Chapter 8 Ecology

Contents

8 Ecology

8.1 Introduction

8.1.1 This chapter considers the likely significant effects of Torfichen Wind Farm (the 'Proposed Development') on non-avian ecology, including designated sites, terrestrial and aquatic habitats, and protected species. This ecological assessment has been carried out by MacArthur Green and is based on best practice guidance, including guidance by NatureScot[i] and the Chartered Institute of Ecology and Environmental Management (CIEEM)[ii]. All staff contributing to this chapter have professional experience in ecological impact assessment and ecological survey.

8.1.2 The key objectives of the chapter are to:

- consider relevant legislation, policy and guidance;
- establish the baseline conditions;
- describe the assessment methodology and significance criteria used in completing the impact assessment;
- describe the potential effects, including direct, indirect and cumulative effects associated with the Proposed Development;
- set out the mitigation measures proposed to address the likely significant effects; and
- assess the residual effects remaining following the implementation of mitigation measures.

8.1.3 The chapter is supported by the following Technical Appendices:

- **Technical Appendix 8.1**: National Vegetation Classification (NVC) and Habitats Survey Report;
- **Technical Appendix 8.2**: Protected Species Survey Report[iii];
- **Technical Appendix 8.3**: Bat Survey Report;
- **Technical Appendix 8.4**: Fish Survey Report;
- **Technical Appendix 8.5**: Outline Species Protection Plan (SPP); and
- **Technical Appendix 8.6**: Outline Biodiversity Enhancement Management Plan (OBEMP).

8.1.4 The following figures are referenced in the text where relevant:

- **Figure 8.1**: Ecological Designated Sites and Ancient Woodland within 5 km;
- **Figure 8.2**: Carbon and Peatland Map 2016;
- **Figure 8.3**: National Vegetation Classification (NVC) Survey Area and Survey Results;

- **Figure 8.4**: Potential Groundwater Dependent Terrestrial Ecosystems (GWDTEs) Survey Area and Survey Results;
- **Figure 8.5**: Protected Species Survey Area and Survey Results;
- **Figure 8.5C**: Confidential Protected Species Survey Results;
- **Figure 8.6:** Bat Survey Area, Anabat Locations & Preliminary Bat Roost Assessment Results;
- **Figure 8.7**: Average Seasonal Bat Site Activity 2022 – Common Pipistrelle;
- **Figure 8.8**: Average Seasonal Bat Site Activity 2022 – Soprano Pipistrelle;
- **Figure 8.9**: Average Seasonal Bat Site Activity 2022 – Nathusius' Pipistrelle;
- **Figure 8.10**: Average Seasonal Bat Site Activity 2022 - Nyctalus spp.;
- **Figure 8.11**: Electrofishing Locations and Survey Results; and
- **Figure 8.12:** Outline Biodiversity Enhancement Management Plan Area.

8.1.5 The Confidential Annex of **Technical Appendix 8.2** and **Figure 8.5C** will not be published with the Environmental Impact Assessment (EIA) Report due to the potential risk to protected species. However, they will be issued to the Scottish Ministers, NatureScot and Midlothian Council.

8.2 Legislation, Policy and Guidance

8.2.1 The following legislation, policy and guidance have been considered in carrying out this ecology assessment.

Legislation

- European Union Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the 'Habitats Directive');
- European Union Council Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy ('Water Framework Directive');
- Environmental Impact Assessment Directive 85/337/EEC, as amended ('EIA Directive') (as subsequently codified by Directive 2011/92/EU, as amended by Directive 2014/52/EU);
- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017;
- The Conservation (Natural Habitats &c.) Regulations 1994 (as amended) (the 'Habitats Regulations');

- The Water Environment and Water Services (Scotland) Act 2003;
- Nature Conservation (Scotland) Act 2004 (as amended);
- Wildlife and Natural Environment (Scotland) Act 2011;
- The Water Environment (Controlled Activities) (Scotland) Regulations 2011;
- Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003;
- Wildlife and Countryside Act 1981 (as amended); and
- Protection of Badgers Act 1992.

Policy

8.2.2 **Chapter 5: Statutory Policy and Framework** sets out National Planning Framework (NPF) 4 and the planning policy framework that is relevant to this EIA Report. The following planning policy of relevance to ecology have been considered in carrying out this assessment:

- Joint Nature Conservation Committee (JNCC) and Department for Environment, Food and Rural Affairs (DEFRA) (2012). UK Post-2010 Biodiversity Framework;
- Scottish Executive (2004). Scottish Biodiversity Strategy: It's in Your Hands;
- Scottish Government (2022a). Onshore Wind Policy Statement 2022;
- Scottish Government (2022b). Scottish Biodiversity Strategy to 2045. Tackling the Nature Emergency in Scotland; and
- Scottish Government (2023). National Planning Framework 4 (NPF4).

Guidance

- CIEEM (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine;
- Collins, J. (2016). Bat Surveys for Professional Ecologists: Good Practice Guidelines. 3rd Edition;
- Midlothian Council (2019). Midlothian Local Biodiversity Action Plan 2019 – 2024;
- European Commission, Directorate-General for Environment (2010). Wind energy developments and Natura 2000;
- NatureScot (2020). General pre-application and scoping advice for onshore wind farms;
- JNCC (2022). Guidelines for selection of biological Sites of Special Scientific Interest (SSSIs);
- Scottish Badgers (2018). Surveying for Badgers: Good Practice Guidelines. Version 1;

- Scottish Environment Protection Agency (SEPA) (2017a). Land Use Planning System Guidance Note 4 – Planning guidance on on-shore windfarm developments;
- SEPA (2017b). Land Use Planning System Guidance Note 31 – Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystem;
- Scottish Executive (2000). Nature conservation: implementation in Scotland of EC Directives on the conservation of natural habitats and of wild flora and fauna and the conservation of wild birds ('The Habitats and Birds Directives'). Revised guidance updating Scottish Executive Circular no. 6/1995;
- Scottish Executive Rural Affairs Department (SERAD) (2001). European Protected Species, Development Sites and the Planning Systems: Interim guidance for local authorities on licensing arrangements;
- Scottish Government (2016). Draft Peatland and Energy Policy Statement;
- Scottish Government (2017). Planning Advice Note 1/2013 – Environmental Impact Assessment. Revision 1.0;
- Scottish Government (2017). Planning Circular 1/2017: Guidance on The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017;
- Scottish Government, SNH, SEPA (2017). Peatland Survey – Guidance on Developments on Peatland;
- Scottish Government (2019). The Scottish Forestry Strategy 2019 - 2029;
- Scottish Government (2020). EU Exit: The Habitat Regulations in Scotland;
- Scottish Government (2020). Securing a green recovery on a path to net zero: climate change plan 2018 – 2032 – update;
- Scottish Government (2020). Update to the Climate Change Plan 2018 - 2032;
- Scottish Government (2021). Freshwater and diadromous fish and fisheries associated with onshore wind farm and transmission line developments: generic scoping guidelines;
- Scottish National Heritage (SNH) (2015). Scotland's National Peatland Plan;
- SNH (2016). Decommissioning and Restoration Plans for wind farms;
- SNH (2016). Planning for Development: What to consider and include in deer assessments and management at development sites. Version 2;

- SNH (2016). Planning for Development: What to consider and include in Habitat Management Plans. Version 2;
- SNH (2018). Advising on carbon-rich soils, deep peat and priority peatland habitat in development management;
- SNH (2018). Environmental Impact Assessment Handbook – Version 5: Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment process in Scotland;
- Scottish Renewables, SNH, SEPA, Forestry Commission (Scotland), Historic Environment Scotland & Association of Environmental Clerks of Works (AEECoW) (2019). Good Practice During Windfarm Construction. 4th Edition;
- NatureScot (2021). Assessing the cumulative landscape and visual impact of onshore wind energy developments;
- NatureScot, Natural England, Natural Resources Wales, RenewableUK, Scottish Power Renewables, Ecotricity Ltd, the University of Exeter & Bat Conservation Trust (BCT) (2019, updated 2021). Bats and Onshore Wind Turbines – Survey, Assessment and Mitigation;
- NatureScot (2023). Advising on peatland, carbon-rich soils and priority peatland habitats in development management; and
- NatureScot (2023). Planning and development: protected species.

