the Proposed Development.
	SEPA state that EIA development should fully mitigate potential negative effects prior to identifying biodiversity enhancements, with enhancements provided in addition to mitigation and refer to their data set which identifies where riparian planting would be most beneficial (sepa.org.uk/environment/environmental-data/). SEPA highlight that there may be opportunities for riparian planting along watercourses within landownership boundaries and would welcome the	Enhancement measures proposed within Technical Appendix 8.5: Outline HMP do not include riparian planting. Opportunities onsite for riparian planting occur within the area identified for wetland creation, and riparian planting here is therefore not appropriate. Details of mitigation, compensation and enhancement measures are detailed within paragraphs 8.187 to

	exploration of such planting as part of proposed habitat enhancements.	8.190, with full details provided in Technical Appendix 8.5: Outline HMP .
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Effects Assessed in Full

- 8.9 This assessment concentrates on the effects of construction and operation of the Proposed Development upon important ecological features (decommissioning is scoped out of the assessment – see **Chapter 6: Scoping and Consultation**).
- 8.10 In accordance with the assessment methodology used (see paragraphs 8.28 to 8.33), ecological receptors considered important at a local or greater level have been considered within the detailed assessment. These are outlined in paragraph 8.144 and 8.201.

Effects Scoped Out

- 8.11 Ecological features have been scoped out of detailed assessment where there is no potential for significant effects upon the ecological receptor or where the ecological features are not considered important at a local or greater level (See **Table 8-3** and **Table 8-6**), is not a GWDTE and/or is not subject to legal or policy protection
- 8.12 In accordance with the assessment methodology used (see paragraphs 8.28 to 8.30) habitats which are considered to be of relatively low ecological value (see **Table 8-3**) or would not be impacted by the Proposed Development have been scoped out of the detailed assessment. These habitats are as follows:
- bracken, other coniferous woodland, dry lowland heaths - these habitats will not be impacted directly, indirectly or cumulatively by the Proposed Development;
 - *Arrhenatherum* neutral grassland, *Holcus-Juncus* neutral grassland, non-native ornamental hedgerow, *Molinia caerulea-Potentilla erecta* mire, buildings, other developed land, unsealed unvegetated surface, built linear features - these habitats are of low ecological value. However, they are considered as part of the overall impact assessment on biodiversity.
- 8.13 Based on the desk study produced for the Proposed Development (included within the EIA Scoping Report (SLR, 2025)) and consideration of the extent and nature of the Proposed Development, effects on the following features, species or species groups have been scoped out of the assessment. For more information on each species / group, please refer to **Table 8-6**.
- designated sites: given the distances between the Site and the designated sites listed in the EIA Scoping Report (SLR, 2025), lack of connection and the reasons for their designation, it is unlikely that the Proposed Development would result in any significant adverse effects on the qualities for which the areas have been designated for. Therefore, impacts on designated sites have been scoped out of this assessment;
 - ancient woodland: given the distances and lack of connection between the Site and areas of ancient woodland described in the EIA Scoping Report (SLR, 2025), it is unlikely that the Proposed Development would result in any significant adverse effects, therefore impacts on ancient woodland have been scoped out of this assessment;
 - invertebrates: NatureScot (2024) general pre-application/ scoping advice to developers for onshore wind farms state that: “there are some protected species (e.g.

moths and other invertebrates and amphibians) that, with standard mitigation, are unlikely to experience any significant environmental effects. Such species will not normally require surveys to inform the EIA, unless they are European Protected Species (EPS) or qualifying features of protected areas. Instead, we advise that developers should normally be able to apply mitigation during construction to minimise impacts and avoid committing an offence.” Due to the area of suitable habitat being lost being small in comparison with the availability of similar habitats in the wider area, significant negative effects on invertebrate species are not considered likely, therefore invertebrates have been scoped out of the detailed assessment. Invertebrates have, however, been considered as part of the overall assessment of potential impacts on biodiversity, and within **Technical Appendix 8.5: Outline HMP**;

- amphibians: One record returned of smooth newt during desk study data search. Great crested newt (GCN) (*Triturus cristatus*) eDNA surveys returned a negative result, therefore this species is considered likely absent from Site. No other amphibian species were recorded during surveys therefore amphibians have been scoped out of this assessment;
- Freshwater Pearl Mussel (FWPM) (*Margaritifera margaritifera*): have been scoped out of this assessment. No records were returned within 2km, and there is a lack of suitable habitat on Site, therefore no potential for significant negative effects;
- mountain hare (*Lepus timidus*) have been scoped out of this assessment. Mountain hare are not currently known to be in this area and there is lack of suitable habitat on Site, therefore there is no potential for significant negative effects;
- beaver (*Castor fiber*) have been scoped out of this assessment. Beaver is not currently known to be in this area and there is a lack of suitable habitat on site, therefore there is no potential for significant negative effects;
- pine marten (*Martes martes*) have been scoped out of this assessment due to lack of evidence of presence identified during the field surveys, limited suitable habitat present within the Site and lack of connectivity to woodland in the wider area;
- red squirrel (*Sciurus vulgaris*) have been scoped out of this assessment due to lack of suitable habitat within the Site and no field signs identified during the field survey;
- at height bat surveys were scoped out given the Site is not densely forested and bat activity recorded at ground level is less likely to vary significantly from activity at rotor swept height in open areas than in forestry settings (NatureScot et al, 2021);
- wild deer are not considered to be present in significant numbers within the Site boundary. Only two records of roe deer were returned within the last 15 years, and no evidence of significant populations were found during desk studies or field surveys. As such, the potential for significant impacts on deer is considered negligible, and a draft Deer Management Statement is not required. Therefore, deer have been scoped out of this assessment; and
- wildcat (*Felis silvestris*) have been scoped out of this assessment. The Proposed Development Site lies outwith the current range of wildcat distribution in Scotland, therefore there is no potential for significant negative effects.

Approach and Methods

- 8.14 This Chapter takes an appropriate and topic-specific approach to assessment of the Proposed Development within the parameters identified in **Table 3.1 of Chapter 3**:

Description of Development. This Chapter provides a worst-case assessment for biodiversity (excluding birds, see **Chapter 9**) and presents environmental information for consultees and decision makers to comment on and determine the application within the parameters of the Proposed Development.

Study Area

- 8.15 The study area used for the EIA varies according to the ecological receptor in question, based on relevant good practice guidance. The study area used for habitats and vegetation is shown on **Figure 8.1.1** and **Figure 8.1.2** within **Technical Appendix 8.1: Habitat Survey Report** and includes all areas within the Site and an associated buffer zone that ensures coverage of wetland habitats within 250m of all proposed wind turbines and 100m from all other proposed infrastructure, including the Site access route from the A75. SEPA guidelines (SEPA, 2024) stipulate survey of a 250m buffer from excavations deeper than 1m, and a 100m buffer for excavations of less than 1m.
- 8.16 The study areas for the relevant faunal species are summarised in the 'Approach and Methods' section below and are described in detail within **Technical Appendices 8.2 to 8.4**. For ease of reference, the study areas included all suitable habitat within the Site, as well as watercourses within 200m of proposed infrastructure (where these lie outside of the Site boundary) for mammals and the aquatic habitat assessment, and the Site and 200m plus rotor radius from proposed wind turbines (where this lies outside the Site boundary) for bats.

Desk Based Research and Data Sources

- 8.17 An ecological desk study was undertaken to collate available ecological information in relation to the Proposed Development and surrounding environment. Desk study data search parameters are summarised in the EIA Scoping Report (SLR, 2025).
- 8.18 A search of the Dumfries and Galloway planning portal for relevant ecological reports submitted for other nearby developments within 10km of the Site was made, and where relevant information could be obtained, these reports were reviewed for relevant ecological information:
- Becks Burn Wind Farm Environmental Statement (SKM Enviros, 2013); and
 - Jockstown Solar Farm Extended Phase 1 Habitat Report (ITPEnergised, 2021a).

Field Surveys

- 8.19 The scope of surveys described in paragraphs 8.20 to 8.26 was agreed with NatureScot as part of the Scoping process, no changes have been made to these agreed methods. The methodologies for the survey work are briefly outlined in paragraph 8.20 to 8.26. For full methodologies please refer to **Technical Appendices 8.1 to 8.4**.
- 8.20 The UK Habitat Classification (UKHab) and National Vegetation Classification (NVC) surveys were undertaken in August 2025 on all land within the Site boundary and a 250m buffer where accessible in accordance with methods described in the UK Habitat Classification User Manual (UKHab Ltd, 2023) and the NVC User Handbook respectively (Rodwell, 2006). For full details see **Technical Appendix 8.1**.
- 8.21 A walkover survey for protected and priority species was undertaken in April 2025. Surveys focused on otter (*Lutra lutra*), water vole, badger (*Meles meles*), pine marten and red squirrel (*Sciurus vulgaris*) following standard methodologies e.g. Chanin (2003), Dean

et al (2016), Scottish Badgers (2018), NatureScot (2018), Bang and Dahlstrom (2006) and Forestry Commission (2009). For full details see **Technical Appendix 8.2**.

- 8.22 A Great Crested Newt (GCN) habitat suitability index survey was undertaken in April 2025, of all accessible waterbodies within the Site plus a 500m buffer area in accordance with guidance (Oldham et al, 2000).
- 8.23 GCN eDNA surveys were undertaken in June 2025 of waterbodies with an HSI score of 'Average' or above in accordance with guidance (Arg UK, 2010).
- 8.24 A Daytime Bat Walkover (DBW) and Ground Level Tree Assessment (GLTA) to assess the suitability of habitats for commuting, foraging and roosting bats was undertaken in April 2025 in accordance with Bat Conservation Trust (BCT) guidelines (Collins, 2023). For full details see **Technical Appendix 8.3**.
- 8.25 Based on the proposed four turbine layout provided by the Client at scoping stage, a programme of bat activity surveys was undertaken deploying full spectrum static bat detector units deployed at each proposed wind turbine location during the 2025 active bat season following BCT (Collins, 2023) and NatureScot et al (2021) guidance (see **Figure 8.3.2 of Technical Appendix 8.3** for detector locations and **Technical Appendix 8.3** for full methodology details).
- 8.26 An aquatic habitat assessment was undertaken in April 2025 to assess baseline aquatic habitats present onsite and identify habitats with the potential to support aquatic protected species including salmonids, and European eel (*Anguilla Anguilla*). Methodology employed for the habitat assessment was conducted under a modified version of the Scottish Fisheries Coordination Centre (SFCC) (SFCC, 2010) outlined in the Environment Agency document 'Restoration of Riverine Salmon Habitats: A guidance Manual' (Hendry and Cragg-Hine, 1997). For full details see **Technical Appendix 8.4**.

Assessment Methods

- 8.27 The CIEEM guidelines forms the basis of the impact assessment presented in this Chapter, these guidelines have been endorsed by NatureScot.

Important Ecological Features

- 8.28 Important Ecological Features (IEFs) are those that are protected by legislation and policy (and therefore have a conservation objective) plus any other features determined to be important by the ecologist completing the assessment.
- 8.29 In accordance with the CIEEM guidelines, for this assessment, effects have been assessed in detail for features subject to specific legal and policy protection, plus any additional features evaluated as of Local value or greater. Features that could be present but scoped out because they would not experience significant adverse effects or are not specifically protected by legislation or policy and / or are of less than local value are considered in the overall assessment of the Proposed Development on biodiversity and considered within the outline HMP (**Technical Appendix 8.5**).
- 8.30 Ecological features should be considered within a defined geographical context. For this assessment the following geographic frame of reference has been adapted from the CIEEM guidelines:
- international;
 - national (i.e. Scotland);

- regional (i.e. Dumfries and Galloway);
- Natural Heritage Future Zone (NHFZ) (i.e. Western Southern Uplands and Inner Solway);
- local (i.e. within approximately 5km); and
- less than local.

- 8.31 In assigning a level of value to a species population, its distribution and abundance has been taken into account, including a consideration of trends based on available historical records. Reference has also been made to published lists of priority species where available.
- 8.32 The Ecobat online tool (Lintott et al, 2018) was used to assess the relative levels of bat activity at the Site in the context of bat survey information collected from similar areas (within 200km of the Site) at the same time of year (within 30 days) and in comparable weather conditions. Ecobat generates a percentile rank (and associated confidence limits) for each night where bat activity was recorded against a reference range. For example, data reported as being within the 80th percentile means that 80% of the nights within the reference range had less than or equal to the number of bat passes as the night being analysed. Percentiles returned for each species were then used to determine activity levels in line with NatureScot guidance (NatureScot et al, 2021).
- 8.33 The output from Ecobat was then considered in assessing the value of bat populations recorded at the Site.

Impact Assessment

- 8.34 The ecological impact assessment process follows the steps outlined in the CIEEM guidance (CIEEM, 2018) and considers both direct impacts and any indirect, secondary, cumulative, short-term, medium-term and long-term, permanent and temporary, positive and negative impacts. Direct ecological impacts are changes that are directly attributable to a defined action, e.g., the physical loss of habitat during the construction process. Indirect ecological impacts are attributable to an action, but which affect ecological resources through effects on an intermediary ecosystem, process, or receptor, e.g., the creation of access tracks which cause hydrological changes, which, in the absence of mitigation, could lead to the drying out of adjacent peatland habitats.

Significance of Effect

- 8.35 Consideration of conservation status is important for evaluating the effects of impacts on individual habitats and species and assessing their significance.
- 8.36 A significant effect is defined as an effect that either supports or undermines biodiversity conservation objectives for the important ecological feature in question. Significance of effects is assessed based on whether the potential impact would adversely affect the favourable conservation status of an important ecological feature or prevent the important ecological feature recovering or maintaining its favourable conservation status in Scotland.
- 8.37 For habitats, the Habitats Directive states that *“the conservation status of a natural habitat will be taken as favourable when:*
- *Its natural range and areas it covers within that range are stable or increasing,*

- *The specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future,*
- *The conservation status of its typical species is favourable as defined in (i)."*

8.38 For species, the Habitats Directive states that 'the conservation status will be taken as "favourable" when:

- *population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and*
- *the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and*
- *there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis."*

8.39 For habitats and species not listed within the Habitats Directive and where there is no listed statement of conservation status, significance of effect is based upon the likely level of ecological conditions that would allow the area of habitat / specie population to continue to exist at a given level or continue to increase along an existing trend.

Avoidance, Mitigation, Compensation and Enhancement

8.40 A sequential process has been adopted to avoid, mitigate, and compensate for ecological impacts. This is often referred to as the 'mitigation hierarchy'. Awareness has also been paid to the mitigation hierarchy as provided by NPF4 of avoid, minimise, restore and offset as well as the requirement to provide significant biodiversity enhancement.

8.41 It is important for the EIA to clearly differentiate between avoidance, mitigation, compensation and enhancement and these terms are defined here as follows:

- avoidance is used where an impact has been avoided, e.g., through changes in scheme design. This is normally dealt with at the project design stage and is therefore addressed in **Chapter 2: Site Description and Design Evolution**. Avoidance is considered embedded mitigation for the purposes of this assessment;
- mitigation is used to refer to measures to reduce or remedy a specific negative impact in situ e.g. using fencing to protect sensitive areas during construction. Mitigation measures may be located within or outwith the Site, depending on circumstances;
- compensation describes measures taken to offset the loss of, or permanent damage to ecological features, not addressed through mitigation (i.e. residual effects). Compensation measures should be similar to the ecological feature lost or damaged; and
- enhancement is the provision of new benefits for biodiversity that are additional to those provided as part of mitigation or compensation measures (although they can be complementary) and result in a net benefit to biodiversity.

Residual Effects

8.42 Any significant effects that are not addressed through avoidance and mitigation, and will therefore result in effects that are significant, are assessed as residual impacts.