8.3 Consultation

8.3.1 Consultation for this ecology assessment was undertaken with the organisations shown in **Table 8.1** below.

Table 8.1 Consultation Responses

Consultee (Type and Date)	Summary of Consultation Response	Response
Energy Consents Unit, EIA Scoping Opinion, 13 April 2023	Ministers direct the Applicant to Marine Scotland Science standing advice for onshore windfarms. As well as watercourses and waterbodies within and downstream of the Proposed Development, the Applicant should consider any areas of Special Areas of Conservation (SAC) where fish are a qualifying feature and proposed felling operations particularly in acid sensitive areas.	Marine Scotland Science (MSS) guidance has been followed within this assessment. Potential effects on watercourses within the Study Area are detailed in this chapter. As per paragraph 8.7.13 aquatic habitats and species have been scoped out of the detailed assessment. A Fish Survey Report is provided (Appendix 8.4) which details fish recorded within the site and Survey Area.

Consultee (Type and Date)	Summary of Consultation Response	Response
		Potential effects of the Proposed Development on SACs/SSSIs within 5 km of the site and qualifying features therein are detailed in paragraphs 8.7.3 - 8.7.9.
NatureScot, EIA Scoping Opinion, 15 March 2023	The habitat and species surveys carried out appear comprehensive and that the proposed approach to the assessment of impacts appears appropriate and in line with NatureScot guidance. NatureScot accept that the Moorfoot Hills SAC, River Tweed SAC, and Peeswit Moss SAC are not hydrologically linked to the Proposed Development and therefore impacts on their non-avian features can be scoped out.	Noted. NatureScot guidance has been considered within this assessment and potential effects of the Proposed Development on protected species are considered within this chapter. Embedded mitigation measures are included in paragraphs 8.5.1- 8.5.6 (Embedded Mitigation). An outline Species Protection Plan (SPP) is provided (**Technical Appendix 8.5**), and the detailed SPP will establish measures to safeguard known protected species within the site.
	The site contains an area of Class 1 nationally important carbon-rich soils, deep peat and priority peatland habitat and is therefore likely to be of high conservation value. Development proposals on peat will always require a site-specific and detailed peat and vegetation survey and the results from that should then inform the need for a PLHRA and a Peat Management Plan. NatureScot encourages developments to avoid carbon rich soils, deep peat and priority peatland habitat to minimise losses. Where avoidance is not possible, mitigation measures will be required. Existing peatland habitat should be restored and improved to compensate for unavoidable residual adverse effects. Habitat enhancement should go beyond compensation and should provide overall positive effects or net benefit for peatland interest. Reference is made to NatureScot's pre-application scoping guidance document.	Potential effects of the Proposed Development on SACs/SSSIs within 5 km of the site and their non-avian qualifying features therein are detailed in paragraphs 8.7.3 - 8.7.9. A National Vegetation Classification (NVC) and Habitats Survey Report is provided (**Technical Appendix 8.1**). An Outline Biodiversity Enhancement Management Plan (OBEMP) has been developed in consultation with landowners (**Technical Appendix 8.6**), which details various biodiversity enhancement measures at the site, including peatland restoration. Detailed peat depth surveys, PLHRA and Peat Management Plan are provided in **Chapter 10: Geology, Hydrology & Hydrogeology** and associated appendices.

Midlothian Council, EIA Scoping Opinion, 13 February 2023	Midlothian Council are content with the approach suggested in the EIA Scoping process, so long as the potential impact on the areas of long-established woodland of plantation origin is fully considered in the ecology assessment.	Noted. Potential effects on ancient woodland have been avoided and considered within this chapter and have been scoped out of the assessment as per paragraph 8.7.9.
Fisheries Management Scotland, EIA Scoping Opinion, 10 February 2023	The Proposed Development falls within the river catchments relating to the Forth District Salmon Fishery Board (DSFB) and Forth Rivers Trust. Fisheries Management Scotland advise that the proposals are conducted in full consultation with the Board/Trust.	Forth District Salmon Fishery Board have been consulted (see below), and a Fish Survey Report has been provided (**Technical Appendix 8.4**).
Forth District Salmon Fishery Board, EIA Scoping Opinion, 13 February 2023	The Board remains neutral to the Proposed Development however the EIA Scoping Opinion outlined a number of survey and mitigation requirements.	A Fish Survey Report is provided (**Technical Appendix 8.4**) which details fish recorded within the site and Survey Area. Measures will be in place to mitigate for impacts on the good status of the watercourses that may be affected by the Proposed Development as detailed in paragraphs 8.5.1 - 8.5.6 (Embedded Mitigation). Discussion relating to watercourses from the perspective of water quality and watercourse crossings are detailed within **Chapter 10: Geology, Hydrology & Hydrogeology**.

8.4 Methodology

Scope of Assessment

8.4.1 This chapter considers the potential effects of construction, operation and decommissioning (including cumulatively) of the Proposed Development upon those ecological features identified during the review of the desk-based assessment and field surveys. Effects, both temporary and permanent, upon the following features are assessed:

- designated nature conservation sites – effects include direct (i.e., derived from land-take or disturbance to habitats or protected species) and indirect (i.e., habitat fragmentation and modification, including

through changes caused by impacts to supporting systems such as groundwater or overland flow);

- terrestrial habitats – effects include direct (i.e., derived from land-take) and indirect (i.e., habitat fragmentation and modification, including through changes caused by impacts to supporting systems such as groundwater or overland flow);
- aquatic habitats – effects are limited to the ecological impacts of changes in water conditions through potential pollution effects (hydrological effects are considered in **Chapter 10: Geology, Hydrology & Hydrogeology**); and
- protected species and other notable species – effects considered include direct (i.e., loss of life; loss of key habitat; displacement from key habitat; barrier effects preventing movement to/from key habitats; and general disturbance) and indirect (i.e., loss/changes of/to food resources; population fragmentation; degradation of key habitat e.g., as a result of pollution).

Elements Scoped Out of Assessment

8.4.2 On the basis of the professional judgement of the EIA team, experience from other relevant projects and policy guidance, and feedback from consultees (e.g., **Table 8.1** above), the generally common and widely distributed habitats or species which do not fall within the following categories were scoped out of detailed assessment:

- Habitats listed in Annex I to the Habitats Directive, and species listed in Annex II to the Habitats Directive;
- UK Biodiversity Action Plan (UKBAP)[iv] or Scottish Biodiversity List (SBL) Priority Habitats[v]; and
- Habitats or species protected by other legislation such as the Wildlife and Countryside Act 1981 (as amended) the Nature Conservation (Scotland) Act 2004 (as amended), or The Protection of Badgers Act 1992.

8.4.3 Further ecological features and potential effects have been scoped out of the detailed assessment based on the results of the desk-based assessment and survey work undertaken for the Proposed Development, due to a lack of potential significant effect at a relevant species population or habitat extent scale. Details of ecological features and effects scoped out after further data searches and post-survey are provided in paragraphs 8.7.2 to 8.7.26 below.

Baseline Characterisation

Desk-based Assessment and Field Survey Area

8.4.4 The area within which the desk-based assessment and field surveys were undertaken varies depending on the ecological feature and its independent search or survey requirements. Details of the extents are described in the 'Baseline Conditions' section of this Chapter and **Technical Appendices 8.1 - 8.4** and their respective Figures. The areas covered by the field surveys are hereafter referred to as the 'Survey Area', and these same areas which are considered as part of the assessment process are collectively referred to as the 'Study Area' (N.B. the Study Area, in most cases, generally equates to the site boundary).

Baseline Survey Methodology

Desk-based Assessment

8.4.5 A desk-based assessment was undertaken to collate available ecological information in relation to the site[vi] and surrounding environment. This comprised a search of available online datasets, desk-based assessment resources and consultation with other organisations. The following data sources were considered as part of the determination of scope of baseline surveys and assessment:

- National Biodiversity Network (NBN) Atlas Scotland (NBN, 2023) for protected or notable species records within 5 km of the site boundary from the last 15 years (i.e., 2008 and onwards)[vii];
- NatureScot Sitelink (NatureScot, 2023) for designated site information within 5 km of the site boundary[viii];
- The British Deer Society (2016) for deer distribution survey results[ix];
- Scotland's Environment Map (SEPA, 2023) for the Carbon and Peatland Map (2016)[x];
- Midlothian Local Biodiversity Action Plan 2019-2024 (Midlothian Council, 2019);
- Ancient Woodland Inventory Scotland (SEPA, 2023) for ancient woodland sites within 5 km of the site boundary[xi];
- SEPA Water Environment Hub (SEPA, 2015) for watercourse classification[xii];
- The EIA Report and associated documents for Carcant Wind Farm (adjacent to the site boundary); and

- Relevant scientific literature on protected species' distribution, habitats distribution and conservation status etc.

Field Surveys

8.4.6 The following field surveys were undertaken to further establish the baseline ecological conditions at the Proposed Development (plus appropriate buffers) to inform the assessment and were undertaken in line with standard methodologies and best practice guidance (respective survey areas shown in **Figures 8.3 - 8.6**):

- NVC surveys, incorporating Phase 1 habitat characterisation and potential GWDTE habitats (Autumn 2022);
- Protected species surveys (October 2022 and November 2022), focusing on otter (*Lutra lutra*), water vole (*Arvicola amphibius*), badger (*Meles meles*), red squirrel (*Sciurus vulgaris*) and pine marten (*Martes martes*);
- A Habitat Suitability Index (HSI) assessment (October 2022) was carried out to determine the suitability of any waterbodies for great crested newt (GCN) (*Triturus cristatus*);
- Preliminary bat roost assessments (October 2022 and November 2022);
- Bat automated activity surveys (May 2022 to October 2022);
- Fisheries surveys, including electrofishing and habitat surveys (October 2022); and
- Incidental records of other protected species (such as signs or features of particular importance i.e., potential signs of adder (*Vipera berus*), common or viviparous lizard (*Zootoca vivipara*), slow worm (*Anguis fragilis*), and potential hibernacula for reptiles), notable species, or invasive non-native species (INNS), were also recorded during field surveys.

8.4.7 The full details of the survey methods, species-specific legislation and guidance and results for surveys undertaken in 2022 are provided within **Technical Appendices 8.1 - 8.4**.

8.4.8 Surveys for beaver (*Castor fiber*) and wildcat (*Felis silvestris*) were scoped out of field surveys due to the absence of suitable habitat or the Survey Area being located outwith the known range or distribution of these species.

Methodology for Assessment of Effects

8.4.9 The significance of the potential effects of the Proposed Development has been assessed by professional consideration of the sensitivity of the

ecological features and the spatial and temporal magnitude of the potential effects.

8.4.10 The assessment method follows the process set out in the CIEEM (2018) guidance[xiii], which is in line with the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 and guidance on the implementation of the EU Birds and Habitats Directive[xiv].

8.4.11 The assessment for wider countryside interests (i.e., unrelated to any Natura 2000 sites) involves the following process:

- identification of the potential ecological effects of the Proposed Development on ecological features, including both positive and negative;
- considering the likelihood of occurrence of potential effects;
- defining the nature conservation value and conservation status of the ecological features present to determine sensitivity;
- establishing the magnitude of change associated with the potential effect (both spatial and temporal);
- based on the above information, making a professional judgement as to whether or not the resultant effect is significant in terms of the EIA Regulations[xv];
- if a potential effect is determined to be significant, measures to avoid, reduce, mitigate or compensate for the effect are suggested where required;
- considering opportunities for enhancement where appropriate; and
- confirming residual effects after mitigation, compensation or enhancement are considered[xvi].

Sensitivity of Ecological Features

8.4.12 The sensitivity of the baseline conditions, including the importance of environmental features on or near to the Proposed Development, or the sensitivity of potentially affected receptors, will be assessed in line with best practice guidance, legislation, statutory designations and/or professional judgement.

8.4.13 Determination of the level of sensitivity of an ecological feature is based on a combination of the feature's nature conservation value and conservation status. Nature conservation value is defined on the basis of the geographic context shown in **Table 8.2** below, which follows the CIEEM (2018)[ii] guidance.

8.4.14 Attributing a value to an ecological feature is generally straightforward in the case of designated sites, as the designations themselves are normally indicative of an importance level. For example, the Moorfoot Hills SAC is designated under the Habitats Directive and is therefore implicitly of European (international) importance. In the case of species, assigning value is less straightforward as contextual information about distribution and abundance is fundamental, including trends based on historical records. This means that even though a species may be protected through legislation at a national or international level, the relative value of the population on site may be quite different (e.g., the site population may consist of a single transitory animal, which within the context of a thriving local/regional/national population of a species, is therefore of local or regional value as opposed to national or international).

8.4.15 Determination of the level of importance of ecosystems, habitats and species is based on professional judgement and a combination of factors, such as level of protection, rarity, conservation status, population trends, and quality/extent of the feature in the Study Area. Published evaluation criteria (e.g., the SBL and JNCC (2022)[xvii]) are used where relevant. Where appropriate, information regarding the particular ecological feature's conservation status is also considered to fully define its importance. This enables an appreciation of current population or habitat trends to be incorporated into the assessment.

8.4.16 In line with the CIEEM (2018) guidance[ii], it is not necessary to carry out detailed assessment on features that are sufficiently widespread, unthreatened, and resilient to effects of the Proposed Development[xviii]. However, those ecological features affected by the Proposed Development and deemed to be of at least local importance are termed Important Ecological Features (IEFs) and are taken forward for assessment.

Table 8.2 Approach to Valuing Ecological Features[xix]

Importance of Feature in Geographical Context	Summary of Consultation Response
International/European	An internationally designated site (e.g., SAC), or undesignated areas that meet the criteria for international designations, or qualifying species whose presence contributes to the maintenance of such a site. Species present in internationally important numbers (>1 % of biogeographic populations).
National (UK)	A nationally designated site (e.g., SSSI, or a National Nature Reserve ('NNR')), or sites meeting the criteria for national designation or qualifying species whose presence contributes to the maintenance of such a site.

Importance of Feature in Geographical Context	Summary of Consultation Response
	Species present in nationally important numbers (>1 % of UK population).
Regional (Natural Heritage Zone or Local Authority Area)	Regionally significant and viable areas of key habitat identified in a regional Biodiversity Action Plan ('BAP'). Species present in regionally important numbers (>1 % of Natural Heritage Zone ('NHZ') population). Areas of key habitat falling below criteria for selection as a SSSI (e.g., areas of semi-natural ancient woodland larger than 0.25 hectares (ha)).
Local	A site within the local area designated for nature conservation (e.g., Local Nature Reserves). Areas of semi-natural ancient woodland smaller than 0.25 ha. Areas of habitat or species considered to appreciably enrich the ecological resource within the local context, e.g., species-rich flushes or hedgerows.
Negligible	Usually widespread and common habitats and species that do not meet the above criteria. Features falling below local value are not considered in detail in the assessment process.

Magnitude of Effect

8.4.17 The magnitude of potential effects refers to changes in the extent and integrity of an ecological feature. The following definition of ecological 'integrity' is found within Scottish Executive circular 6/1995 (updated by Scottish Executive (2000)): *"The integrity of a site is the coherence of its ecological structure and function, across its whole area, which enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified"*[xx]. Although this definition is used specifically regarding European level designated sites (e.g., an SAC), it is applied to wider countryside habitats and species for the purposes of this assessment.

8.4.18 The magnitude of potential effects will be identified through consideration of the Proposed Development, the degree of change to baseline conditions predicted as a result of the Proposed Development, how the ecological features are likely to respond to the Proposed Development, the duration and reversibility of an effect and the application of professional judgement, best practice guidance and legislation. This change can occur during construction or operation of the Proposed Development, and effects can be beneficial, neutral or adverse.

8.4.19 Effects are determined in terms of magnitude in space and time. There are five levels of spatial effects and five levels of temporal effects, described in **Table 8.3** and **Table 8.4** below.

Table 8.3 Definition of Spatial Effect Magnitude upon the IEFs

Magnitude of Effects	Definition
Very High	Would cause the loss of the majority of a feature (>80 %) or would damage a feature sufficiently to immediately affect its integrity.
High	Would have a major effect on the feature or its integrity, for example more than 20 % habitat loss or damage.
Medium	Would have a moderate effect on the feature or its integrity, for example between 10 and 20 % habitat loss or damage.
Low	Would have a minor effect upon the feature or its integrity, for example, less than 10 % habitat loss or damage.
Negligible	Minimal change on a very small scale; effects not dissimilar to those expected within a 'do nothing' scenario.