8.43 Residual effects can be offset through compensatory measures as detailed in paragraph 8.41.

Cumulative Effects

- 8.44 The potential for cumulative effects with other development proposals has been assessed within this Chapter. The assessment of cumulative effects includes operational projects, projects under construction, consented projects which are not yet under construction, and projects for which planning applications have been submitted.
- 8.45 For aquatic features (including otter) potential cumulative effects are only likely to be significant for other developments located within the same hydrological sub-catchments.
- 8.46 For habitats, potential cumulative effects have been assessed for other developments within 10km which could affect the same habitat / habitat types.
- 8.47 For (non-avian) terrestrial features potential cumulative effects are only likely where other developments could affect the same species/ species population. I.e. cumulative effects on bats are likely to be limited to other wind farm developments and as such, for bats, the cumulative assessment has been restricted to other developments within 10km, given that foraging distances for bat species most likely to be found in Scotland are less than 5km (Collins, 2023).

Assumptions, Limitations and Confidence

- 8.48 Presented here is a summary of limitations detected during the surveys; further details are presented in **Technical Appendix 8.1** to **8.4**. It should be noted that none of these limitations are considered likely to significantly affect the assessment.
- 8.49 The UKHab Minimum Mapping Unit (MMU) for the field survey was 400m², which may result in small areas of notable habitat (e.g. Priority Habitat) being excluded from UKHab output maps. In order to ensure all areas of notable habitat were effectively captured, point features and target notes detailing the location of each habitat, key species, and general condition were recorded during the field survey.
- 8.50 Access was restricted in some areas outside the Site boundary therefore some areas within the survey buffer were primarily mapped using aerials and viewed from inside the Site boundary where possible. Consequently, detail and accuracy are lower in the buffer area compared to areas within the Site boundary. The buffer area to the south of the A75 was not accessed, however this is not hydrologically connected to the Site and therefore impacts from the works associated with the Proposed Development are likely to be low in this part of the buffer.
- 8.51 The south east part of the watercourse running through Site had significant scrub which limited access for otter and water vole surveys. Based on the morphology of the watercourse it is unlikely that otter resting sites, especially those used for breeding, could be present. Therefore, this is not considered a limitation in regard to otter. To address the limitation in regard to potential water vole presence, mitigation was considered on a precautionary basis with avoidance suggested first instance.
- 8.52 The Scots pine woodland in the north west buffer of the Site could not be fully surveyed during the GLTA survey due to a high number of fallen trees preventing full access. Trees were surveyed from a distance with binoculars. It was noted that most trees contained Potential Roost Features (PRFs). As no works are planned in this area, this is not considered to be a significant limitation to the impact assessment.
- 8.53 Due to technical issues, bat data was not collected for static location C (see **Figure 8.3.2** of **Technical Appendix 8.3**) in spring and summer. This limitation has been considered within the analysis of results.

- 8.54 The error rate for the auto-ID of the noise data was 68% which indicates a high level of misidentification of bat calls and noise. This is not considered to be a limitation to the results, as a high number of bat passes were detected, which provides sufficient data for analysis. Additionally, it was mainly common pipistrelle *Pipistrellus pipistrellus* and soprano pipistrelle *Pipistrellus pygmaeus* which were misidentified (of the 10% checked) which were detected in high numbers and their activity level can be understood from this data.
- 8.55 Limitations associated with the use of the Ecobat analysis tool have been identified. For example, the outputs of the Ecobat tool are considered in the context of wider data collection from third parties and are not accepted as a rigorous appraisal method in isolation. The assessment of effects on bats contained within this chapter draws from other information sources and therefore the limitations associated with Ecobat are not considered likely to significantly affect the assessment.
- 8.56 The desk study data search is limited to records publicly available for commercial use and therefore is unlikely to be comprehensive for some habitats and species. This is not considered to be a significant limitation given that the desk study exercise is used to inform survey scope and provide information on historical use of the Site and surrounding area.
- 8.57 An ecological survey provides only a 'snapshot' of the conditions prevailing at the time of survey. Whilst it is considered unlikely that any significant evidence of protected or otherwise notable species were overlooked during the survey work, due to the nature of the subjects of ecological surveys, it is feasible that species that use the Site may not have been recorded by virtue of their seasonality, cryptic behaviour, habit, or random chance. This is a standard limitation that is common to all ecological survey work. It is considered unlikely, however, that additional surveys of the Site would materially alter the conclusions of the baseline survey work. Pre-construction surveys are proposed (see paragraphs 8.130 to 8.131) which intend to address any issues resulting from future changes in the distribution of species within the Site.

Baseline Conditions

Current Baseline

Peatland

- 8.58 The Carbon and Peatlands Map (Scotland Soils, 2016) indicates the potential presence of small areas of 'Class 1' peatland within the application boundary. Class 1 peatlands are considered nationally important and are of high conservation value. Site-specific information relating to carbon-rich soils and deep peat (including a peat depth survey) is contained within **Chapter 9: Hydrology, Hydrogeology and Geology**. A description and evaluation of the habitats present on Site, based on field survey data, is contained in Table 8-3.

Existing Records of Protected and Notable Species

- 8.59 **Table 8-2** provides a summary of the results of the protected and priority species search (excluding marine and avian species) detailed in paragraphs 8.17 (see the Scoping Report (SLR, 2023) for further details) and the review of relevant ecological reports associated with nearby developments (see paragraph 8.18).

Table 8-2: Existing results of protected and priority species

Species	Status*	Notes
Fish		
River lamprey (<i>Lampetra fluviatilis</i>)	HR Sch2 HD Annex II, IV SBL (marine part of life cycle) LBAP	One record within 2km site, recorded 2002
Reptiles		
Slow worm (<i>Anguis fragilis</i>)	WCA Sch5	Eight records within 2km, last recorded 2007
Common Lizard (<i>Zootoca vivipara</i>)	WCA Sch5	11 records within 2km, last recorded 2007
Adder (<i>Vipera berus</i>)	WCA Sch5 SBL LBAP	Three records within 2km, last recorded 2009
Mammals		
<i>Chiroptera</i> sp.	HR Sch2 WCA Sch5 SBL (common pipistrelle, soprano pipistrelle, Daubenton's bat, Nathusius' pipistrelle, brown long eared bat) LBAP (soprano pipistrelle, brown long eared bat, Daubenton's bat, noctule bat, Natterer's bat, Leisler's bat, whiskered bat)	Within 2km of the Site
<i>Nyctalus</i> sp.		
<i>Myotis</i> sp.		Recorded at Beck Burn Wind Farm 7.1km east of Site.
Noctule bat		Recorded at Beck Burn Wind Farm 7.1km east of Site.
Daubenton's bat (<i>Myotis daubentonii</i>)		
Natterer's bat (<i>Myotis nattereri</i>)		Recorded at Beck Burn Wind Farm 7.1km east of Site.
Whiskered/ Brandt's bat (<i>Myotis mysacinus/ brandtii</i>)		Within 2km of the Site Whiskered bat maternity roost recorded 1990

Common pipistrelle		Roost recorded 2015 approximately 2.14km from Site; Recorded at Beck Burn Wind Farm 7.1km east of Site.
Soprano pipistrelle		Recorded at Beck Burn Wind Farm 7.1km east of Site.
Brown long eared bat (<i>Plecotus auritus</i>)		Roost (transitional) recorded in 2010 approximately 8km from Site; Recorded at Beck Burn Wind Farm 7.1km east of Site.
Badger	Protection of Badgers Act	Six records within 2km, last recorded 2017. Nine setts recorded at Beck Burn Wind Farm 7.1km east of Site.
Water Vole	WCA Sch5 LBAP	Three records within 2km, all recorded in 2002.
Otter	HR Sch2 WCA Sch5 HD Annex II, IV SBL LBAP	12 records within 2km of Site, last recorded 2019
Invasive Non-Native Species		
Grey squirrel	Sch9 WCA	Within 2km of the Site
<p>*SBL – Scottish Biodiversity List (SBL) (Scottish Government, 2013)</p> <p>LBAP – Dumfries and Galloway Local Biodiversity Action Plan (Dumfries and Galloway Council, 2009)</p> <p>HR Sch2 = Included on Schedule 2 of the Conservation (Natural Habitats &c) Regulations 1994 (as amended in Scotland)</p> <p>WCA Sch5 = Listed on Schedule 5 of the Wildlife and Countryside Act 1981 (as amended in Scotland)</p> <p>WCA Sch9 – Listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended in Scotland)TBC</p> <p>HD Annex II – Listed in Annex II of the Habitats Directive</p> <p>HD Annex IV – Listed in Annex IV of the Habitats Directive</p>		

Biodiversity Baseline

- 8.60 The Convention on Biological Diversity defines biodiversity as '*the variability among living organisms from all sources including, inter alia, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and ecosystems*' (Convention on Biological Diversity, 1993).
- 8.61 The Site is comprised predominantly of pastoral fields with lines of trees and small areas of deciduous woodland. Two Annex I habitats are present within the Site: European dry heaths and transition mires and quaking bogs. Additionally, seven habitats listed on the SBL were recorded.

- 8.62 A herb-rich, damp pasture is present within the south of the Site. This area is very species rich and has high plant and invertebrate diversity.
- 8.63 The habitats onsite support a variety of fauna from invertebrates, amphibians, reptiles to mammals such as badger and deer. Bat surveys found at least eight species of bat utilising the Site. The watercourses within the Site were not found to provide suitable habitat for fish species such as salmonids or lampreys.
- 8.64 Both roe deer and red deer have been recorded in the wider area though no incidental sightings of deer were made on site. It is likely that the surrounding area supports a relatively small population of deer at low densities. No deer management plan is in place covering the Site, and deer or livestock grazing is not thought to be an important factor for vegetation structure and composition.
- 8.65 Ecosystem services are '*the direct and indirect contributions ecosystems provide for human wellbeing and quality of life*' (NatureScot, 2024). The ecosystem within the Site provides a range of regulating, provisioning and supporting services such as pollination, photosynthesis, sheep grazing and space for wildlife.

Evaluation of Biodiversity

- 8.66 The Site is approximately 122ha with some diversity of habitats, however, approximately 89.13ha is modified grassland habitat. The habitat variety onsite is limited to modified grassland, acid grassland, heathland, wetland, woodland and urban habitats and areas of standing water/ streams. Some habitats vary in importance from less than local to national, and support mainly common plant species. One plant species recorded (whorled caraway (*Trocdaris verticillata*) is listed as vulnerable on the England red list (Stroh et al, 2014) and as a priority plant species within the LBAP, while it is not on the red list for Scotland, it is considered notable due to the proximity of the Site to the English border, and the fact that the plant is indicative of priority habitats.
- 8.67 Peatland has been identified as a national conservation priority within Scotland's National Peatland Plan (SNPP) for its importance to biodiversity, water quality, and as a carbon store (SNH, 2015). There is a small area of degraded blanket bog in the south west of the Site.
- 8.68 Annex I habitats are natural habitat types generally regarded as being of European importance. Two habitats identified onsite (European dry heath and transition mires and quaking bogs) were found to correspond to Annex I habitats. In addition, the woodland, heathland, hedgerow and flushes, fens and swamps habitats correspond with SBL priority habitats of national importance.
- 8.69 The bat assemblage utilising the Site was found to be of national importance due to the presence of species rare in Scotland.
- 8.70 The Site is considered to have an overall biodiversity value of local. The majority of the Site is comprised of modified grassland which is of low ecological value. Although there are some areas of priority habitats present, they are small in size and the small area of blanket bog present is degraded in nature. The impacts on these priority habitats are considered separately.

Habitats and Vegetation Baseline

Evaluation of Habitats and Vegetation Features

- 8.71 Habitats identified under the UKHab classification and NVC communities within the study area (see paragraph 8.15) are shown in **Table 8-3**.
- 8.72 Full details of habitat surveys carried out can be found in **Technical Appendix 8.1**. The mapped results are shown on **Figures 8.1.1** and **8.1.2** within **Technical Appendix 8.1** (with proposed infrastructure locations overlain).
- 8.73 **Table 8-3** also summarises the conservation listing for each habitat/community and evaluates the importance for each habitat/community within the study area. For habitats recorded in mosaic, the mosaics have been evaluated based on their floristic composition, underlying substrate and occurrence within the study area.
- 8.74 No plant species listed on Schedule 8 of the Wildlife and Countryside Act 1981 were recorded. Additionally, no SBL higher plant, moss or liverwort priority species were recorded within the study area. One plant species recorded (whorled caraway) is listed as vulnerable on the England red list (Stroh et al, 2014) and as a priority plant species within the LBAP, while it is not on the red list for Scotland, it is considered notable due to the proximity of the Site to the English border, and the fact that the plant is indicative of priority habitats.

Table 8-3 Evaluation of UKHab Habitats and NVC Communities present within the study area

UK Habitat Type	NVC Community Name	Area (within Site)	Conservation Listing*	Potential of Groundwater Dependency	Description and Reason for Evaluation	Evaluation
g1c Bracken	U20 <i>Pteridium aquilinum-Galium saxatile</i> community	Buffer only	None	None	Not Applicable (NA) – present in buffer only.	NA
g3c Other neutral grassland	MG1 <i>Arrhenatherum elatius</i> grassland	0.33ha	LBAP	None	An area dominated primarily by false oat-grass around a pond is mixed with tall herbs and scrub, with a mix of tall a short sward to accommodate cover around the pond and a path. Although false oat-grass dominated habitats are generally low value habitats, this area had some species and sward diversity with scattered scrub, which forms a good habitat for a range of birds and invertebrates. Due to the moderate species-richness and high value to wildlife, this area has been assessed as having local importance.	Local
	OV27 <i>Epilobium angustifolium</i> community	Buffer only	LBAP	None	NA – present in buffer only	NA
g3c5 <i>Arrhenatherum</i> neutral grassland	MG1 <i>Arrhenatherum elatius</i> grassland	5.84ha	LBAP	None	Areas of false-oat grass dominated grassland were recorded in tall swards in small patches the Site. These areas were mostly species poor, with relatively low value for wildlife. These areas low species richness are considered to be of limited ecological value and have therefore been classified as 'less than local' importance.	Less than Local – considered as part of biodiversity in general only.

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UK Habitat Type	NVC Community Name	Area (within Site)	Conservation Listing*	Potential of Groundwater Dependency	Description and Reason for Evaluation	Evaluation
g3c7 <i>Deschampsia</i> neutral grassland	MG9 <i>Holcus lanatus</i> - <i>Deschampsia cespitosa</i> grassland	7.46ha	LBAP	GWDTE	The tufted hair-grass dominated habitat was recorded in the south of the Site in a very damp area, mixed with areas dominated by rushes and sedges. The area was unusually herb rich and a high amount invertebrate activity was noted. This habitat has no conservation listing, however due the species richness of the habitat, this area has been assessed as having local importance.	Local
g3c8 <i>Holcus</i> - <i>Juncus</i> neutral grassland	MG10 <i>Holcus lanatus</i> - <i>Juncus effusus</i> rush-pasture	1.08ha	LBAP	GWDTE	Areas of rush dominated neutral grassland were recorded in tall swards in damper patches in the south of the Site and in the buffer. These areas were mostly species poor, with relatively low value for wildlife. These areas have no conservation listing and are considered to be of limited ecological value and have therefore been classified as 'less than local' importance.	Less than Local- considered as part of biodiversity in general / potential GWDTE only.
g4 Modified grassland	MG6 <i>Lolium perenne</i> - <i>Cynosurus cristatus</i> grassland	89.13ha	None	None	Areas of neutral and modified grassland were recorded mostly in the enclosed grassland areas to the north of the Site. These areas were mostly species poor, with low value for wildlife. These areas have no conservation listing and are considered to be of limited ecological value and have therefore been classified as 'less than local' importance.	Less than Local - considered as part of biodiversity in general only.
	N/A	Buffer only	None	None	NA – present in buffer only.	NA
w1 Broadleaved and mixed woodland	N/A	2.91km	LBAP	None	Lines of trees were recorded throughout the Site along fencelines and tracks. Treelines provide commuting and foraging corridors for a range of wildlife, and are particularly important within the	Local

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UK Habitat Type	NVC Community Name	Area (within Site)	Conservation Listing*	Potential of Groundwater Dependency	Description and Reason for Evaluation	Evaluation
					agricultural landscape, linking larger habitats such as woodlands. This habitat has no conservation designation, however due the strategic importance of this area for wildlife, these areas have been assessed as having local importance.	
w1d Wet Woodland	W4 <i>Betula pubescens-Molinia caerulea</i> woodland	0.92ha	Annex I SBL LBAP	GWDTE	The purple moor-grass W4 woodland was recorded in the south of the Site. Wet woodland is a priority habitat listed on SBL and is estimated to cover between 50,000ha and 70,000ha within the UK, often in small, distinct patches. Given the priority status and vulnerable nature of this habitat, this habitat has been assessed as having national importance.	National
w1g Other broadleaved woodland and w1h Other woodland; mixed	W7 <i>Alnus glutinosa-Fraxinus excelsior-Lysimachia nemorum</i> woodland	0.38ha	SBL LBAP	GWDTE	The broadleaved and mixed woodland was recorded in a small patch surrounded by modified grassland, and at the edge of the Site into the buffer. The areas are small and relatively species poor, with high mono-specific cover of species such as bracken, rosebay willowherb and soft rush. Although as a woodland the habitat is classified as SBL, due to the small size a relatively low ecological value of the woodlands the areas have been assessed as having regional importance.	Regional
	N/A	1.73ha	SBL LBAP	None		
	W10 <i>Quercus robur-Pteridium aquilinum-Rubus fruticosus</i> woodland	Buffer only	SBL LBAP	None	NA – present in buffer only.	NA
w2c Other coniferous woodland	N/A	Buffer only		None	NA – present in buffer only.	NA
h1a5 Dry heaths;	H12 <i>Calluna vulgaris-Vaccinium myrtillus</i> heath,	Buffer only	SBL	None	NA – present in buffer only.	NA

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UK Habitat Type	NVC Community Name	Area (within Site)	Conservation Listing*	Potential of Groundwater Dependency	Description and Reason for Evaluation	Evaluation
lowland (H4030)	<i>Calluna vulgaris</i> sub-community		LBAP Annex I			
h2a6 Other native hedgerow	N/A	3.77km	SBL LBAP	None	<p>Hedgerows were recorded throughout the Site along field boundaries. Hedgerows provide commuting and foraging corridors for a range of wildlife, and are particularly important within the agricultural landscape, linking larger habitats such as woodlands. The hedgerows onsite were regularly managed and primarily comprised of hawthorn with generally low diversity.</p> <p>Although this habitat is classified as SBL, due to the low species richness, these areas has been assessed as having regional importance.</p>	Regional
h2b Non-native ornamental hedgerow	N/A	0.12km	None	None	<p>A non-native ornamental borders a boundary to a private property to the east of the Site. While all hedgerows provide some cover for wildlife, non-native hedgerows are low priority for wildlife.</p> <p>These areas have no conservation status and are considered to be of limited ecological value and have therefore been classified as 'less than local' importance.</p>	Less than Local - considered as part of biodiversity in general only.
f1a6 Degraded blanket bog	M19 <i>Calluna vulgaris-Eriophorum vaginatum</i> blanket mire	0.19ha	SBL LBAP Annex I	None	<p>There is one small patch of degraded blanket bog in the south south west of the Site at the edge of the wet woodland. Blanket bog is listed on the SBL and has intrinsic importance due to the peat substrate.</p> <p>The blanket bog on this Site has been assessed as having local value due to the small size of the area and the disturbed and degraded nature of the habitat.</p>	Regional

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UK Habitat Type	NVC Community Name	Area (within Site)	Conservation Listing*	Potential of Groundwater Dependency	Description and Reason for Evaluation	Evaluation
f2a8 Transition mires and quaking bogs - lowland (H7140)	M9 <i>Carex rostrata-Calliergon cuspidatum/giganteum</i> mire	0.95ha	SBL Annex I LBAP	GWDTE	<p>Areas of transition mire were recorded in small patches in the south of the Site. Transition mire are both SBL and Annex I listed habitats. The areas were particularly herb rich and a high amount invertebrate activity was noted.</p> <p>Although the areas in site are small, due to the high species richness and high value to wildlife on this Site, transition mires have been assessed as having national value.</p>	National
f2b Purple moor-grass and rush pastures	M23 <i>Juncus effusus/acutiflorus-Galium palustre</i> rush-pasture	2.04ha	SBL LBAP	GWDTE	<p>Areas of rush pasture were recorded across the south of the Site. Rush pasture is an SBL listed priority habitat and a priority habitat within the LBAP. The areas were particularly herb rich and a high amount invertebrate activity was noted.</p> <p>Although this area of habitat is of high species richness and high value to wildlife on this Site, due to its relatively small size, transition mires have been assessed as having regional value.</p>	Regional
f2f Other wetlands	M23 <i>Juncus effusus/acutiflorus-Galium palustre</i> rush-pasture	6.33ha	LBAP	GWDTE	<p>Rushy areas classified as other wetland were recorded across the Site. These areas were generally rush dominated but with lower species richness than the f2b rush pasture areas. The areas did however still have relatively high species richness with high invertebrate activity.</p> <p>This habitat has no conservation listing, however due the species richness of the habitat this area has been assessed as having local importance.</p>	Local
	M25 <i>Molinia caerulea-Potentilla erecta</i> mire	0.8ha	LBAP	None	<p>There is a small area dominated by purple moor-grass in the south of the Site, adjacent to the Molinia dominated W4 woodland. The area is generally species poor and covers a small area.</p> <p>These areas have no conservation listing and are considered to be of limited ecological value and</p>	Local

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UK Habitat Type	NVC Community Name	Area (within Site)	Conservation Listing*	Potential of Groundwater Dependency	Description and Reason for Evaluation	Evaluation
					have therefore been classified as 'local' importance.	
	S10 <i>Equisetum fluviatile</i> swamp	0.59ha	SBL LBAP	None	The swamp area dominated by horsetail was found in the south of the Site. Swamp habitats are SBL listed priority habitats. Equisetum swamps are generally low in diversity, however this swamp represents a low point in the landscape the holds water feeding into the species rich rush pasture and transition mire in the surrounding area. Due to the priority status of this habitat and its strategic significance in association with adjacent f2b habitats, this area has been assessed as having national importance.	National
u1b5 Buildings	N/A	0.55ha	None	None	Urban areas have limited species diversity and low value for wildlife, although there is some association for nesting birds in buildings on this Site. These areas have no conservation status and are considered to be of limited ecological value and have therefore been classified as 'less than local' importance.	Less than Local - considered as part of biodiversity in general only.
u1b6 Other developed land	N/A	2.26ha	None	None		
u1c Artificial unvegetated, unsealed surface	N/A	Buffer only	None	None		
u1e Built linear features (wall, fence, road, track)	N/A	5.88km	None	None		
r1 Standing open water and canals (ditches)	N/A	0.36km	LBAP (lowland burns and ditches)	None	Ditches were recorded throughout the Site, mostly along field margins. The ditches were considered low value to invertebrate, fish and mammal species and have been assessed as having less than local importance and therefore are considered to be of local value.	Less than Local - considered as part of biodiversity

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UK Habitat Type	NVC Community Name	Area (within Site)	Conservation Listing*	Potential of Groundwater Dependency	Description and Reason for Evaluation	Evaluation
						in general only.
r1g Other standing water	N/A	0.16ha	SBL LBAP	None	There is a pond in the south of the Site with some aquatic vegetation, varied shade around the edges and moderate value to wildlife. Ponds are SBL listed priority habitats.	Local
r2b Other rivers and streams	N/A	1.28km	SBL LBAP	None	The watercourses present are very minor, mostly <1m wide, and represent small tributaries which feed into more significant watercourses off-site. The tributaries are not particularly notable in habitat terms, however they are SBL listed priority habitats and provide suitable habitat for a range of aquatic species and are connected to more significant watercourses, and therefore are considered to be of local value	Local
<p>* NVC sub-communities are not listed in this table, but detailed in the habitat report</p> <p>Annex 1: Habitats listed on Annex 1 of the Council Directive EEC of 21 May 1992 on the Conservation of Natural Habitats and Wild Fauna and Flora (the Habitats Directive).</p> <p>SBL – Scottish Biodiversity List</p> <p>LBAP – Dumfries and Galloway Local Biodiversity Action Plan</p>						

Faunal Baseline

- 8.75 A summary of the protected, priority or otherwise notable non-avian faunal species recorded within the relevant study areas during the surveys undertaken in 2025 and/or for which record were returned during the desk study is provided in paragraphs 8.58 to 8.59. Further details are provided in **Technical Appendices 8.2 to 8.4**.

Fish

- 8.76 River lampreys are known to occur within 2km of the Site. Additionally, the Solway Firth Special Area of Conservation (SAC), located 2km south of the Site is designated for river lamprey and sea lamprey (*Petromyzon marinus*).
- 8.77 An assessment of the aquatic habitat suitability for fish and other protected aquatic species is provided in **Technical Appendix 8.4**. Two sampling locations were assessed and ranked for Salmonid Spawning Potential (SSP) and Fish Utilisation Potential (FUP).
- 8.78 The sampling locations both scored as having low FUP and not suitable for SSP with no characteristics required to support either resident or migratory fish species. Watercourses also lacked suitable characteristics to support lamprey or eel species.

Reptiles

- 8.79 The desk study data search returned records of common lizard, slow worm and adder within 2km of the Site and a single common lizard was recorded during the habitat surveys in August 2025.
- 8.80 The wet heath and grassland habitats within the Site provide suitable habitat for reptiles, additionally there is potential reptile refugia onsite in the form of a tyre pile and a pile of wood and metal present onsite (see **Technical Appendix 8.2**).

Water Vole

- 8.81 Three records of water vole were returned during the desk study data search within 2km of the Site, all recorded in 2002 on Nutberry Moss, a tributary of Kirtle Water.
- 8.82 The majority of watercourses present onsite did not provide suitable habitat to support water vole. However, the watercourse to the south south east of the Site offered habitat suitable to support water vole with a moderate bank profile providing opportunities for burrowing and vegetation present for foraging (see **Technical Appendix 8.2** for full details).
- 8.83 No evidence of water vole presence was recorded during the survey undertaken in 2025, although known to be present in the wider area there is limited suitable habitat available onsite and water voles are therefore unlikely to be present.

Otter

- 8.84 Twelve records of otter were returned during the desk study data search within 2km of the Site, with the most recent record occurring in 2019.
- 8.85 Otters were confirmed as present on Site, with spraint identified on an unnamed watercourse within the south east of the Site (see **Figure 8.2.1** of **Technical Appendix 8.2**) during the baseline surveys. The watercourses in the south and south east of the Site were noted as having potential for commuting otter but limited opportunities for long term

shelter and resting. The watercourse within the west of the Site offered suitability for commuting but limited suitability for foraging or resting due to very steep, unvegetated banks modified for drainage and a lack of suitability to support fish species (see **Technical Appendix 8.2**).

Badger

- 8.86 The desk study returned 11 records of badger within 2km of the Site, five within the last 15 years, most recently recorded in 2017.
- 8.87 Much of the habitat within the Site is considered suitable for badger foraging and sett creation including the grassland habitat in the north of the Site, the deciduous woodland in the south west of the Site and some areas within the south of the Site.
- 8.88 A range of badger field evidence was recorded during the 2025 surveys, including snuffle holes, guard hairs and prints (see **Technical Appendix 8.2** for full details). Three badger setts were recorded, the locations of which are shown on confidential **Figure 8.2.3** of **Technical Appendix 8.2**.
- 8.89 Given the confirmed presence of badger setts within the Site boundary, potential impacts on badgers due to the Proposed Development are considered within this assessment.

Bats

- 8.90 Desk study data returned during the data search returned records of at least seven bat species within 2km of the Site, including a roost record of brown long eared and common pipistrelle, and a maternity roost record of whiskered bat recorded in 1990 (see **Table 8-2**).
- 8.91 Full details of the results of all bat surveys can be found within **Technical Appendix 8.4**.

Habitat Suitability

- 8.92 Woodland in the south west of the Site and along the southern boundary provides habitat suitable for foraging and commuting bats. Additionally, treelines along field boundaries within the south and north west of the Site provide foraging and commuting opportunities. The Site is of moderate suitability for commuting and foraging bats due to the linear habitats present within the Site and connectivity to suitable habitat within the wider area (Collins, 2023).
- 8.93 Habitats within the Site that are considered suitable to support bat roosting include numerous mature trees lining field edges and agricultural buildings within the east of the Site. As these buildings were >250m from the closest infrastructure, further assessment was not conducted as no potential for impacts on bats roosting in these structures.
- 8.94 There are 22 individual trees within the study area that are suitable for supporting roosting bats. A large block of Scots pine woodland, comprising 30 to 40 trees (several of which were noted to support PRFs), was also recorded. The results of the GLTA are summarised in paragraph 8.95. For full details see **Technical Appendix 8.3 Appendix B** and **Figure 8.3.1**.
- 8.95 Two trees were classified as 'PRF-M', suitable for multiple bats; 10 trees were classified as 'PRF-I', suitable for individual bats or a very small number of bats and ten individual trees, plus the block of woodland were classified as 'PRF', meaning that at least one PRF is present.

8.96 Table 8-4 summarises the details of the trees with bat roosting potential within 30m of proposed infrastructure.

Table 8-4 Trees with PRFs within 30m of proposed infrastructure

Tree No.	Categorisation / details	Distance from nearest infrastructure
10	PRF-I (lifted bark)	18.4m
14	PRF-M (butt rot – PRF-M, rot hole - PRF-I, tear out – PRF-M)	21.1m

8.97 Due to the relatively large amount of trees with suitability for roosting bats and the connectivity of habitats present onsite that could be used for foraging bats the Site is considered to be of high suitability for foraging, commuting and roosting bats (BCT,2023). However, given the distance between the buildings and the infrastructure, the overall habitat risk is considered to be moderate (NatureScot et al, 2021).

Activity Surveys

8.98 A total of 11,998 bat passes were recorded over a total of 56 nights during the 2025 active bat season.

8.99 Data recorded during the activity surveys confirmed that at least eight species of bats utilise the Site for commuting and foraging purposes. A summary of activity relating to each of these bat species is provided in **Table 8-5**.

8.100 Both the 'mean' and 'median' passes per night are presented in **Table 8-5**, the median value provides a more accurate representation of bat activity as mean values may be skewed by nights of very high or very low activity and lead to an over/under estimation of activity.

8.101 Due to close similarities in the echolocation call structure of certain species, some echolocation files were identified to genus only.

Table 8-5 Bat Activity Summary

Species	Mean passes per night (all locations combined)	Median passes per night (all locations combined)	Activity Summary
Soprano pipistrelle	247.5	163	The most frequently recorded species during activity surveys. Recorded at all four detector locations with a total of 8,167 passes accounting for 68% of total bat passes recorded within the Site. The greatest levels of soprano pipistrelle activity was recorded during the autumn survey period. Median 163 passes per night.
Common pipistrelle	58.9	35	The second most frequently recorded species during activity surveys. Recorded at all four detector locations with a total of 1,944 passes accounting for 16% of total bat passes recorded within the Site. The greatest levels of common

Species	Mean passes per night (all locations combined)	Median passes per night (all locations combined)	Activity Summary
			pipistrelle activity was recorded during the autumn survey period. Median 35 passes per night.
Nathusius pipistrelle	0.1	0	Nathusius pipistrelle was recorded at only one detector location in a single night during the autumn survey period. A total of three passes was recorded accounting for 0.03% of total bat passes.
<i>Pipistrellus sp.</i>	2.2	1	Bat activity attributed to the genus <i>Pipistrellus</i> was recorded at all four detector locations with a total of 74 passes accounting for 0.6% total bat passes recorded on Site. The greatest level of <i>Pipistrellus</i> activity was recorded in the summer survey period. Median of one pass per night.
Brown long-eared bat	0.5	0	Brown long eared bats were recorded at all four detector locations with a total of 18 passes accounting for 0.2% total bat passes recorded on Site. The greatest level of brown long eared bat activity was recorded in autumn. Average 0.5 passes per night, median 0 passes per night. It should be noted that activity is likely to be higher than indicated as brown long eared bats are often under recorded due to their low amplitude calls.
Noctule bat	11.5	7	Noctule bats were recorded at all four detector locations with a total of 381 passes accounting for 3% of total bat passes recorded on Site. The greatest level of noctule activity was recorded in the summer survey period. Median of seven passes per night.
Leisler's bat	0.1	0	Leisler's bats were recorded at two locations within the Site, with a total of 3 passes accounting for 0.02% of total bat passes recorded. Two of the passes were recorded at one location within two seconds of each other during the autumn survey period, suggesting this can be attributed to a single bat. The third pass was recorded in the summer survey period. Average 0.1 passes per night.
<i>Nyctalus sp.</i>	10.9	4	Bat activity attributed to the genus <i>Nyctalus</i> were recorded at all four detector locations within the Site, with a total of 359 passes accounting for 3% of total bat passes recorded. The greatest level of <i>Nyctalus</i> activity was recorded in the summer survey period. Median of four passes per night.
Daubenton's bat	3.3	3	Daubenton's bats were recorded at all four detector locations within the Site, with a total of 109 passes accounting for 0.9% of total bat passes recorded. The highest level of Daubenton's activity was recorded in the summer survey period. Median of three passes per night.
Natterer's bat	0.2	0	Natterers bat were recorded at all four detector locations within the Site, with a total of seven

Species	Mean passes per night (all locations combined)	Median passes per night (all locations combined)	Activity Summary
			passes accounting for 0.1% of all bat passes recorded. The highest level of Natterer's activity was recorded in the autumn survey period. Average 0.2 passes per night.
<i>Myotis sp.</i>	28.3	22	Bat activity attributed to the genus <i>Myotis</i> were recorded at all four locations within the Site, with a total of 933 passes accounting for 8% of all bat passes recorded. The highest level of <i>Myotis</i> activity was recorded in the summer survey period. Median 22 passes per night.