Table 8.4 Definition of Temporal Effect Magnitude upon the IEFs

Magnitude of Effects	Definition
Permanent	Effects continuing indefinitely beyond the span of one human generation (taken here as >30 years), except where there is likely to be substantial improvement after this period in which case the category Long Term may be more appropriate.
Long Term	Between 15 years up to (and including) 30 years.
Medium Term	Between 5 years up to (but not including) 15 years.
Short Term	Up to (but not including) 5 years.
Negligible	No effect.

Cumulative Assessment

8.4.20 Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated to a particular location[xxi]. As such, NatureScot guidance sets out that cumulative effects require the assessment of the effects of the Proposed Development together with other developments, projects or activities[xxii]. In the interests of focusing on the potential for significant effects, this assessment considers the potential for cumulative effects with other

onshore wind farm EIA developments in the vicinity[xxiii] of the Proposed Development. The context in which these effects are considered is heavily dependent on the ecology of the features assessed. For example, for water voles it may be appropriate to consider effects specific to individual catchments, should the distance between neighbouring catchments be sufficient to assume no movement of animals between them, whereas for blanket bog, the region or NHZ may be the relevant spatial scale. Therefore, where it is considered necessary, an assessment of cumulative effects will be made for each feature, appropriate to its ecology.

Significance of Effect

8.4.21 The significance of potential effects is determined through a standard method of assessment based on professional judgement and available evidence, considering the sensitivity (nature conservation value and conservation status) of the IEF, and the nature and magnitude of effect, in a reasoned way.

8.4.22 A 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for IEFs or for biodiversity generally[xxiv]. Broadly, significant effects include those which result from impacts on the structure and function of defined sites, habitats or ecosystems, and the conservation status of habitats and species (including extent, abundance and distribution)[xxv].

8.4.23 **Table 8.5** below sets out the significance criteria used to assess the potential effects of the Proposed Development.

Table 8.5 Significance Criteria

Magnitude of Effects	Definition
Major	Significant effect, as the effect is likely to result in a long term significant adverse effect on the structure and function of defined sites, habitats or ecosystems or on the conservation status of habitat and species.
Moderate	Significant effect, as the effect is likely to result in a medium term or partially significant adverse effect on the structure and function of defined sites, habitats or ecosystems or on the conservation status of habitats and species.
Minor	Not a Significant effect, the effect is likely to adversely affect the feature at a low level by virtue of its limited duration and/or extent, but there will probably be no effect on the structure and function of defined sites, habitats or ecosystems or on the conservation status of habitats and species.
Negligible	No material effect. The effect is assessed to be Not Significant.

8.4.24 Using these definitions and the four categories above, it must then be decided whether there would be any effects which would be sufficient to adversely affect the IEF to the extent that its conservation status deteriorates from that which would be expected should baseline conditions remain (i.e., the 'do nothing' scenario).

8.4.25 Major and moderate effects are considered to be significant within the context of the EIA Regulations.

8.4.26 Where significant adverse effects are identified, mitigation and/or compensation is required to reduce or offset effects where possible[xxvi], including avoidance or reduction through implementation of and compliance with best practice guidance and protected species legislation. Effects that are not significant would be expected to be avoided or reduced through compliance with best practice guidance and protected species legislation.

8.4.27 Residual effects are characterised as either adverse, neutral or beneficial and either significant or not significant, taking mitigation proposals into account.

Assessment Limitations

8.4.28 Limitations exist regarding the knowledge base on how some species, and the populations to which they belong, react to impacts. A precautionary approach is taken in these circumstances, and as such it is considered that these limitations do not affect the robustness of this assessment.

8.4.29 Ecological surveys are limited by factors which affect the presence of plants and animals, such as the time of year, migration patterns, and behaviour. The ecological surveys undertaken to support the Proposed Development have not therefore produced a complete list of plants and animals and the absence of evidence of any particular species should not be taken as conclusive proof that the species is not present or that it will not be present in the future.

8.4.30 No notable limitations were experienced with regards to habitats, fish, or protected species field surveys. The bat field surveys experienced some limitation due to failed Anabat detectors, however all bat detectors are susceptible to limitations (see **Technical Appendices 8.1 - 8.4** for details).

8.4.31 Whilst some general limitations have been identified (i.e., as described in paragraphs 8.4.28 - 8.4.30 above), it is considered that there is sufficient information to enable a robust assessment to be taken in relation to the identification and assessment of potential effects on ecological features.

8.5 Embedded Mitigation

Iterative Design Process

8.5.1 As part of the iterative design process for the Proposed Development, ecological constraints identified through baseline survey results were considered to avoid or reduce negative effects on ecological features where possible (see **Chapter 2: Site Selection & Design Evolution**). This involves:

- a 50 m buffer for any infrastructure or construction activity around all watercourses where possible, except where a minimum number of watercourse crossings are required. This will minimise effects on associated habitats and species;
- designing track length and alignment to reduce the extent of new track and number of watercourse crossings required, where feasible considering the topography of the site;
- avoiding deeper peatland (>1 m), blanket bog and wet/dry modified bog, and potential high GWDTEs for the location of wind turbines and other infrastructure as far as practicable;
- where possible a minimum 30 m buffer for any infrastructure or construction activity (100 m for pile driving and blasting works) around the entrance to any badger sett; and
- establishing a 50 m buffer from turbine blade tips to edge habitats, across the site to safeguard bats[xxvii].

Pre-Construction and Construction

8.5.2 The assessment in this EIA Report has been carried out on the basis that all works would be carried out in line with good industry practice construction measures, guidance and legislation.

8.5.3 To ensure all reasonable precautions are taken to avoid negative effects on habitats, protected species and aquatic interests, a suitably qualified Ecological Clerk of Works (ECoW) will be appointed prior to the commencement of construction to advise the Applicant and the Contractor on all ecological matters. The ECoW will be required to be present on-site during the construction phase and will carry out monitoring of works and briefings with regards to any ecological sensitivities on the site to the relevant staff of the Contractor and sub-contractors.

8.5.4 A SPP (outline SPP provided in **Technical Appendix 8.5**) will be implemented during the construction phase. The SPP details measures to safeguard protected species known or likely to be in the area. The SPP includes pre-construction surveys and good practice measures during

construction. Pre-construction surveys will be undertaken to check for any new protected species or features in the vicinity of the construction works. The results of the pre-construction surveys will be used to update the outline SPP ahead of construction starting. The SPP will remain a live document to be updated as required and in agreement with the ECoW where changes to the distribution and status of protected species and features are recorded.

8.5.5 Any micrositing of infrastructure will be based on a review of existing ecological data and the completion of pre-construction surveys, to take into consideration the potential for direct encroachment onto protected species features, sensitive habitats or GWDTEs, or indirect alteration of hydrological flows supporting sensitive habitats or GWDTEs. Any micrositing will also take into consideration any buffer distances on protected features identified, as detailed within the SPP (**Technical Appendix 8.5**).

8.5.6 There will be a contractual management requirement for the successful Contractor to develop and implement a comprehensive, site-specific and robust Construction Environmental Management Plan (CEMP) in consultation with the SEPA and the planning authority. This document will detail how the successful Contractor will manage the works in accordance with all commitments and mitigation detailed in the EIA Report, the SPP, statutory consents and authorisations, and good industry practice and guidance for environmental management, including implementation of appropriate pollution prevention (particularly in relation to watercourses).

Operation

8.5.7 In line with best practice guidance on bats (NatureScot et al., 2021[xxvii]) the Proposed Development will utilise the method of reduced rotation speed whilst idling by feathering, at all wind turbines, to reduce collision risks to bats during the bat active period (April to October). The guidance notes that, *"The reduction in speed resulting from feathering compared with normal idling may reduce fatality rates by up to 50 %"*. Given the known presence of high collision risk bat species on-site, this measure will be put in place from the start of the operational period of the Proposed Development, and it does not result in any loss of output.

8.5.8 Operational phase environmental management plans following relevant best practice and guidance will be in place during operation of the Proposed Development, these will for example include provisions for, but not limited to, ongoing pollution prevention control measures.

8.6 Baseline Conditions

8.6.1 This Section details the results of the desk-based assessment and field surveys, providing the ecological baseline for the site and Study Area, and includes:

- statutory nature conservation designated sites (not including those designated for only ornithological or geological features);
- habitats and vegetation; and
- protected or notable species.