- 8.102 The greatest levels of bat activity were recorded during the autumn survey period with the average bat passes totalling 573.1 passes per night. The lowest levels of bat activity were recorded in the spring survey period with an average of 199.6 passes per night.
- 8.103 The greatest levels of bat activity were recorded at the static detector location C (see **Figure 8.3.2 of Technical Appendix 8.3**), located close to the western boundary of the Site, with an average of 290.3 passes. No data was recorded at this location during the spring survey period, suggesting that bat activity in this location would have been higher in reality.
- 8.104 Static detector location A, on the northern boundary of the Site, also returned a high level of bat activity (roughly a third less than location C), however, bats were recorded on 10 more nights at location A than location C, suggesting that location A is subject to a more consistent level of bat activity.
- 8.105 The lowest levels of bat activity were recorded at location B, located in the centre of the Site, with an average of 38.7 passes, however no data was recorded at this location during the summer survey period due to a technical error, which likely contributed to the low levels of activity recorded at this location.
- 8.106 Bat activity recorded at location D, in the north west corner of the Site, was also relatively low, with an average of 60.7 passes.
- 8.107 Given that the habitat risk of the Site was assessed as 'moderate' for bats (see paragraph 8.97), and the fact that the project is considered to be of 'medium' size under the NatureScot guidelines (NatureScot et al, 2021), the Proposed Development presents a medium risk level to bat species (see Table 3a in NatureScot et al, 2021).
- 8.108 Comparison of the activity data recorded during periods of 'typical' activity with similar sites within a 200km radius using *Ecobat* concluded the following:
- common pipistrelle, *Nyctalus sp.*, Daubenton's and Natterer's bats all exhibited low levels of activity compared with regional bat activity; and
 - noctule and *Myotis sp.* were found to exhibit low to moderate levels of activity compared with regional bat activity.
- 8.109 Comparison of the activity data recorded during periods of 'peak' activity concluded:
- Natterer's were found to exhibit low levels of activity when compared with regional bat activity;

- common pipistrelle were found to exhibit low to moderate levels of activity compared to regional bat activity;
- soprano pipistrelle were found to exhibit moderate levels of activity compared to regional bat activity;
- Daubenton's were found to exhibit moderate to high levels of activity compared to regional bat activity; and
- noctule, *Nyctalus* sp. and *Myotis* sp. were found to exhibit high levels of activity when compared to regional bat activity.

8.110 It was not possible to confidently estimate Nathusius' pipistrelle, *Pipistrellus* sp, Leisler's and brown long eared bats due to the low reference range within *Ecobat*. The three records of Nathusius' pipistrelle and Leisler's bat and the 18 records of brown long eared bat recorded at the Site are the only records of these species in this region on *Ecobat*. In the case of brown long eared bats, this is potentially because they are less likely to be picked up due to low amplitude calls (Collins, 2023). Similarly, the 74 *Pipistrellus* sp. records recorded onsite account for more than half of the *Pipistrellus* sp. records for the area, this means that the activity level results for these results would be inflated.

Roosting Analysis

- 8.111 *Ecobat* output included an analysis of calls recorded within species specific emergence windows, which are considered to give an indication as to the likelihood of a roost nearby.
- 8.112 A total of 111 bat passes were recorded during the soprano pipistrelle emergence window. These calls were recorded at all four detector locations (located in the western half of the Site), and recorded in autumn. The high number of passes recorded suggests that soprano pipistrelles are roosting in close proximity to the detector locations, either within the Site or in close proximity to it. Furthermore, the timing of these passes suggests the potential presence of a maternity roost, as autumn is the time of year bats within maternity roosts begin to disperse.
- 8.113 A total of 34 bat passes were recorded during the *Myotis* sp. emergence window. These calls were recorded at location C and D (see **Figure 8.3.2 of Technical Appendix 8.3**), both located close to the western boundary of the Site. The high number of passes recorded within the emergence window suggests the presence of a *Myotis* sp. roost in close proximity to these detector locations, either within the Site or in very close proximity.

Evaluation of Faunal Features

- 8.114 An evaluation of the non-avian faunal features which are either known to be present or considered likely to be present within the study area is provided in **Table 8-6**.

Table 8-6 Evaluation of Faunal Features

Receptor	Legal / Conservation Listing*	Reason for Evaluation	Evaluation
Fish: Brown Trout/Sea Trout, Atlantic salmon, European eel	WCA Sch 3, SBL	<p>River lampreys are known to occur within 2km of the Site. The Solway Firth SAC (2.9km south of Site) is designated for river lamprey and sea lamprey. River lamprey is protected under Schedule 3 of the Wildlife and Countryside Act, both river lamprey and sea lamprey are listed on the SBL.</p> <p>The fish habitat assessment concluded that the habitats onsite are not suitable for either migratory or resident fish species, and lacked suitable characteristics to support lamprey or eel species.</p> <p>Although there is a lack of suitable habitat onsite to support protected fish species, the watercourses onsite drain into watercourses with known fish presence. Therefore the Site is assessed as being of local value to fish.</p>	Local
Reptiles - common lizard, adder and slow worm	WCA Sch 5 (in respect of Section 9(1) and 9(5) only, SBL (adder)	<p>Most of the Site contains suitable habitat for supporting common lizard, both foraging and basking. Common lizard is described as widespread throughout Scotland (Scottish Wildlife Trust, n.d.) (with the exception of the most Scottish islands). Common lizards were confirmed as present onsite through an incidental sighting was recorded during the 2025 habitat surveys. Therefore, as common lizard are widespread in the area, and given the size of the Site and abundance of suitable habitat in the surrounding area, reptiles within the Site are assessed as being of no more than local importance.</p> <p>Due to the presence of suitable habitats such as heath, it is also possible for both adder and slow worm to be present on site. Slow worms have wide distribution across Scotland (NatureScot, n.d.). Adder are reported to be widespread in Scotland, although patchy in their distribution, however recent studies have suggested a decline in adder numbers, primarily due to habitat loss (Ward <i>et al</i>, 2025).</p> <p>Given the presence of similar suitable habitat surrounding the Site, and lack of records of these species within the Site, the Site is assessed as being of local value to both adder and slow worm, if present.</p>	Local

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Water Vole	WCA Sch 5 SBL	<p>The Site contained limited suitable habitat for burrowing and foraging however water vole have been recorded in the wider area, within a tributary of the Kirtle Water to the east of the Site.</p> <p>Water vole are described as being widespread across Scotland. Given the limited habitat within the Site and the presence of suitable habitat within the wider area, the Site is considered of less than local value to water vole.</p>	Less than local
Otter	HR Sch2, WCA Sch5, SBL HD Annex II, IV	<p>Otter are confirmed as being present on site, with spraint identified during the 2025 survey on an unnamed watercourse within the south east of the Site. The Site offers some suitable habitat for foraging and commuting but limited potential for shelter creation.</p> <p>Otters are known to be widespread across Scotland with a significant proportion of the population being found in the north and west of the country (JNCC, n.d). Otters are known to be present in the wider area, with records occurring on the Kirtle Water to the east of the Site.</p> <p>Due to the presence of higher quality habitat within the surrounding habitat, and the lack of records of otter resting sites within the Site, the Site is assessed to be of no more than local value to otter.</p>	Local
Badger	Protection of Badgers Act/WANE	<p>Badgers are known to be present within the wider area and the Site contains habitat suitable for foraging, commuting and sett creation.</p> <p>Evidence of badger presence including three badger setts were recorded during the 2025 surveys. Badgers are described as being widespread across mainland Scotland (NatureScot, n.d). Given the presence of similarly suitable habitat in the wider area, the Site is considered as of local value to badger.</p>	Local
Bat assemblage	HR Sch2, WCA Sch 5, HD Annex IV SBL (common pipistrelle, soprano pipistrelle, Daubenton's bat, brown long eared bat, Nathusius' pipistrelle)	<p>At least eight bat species were recorded during the 2025 surveys: common pipistrelle, soprano pipistrelle, Nathusius pipistrelle, <i>Pipistrellus sp.</i>, brown long eared bat, noctule bat, Leisler's bat, <i>Nyctalus sp.</i>, Daubenton's bat, Natterer's bat and <i>Myotis</i> species. Most activity recorded was soprano pipistrelle (68% of calls recorded) and common pipistrelle (16% of calls recorded). Non pipistrelle species made up only 15.4% of all passes recorded.</p> <p>The species recorded onsite include common and widespread species and rarer species which are less widespread.</p> <p>Potential roosting habitat is found in 22 individual trees and a large block of Scots pine woodland (30 to 40 trees). Two PRFs identified were classified as being suitable for multiple bats, the remaining were classified as being suitable for individual or small numbers of bats.</p> <p>As per current guidance (Reason and Wray, 2023), considering the location of the Site and the maximum species of bat that the Site may support based on the results of the activity survey, the bat assemblage that make use of the Site is considered to be of national importance.</p>	National

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Soprano pipistrelle		Soprano pipistrelle is a common and widespread species in southern Scotland (Reason and Wray, 2023) with a population estimated to be 1,210,000, which is considered to have been increasing significantly since 1999 (BCT, 2025). The majority of foraging/ commuting activity recorded across the Site was attributed to soprano pipistrelle (recorded at all four locations) and activity was typically low when compared to regional bat activity, increasing to moderate during periods of peak activity. Therefore the soprano pipistrelle population is considered to be of local value.	Local
Common pipistrelle		Common pipistrelle is a common and widespread species in southern Scotland (Reason and Wray, 2023) with a population estimated to be 875,000, which is considered to have been stable since 1999 (BCT, 2025). A common pipistrelle roost was recorded within 2km of the Site in 2015. A high proportion of foraging/commuting activity recorded across the Site was attributed to common pipistrelle (recorded at all four locations) and activity was typically low when compared to regional bat activity, increasing to low to moderate levels during periods of peak activity. Therefore, the soprano pipistrelle population is considered to be of local value.	Local
Nathusius pipistrelle		Nathusius pipistrelle is considered a rare species in southern Scotland and throughout the UK (Reason and Wray, 2023) with population estimates unavailable at this time. Nathusius pipistrelle was only recorded on a single night at one detector location, it was not possible to compare activity levels at a regional level. Although nathusius pipistrelles forage in broadleaved woodland and parkland, they are known to favour riparian habitat and always near freshwater habitats and it is therefore unlikely the Site sits within the core sustenance zone of a roost. Therefore, the nathusius pipistrelle population that make use of the Site is considered to be of regional value.	Regional
<i>Pipistrellus sp.</i>		As above, both common and soprano pipistrelles are common and widespread in southern Scotland, with nathusius pipistrelles considered rare (Reason and Wray, 2023). The majority of the bat activity onsite was attributed to common and soprano pipistrelle with nathusius recorded on a single night only. On that basis, <i>Pipistrellus sp.</i> populations that make use of the Site are assessed as being of local value.	Local
Brown long eared bat		Brown long eared bats are considered widespread in southern Scotland but not as abundant in all geographies (Reason and Wray, 2023) with population estimates of 230,000 which is considered to have been stable since 1999 (BCT, 2025). Brown long eared bats were recorded at all four locations but accounted for only 0.2% of all passes recorded. Brown long eared bats can be under-recorded due to their low frequency calls, therefore there is the potential that they are present in higher numbers than suggested. A brown long eared roost was recorded within 2km of the Site in 2010. The brown long eared bat population that make use of the Site is assessed as being of no more than NHFZ value.	NHFZ

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Noctule bat	Noctule bats are considered a rare species in Scotland, only recorded in southern Scotland to date (Reason and Wray, 2023), population estimates for Scotland are not available at this time, their population in England is estimated at 565,000 (BCT, 2025). Noctule bats were recorded at all four detector locations and accounted for 3% of all passes recorded. Activity levels were typically low to moderate when compared with regional bat activity, increasing to high during periods of peak activity. Given their rarity in Scotland the population that make use of the Site is assessed as being of national value.	National
Leisler's bat	Leisler's bats are considered a rare species in Scotland (Reason and Wray, 2023), population estimates are not available at this time. Leisler's bats were recorded at two locations on only two nights accounting for only 0.03% of all passes recorded. On that basis, the population that make use of the Site is assessed as being of local value.	Local
<i>Nyctalus</i> sp.	<i>Nyctalus</i> species are rare in Scotland, both <i>Nyctalus</i> species are considered rare in southern Scotland (Reason and Wray, 2023) with no population estimates available for Scotland. Passes attributed to <i>Nyctalus</i> species were recorded at all four locations and accounted for 3% of all recorded bat passes on site, likely attributed to Noctule bats. Activity levels were typically low when compared to regional bat activity, increasing to high during periods of peak activity. Therefore, <i>Nyctalus</i> sp. populations within the Site are assessed as being of national value.	National
Daubenton's bat	Daubentons bats are considered widespread in southern Scotland but not as abundant in all geographies (Reason and Wray, 2023) with population estimated to be 235,000 and considered to have been stable since 1999 (BCT, 2025). Daubentons were recorded at all four locations, accounting for 0.9% of total bat passes. Activity levels were typically low when compared to regional bat activity, increasing to moderate during periods of peak activity. On that basis, the population that make use of the Site is considered to be of no more than NHFZ value.	NHFZ
Natterer's bat	Natterers bats are considered widespread in southern Scotland but not as abundant in all geographies (Reason and Wray, 2023), with an estimated population in Scotland of 41,000 which is considered to have been stable since 2011 (BCT, 2025). Natterer's bats were recorded at all four detector locations but accounted for only 0.1% of all passes recorded. Activity levels were low when compared with regional bat activity. The population within the Site is assessed as no more than local value.	Local
<i>Myotis</i> sp.	<i>Myotis</i> species are less widespread in Scotland. As detailed above, both Daubenton's and Natterer's bat are considered widespread in southern Scotland, but not as abundant in all geographies (Reason and Wray, 2023). Whiskered bat (<i>Myotis mystacinus</i>) is considered to be rare in southern Scotland (Reason and Wray, 2023) and only occur in patchy distribution within southern Scotland with	Regional

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		<p>population estimates not available at this time. A maternity roost was recorded within 2km of the Site in 1990.</p> <p>Brant's bat (<i>Myotis brandtii</i>) are considered the rarest species in southern Scotland (Reason and Wray 2023), with current population estimates not available at this time.</p> <p><i>Myotis</i> sp. were recorded at all four monitoring locations, accounting for 8% of all passes recorded. Typical activity levels of <i>Myotis</i> sp. were low to moderate when compared to regional bat activity increasing to high during peak activity. On this basis the population of <i>Myotis</i> sp. bats that make use of the Site are assessed as being of regional value.</p>	
<p><i>*Table Key: Status</i></p> <p><i>HR Sch2 = Included on Schedule 2 of the Conservation (Natural Habitats &c) Regulations 1994 (as amended in Scotland)</i></p> <p><i>WCA Sch5 = Listed on Schedule 5 of the Wildlife and Countryside Act 1981 (as amended in Scotland)</i></p> <p><i>WCA Sch 3= Listed on Schedule 3 of the Wildlife and Countryside Act 1981 (as amended in Scotland)</i></p> <p><i>WANE = Included in the Wildlife and Natural Environments (Scotland) Act (2011)</i></p> <p><i>SFF = Salmon spawning beds protected under the Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003</i></p> <p><i>SBL = listed on Scottish Biodiversity List (SBL) (Scottish Government, 2013)</i></p> <p><i>Conservation Status: based on Article 17 Habitats Directive Reports 2019: Species Conservation Status Assessments 2019 (for those listed on WCA)</i></p>			

Cumulative Situation

- 8.115 **Chapter 5** contains details of all known operational and ‘in planning’ wind energy developments within approximately 10km of the Site.
- 8.116 A search of the relevant planning portals was also undertaken to identify any non-wind energy developments within 2km of the Site which could potentially contribute to significant cumulative effects.
- 8.117 When undertaking the cumulative effects assessment, it is important to consider only those projects which could potentially contribute to significant cumulative effects with the Proposed Development. As set out in paragraph 8.44 and 8.55, for this assessment potential cumulative effects have been assessed for the following features and developments:
- cumulative effects of habitat loss within 10km;
 - cumulative effects on aquatic features within the same sub-catchments and within 2km; and
 - cumulative effects on bat populations, which are possible in combination with other wind farms within a 10km radius of the Proposed Development.
- 8.118 Projects that meet the criteria in paragraph 8.117 and are therefore considered in this cumulative effects assessment are summarised in **Table 8-7**. These include all other developments within the relevant study areas which are either operational, under construction, consented or for which a planning application has been submitted.