Desk-based Assessment

Designated Sites

8.6.2 There are no statutory designated sites within the site. There are three SACs and four SSSIs within 5 km of the site boundary that contain ecological (non-avian) qualifying interests. Details of these sites are listed in **Table 8.6** and shown on **Figure 8.1**.

8.6.3 The Moorfoot Hills SAC/SSSI is approximately 145 m from the site boundary, with the closest new infrastructure 703 m away (turbine hardstanding). The Moorfoot Hills is a SAC for active blanket bog and dry heath[xxviii]. The plateaus are covered by extensive areas of blanket bog. The site condition monitoring undertaken in 2009 found the blanket bog to be in unfavourable-recovering condition, however the failings were found to be marginal, and mainly due to drying from historical gullying and/or climate change (SNH, 2011[xxix]).

Table 8.6 Ecological Designated Sites within 5 km of the Proposed Development

Site Name	Distance to Site Boundary	Qualifying Interest(s)	Condition and Last Assessed Date
Moorfoot Hills SAC	0.14 km	Blanket bog	Unfavourable Recovering 20 September 2009
		Dry heaths	Unfavourable No change 30 July 2013
Moorfoot Hills SSSI	0.14 km	Blanket bog	Unfavourable Recovering 20 September 2009
		Upland assemblage	Unfavourable Declining 30 July 2013
		Upland birch woodland	Unfavourable Declining 7 October 2014
River Tweed SAC	1.09 km	Atlantic salmon (*Salmo salar*)	Favourable Maintained 5 August 2011

Site Name	Distance to Site Boundary	Qualifying Interest(s)	Condition and Last Assessed Date
		Otter	Favourable Maintained 11 December 2011
		Brook lamprey (*Lampetra planeri*)	Favourable Maintained 22 November 2018
		River lamprey (*Lampetra fluviatilis*)	Favourable Maintained 22 November 2018
		Rivers with floating vegetation often dominated by water-crowfoot	Unfavourable No change 27 September 2013
		Sea lamprey (*Petromyzon marinus*)	Unfavourable Declining 22 November 2018
Peeswit Moss SAC	2.71 km	Active raised bog	Unfavourable Recovering 11 September 2008
		Degraded raised bog	Unfavourable Recovering 11 September 2008
Peeswit Moss SSSI	2.71 km	Raised bog	Unfavourable Recovering 11 September 2008
Dundriech Plateau SSSI	4.04 km	Blanket bog	Unfavourable No change 9 October 2005
		Subalpine flushes	Favourable Maintained 9 October 2005
Crichton Glen SSSI	4.22 km	Lowland neutral grassland	Unfavourable Declining 7 July 2010
		Upland oak woodland	Favourable Maintained 7 July 2008
		Valley fen	Favourable Declining 27 July 2016

Ancient Woodland

8.6.4 There are two small areas of woodland listed on the Ancient Woodland Inventory (AWI) classified as Long-Established that overlap slightly with the site boundary. However, these areas do not overlap with the Proposed Development footprint and there will be no direct loss of habitat. There are numerous areas of woodland listed on the AWI classified as Long-Established and Ancient within 5 km of the site. These are largely located to the north of the site (**Figure 8.1**).

Local Biodiversity Action Plan

8.6.5 The site is located within the Midlothian Council local authority area and therefore forms part of the Midlothian Local Biodiversity Action Plan 2019 - 2024 (LBAP) (Midlothian Council, 2019)[xxx]. The LBAP contains six key priorities, four of which are potentially relevant to the Proposed Development:

- Homes for Wildlife;
- Rivers, Streams and Ponds;
- Invasive Non-Native Species; and
- Protected Sites and Species.

8.6.6 The LBAP identifies the importance of protecting the natural environment and ecosystems. In particular, the animals, plants and habitats contained in the Scottish Biodiversity List (SBL) and species protected through legislation should be protected and supported across Midlothian, notably local priority species, including juniper, hedgehog, common toad and large heath butterfly.

8.6.7 The LBAP also identifies the most prominent INNS and outlines a commitment to avoid the introduction or spreading of INNS, in particular through rivers, streams and ponds. It recognises that watercourses and waterbodies are important wildlife corridors and habitats for a wide variety of species.

Habitats

Terrestrial Habitats

8.6.8 The Carbon and Peatland Map 2016[xxxi] was consulted to assess the likely peatland classes within the site. The map is a *"predictive tool which provides an indication of the likely presence of peat on each individually mapped area, at a coarse scale"* and its purpose is "a high-level planning tool to promote consistency and clarity in the preparation of spatial frameworks by planning authorities"[xxxii]. It identifies areas of *"nationally important carbon-rich soils, deep peat and priority peatland habitat"* which are categorised as Class 1 and Class 2 peatlands. Class 1 peatlands are also *"likely to be of high conservation value"* and Class 2 *"of potentially high conservation value and restoration potential"*.

8.6.9 The map indicates an area of Class 1 carbon-rich soil lies within the site in the area around Yorkston Moss (north of turbine 7), and which extends to the north-east; there is no other Class 1 peatland within 2 km of the site. There is no Class 2 peatland within the site or within 2 km of the site. Much

of the site and surrounding area is underlain by Class 0[xxxiii] (mineral) soils. The remainder of the site comprises scattered and fragmented patches of Class 3[xxxiv], Class 4[xxxv], and Class 5[xxxvi] soils (**Figure 8.2**).

8.6.10 The map is a high-level tool, therefore detailed habitat and peat depth surveys have been undertaken across the site to inform siting, design, mitigation, and the detailed assessment on peatland and relevant habitats. The results of the habitat surveys are discussed in **Technical Appendix 8.1** and paragraphs 8.6.21 - 8.6.25 below, and the results of the peat depth surveys are set out **Chapter 10**.

Aquatic Habitats

8.6.11 The Proposed Development lies almost entirely within the River Esk (SEPA ID: 3800) catchment, specifically the Gore Water/Middleton South Burn (SEPA ID: 3813) branch of the river. The site is close to the east bank of Gladhouse Reservoir, and borders the Tweed catchment to the south, but does not impact it due to lack of hydrological connectivity. The South Burn was assessed by SEPA in 2014 as part of their Water Framework Directive (WFD) Classification as having Poor access for fish migration, Moderate water quality and Good water flows and levels, with an overall condition of Poor[xxxvii].

Protected Species

Non-avian

8.6.12 Data from the NBN Atlas Scotland (2023)[vii] obtained as part of the desk-based assessment indicated that the following protected or notable species have been recorded within 5 km (10 km for bats) of the site within the last 15 years (i.e., 2008 onwards) (data licences and providers are detailed in **Technical Appendices 8.2** and **8.3**):

- bats: brown long-eared (*Plecotus auritus*); common pipistrelle (*Pipistrellus pipistrellus*); Daubenton's (*Myotis daubentonii*); Natterer's (*Myotis nattereri*); noctule (*Nyctalus noctule*); and soprano pipistrelle (*Pipistrellus pygmaeus*);
- brown hare (*Lepus europaeus*);
- mountain hare (*Lepus timidus*);
- otter; and
- red squirrel.

8.6.13 No sightings of red squirrel have been recorded within the site (Saving Scotland's Red Squirrels, 2023[xxxviii]), however two sightings have been recorded within 5 km of the site between 2022 and 2023. The EIA documents

submitted for the nearby operational Cloich Forest Wind Farm did not record any sightings of red squirrel within that survey area[xxxix].

Fish

8.6.14 As noted in paragraph 8.6.11 above, the site is located within the South Esk catchment, which is in the Forth District Salmon Fishery Board (FDSFB) jurisdiction. The 2020 Annual Report of the FDSFB ranked the South Esk as having very low productivity for Atlantic salmon (*Salmo salar*) and brown/sea trout (*Salmo trutta*) (ranked eight out of ten and nine out of ten respectively)[xl].

8.6.15 Forth Rivers Trust (FRT) have undertaken electrofishing surveys on the South Esk since 2011 and have recorded many barriers to fish migration due to the industrial mining history of the Lothian Esk (see **Technical Appendix 8.4** for further details).

Other Species

Deer

8.6.16 Deer are not included in the assessment from a nature conservation perspective but are considered due to potential welfare issues and their potential impact on other ecological features through grazing.