Table 8-7 Other Projects Considered in Cumulative Effects Assessment

Project	Status	Distance and direction from Site	Details
Beck Burn Wind Farm	Operational	7.1km east	9 turbines (126.5m tip height)
Jockstown Solar Farm	Consented	5.2km north west	27.9MW solar capacity, 12MW battery storage capacity

Future Baseline

- 8.119 In the absence of the Proposed Development, the Site is likely to remain as grassland fields with small areas of deciduous woodland, with a wetland area to the south. The Site would likely continue to be utilised for grazing.
- 8.120 In the absence of the Proposed Development, it is possible that common lizard would continue to utilise the suitable habitat within the Site for foraging, basking and potentially hibernating in small numbers. It is possible that slow worm and adder may start to utilise the areas of suitable habitat within the Site.
- 8.121 Badgers are likely to continue to utilise the Site for foraging and sett creation, and otters are likely to continue to utilise the Site for commuting, although suitable habitat for resting would likely remain limited.
- 8.122 Bats are likely to continue to utilise the Site for foraging and commuting and may utilise suitable habitat within the Site for roosting. In the absence of the Proposed Development

the usage of the Site by bats is expected to remain at current levels, although rarer species may increase their usage as they expand their distribution in southern Scotland.

- 8.123 In the absence of the Proposed Development, it is possible that water vole may start to utilise the areas of suitable habitat within the Site, although suitable habitat would remain limited.
- 8.124 Climate change is predicted to result in complex changes to biodiversity. This may result in changes to the vegetation present or the potential for new species to colonise the Site, which potentially includes non-native species, although the extent of any such changes cannot be accurately predicted at this time. However, in the absence of any detailed, quantifiable information it has been assumed that in the absence of the Proposed Development the ecological condition of the Site is unlikely to change significantly over the next 40 years (the anticipated lifetime of the Proposed Development).

Assessment of Effects

- 8.125 The assessment of effects is based on the information outlined in **Chapter 3: Description of Development**.

Embedded Measures

- 8.126 The Proposed Development has been subject to a number of design iterations and evolution in response to the constraints identified as part of the baseline studies, to reduce environmental effects (see **Chapter 2: Site Description and Design Evolution** and **Chapter 3: Description of Development**). With respect to ecology, the following changes have been incorporated to avoid or minimise negative effects:
- it was not possible to avoid SBL rush pasture habitats completely to facilitate the construction of the access track. However, these habitats have been avoided as far as possible;
 - a distance of at least 50m between turbine blade tip and nearest woodland has been established as per current guidance (NatureScot, 2021);
 - a 50m buffer to all watercourses and waterbodies shown on the OS 1:10,000 scale mapping has been applied. No development is proposed within this 50m buffer with the exception of:
 - proposed watercourse crossing WX01; and
 - approximately 340m of track surrounding WX01.
 - a 10-15m buffer has also been applied to watercourses in accordance with SEPAs guidance on riparian corridors and no development is proposed within these buffers.

Good Practice Mitigation Measures

- 8.127 Full details of construction mitigation measures would be provided in a Construction Environmental Management Plan (CEMP). An outline CEMP is included as **Technical Appendix 3.1: Outline CEMP**. Good practice measures in relation to pollution risk and sediment management to be adopted during the construction and operation phases are also set out in **Chapter 10: Hydrology, Hydrogeology and Geology**. During the construction phase, good practice techniques with respect to peatland environments, as

contained within 'Good Practice during Wind farm Construction' (NatureScot, 2024), would be implemented. Further details on peat and water management during construction are provided in **Chapter 10: Hydrology, Hydrogeology and Geology**, and **Technical Appendix 3.1: Outline CEMP**.

- 8.128 Good practice measures to protect retained habitats during the construction phase would be implemented, including the erection of temporary protective fencing demarcating the working footprint, to be overseen and policed by the Environmental Clerk of Works (EnvCoW) (also see paragraphs 8.132 and 8.133); further details are provided in the Outline CEMP (**Technical Appendix 3.1**). Good practice techniques for vegetation and habitat reinstatement would be adopted and implemented on areas subject to disturbance during construction as soon as is practicable.
- 8.129 Good practice measures (SEPA, 2016) to prevent the spread of invasive species onto the Site will be followed where appropriate and proportionate.

Pre-Construction Surveys

- 8.130 Due to the time that will have elapsed between surveys and construction commencing and the possibility that badger, bat and otter activity could have changed in the intervening period, and/or habitat suitability for species scoped out/ not currently present onsite may have changed, a pre-construction survey for protected mammals (focusing on otter, badger, roosting bats, and water vole and/or red squirrel (if suitable habitat is found to be present)) would be undertaken. This would cover all suitable watercourses and other suitable habitat within 250m of proposed infrastructure. The results of the pre-construction survey would inform the need for further mitigation (if required) or confirm existing mitigation proposals in respect of working practices, or consultation with NatureScot, if required.
- 8.131 If during pre-construction surveys, invasive non-native species are identified, an Invasive Species Management Plan should be produced (or included within the final HMP) to prevent their spread across the wider landscape. Best practice guidance (SEPA, 2016) should be referred to within this plan.

Environmental Clerk of Works (EnvCoW)

- 8.132 A suitably qualified EnvCoW would be employed to oversee activities at key points for the duration of construction and reinstatement periods (at a frequency to be agreed with the Local Planning Authorities and NatureScot) to ensure natural heritage interests are safeguarded. The role of the EnvCoW would include the following tasks:
- to give toolbox talks to all staff onsite, e.g., an ecological induction, so staff are aware of the ecological sensitivities on the Site and the legal implications of not complying with agreed working practices;
 - to agree and monitor measures designed to minimise damage to retained habitats and proposed peatland restoration areas;
 - to undertake pre-construction surveys (as paragraph 8.130), pre-works checks for protected species and advise on ecological issues where required; and
 - to carry out pre-construction inspections of areas which require reptile mitigation and supervision of mitigation works, where required.

- 8.133 The EnvCoW would also undertake additional roles such as assisting with hydrological measures checking for nesting birds and implementing the Bird Protection Plan (see **Chapter 9: Ornithology** and **Chapter 10: Hydrology, Hydrogeology and Geology**).

Reptiles

- 8.134 In order to comply with the Wildlife and Countryside Act 1981 mitigation would be employed to reduce the chances of inadvertently killing or injuring individual reptiles during construction works. Given the low numbers of reptiles likely to be present, the large areas of suitable habitat that would remain unaffected by the works and given also the large spatial scale of the works, fencing and translocation are not considered appropriate. Proposed mitigation therefore would involve vegetation management and the identification/removal of potential refugia and hibernacula within areas of suitable habitat, if present. The proposed Site speed limit of 15mph would also reduce the likelihood of accidental injury/killing of reptiles by construction traffic.
- 8.135 Where appropriate and safe to do so, during the active season (typically April to October) all potential refuges within construction working areas will be removed, and construction works will employ a 'soft start' to allow any individuals to exit the area. Outwith the active season, checks and removal of hibernacula will be conducted. These checks will be conducted under the guidance of the EnvCoW.

Terrestrial Mammals

- 8.136 Species Protection Plans would be prepared prior to construction, informed by the pre-construction surveys, to describe how works will take place in a sensitive manner, in order to avoid impacts on protected or notable species present.
- 8.137 During construction, site speed limits of 15mph would reduce the likelihood of accidental injury/killing of mammal species by construction traffic.
- 8.138 All potentially dangerous substance or materials within the temporary construction compound would be carefully stored to prevent then causing any harm to mammal species which may enter the compound at night.
- 8.139 During construction all excavations greater than 1m depth would either be covered at night or designed to include a ramp to allow animals a means of escape should they fall in.

Bats

- 8.140 Bats can be impacted by wind development through collision, habitat loss and displacement through turbine operation (Voight et al, 2024). Collision with wind turbines is now the leading cause of multiple mortality events in bats globally (O'Shea et al, 2016), with a suspected annual loss of 30,000 bats per year in the UK (Voight et al, 2024). Therefore, in effort to avoid these impacts, in line with current NatureScot guidance (NatureScot, 2021) turbines would be situated at least 50m from features that may be utilised by commuting and foraging bats (i.e. watercourses and woodland edge habitat).
- 8.141 Temporary construction lighting would be restricted to the minimum required for safety reasons, which would be required for any external construction activities during hours of darkness and low natural light. This lighting would be designed to minimise illumination, glare, or light spillage to nearby ecological features (e.g. woodland edge habitat or watercourses utilised by commuting and foraging bats). Details of construction lighting would be provided within the final CEMP.

- 8.142 Operational lighting would also be restricted to the minimum required for operational and security purposes. Once the development is operational, external lighting would only be provided at key areas, such as around the substation, and utilised only during essential operational activities. Lighting would be directed away from sensitive habitats such as woodland and waterbodies, wherever possible, to minimise light spill to adjacent habitats. Lighting would avoid specifications with a high UV component. Operational lighting would be agreed with the Planning Authorities prior to construction.
- 8.143 Any lighting required in areas of likely bat activity would be established in line with current guidance (ILP, 2023).

Potential Construction Effects

Potential Effects

- 8.144 Potential effects, taking account of the good practice mitigation measures outlined in paragraphs 8.128 to 8.143, are addressed for each feature in turn during construction in paragraphs 8.145 to 8.185. Effects have been assessed only for important ecological features (i.e. those with a value of Local level or above, potential GWDTEs and/or legally protected species). These comprise:
- other neutral grassland, *Deschampsia* neutral grassland, Broadleaved and mixed woodland, wet woodland, other broadleaved/other mixed woodland, other native hedgerow, degraded blanket bog, transition mires and quaking bogs- lowland, purple moor-grass and rush pastures, other wetlands and other standing water and other rivers and streams;
 - fauna: fish, reptiles, otter, badger and bats; and
 - biodiversity.

Habitats

- 8.145 Impacts on habitats are categorised as follows:
- permanent habitat loss- this includes all areas of habitat present under the footprint of the Proposed Development and includes areas that would be subject to grading and potential cable laying;
 - a maximum of 20% loss of habitat has been assumed under the solar array during construction due to ground excavations and compaction; and
 - temporary habitat loss – calculated for areas within the working corridor that will be disturbed/damaged during construction, and reinstated following construction (including underneath the footprint of the temporary construction compound). A 5m temporary buffer has been applied from infrastructure to allow for possible damage during construction.
- 8.146 **Table 8-8** details the estimated direct and indirect/temporary land take for habitats present on Site, and potential GWDTE communities

Table 8-8 Summary of Habitat Loss by UKHab Type

UKHab	NVC	Permanent Loss (ha)	Temporary Loss (ha)	Total Loss (ha)	Permanent Loss – linear features (km)
f2b Purple moor-grass and rush pastures	M23a* <i>Juncus effusus/acutiflorus-Galium palustre</i> rush-pasture	0.04	0.06	0.10	-
f2f Other wetlands	M23b* <i>Juncus effusus/acutiflorus-Galium palustre</i> rush-pasture	0.10	0.16	0.26	-
g3c5 <i>Arrhenatherum</i> neutral grassland	MG1a <i>Arrhenatherum elatius</i> grassland /M23b	0.00	0.01	0.01	-
	MG1b/e <i>Arrhenatherum elatius</i> grassland	0.13	0.18	0.31	-
g3c7 <i>Deschampsia</i> neutral grassland	MG9a <i>Holcus lanatus-Deschampsia cespitosa</i> grassland	0.06	0.13	0.19	-
g3c8 <i>Holcus-Juncus</i> neutral grassland	MG10a <i>Holcus lanatus-Juncus effusus</i> rush-pasture	0.02	0.02	0.04	-
g4 Modified grassland	MG6a <i>Lolium perenne-Cynosurus cristatus</i> grassland	8.66	4.64	13.30	-
u1b6 Other developed land	n/a	0.03	0.02	0.05	-
w1 Lines of trees	n/a	-	-	-	0.35
h2a6 Other native hedgerow	n/a	-	-	-	0.06
All Habitats		9.06	5.26	14.33	0.41
<i>*Potential GWDTE Habitat</i>					

- 8.147 The total loss of 0.1ha of regionally important purple-moor grass and rush pastures would undermine the conservation objective outlined in the Scottish Biodiversity Delivery Plan (Scottish Government, 2024) to support the recovery of vulnerable habitats and is therefore likely constitute a significant negative effect at a regional level.
- 8.148 Although the other wetland habitat has relatively high species richness, the total loss of 0.26ha would not undermine the relevant policies listed in the Dumfries and Galloway LDP (Dumfries and Galloway Council, 2019) and is therefore unlikely to constitute a significant effect.
- 8.149 The total loss of 0.19ha of locally important *Deschampsia* neutral grassland is considered to constitute a significant negative effect at a local level due to the fact that it is listed as a priority habitat in the LBAP (Dumfries and Galloway Council, 2009) and therefore this loss undermines the objective of no net loss for priority habitats.
- 8.150 The total loss of 0.35km of locally important lines of trees is likely to constitute a significant negative effect at a local level due to the fact that woodland habitats are listed as priority habitat in the LBAP (Dumfries and Galloway Council, 2009) and therefore this loss undermines the objective of no net loss of priority habitats.
- 8.151 The total loss of 0.06km of regionally important native hedgerow habitat would undermine the conservation objective outlined in the Scottish Biodiversity Delivery Plan (Scottish Government, 2024) to support the recovery of vulnerable and important habitats. Therefore, this loss would likely constitute a significant negative effect at a regional level.
- 8.152 The loss of *Arrhenatherum* neutral grassland, *Holcus-Juncus* neutral grassland and modified grassland as not been assessed due to their evaluation being of less than local value.
- 8.153 The majority of infrastructure is situated a minimum of 50m away from primary watercourses (see paragraph 8.126). Assuming that best practice pollution prevention measures are adopted, no significant effect is predicted on the running water environment. An assessment of effects specific to otter is addressed separately in paragraphs 8.167 to 8.169.