8.6.17 Data from the NBN Atlas contained records of fallow deer (*Dama dama*), red deer (*Cervus elaphus*), roe deer (*Capreolus capreolus*) and sika deer (*Cervus nippon*) within 5 km of the site (see **Technical Appendix 8.2**). Data obtained from the Deer Distribution Survey (British Deer Society, 2016) confirmed the presence or likely presence of the following species within the site:

- fallow deer (recorded in 2007 and/or 2011, reconfirmed in 2016);
- red deer (confirmed only in 2016);
- roe deer (recorded in 2007 and/or 2011, reconfirmed in 2016); and
- sika deer (recorded in 2007 and/or 2011, unconfirmed in 2016).

8.6.18 In terms of habitat suitability for deer species, discrete areas of broadleaved semi-natural woodland and conifer plantation could provide shelter, with open areas of grassland and upland habitats throughout providing grazing and commuting opportunities.

Invasive Non-Native Species (INNS)

8.6.19 INNS are a threat to biodiversity and there is a legal obligation to control their spread[xli]. Records of grey squirrel (*Sciurus carolinensis*) were identified within 5 km of the site since 2008 (NBN Atlas Scotland, 2023; see

Technical Appendix 8.2). Japanese knotweed (*Fallopia japonica*) and rhododendron (*Rhododendron ponticum*) have also been recorded within the vicinity (north) of the site boundary, and a strand of Japanese knotweed was recorded within 1 km to the east of the site boundary (see **Technical Appendix 8.4**).

Field Surveys

8.6.20 Details of field survey methodologies, survey timings, Survey Area extents, and survey results are included within **Technical Appendices 8.1 – 8.4**. The following sections summarise the baseline conditions as identified during these surveys.

Habitats

National Vegetation Classification (NVC) and Phase 1

8.6.21 **Technical Appendix 8.1** sets out detailed descriptions of habitats identified, and vegetation recorded during the surveys.

8.6.22 The NVC data collected were also cross-referenced to the Phase 1 Habitat Survey Classification (JNCC, 2010[xlii]) to allow a broader characterisation of habitats. The extent of Phase 1 habitat types within the Study Area[xliii] was calculated using the correlation of NVC communities to their respective Phase 1 types specific to the site (see **Technical Appendix 8.1** for details), and their extents mapped within ArcGIS software, including within mosaic areas.

8.6.23 The NVC communities and non-NVC types recorded within the Study Area are provided in **Annex A, Table 8.11** (included at the end of this chapter) and include proportions of particular habitat types that are found within the site, including those within mosaic habitats. Full descriptions of the habitats, NVC communities and associated flora of the site and wider Survey Area are provided in **Technical Appendix 8.1**.

8.6.24 **Figure 8.3** displays the data collected during the surveys. Due to site design iterations, and to provide survey buffers to account for the presence of potential GWDTE (where land access permission allowed), in many areas the Survey Area extended well beyond the site boundary[xliv]. The Phase 1 symbology shading in **Figure 8.3** has been used to broadly characterise stands of vegetation based on the dominant NVC community within a particular area[xlv].

8.6.25 **Diagram 8.1** summarises the Phase 1 habitats which contribute to over 1% of the Study Area and shows that unimproved acid grassland, marshy grassland, and dry modified bog make up the majority of the Study Area. As detailed in **Annex A, Table 8.11**, the Study Area contains a variety of habitat types, and whilst some relatively homogenous stands of vegetation occur, many of the identified communities form complex mosaics and transitional areas across the Study Area. The only habitat types that have subsequently been scoped in to the assessment of effects due to their extent and nature conservation value are wet heath and wet and dry modified bog (see **Table 8.8** below). Detailed descriptions of these habitat types are included in **Technical Appendix 8.1**.

8.6.26 As detailed in paragraph 8.6.8 above, the Carbon and Peatland Map 2016 (**Figure 8.2**) has identified that there is an area of Class 1 peatland within the site around Yorkston Moss area which extends to the north-east of the site. During the site surveys, it was recorded that whilst areas of M19 blanket mire are present at Yorkston Moss much of the surrounding area identified as Class 1 peatland has become heavily degraded M20b/M20 dry modified bog and in poor condition. Some areas have been heavily grazed upon by livestock and have transitioned to a degraded form of M15d wet dwarf shrub heath. Much of the area mapped as Class 1 peatland is therefore not of Class 1 peatland quality.

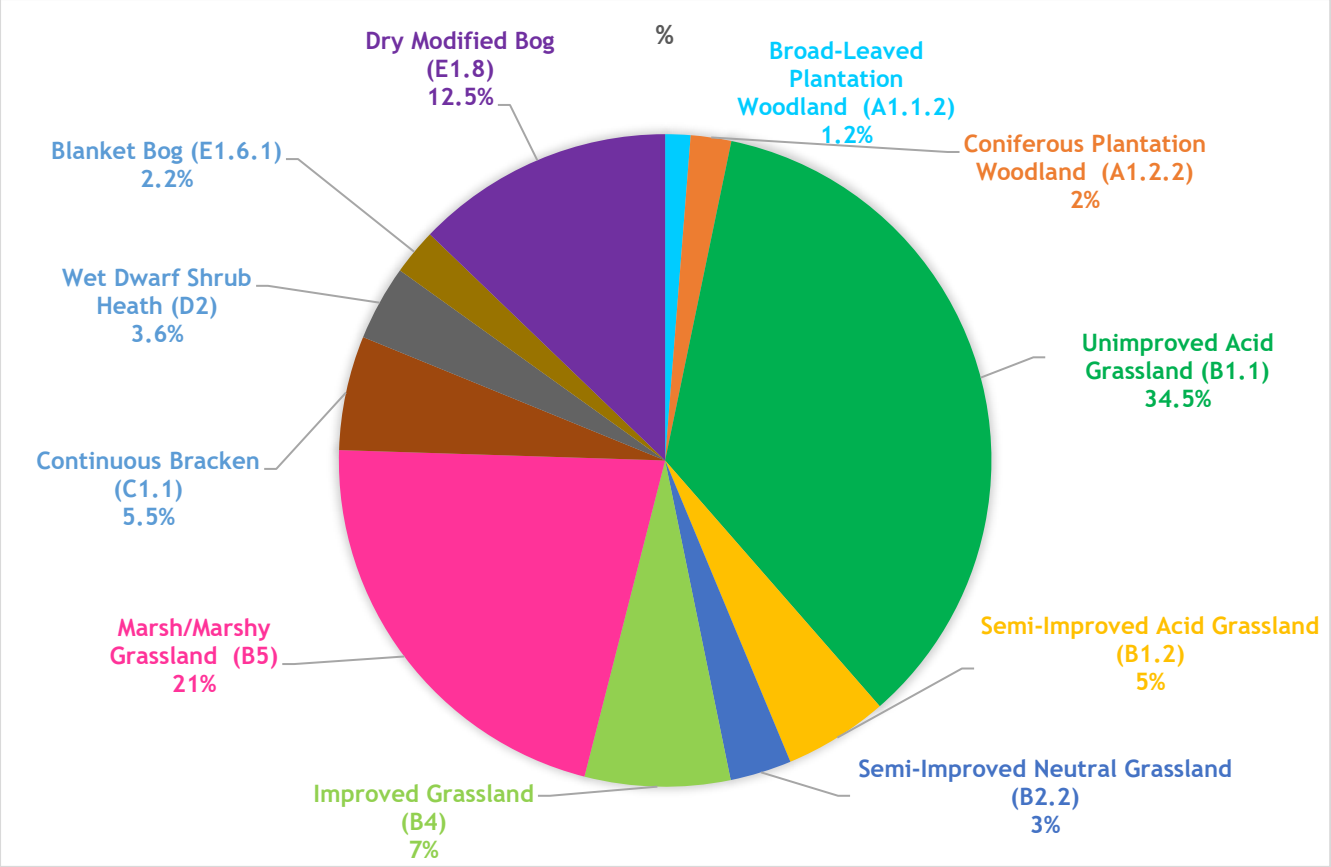

Diagram 8.1: Predominant Phase 1 Habitat Types Recorded within the Study Area (habitat types making up <1% of the Study Area are not included).

Groundwater Dependent Terrestrial Ecosystems (GWDTEs)

8.6.27 The NVC results were referenced against SEPA guidance[xlvi] to identify those habitats which may be classified, depending on the hydrogeological setting, as being potentially groundwater dependent. Potential GWDTE NVC communities recorded within the survey area are detailed in **Technical Appendix 8.1** and shown on **Figure 8.4**.