GWDTE

- 8.154 **Table 8-8** shows the habitat loss (direct and indirect/temporary) for all potential GWDTE communities. The communities marked with an asterisk in **Table 8-8** have conferred upon them a potential to have groundwater dependency (based on SEPA (2024) guidance).
- 8.155 For a detailed assessment of the groundwater dependency of these habitats, please refer to **Chapter 10: Hydrology, Hydrogeology and Geology**. In summary, the GWDTE assessment presented in **Chapter 10** concludes that all areas of potential GWDTE are sustained by rainfall, surface water ponding and waterlogging of soils adjacent to watercourses or above the low permeability deposits, rather than by emergent groundwater. Therefore, it is considered that potential GWDTE habitats are not predominantly sustained by groundwater, but safeguards to maintain these habitats and the surface water flow paths to these habitats should be maintained during construction and operation of the Proposed Development.

Fauna

Fish

- 8.156 As noted in paragraph 8.78, there is no suitable habitat to support fish or lamprey species onsite and therefore no potential for direct impacts on these species.
- 8.157 As fish species are known to be present in watercourses hydrologically connected to the Site, construction activities have some potential to indirect impacts to these species downstream through pollution of the water environment.
- 8.158 A minimum 50m buffer will be maintained between all proposed infrastructure and the watercourses present onsite, other than those stated in paragraph 8.126.
- 8.159 With the implementation of good practice pollution prevention measures (**Chapter 10: Hydrology, Hydrogeology and Geology**) the likelihood of a pollution event affecting fish within downstream watercourses is considered to be low. Therefore, no significant effects on fish species are predicted.

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- 8.160 Common lizard has been recorded on the Site, and records of common lizard, slow worm and adder were returned by the desk study data search. The construction of the Proposed Development would result in the direct loss of up to 0.93ha potentially suitable habitat for this species. This loss is not considered significant, given the extensive availability of similar habitat present in the wider area, and the likely low population of common lizard present. Indirect/temporary loss of habitat has been considered here however it is anticipated that the areas subject to drying or other temporary damage would still be utilised by common lizard for activities such as basking and potentially foraging (following habitat reinstatement).
- 8.161 Construction activities have some potential to cause temporary disturbance to reptiles utilising potentially suitable habitat within the Site. The disturbance would likely be via noise, machinery and human presence. Given the availability of suitable habitat in the wider area, and the likely low population of reptiles present, no significant effects due to disturbance are predicted.
- 8.162 Good practice mitigation measures aimed at reptiles (see paragraphs 8.134 to 8.135), would be implemented during the construction phase, to prevent the inadvertent injury or killing of individuals. On the basis that the proposed measures are implemented, no significant effects on reptiles are predicted, and no contravention of the relevant legislation is likely.

Water Vole

- 8.163 Water voles are known to be present in the wider area, however the Site contained limited habitat for water voles and no evidence was recorded during surveys.
- 8.164 As water vole have been recorded in watercourses hydrologically connected to the Site, construction activities have some potential to indirect impacts to these species downstream through pollution of the water environment.
- 8.165 A minimum 50m buffer will be maintained between all proposed infrastructure and the watercourses present on site, other than those stated in paragraph 8.126.
- 8.166 With the implementation of good practice pollution prevention measures (**Chapter 10: Hydrology, Hydrogeology and Geology**) the likelihood of a pollution event affecting fish within downstream watercourses is considered to be low. Therefore, no significant effects on fish species are predicted.

Otter

- 8.167 Otters were confirmed as present within the Site, with baseline surveys identifying otter spraint on an unnamed watercourse in the south east of the Site. The Site contains suitable habitat for otter commuting, however there are limited opportunities for the creation of resting sites.
- 8.168 Construction activities have some potential to cause temporary disturbance to otters which may be using some of the watercourses and waterbodies on and around the Site for commuting and foraging. The disturbance would likely be via noise and human presence. However, there is a 50m minimum stand off from the proposed infrastructure to watercourses. Otters have large home ranges and are able to adapt to a certain level of human disturbance (Chanin, 2003) and are most active at night. Given the majority of construction works will take place during daytime hours, the likelihood of potential disturbance to otter is low and would not undermine the conservation objective of maintaining favourable conservation status. Therefore, no significant effects are predicted.
- 8.169 The death or injury of an individual otter during construction could have a potentially significant effect on the conservation status of this species in the local area. However, following implementation of the good practice measures outlined in paragraphs 8.136 to 8.139, death or injury to otters during construction is not likely and would not undermine the conservation objective of maintaining favourable conservation status. As such, no significant effects are predicted to occur.

Badger

- 8.170 Badgers are confirmed as present on site, with three setts identified within the survey area.
- 8.171 Construction activities have the potential to cause temporary disturbance to badgers within their setts if works come within 30m of a sett, if active at the time of construction. Both sett 3 (a main sett comprising six entrances) and sett 2 (an outlier sett comprising two part-used entrances) fall within 30m of the infrastructure footprint. If active at the time of construction, works within 30m would contravene legislation, however it is unlikely that disturbance would affect the badger local population as a whole. Therefore, no significant effects are predicted.
- 8.172 The death or injury of a badger during construction could potentially represent an offence under the relevant legislation (i.e. The Protection of Badgers Act) however, it is not likely to have a significant effect on the conservation status of this species in the local area. Additionally, the following implementation of the good practice measures outlined in paragraphs 8.136 to 8.139, death or injury to badgers during construction is not likely and would not affect the local badger population as a whole. As such, no significant effects would be likely to occur due to death or injury.

Bats – Foraging and Commuting

- 8.173 The Proposed Development has the potential impact foraging and commuting bats via habitat loss and disturbance due to noise and construction lighting.
- 8.174 The construction of the Proposed Development would result in the loss of 0.35km lines of trees and 0.06km native hedgerow habitat. Given the relatively small areas of this habitat loss, and the availability of suitable foraging habitat in the wider area, no significant effects are likely on foraging and commuting bats due to habitat loss.
- 8.175 Analysis of the bat activity survey results indicate that proposed turbine locations were subject to variable bat activity, ranging from low to moderate during periods of typical bat activity, and low/moderate to high during periods of peak bat activity. Construction activities would mostly take place during daylight hours during the active bat season (April

to October, 07:00 to 19:00), therefore no significant effects are likely on foraging and commuting bats due to disturbance during construction.

Bats - Roosting

- 8.176 Based on the number and categorisation of the PRFs identified during the GLTA survey, it is likely that the majority of roosts (if present) would comprise a small number of bats. Only two trees within the Site were assessed as having the potential to support multiple bats. Of the species with the potential to be present on Site, common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, brown long eared bats, noctule bats and Natterer's bats are known to roost in trees (Jackson, 2015).
- 8.177 Ecobat output relating to calls recorded within the emergence window indicated that there is the potential presence of both a soprano pipistrelle and *Myotis* sp. roost either within the Site or in close proximity to the Site. Furthermore, there is the potential that the soprano pipistrelle roost is a maternity roost (see paragraphs 8.111 to 8.113).
- 8.178 The pre-construction surveys detailed in paragraph 8.130 and 8.131 would allow any trees with confirmed bat roosts present to be identified.
- 8.179 The areas of proposed tree removal (see **Figure 2.3 of Chapter 2**) would result in the loss of trees with bat roosting potential (trees 12, 13 and 14) (see **Figure 8.3.1 of Technical Appendix 8.3**). Tree 12 was categorised as 'PRF' meaning that at least one feature that could be used by roosting bats is present, tree 13 had multiple features present categorised as PRF-I (features suitable for use by small numbers of bats), and tree 14 had two features categorised as PRF-M (features suitable for use by multiple bats, therefore may be used by a maternity colony) and one feature categorised as PRF-I. There is therefore potential for works to damage or destroy a bat roost (if present).
- 8.180 As noted in paragraph 8.177 it is most likely that any roosts (if present) would be either soprano pipistrelle or *Myotis* sp. The loss of a maternity roost of both soprano pipistrelle or *Myotis* sp. bats would contravene relevant legislation and constitute a likely long-term significant negative effect at a local level (for soprano pipistrelles) and a regional level (for *Myotis* sp. bats).
- 8.181 There is the potential for roosting bats (if present) to be disturbed by the construction works due to increased noise during construction, increased human presence and lighting associated with works. Specifically, any roosts contained in Tree 10 (suitable for small numbers of roosting bats) and Tree 14 (suitable for multiple bats/ a maternity roost) would be likely impacted by disturbance given they are both approximately 20m from the closest infrastructure (see **Table 8-4**). Any disturbance would contravene relevant legislation and constitute a likely significant short-term negative effect at a local level, most likely for soprano pipistrelles and *Myotis* sp. bats.

Biodiversity

- 8.182 NPF4 Policy 3b requires projects to demonstrate that proposed developments '*will conserve, restore and enhance biodiversity, including nature networks so that they are in a demonstrably better state than without intervention*' and includes the requirement to provide significant biodiversity enhancements, in addition to any proposed mitigation.
- 8.183 It is also stated that biodiversity enhancements should '*include nature networks; linking to and strengthening habitat connectivity within and beyond the development, secured within a reasonable timescale and with reasonable certainty*' and also include management and monitoring requirements wherever appropriate.

- 8.184 Construction of the Proposed Development would result in the loss of biodiversity (through the loss of the amount and diversity of wildlife) by:
- reducing the areas of habitat (see **Table 8-8**) and the populations of some species (e.g. noctule bats) associated with these habitats within the Site (but not the complete loss of any one habitat type or species);
 - the disruption of ecological networks; and
 - pollution of the water environment.
- 8.185 Other than the wetland habitats in the south of the Site (including purple moor grass and rush pastures), the majority of the habitats present have low species diversity and abundance and are widespread and common. The species potentially impacted are similarly widespread and common. However, without mitigation this loss of biodiversity would be contrary to the requirements of NPF4 and undermine Objective 2 and 4 of the Scottish Biodiversity Strategy Delivery Plan (Scottish Government, 2024). Therefore constituting an overall significant long-term negative effect at the local level.

Additional, Mitigation, Compensation and Enhancement

- 8.186 Embedded mitigation and good practice measures are detailed in paragraphs 8.126 to 8.143, as well as in the Outline CEMP (**Technical Appendix 3.1**) and **Chapter 10: Hydrology, Hydrogeology and Geology**. No further mitigation measures are proposed to mitigate against potentially significant effects upon important ecological features during construction. However, a detailed Habitat Management Plan (HMP) would be produced and agreed post consent. This would detail measures to compensate for the significant residual effects of habitat loss associated with the Proposed Development and provide significant biodiversity enhancement, in accordance with NPF4. An Outline HMP is provided in **Technical Appendix 8.5**, and a summary is provided in the following section (paragraphs 8.187 – 8.190).

Habitat Restoration and Management

- 8.187 The broad principal aim of the Outline HMP is to outline habitat restoration and management measures which are proposed to compensate for the direct and indirect loss of sensitive natural/ semi natural habitats, notably rush pasture and transition mire habitat, as a result of construction of the Proposed Development and to provide significant biodiversity enhancements, in accordance with NPF4.
- 8.188 The proposed restoration includes a total of 19.31ha of wet meadow habitat, 1.19ha of broadleaf woodland habitat and 0.23km of native hedgerow habitat.
- 8.189 The Outline HMP sets out the following management goals:
- restoration and enhancement of rush pasture and transition mire through surface water maintenance, grazing and limitation of tree and scrub regeneration;
 - planting of native woodland;
 - creation of hedgerows;
 - provision and maintenance of wildlife boxes/nests including bat roost and hibernation boxes and reptile hibernacula; and
 - bat monitoring.

- 8.190 The success of the management goals set out in paragraph 8.189 will be monitored through a variety of habitat and species monitoring methods, see **Technical Appendix 8.5** for full details.

Residual Effects

- 8.191 During the construction phase, the permanent loss of up to 0.04ha and temporary loss of 0.06ha purple moor-grass and rush pastures habitat is considered to constitute a significant long term negative effect at the regional level, and the permanent loss of 0.06ha and temporary loss of 0.13ha of *Deschampsia* neutral grassland would constitute a significant long term negative effect at a local level.
- 8.192 The habitat restoration and enhancement measures detailed in paragraph 8.188 and **Technical Appendix 8.5** delivers 0.36ha restoration and 18.95ha enhancement. This restoration and enhancement would offset the significant negative effects outlined in paragraph 8.191.
- 8.193 The permanent loss of 0.35km lines of trees and 0.06km native hedgerow habitat would constitute significant long term negative effects at the local and regional level respectively.
- 8.194 The habitat restoration and enhancement measures detailed in paragraph 8.188 and **Technical Appendix 8.5** delivers 1.19ha of native woodland creation and 0.23km native hedgerow creation, which would offset the significant negative effects detailed in paragraph 8.193.
- 8.195 No significant negative effects are predicted due to disturbance to badgers within their setts (if active) (paragraph 8.171) however as the infrastructure footprint falls within 30m of both sett 3 and sett 2, any potential disturbance during construction would contravene legislation. The mitigation measure detailed in paragraph 8.130 would allow a licence to be sought from NatureScot in order for the works to proceed.
- 8.196 Construction activities have the potential to cause a likely significant short term negative effect at a local level for soprano pipistrelle and *Myotis* sp. bats due to disturbance of roosting bats (if present). If required, the mitigation measure detailed in paragraph 8.130 would allow a licence to be sought from NatureScot in order for the works to proceed. This licence would also include, if appropriate, mitigation such as the provision of a compensatory roost resource. Therefore, no residual significant effects on roosting bats are likely during construction.
- 8.197 The tree removal proposed to support construction of the Proposed Development has the potential to result in the loss of both soprano pipistrelle and *Myotis* sp. maternity roosts (if present). The mitigation measure detailed in paragraph 8.130 would allow a licence to be sought from NatureScot in order for works to proceed. This licence would include, if appropriate, appropriate mitigation such as the provision of a compensatory roost resource. Therefore, no residual significant effects on roosting bats are likely.
- 8.198 The loss of biodiversity during construction is considered to constitute a significant long-term negative effect at a local level. However, habitats lost would be reinstated as per **Technical Appendix 8.5: Outline Habitat Management** Plan and the proposed enhancement would result in the net gain of approximately 18.95ha of wet meadow habitat and 1.19ha broadleaf woodland habitat, in addition to the provision of artificial nest boxes for wildlife (bats and reptiles). This would offset the significant long-term negative effects and result in a residual net positive effect on biodiversity as a whole.
- 8.199 Following the employment of mitigation and compensation measures, no significant residual effects are predicted for important ecological features during the construction

phase, (other than biodiversity and habitats). The significant residual effects on biodiversity and habitats are offset via proposed restoration.

Potential Operational Effects

Potential Effects

- 8.200 Operational effects (assuming that the stated good practice mitigation measures, as set out in the Assessment of Effects section and **Chapter 10: Hydrology, Hydrogeology and Geology**, are implemented), are addressed for relevant features in paragraphs 8.202 to 8.224.
- 8.201 Effects have been assessed only for important ecological features (i.e. those with a value of Local level or above) and/or legally protected species. These comprise:
- habitats; and
 - fish, reptiles, otter, badger and bats; and
 - biodiversity.

Habitats

- 8.202 Habitats beneath the solar array would be subject to shading effects (Carvalho et al, 2025). However, the habitats present in this area are heavily modified and therefore no loss of species diversity or degradation is predicted. This land will continue to be utilised for grazing throughout operation. Therefore, no significant effects due to shading are predicted.
- 8.203 No significant adverse effects on other retained habitats are predicted. Infrastructure would be in place and only occasional service vehicles would be present on the Site, with the potential for incidents and spillages affecting sensitive habitats considered to be very low. In addition to this, good practice measures would be implemented further reducing the risk of an incident occurring.

Fauna

Fish

- 8.204 During the operational phase, maintenance traffic would be minimal. No hazardous chemicals would be stored onsite during the operational phase. During major maintenance events, temporary storage of hazardous chemicals could occur onsite but would be subject to implementation of standard pollution prevention control measures (see paragraph 8.127). Additionally, there is a 50m buffer between most proposed infrastructure and watercourses onsite (other than those listed in paragraph 8.126), as a result there would be limited mechanisms for causing water pollution, and as such, no significant effects on fish are predicted during operation.