8.6.28 GWDTE sensitivity has been assigned solely on the SEPA listings. However, many of the NVC communities on the list are common habitat types across Scotland and generally of low nature conservation value. Furthermore, depending on several factors such as geology, superficial geology, presence of peat and topography, many of the potential GWDTE communities recorded may in fact be only partially groundwater fed or not dependent on groundwater. Because designation as a potential GWDTE is related to groundwater dependency and not nature conservation value, GWDTE status has not been used as criteria to determine a habitat's nature conservation value and similarly does not factor in the identification of IEFs within ecological impact assessments. There is however a requirement to consider

GWDTEs, and the data gathered during the NVC surveys has been used to inform this assessment in **Chapter 10**.

Annex I Habitats

8.6.29 Many NVC communities can also correlate with various Annex I habitat types listed under the Habitats Directive. The fact that an NVC community can be attributed to an Annex I type however does not necessarily mean all instances of that NVC community constitute Annex I habitat. Its status can depend on various factors such as quality, extent, species assemblages, geographical setting and substrates.

8.6.30 NVC survey data and field observations have been compared to JNCC Annex I habitat listings and descriptions (JNCC, 2023[xlvii]). Those habitats within the site which could be considered Annex I habitats are detailed in **Technical Appendix 8.1**.

Scottish Biodiversity List (SBL) Habitats

8.6.31 The SBL[xlviii] is a list of animals, plants and habitats that Scottish Ministers consider to be of principal importance for biodiversity conservation in Scotland. The SBL identifies habitats which are the highest priority for biodiversity conservation in Scotland; these are termed 'priority habitats'. Some of the priority habitats are quite broad and can be correlated to many NVC types.

8.6.32 Relevant SBL priority habitat types and corresponding associated NVC types recorded within the site are detailed in **Technical Appendix 8.1**.

8.6.33 These SBL priority habitats correspond with the UKBAP Priority Habitats[xlix].

Protected Species (non-avian)

8.6.34 This section outlines the results from the protected species surveys. Detailed methodologies, survey timings, and results, including the legal status of each species, are included within **Technical Appendices 8.2 – 8.4**, and presented in **Figures 8.5 – 8.11**.

Badger

8.6.35 In total, seven badger setts were recorded in the Survey Area, including three main setts, one outlier sett, and three subsidiary setts. Two of the badger setts, both subsidiary, fall within the site boundary (detailed in **Technical Appendix 8.2: Confidential Annex E**, and **Figure 8.5C**). At the time of the surveys (October 2022 and November 2022), badger activity at the setts seemed relatively high, with the majority of setts being recorded

as well-used. Pathways, foraging signs (i.e., snuffle holes) and dung were also recorded in the Survey Area (see **Technical Appendix 8.2: Confidential Annex E**).

8.6.36 The habitat between the stands of woodland in the north of the Survey Area were found to have good suitability for badger foraging and sett building. As such, at the time of the surveys, it's likely that badger utilised a wide portion of the Survey Area.

8.6.37 The central portion of the Survey Area is open moorland, with waterlogged and peaty soil, which is much less suitable for badger in comparison to the habitats in the north of the Survey Area.

Bats

8.6.38 This section provides a summary of the field surveys and associated results for bats. Full details are contained within **Technical Appendix 8.3**.

Preliminary Bat Roost Assessment

8.6.39 Surveys recorded 24 features as having potential suitability for roosting bats, including 20 trees and four structures: one with high suitability, 14 moderate, and nine low within the site (**Figure 8.6**).

8.6.40 Following Collins (2016) guidance, no features with moderate or high suitability for roosting bats were recorded within 200 m plus rotor radius of a proposed turbine location, and no features are within 30 m of the proposed new infrastructure.

Automated Activity Surveys

8.6.41 Static bat activity surveys involved the deployment of 13 detectors on-site from May to September in 2022 over a total period of 48 days and collecting 477 complete recording nights of data. Additional surveys involved the deployment of detectors at six locations within the site during October 2022 over a total period of 14 days and collecting a further 78 complete recording nights of data. Static surveys therefore took place over 62 nights with 555 data recording nights covering spring, summer and autumn, and up to a maximum of 20 consecutive nights per deployment period (see **Technical Appendix 8.3** for full details). Anabat locations are detailed on **Figure 8.6**.

8.6.42 The static bat activity surveys recorded 2959 bat registration by six bat species and one bat genus in total: soprano pipistrelle, common pipistrelle, Daubenton's bat, brown long-eared bat, *Nyctalus* spp., Nathusius' pipistrelle, and Natterer's bat, as shown in **Table 8.7** below.

Soprano pipistrelle and common pipistrelle accounted for 91.59% of registrations across all surveyed locations.

Table 8.7 Total Number of Bat Passes for Each Species Across all Locations (2022)

Species/Species Group	No. of Registrations	Percentage of Total (%)
Soprano pipistrelle	1451	49.04
Common pipistrelle	1259	42.05
Daubenton's	129	4.36
Brown long-eared	53	1.79
Nyctalus spp.	36	1.21
Nathusius' pipistrelle	27	0.91
Natterer's	4	0.14
Total	2959	100

Quantifying Activity

8.6.43 At the time of preparing **Technical Appendix 8.3** and undertaking the assessment within this chapter, the online Ecobat[l] tool was unavailable. As such, the data obtained from the 2022 static bat survey was assessed in accordance with NatureScot et al. (2021) guidance[xxvii] to measure the overall site risk level for each species of bat. The guidance sets out the methodology for assessing bat activity levels, summarised as follows:

- estimating bat activity levels;
- categorising collision risk of the relevant species;
- identifying population relevant abundance (size of the populations);
- categorising the potential vulnerability of bat populations by combining collision risk with population abundance;
- categorising the site risk level;
- completing the overall risk assessment; and
- an assessment of significance and mitigation.

The data from the surveys was compared with data of four reference sites within 20 km of the Survey Area[li]. The results of the reference sites are contained within **Technical Appendix 8.3**, however in summary all four assessments concluded that the majority of the high-risk species had Low risk.

8.6.44 Common pipistrelle and soprano pipistrelle were both attributed activity levels of Low-Moderate relative to the reference sites, and Nyctalus spp. was attributed Low.

Assessing Potential Risk

8.6.45 The site risk level is determined to be Low/Lowest, based on having a Medium project size and a Low habitat risk, in line with NatureScot *et al.* (2021) guidance[xxvii] (see also **Technical Appendix 8.3**).

8.6.46 As per NatureScot et al. (2021) guidance[xxvii], soprano pipistrelle, common pipistrelle, *Nyctalus* spp. and Nathusius' pipistrelle are species deemed to have a high collision risk. The remaining species, Daubenton's bat, brown long-eared bat and Natterer's bat, are considered to have a low collision risk and of low population vulnerability.

8.6.47 The overall risk assessment is calculated by combining the overall risk level at the site together with the average reference bat activity levels to calculate the typical (mean) site risk level. As detailed in **Technical Appendix 8.3**, the maximum bat passes per night ranged from 1 to 96, therefore the mean bat passes per hour (bpph) are generally considered Low.

8.6.48 The overall risk level for the high collision risk species/genus based on the reference sites were Low-Moderate for soprano pipistrelle, common pipistrelle and Nathusius' pipistrelle, and Low for *Nyctalus* spp. (**Technical Appendix 8.3**).

8.6.49 **Figures 8.7 - 8.10** illustrate the average seasonal bat activity results, based on mean bpph, for high collision risk bat species recorded at the site at each survey location, to provide an overview of how bat activity and risk levels vary across the site by season and by species. As seen in these figures many locations in many of the survey periods recorded no, or low, activity by high collision risk bat species.

Otter

8.6.50 No otter field signs were recorded within the site; one otter spraint was recorded on the western edge of the Survey Area by a small waterbody linked to the Gladstone Reservoir (**Figure 8.5**). No protected features for otter were recorded.

8.6.51 The watercourses within the Survey Area are generally small upland burns that are open and offer little opportunity for shelter or resting, however they may be some limited suitability for foraging and commuting for otter. It was recorded in the surveys that at many points the watercourses had been heavily poached by livestock.

Water Vole

8.6.52 No signs of water vole presence were recorded during the surveys. As the watercourses have been heavily poached by livestock, the habitat suitability is low for water vole.