Reptiles

- 8.205 During the operation of the Proposed Development, only minimal maintenance traffic would be present onsite and this would be restricted to driving along onsite access tracks only, with an applied speed limit similar to that in place during construction.
- 8.206 Habitat enhancement and the provision of reptile refugia proposed within the Outline HMP (**Technical Appendix 8.5**) would therefore result in a significant long term positive effect upon reptiles during operation.

Water Vole

- 8.207 During the operational phase, maintenance traffic would be minimal. No hazardous chemicals would be stored onsite during the operational phase. During major maintenance events, temporary storage of hazardous chemicals could occur onsite but would be subject to implementation of standard pollution prevention control measures (see paragraph 8.127). Additionally, there is a 50m buffer between most proposed infrastructure and watercourses onsite (other than those listed in paragraph 8.126), as a result there would be limited mechanisms for causing water pollution, and as such, no significant effects on water vole are predicted during operation.

Otter

- 8.208 Human activity associated with maintenance activities would be limited to the permanent infrastructure areas and only minimal maintenance traffic would be present, which would be restricted to the access tracks and subject to similar speed limits to those in place during construction. As discussed in the 'Construction Effects' section, paragraph 8.167, there is some evidence of otter using the Site however habitats within the Site are considered only suitable for otter commuting. On that basis, otter presence is likely to be occasional and therefore the potential for otter to be affected during operation is low.
- 8.209 No hazardous chemicals would be stored on the Site during the operational phase, and activities involving excavations would have ceased. During major maintenance events, temporary storage of hazardous chemicals could occur onsite, but would be subject to implementation of standard pollution prevention control measures and works would not take place within 50m of any watercourses, other than those listed in paragraph 8.126. As a result, there would be limited mechanisms present for causing water pollution.
- 8.210 Based on the above, assuming that all stated good practice measures are implemented, no significant effects on otter are likely during operation.

Badger

- 8.211 There is a potential risk of both disturbance and injury / death of badgers during maintenance works associated with the Proposed Development. This could potentially represent an offence under the relevant legislation (i.e. The Protection of Badgers Act), which could have a significant short-term negative effect at a local level.
- 8.212 During the operation phase, it is assumed that maintenance activities would take place during daylight hours and vehicle traffic would be minimal, and subject to similar speed limits to those in place during construction. On that basis, no significant effects would be likely to occur due to death or injury.

Bats – Foraging and Commuting

- 8.213 Operational wind turbines can affect bats in a number of ways, although the main concerns relate to collision mortality, barotrauma and other injuries resulting from collision with, or flying in very close proximity to, moving turbine blades (NatureScot, 2021). Potential impacts resulting from collision with turbines are assessed in paragraphs 8.218 to 8.223.
- 8.214 There is some evidence that the operation of solar farms has the potential to impact local bat populations through changes in habitat structure, foraging opportunities and landscape connectivity (Reason and Wray, 2025). Additionally, although current NatureScot guidance relating to solar farms (NatureScot, 2025) state that collision risk for bats is low, recent research suggests that there may be collision related fatalities due to bats mistaking the surface of solar panels with that of water (Reason and Wray, 2025). It

should be noted, however, that research regarding the potential impacts of solar farms on bat populations is in the early stages, and there is not enough evidence, currently, to draw detailed conclusions.

- 8.215 Potential impacts on bats as a result of the presence of solar panels are assessed in paragraphs 8.216 to 8.217.

Solar PV Arrays

- 8.216 Impacts on bat populations as a result of habitat loss to facilitate the Proposed Development are covered in the Potential Construction Effects section above. There is some evidence, however, that the presence of solar PV modules has the potential to influence bat foraging behaviour due to changes in microclimate and invertebrate availability (Tinsley *et al*, 2023). Some research found activity was lowered at sites where solar PV modules were present (Tinsley *et al*, 2023), while others found some bat species altered their foraging behaviour in areas where solar PV modules were present, decreasing feeding behaviour (Barre *et al*, 2023).
- 8.217 While research is in the early stages, findings suggest that the presence of solar PV modules has the potential to negatively affect bat species present. Should this happen, this would constitute a significant negative effect at a national level on the bat assemblage utilising the Site.

Wind Turbine Collision

- 8.218 As described in paragraph 8.25, activity surveys were undertaken within the Site at four locations, and the results indicated low to moderate levels of bat activity during periods of typical activity (see paragraph 8.108) and low to high levels of bat activity during periods of peak activity (see paragraph 8.109).
- 8.219 Based on NatureScot onshore wind guidance (NatureScot *et al*, 2021) the Proposed Development presents a medium initial risk to bats (see paragraph 8.107) however this is likely to be an overestimation due to the Proposed Development being considered of 'large' size as the wind turbines are >100m in height ('large' developments consist of turbines >100m or consist of >40 turbines).
- 8.220 Recorded bat activity data confirmed three species and one species group of bats classified as at 'low risk' of collision with turbines in Scotland utilise the Site:
- brown long eared bat;
 - Daubenton's bat;
 - Natterer's bat; and
 - Myotis sp.
- 8.221 Recorded bat activity data confirmed that at least five species and two species groups of bat classified as at 'high risk' of collision with wind turbines in Scotland utilise the Site:
- common pipistrelle;
 - soprano pipistrelle;
 - Nathusius' pipistrelle;
 - Pipistrellus sp.;
 - noctule;
 - Leisler's bat; and

- *Nyctalus* sp.

8.222 Collision risk analysis was carried out for all 'high risk' species only as per NatureScot guidance (NatureScot *et al*, 2021).

8.223 Potential impacts on bats during operation have been assessed for each species / species group present in **Table 8-9**.

Table 8-9 Assessment of potential operational effects on bat species

Species/Group	Assessment
Common pipistrelle	Classified as high collision risk (NatureScot <i>et al</i> , 2021), however as common pipistrelles are relatively common in Scotland, overall population vulnerability is classed as medium. Collision risk analysis indicates that during periods of typical activity, collision risk for this species was low, increasing to medium risk during periods of peak activity at Location A in spring and Location C in autumn. Although there remains a risk that the operational wind farm could result in the death or injury of a common pipistrelle, it is unlikely that this would affect the favourable conservation status of the local population. Therefore, no significant effects on common pipistrelles are likely due to turbine collision.
Soprano pipistrelle	Classified as high collision risk (NatureScot <i>et al</i> , 2021), however as common pipistrelle are relatively common in Scotland, overall population vulnerability is classified as medium. Collision risk analysis indicates that during periods of typical activity, collision risk for this species is low other than Location A and C in autumn where there is medium risk of collision. During periods of peak activity, collision risk is increased to medium at Locations A, B and D in both summer and autumn. Given the potential proximity of a soprano pipistrelle maternity roost, there is the potential that killing or injury of soprano pipistrelles could negatively affect the favourable conservation status of the local population, this would be considered a significant negative effect at the local level.
Nathusius pipistrelle	Classified as high collision risk (NatureScot <i>et al</i> , 2021) and as Nathusius' pipistrelles are one of the rarest bat species in Scotland, overall population vulnerability is also classified as high. While collision risk analysis was carried out the reference range for this species within Ecobat was below the minimum number required for confidence in the output. Despite this, as Nathusius' pipistrelle are rare in Scotland with high population vulnerability, any death or injury during wind farm operation could affect the conservation status of the regional population which would be considered a significant negative effect at the regional level. However, given the low incidence of the species on the Site, the probability of collision is very low.
<i>Pipistrellus</i> sp.	As above, both common and soprano pipistrelles are classed as medium vulnerability, Nathusius' pipistrelles classed as high vulnerability. While collision risk analysis was carried out the reference range for this species within Ecobat was below the minimum number required for confidence in the output however, given the majority of the data collected was attributed to common and soprano pipistrelles, it is most likely that any death or injury of <i>Pipistrellus</i> sp. would impact common and/or soprano pipistrelles and it is unlikely that this would negatively affect the favourable conservation status of the local populations. Therefore, no significant effects on <i>Pipistrellus</i> sp. are likely.
Brown long eared	Classified as low collision risk and low overall population vulnerability in Scotland (NatureScot <i>et al</i> , 2021). While collision risk analysis was carried out the reference range for this species within Ecobat was below the minimum number required for confidence in the output however given brown long eared bats were recorded at all detector locations in every survey season, there remains a risk that the operational wind farm could result in the death or injury of an individual. Additionally, brown long eared bats have lower frequency calls which may result in underestimation of activity on site. Despite this, it is unlikely that any death or injury of this species would affect

Species/Group	Assessment
	the favourable conservation status of the population, therefore, no significant effects on brown long eared bats are likely.
Noctule bat	Classified as high collision risk and high overall population vulnerability in Scotland (NatureScot <i>et al</i> , 2021). Collision risk analysis indicates that during periods of typical activity collision risk is low-medium other than at Location D in spring when collision risk increases to high. During periods of peak activity this increases to medium-high, with high collision risk at Location A in summer and Locations B and D in both spring and summer. As noctules are among the rarest bat species in Scotland, known to reproduce slowly, any death or injury could cause population decline and therefore negatively affect the favorable conservation status of the population. Should this happen, it would be considered a significant negative effect at the national level.
Leisler's bat	Classified as high collision risk and high overall population vulnerability in Scotland (NatureScot <i>et al</i> , 2021). While collision risk analysis was carried out the reference range for this species within Ecobat was below the minimum number required for confidence in the output. Leisler's bats were only recorded on one night in autumn, and one night in summer, however it is likely that a proportion of the <i>Nyctalus</i> sp. passes are attributable to Leisler's. As Leisler's bat are rare in Scotland with high population vulnerability, any death or injury could possibly negatively affect the favorable conservation status of the population. Should this happen, it would be considered a significant negative effect at the local level. However, given the low incidence of the species on the Site, the probability of collision is very low.
Nyctalus sp.	Both noctule and Leisler's bats are classified as high collision risk with high overall population vulnerability due to the fact they are among the rarest bat species in Scotland. Calls attributed to <i>Nyctalus</i> sp. were recorded at all detector locations in all survey seasons. See assessment for Noctule and Leisler's bats above.
Daubenton's bat	A rarer species in Scotland however classified as low collision risk therefore their overall population vulnerability in Scotland is classified as low (NatureScot <i>et al</i> , 2021). Daubenton's bats were recorded at all four monitoring locations in all survey seasons, therefore a risk remains that the operation of the wind farm could result in death or injury of this species. Given their low population vulnerability it is unlikely that this would negatively affect the favourable conservation status of the population. Therefore, no significant effects on Daubenton's bats during operation are likely.
Natterer's bat	A rarer species in Scotland, however classified as low collision risk, therefore the overall population vulnerability in Scotland is classified as low (NatureScot <i>et al</i> , 2021). Natterer's bats were recorded at all monitoring locations in autumn only. A risk remains that the operational wind farm could result in death or injury of this species. Given their low population vulnerability it is unlikely that this would negatively affect the favourable conservation status of the population. Therefore, no significant effects on Natterer's bats during operation are likely.
Myotis sp.	Both Daubenton's and Natterer's bats (both <i>Myotis</i> sp). are classified as low collision risk and have low population vulnerability in Scotland. Whiskered and Brandt's bats (other <i>Myotis</i> spp.) are both among the rarest bat species in Scotland, however have low collision risk and therefore their population vulnerability is classed as medium (NatureScot <i>et al</i> , 2021). Calls attributed to <i>Myotis</i> sp. were recorded at all monitoring locations in all survey seasons and accounted for 8% of all bat passes recorded. There is a risk that the operational wind farm could result in the death or injury of a <i>Myotis</i> sp. bat, however given collisions are more likely to impact Daubenton's and Natterer's bats, no significant effects are likely.

Bats - Roosting

8.224 Increased vehicle traffic utilising the access road has the potential to disturb roosting bats (if present), however, during operation it is assumed that vehicle traffic would be minimal.

The majority of trees with roosting potential are situated over 30m from proposed infrastructure, however one retained tree (tree 10) is located approximately 20m from the proposed access track. Both soprano pipistrelles and Daubenton's are known to roost in buildings in Scotland, and Natterer's is known to occasionally roost in roof spaces, where they would be subject to noise. Therefore, it is unlikely that the noise generated from vehicle traffic would result in disturbance to bats in their roosts. Therefore, no significant effects on roosting bats (if present) during operation are likely.

Biodiversity

- 8.225 Operation of the Proposed Development would result in a loss of biodiversity due to:
- impacts on retained habitats situated under the solar array due to shading.
 - the reduction of species populations (e.g. bats through collision and invertebrates due to habitat changes).
- 8.226 Without mitigation this loss of biodiversity would be contrary to the requirements of NPF4 and undermine Objective 2 and 4 of the Scottish Biodiversity Strategy Delivery Plan (Scottish Government, 2024). As such, this is likely to constitute a significant long term negative effect at the local level.

Additional Mitigation, Compensation and Enhancement

- 8.227 Good practice involving 'feathering' whereby turbine blades would be pitched out of the wind to reduce rotation speeds (to below 2rpm) while idling would be employed. The reduction in speed created through feathering compared with idling alone has the potential to reduce bat fatality rate by up to 50% (NatureScot *et al*, 2021).
- 8.228 Due to the potential significant effects on bat species due to collision risk, curtailment is recommended at all wind turbine locations between dusk and dawn during the active bat season (April to September inclusive). In order to minimise down time, NatureScot guidance (NatureScot *et al*, 2021) recommends curtailment take place in conditions where temperatures are above 10°C and wind speeds are between 5 and 6.5 m/s.
- 8.229 It is recommended that post-construction monitoring takes place in order to monitor the effectiveness of the mitigation measures proposed determine whether the curtailment regime can be refined such that turbine down time can be minimised whilst ensuring it remains effective. See paragraph 8.251.
- 8.230 No further specific mitigation measures are proposed during the operational phase. However, compensation and enhancement measures provided as part of the Outline HMP (see paragraphs 8.189 to 8.190 and **Technical Appendix 8.5**) would remain in place during the operational phase.

Residual Effects

- 8.231 Potential significant negative effects are predicted to soprano pipistrelles, noctule bats, Nathusius' pipistrelles and Leisler's bats due to collision risk. Feathering of wind turbine blades during idling and curtailment during the active bat season (paragraph 8.227) would result in a reduction of collision risk to foraging and commuting bats to a level which is not considered to be significant.
- 8.232 Potential significant negative effects at a national level are predicted on the bat assemblage present due to the presence of solar panels. However, the habitat restoration/planting would provide an increase in invertebrate species present in habitat

away from the solar array compensating for the potential decrease in prey availability and offsetting the significant negative effects outlined in paragraph 8.217.

- 8.233 The loss of biodiversity during operation is considered to constitute a significant long-term negative effect at a local level. However, the proposed habitat enhancement as per **Technical Appendix 8.5: Outline Habitat Management Plan** would result in the net gain of approximately 18.95ha of wet meadow habitat and 1.19ha broadleaf woodland habitat, in addition to the provision of artificial nest boxes for wildlife (bats and reptiles). This would offset the significant long-term negative effects and result in a residual net positive effect on biodiversity as a whole.
- 8.234 Following the employment of mitigation and compensation measures, no significant residual effects are predicted for important ecological features (other than biodiversity and bats which are offset via proposed restoration) during the operational phase.

Potential Cumulative Effects

Construction Phase

Habitats

- 8.235 Cumulative effects on habitats have been considered for other developments within 10km of the Proposed Development.
- 8.236 No habitat loss or habitat restoration/ compensation information was provided within the Beck Burn Wind Farm Environmental Statement (SKM Enviro, 2013) and therefore it is not possible to assess the cumulative impacts of habitat loss.
- 8.237 The Jockstown Solar Farm habitat survey report (ITP Energised, 2021a) noted that the Site largely consisted of areas of improved grassland, with low plant species diversity in these areas, however higher species diversity was recorded in less managed areas of the Site including field margins and trackside verges. Plant species recorded were considered to consist of common and widespread species. The Biodiversity Management Plan (ITP Energised, 2022) shows provision of new hedgerow planting and underplanting of existing hedgerows. It is assumed that this proposed habitat enhancement would offset any habitat loss due to the consented development, therefore no significant cumulative effects due to habitat loss are predicted.

Aquatic Features

- 8.238 For the cumulative effects on aquatic features (including otter) during construction, the only potential for significant cumulative effects would be via the discharge of particulate matters into watercourses, or through a pollution incident. Wind farms which are already operational are not likely to give rise to significant cumulative effects and therefore the assessment has been restricted to wind farms and other developments within the same catchment which are yet to be constructed.
- 8.239 There are no wind farm developments within the same catchments as the Proposed Development, therefore there is no potential for significant effects on aquatic features during construction. See **Chapter 10: Hydrology, Hydrogeology and Geology** for full details.

Operational Phase

Habitats

- 8.240 Given there will be no significant negative effects on habitats during the operation of the Proposed Development (see paragraph 8.202), no significant negative cumulative effects on habitats are predicted.
- 8.241 The provision of habitat enhancement outlined in the Outline HMP (**Technical Appendix 8.5**) along with the habitat enhancement measures outlined in the Jockstown Solar Farm Biodiversity Management Plan (ITPE, 2022) would result in an overall net gain resulting in a significant positive effect on habitats.

Aquatic Features

- 8.242 It is assumed that all operational wind and solar will be managed in accordance with best practice, industry standards and relevant legislation, planning policy and guidance regulated by statutory consultees. These standards ensure that potential impacts on the water environment are controlled at source. Therefore, no significant cumulative effects on aquatic features are predicted.

Bats

- 8.243 No impacts on bat species during the operation of Jockstown Solar Farm were predicted (ITPE, 2021). The operational Becks Burn Wind Farm Environmental Statement (SKM Enviros, 2013) concluded that there were potential operational impacts on noctule bats due to collision risk. This, along with the predicted impacts of the Proposed Development (see **Table 8-9**) could therefore undermine the favourable conservation status of the species, which is considered a significant cumulative long term negative effect on foraging and commuting noctule bats at a national level.
- 8.244 The Becks Burn Wind Farm Environmental Statement (SKM Enviros, 2013) details a bat monitoring programme to determine effects on the noctule population, this, along with the mitigation measures and monitoring proposed for the Proposed Development would allow impacts on noctule bats to be monitored and mitigation measures to be reviewed and increased if required, reducing the potential effects to a level which is not considered to be significant.
- 8.245 No significant cumulative negative effects are predicted on roosting bats during operation. The provision of bat boxes outlined in both the Proposed Development Outline HMP and the Jockstown Solar Farm Biodiversity Management Plan (ITPE, 2002) would result in increased bat roosting habitat resulting in a cumulative positive effect.

Further Survey Requirements and Monitoring

Habitat Monitoring

- 8.246 Botanical monitoring would be undertaken as part of the HMP, as detailed in **Technical Appendix 8.5**, and summarised below:
- Botanical monitoring and condition assessment to establish baseline and monitor vegetational changes using Common Standards Monitoring (CSM) vegetation condition quadrats;

- tree and scrub cover monitoring to assess the extent of trees and scrub encroachment; and
- monitoring of tree health and survival rates of tree planting.

Hydrological Monitoring

- 8.247 Hydrological monitoring would also be undertaken as part of the HMP, as detailed in **Technical Appendix 8.5**. Hydrological monitoring would involve the monitoring of the water table via dipwells to establish a baseline and monitor any subsequent changes.
- 8.248 In order to monitor the effectiveness of the ditch blocking methods, checks would be made to monitor for damage and highlight required maintenance.
- 8.249 Water quality monitoring before and during the construction phase would be undertaken for the surface water catchments that drain from the Site to identify the presence of pollutants or suspended solids within any of the tributaries of the main channels. Monitoring would be carried out at a specific frequency (determined by the construction phase) on these catchments. For further details see **Chapter 10: Hydrology, Hydrogeology and Geology**.

Species Monitoring

- 8.250 As stated in paragraph 8.129 and 8.130, pre-construction surveys should be undertaken to take account of any changes in distribution of any protected or notable species likely to be present within the Site.
- 8.251 Post-construction bat monitoring would be undertaken in order to assess the success of the proposed mitigation. This is likely to include fatality monitoring and activity surveys. Fatality monitoring would consist of regularly scanning areas below wind turbines for bat carcases, this would be done at a sufficiently high frequency to reduce the risk of dead bats being removed by scavengers in between visits. Activity surveys would be carried out in order to compare activity during operation with baseline data collected to inform this EIA. The monitoring programme would initially take during the first year of operation, the requirement for further monitoring after one year would be reviewed following completion of these surveys.
- 8.252 Invertebrate monitoring would be undertaken as part of the HMP to assess the presence of protected or priority invertebrate species and monitor any changes to populations present subsequently. See **Technical Appendix 8.5** for full details.
- 8.253 Wildlife boxes and reptile hibernacula are proposed as part of the Outline HMP. Checks of wildlife boxes and hibernacula would be carried out in order to assess the success of these measures and perform condition checks. See **Technical Appendix 8.5** for full details.

Summary of Predicted Effects

Proposed Development

- 8.254 **Table 8-10** provides a summary of effects on important ecological features, mitigation, compensation and enhancement measures, and details any residual effects.

Table 8-10 Summary of predicted effects

Receptor	Potential Effect	Embedded Mitigation/Good Practice	Significance of Effect	Additional Mitigation/Compensation	Residual Effect
Construction Phase					
Purple Moor-grass and rush pastures	Direct loss of 0.04ha and temporary loss of 0.06ha of purple moor-grass and rush pasture.	Avoidance of purple moor-grass and rush pastures where possible.	Significant negative effect at a regional level.	Compensation, restoration and enhancement of 19.31ha of wet meadow habitat, 1.19ha of broadleaf woodland habitat and 0.23km native hedgerow habitat via the Outline HMP.	Significant negative effect at regional level, offset through proposed habitat restoration and enhancement leading to an overall positive effect.
Other wetlands	Direct loss of 0.1ha and temporary loss of 0.16ha of other wetland habitat.	Avoidance of other wetland habitat where possible.	Not significant	Compensation, restoration and enhancement of 19.31ha of wet meadow habitat, 1.19ha of broadleaf woodland habitat and 0.23km native hedgerow habitat via the Outline HMP.	Not significant. Overall positive effect through proposed habitat restoration and enhancement.
<i>Deschampsia</i> neutral grassland	Direct loss of 0.06ha and temporary loss of 0.13ha of <i>Deschampsia</i> neutral grassland habitat.	Avoidance of <i>Deschampsia</i> neutral grassland habitat where possible.	Significant negative effect at a local level.	Compensation, restoration and enhancement of 19.31ha of wet meadow habitat, 1.19ha of broadleaf woodland habitat and 0.23km native hedgerow habitat via the Outline HMP.	Significant negative effect at local level, offset through proposed habitat restoration and enhancement leading to an overall positive effect.
Lines of trees	Direct loss of 0.33km treeline habitat.	Avoidance of woodland habitat where possible.	Significant negative effect at a local level.	Compensation, restoration and enhancement of 19.31ha of wet meadow habitat, 1.19ha of broadleaf woodland habitat and 0.23km native	Significant negative effect at local level, offset through proposed habitat restoration and enhancement leading to

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Receptor	Potential Effect	Embedded Mitigation/Good Practice	Significance of Effect	Additional Mitigation/Compensation	Residual Effect
				hedgerow habitat via the Outline HMP.	an overall positive effect.
Native hedgerow	Direct loss of 0.09km native hedgerow habitat.	Avoidance of native hedgerow habitat where possible.	Significant negative effect at a regional level.	Compensation, restoration and enhancement of 19.31ha of wet meadow habitat, 1.19ha of broadleaf woodland habitat and 0.23km native hedgerow habitat via the Outline HMP.	Significant negative effect at a regional level, offset through proposed habitat restoration and enhancement leading to an overall positive effect.
Fish	Indirect impacts on downstream populations due to pollution.	50m buffer between infrastructure and watercourses. Pollution prevention measures.	Not significant.	None.	None.
Reptiles	Loss of up to 0.93ha of suitable habitat for reptiles.	Vegetation management and identification/removal of potential hibernacula and refugia, if present. Site speed limit of 15mph. 'Soft start' construction during active season, checks for reptiles outwith active season.	Not significant.	Reinstatement of habitat subject to temporary habitat loss. Provision of reptile hibernacula via the Outline HMP.	Not significant. Overall positive effect through provision of hibernacula and habitat creation.
Water Vole	Indirect impacts on downstream	50m buffer between infrastructure and watercourses.	Not significant.	None.	None.

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Receptor	Potential Effect	Embedded Mitigation/Good Practice	Significance of Effect	Additional Mitigation/Compensation	Residual Effect
	populations due to pollution.	Pollution prevention measures.			
Otter	Temporary disturbance, injury and/or death of otter.	Covering/ramping of excavations. Site speed limit of 15mph. Suitable storage of materials.	Not significant.	Pre-construction surveys.	Not significant.
Badger	Temporary disturbance, injury and/or death of badger.	Covering/ramping of excavations. Site speed limit of 15mph. Suitable storage of materials.	Not significant (potential for contravention of legislation)	Pre-construction surveys.	Not significant.
Bats – foraging and commuting	Habitat loss and disturbance to commuting and foraging bats.	Turbines (and therefore construction works) situated at least 50m from bat habitat. Daylight construction hours (07:00 – 19:00). Minimisation of temporary construction lighting.	Not significant.	Habitat creation through tree planting via the Outline HMP.	Not significant.
Bats - roosting	Disturbance to roosting bats, damage/destruction of a roost.	Avoidance of woodland habitat. Daylight construction hours (07:00- 19:00).	Significant short-term negative effect at a local level (likely for	Pre-construction surveys.	Not significant.

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Receptor	Potential Effect	Embedded Mitigation/Good Practice	Significance of Effect	Additional Mitigation/Compensation	Residual Effect
			soprano pipistrelles and <i>Myotis</i> sp. bats) due to disturbance. Significant long-term negative effect at a local and regional level (likely for soprano pipistrelle and <i>Myotis</i> sp. bats respectively) due to damage or destruction of a roost.		
Biodiversity	Loss of habitat and population of species. Disruption of ecological networks. Pollution of water environment.	Avoidance of habitat loss where possible.	Significant long term negative effect at the local level.	Compensation, restoration and enhancement of 19.31ha of wet meadow habitat, 1.19ha of broadleaf woodland habitat and 0.23km native hedgerow habitat via the Outline HMP.	Significant long term negative effect at local level, offset through proposed habitat restoration and enhancement resulting in an overall positive effect.
Operational Phase					
Habitats	Loss of species diversity due to shading effects. Damage to habitats due to vehicle	Suitable storage of materials. Vehicle use of access tracks only.	Not significant.	None.	Not significant.

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Receptor	Potential Effect	Embedded Mitigation/Good Practice	Significance of Effect	Additional Mitigation/Compensation	Residual Effect
	movement and pollution.				
Reptiles	Death/injury due to vehicle movement.	Vehicle use of access track only. Site speed limit.	Not significant.	Provision of reptile hibernacula and habitat creation via the Outline HMP.	Not significant. Overall positive effect due to provision of reptile hibernacula and habitat creation.
Fish	Indirect impacts on downstream populations due to pollution.	Suitable storage of materials. Pollution prevention control measures.	Not significant.	None.	None.
Water Vole	Indirect impacts on downstream populations due to pollution.	Suitable storage of materials. Pollution prevention control measures.	Not significant.	None.	None.
Otter	Disturbance due to human activity/ vehicles on site. Death/injury due to vehicle movement. Damage of aquatic habitats due to pollution incidents.	A minimum 50m buffer between proposed infrastructure and primary watercourses present. Suitable storage of materials. Vehicle use of access tracks only. Site speed limit.	Not significant.	None.	Not significant.
Badger	Disturbance due to human	Vehicle use of access tracks only.	Not significant.	None.	Not significant.

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Receptor	Potential Effect	Embedded Mitigation/Good Practice	Significance of Effect	Additional Mitigation/Compensation	Residual Effect
	activity/vehicles on site. Death/injury due to vehicle movement.	Site speed limit.			
Bats – foraging and commuting	Collision with moving turbines/barotrauma. Collision with solar panels. Reduction in foraging habitat.	50m stand off between woodland habitats and blade tip. Turbines sited away from bat habitat.	Significant negative effect on bat assemblage at national level due to potential solar collision. Significant long-term negative effect at a local level for soprano pipistrelle. Significant long-term negative effect at a regional level for Nathusius' pipistrelle. Significant long-term negative effect at a national level for noctule bats. Significant long-term negative effect at a local level for Leisler's bats.	Feathering of turbine blades. Curtailed during active bat season. Post-construction monitoring. Provision of foraging habitat via the Outline HMP.	Not Significant.

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Receptor	Potential Effect	Embedded Mitigation/Good Practice	Significance of Effect	Additional Mitigation/Compensation	Residual Effect
Bats - roosting	Disturbance due to vehicle movement.	Turbines sited away from bat habitat.	Not significant.	None.	None.
Biodiversity	Impacts on habitats due to solar array shading. Reduction of species populations.	None.	Significant long term negative effect at local level.	Compensation, restoration and enhancement of 19.31ha of wet meadow habitat, 1.19ha of broadleaf woodland habitat and 0.23km native hedgerow habitat via the Outline HMP.	Net positive effect.

Cumulative Effects

- 8.255 Significant cumulative effects on noctule bats are predicted during operation due to collision risk. However, the provision of mitigation and monitoring to determine the effectiveness of mitigation measures would reduce impacts to a level that is not considered significant.
- 8.256 The biodiversity enhancements proposed for Jockstown Solar Farm and the Proposed Development would result in a cumulative positive effect on habitats, resulting in an overall positive significant effects on habitats and biodiversity as a whole.

Statement of Significance

- 8.257 Following the avoidance of important features during project design where possible, and with the implementation of the proposed good practice measures and additional mitigation, impacts would be minimised as far as possible.
- 8.258 The Proposed Development would result in a significant negative effect at a national level for the loss of the SBL habitat purple moor-grass and rush pastures, and a significant negative effect at a local level due to the loss of *Deschampsia* neutral grassland and lines of trees. However, this habitat loss would be compensated through the restoration, compensation and enhancement proposed, to be delivered via an HMP, which would result in an overall positive effect.
- 8.259 The Proposed Development would result in a significant negative effect at a regional level for the loss of SBL habitat native hedgerows.
- 8.260 The Proposed Development has the potential to result in significant negative effects on the following species during the construction phase:
- significant short-term negative effect on roosting bats at the local level due to temporary disturbance; and
 - significant short-term negative effects on roosting bats due to damage or destruction of a roost.
- 8.261 Following the implementation of secondary mitigation measures (including pre-construction surveys and directional lighting), no significant residual effects on roosting bats due to disturbance are predicted during the construction phase.
- 8.262 Following the implementation of secondary mitigation measures, no significant residual effects on and roosting bats due to damage or destruction of a roost are predicted during the construction phase.
- 8.263 The Proposed Development would result in a significant negative effect on biodiversity at a local level due to habitat loss and impacts on species. However, habitat loss would be compensated through the restoration, compensation and enhancement proposed, to be delivered via an HMP, which would result in an overall positive effect.
- 8.264 During the operational phase, there is the potential for significant effects on the following species :
- significant long-term negative effect on noctule bats and *Nyctalus* sp. bats at the national level due to collision risk;
 - significant long-term negative effect on Nathusius' pipistrelle bats at the regional level due to collision risk;
 - significant long-term negative effect on Leisler's bats at the local level;

- significant cumulative long-term negative effect on noctule bats at the national level due to collision risk.
- 8.265 Following the implementation of secondary mitigation measures, no significant residual effects on bat species are predicted.
- 8.266 With the implementation of continued good practice measures and the implementation of the proposed outline HMP, no other significant negative effects are predicted during the operational phase.
- 8.267 The overall biodiversity value of the Site would increase through the restoration and enhancement of rush pasture and transition mire habitat. This work is partially to compensate for the loss of habitats for infrastructure construction and preserve the existing floral diversity onsite but goes further and creates and enhances habitat availability for invertebrate, reptile and bat species.

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