Pine Marten

8.6.53 No signs of pine marten presence were recorded during the surveys. Much of the Survey Area is open moorland and farmland and without the more extensive areas of woodland favoured by pine marten. The few small areas of conifer plantation within the Survey Area may provide limited suitable habitat for pine marten.

Red Squirrel

8.6.54 Potential red squirrel feeding signs were recorded within Allanshaw Wood and within two other woodland blocks in the north-east of the site. No red squirrels were sighted during the surveys; therefore, it cannot be ruled out that the feeding signs were from the INNS grey squirrel.

8.6.55 There are a few isolated areas of conifer plantation and some areas of mixed woodland across the site which may offer suitability for foraging and drey building for red squirrel.

Great Crested Newt (GCN)

8.6.56 One waterbody was recorded within 500 m of the Survey Area, however no signs of GCN were recorded.

8.6.57 The waterbody within the Survey Area was recorded as Poor in the HSI assessment (see **Technical Appendix 8.2** for full details of HSI assessment).

Reptiles

8.6.58 One common lizard sighting was recorded to the west of the Survey Area near Black Burn.

8.6.59 Much of the Survey Area and site is open moorland and rough pasture farmland providing suitable foraging habitat for reptiles. Two features with potential for use as hibernacula were recorded during the surveys, both outside the site boundary: a drystone dyke and a pile of stones.

Fish

8.6.60 Forth Rivers Consulting (FRC) carried out electrofishing and fish habitat surveys over three days in October 2022. The detailed survey report is included as **Technical Appendix 8.4**.

8.6.61 Seven watercourse areas were surveyed (one could not be fished), including Black Burn, Latch Burn, Purvies Hill Burn (Upper), Purvies Hill Burn (Lower),

Middleton North Burn (Upper), Middleton North Burn (Lower), and Middleton South Burn (**Figure 8.11**).

8.6.62 The survey found that numerous barriers to fish migration existed on the watercourses downstream of the site, and surveys found no juvenile salmon at any survey points as a result of this. Brown trout, including fry, parr and adult, were found at three electrofishing sites, including Black Burn, Purvies Hill Burn (Lower), and Middleton North Burn (Lower), all outwith but downstream of the site. Stickleback were found at three sites, and minnow were found at one site.

Other Species

8.6.63 Brown hare were recorded at three locations during the surveys: two in the east of the Survey Area and one in the west.

8.6.64 Numerous rabbit warrens were recorded across the Survey Area. Some holes within the warrens were recorded to be potentially of a size that could be used by a protected species, however no diagnostic field signs were recorded.

8.6.65 No further signs or notable species, deer or INNS were recorded during the field surveys.

The Do-Nothing Scenario

8.6.66 In the absence of the Proposed Development, it is likely that the IEFs would generally remain as they are at present, although numbers and distribution of species may fluctuate naturally. The conifer plantation forestry will continue to mature but would be subject to a future felling plan, which may create temporary localised habitat changes until replanting and canopy closure. Vegetation and habitat composition and extents in the Study Area may fluctuate marginally in the long-term in line with increasing or decreasing livestock grazing and fluctuations in deer browsing.

8.7 Potential Effects

8.7.1 This section provides an assessment of the likely effects of the Proposed Development on the IEFs identified through the baseline surveys and assessment. The assessment of potential effects is based on the project description outlined in **Chapter 3: Project Description**, and is structured as follows:

- construction effects;
- operational effects; and
- decommissioning effects.

Ecological Features Scoped Out of the Assessment

8.7.2 In addition to those ecological features and effects already scoped out as detailed within paragraphs 8.7.2 - 8.7.26, with consideration of the additional desk-based assessment and baseline data collected, and following the iterative design and embedded mitigation measures described in paragraph 8.5.1 above, and project assumptions in paragraph 8.7.28 below, several potential effects on IEFs can be scoped out of further assessment based on the professional judgement of the EIA Team and experience from other relevant projects and policy guidance or standards. This includes effects from the construction and operational phases of the Proposed Development, as well as cumulative effects. The following sections detail the ecological features and effects that have been scoped out following further desk-based assessment and site surveys.

Designated Sites and Ancient Woodland

8.7.3 There are no designated sites within the site boundary.

8.7.4 The Moorfoot Hills SAC and SSSI are approximately 145 m south of the site (**Figure 8.1**) and are designated for a number of upland habitats, notably blanket bog. The designated sites fall within a different river catchment to the site (River Tweed as opposed to River Esk), and therefore no hydrological pathways for effects are anticipated. No potential effects on qualifying habitats of the SAC and SSSI (listed in **Table 8.6** above) are therefore anticipated, and the sites are scoped out of the assessment.

8.7.5 The River Tweed SAC is designated for its qualifying features of Atlantic salmon, brook, river and sea lamprey, otter and *"rivers with floating vegetation often dominated by water-crowfoot"*. The site is approximately 1.1 km north of the River Tweed SAC at its closest point. The River Tweed falls within a different catchment to the Proposed Development, and therefore effects on aquatic qualifying features (i.e., all but otter) are scoped out of the assessment due to lack of effects pathways.

8.7.6 Otters that form part of the River Tweed SAC population may use habitat within the site for commuting and foraging, but there is limited habitat available for resting sites. Otter home ranges are large, and individuals are unlikely to be fully dependent on prey availability and access within watercourses within the site. Otters that form part of the SAC population may therefore occasionally be present and transient within the site, but the likelihood of direct impacts taking place such as mortality through collision with site vehicles is very low considering the size of the construction area

and its relation to watercourses, as well as working time primarily being in the day and otter movements being mainly crepuscular/nocturnal. Furthermore, as detailed in paragraph 8.5.6 above, the embedded mitigation includes that construction work would comply with a CEMP developed by the Principal Contractor, which would be monitored by a suitably experienced ECoW. The CEMP would include good practice mitigation for effective silt and pollution prevention and undertaking works in accordance with SEPA best practice guidance. With this embedded mitigation in place, water pollution impacts and therefore any associated indirect effects on otter are considered unlikely. The closest new infrastructure (hardstanding) related to the Proposed Development is approximately 1.75 km north of the River Tweed SAC and construction and operational impacts are therefore unlikely to disturb any otter which are utilising the SAC itself, including protected features. The proposed embedded mitigation of the provision and implementation of the SPP, CEMP (including Pollution Prevention Plan) and presence of an ECoW during construction (incorporating pre-construction otter surveys and ongoing otter monitoring during the construction period), would ensure that all reasonably practicable measures are taken during construction so that provisions of the relevant wildlife legislation are complied with and no impacts on a European designated site will result[lii].

8.7.7 These measures would ensure direct and indirect effects on otter are avoided or reduced to a negligible level. Should otter be affected by minor and non-significant levels of disturbance and/or temporarily displaced during construction, there are abundant foraging and sheltering opportunities locally (outwith the site) for this mobile and wide-ranging species that would ensure that there are no risks to the otters' population viability or overall distribution within the SAC and locally. The Proposed Development is also not considered likely to result in fragmentation of otter populations or territories, nor create any barrier effects with respect to the movement of otters within the SAC or locally. In taking account of the above and standard and proven mitigation measures, any adverse effects on the SAC's conservation objectives for otter can be discounted and a likely significant effect from the Proposed Development on otter can be ruled out.

8.7.8 Peeswit Moss SAC and SSSI, Dundriech Plateau SSSI and Crichton Glen SSSI are scoped out of further assessment due to a lack of potential effects on the designated sites' qualifying features (**Table 8.6**) due to the distance and lack of connectivity to the Proposed Development.

8.7.9 There are few areas of ancient woodland within the site, notably Cockmoor Wood (**Figure 8.1**). No woodland removal or fragmentation is expected in areas of ancient woodland as a result of the Proposed Development. There is some hydrological connectivity between the Proposed Development and patches of AWI woodland present downstream. With embedded mitigation in place, no pollution effects are anticipated. Effects on ancient woodland are therefore considered to be negligible and as such have been scoped out of further assessment.

Terrestrial Habitats

8.7.10 As per paragraph 8.4.2 above, habitats considered to be of low conservation value and are very common habitat types locally and regionally are scoped out of the assessment. Within the Study Area, these include:

- coniferous plantation woodland;
- unimproved and semi-improved acid grassland;
- unimproved and semi-improved neutral grassland;
- improved grassland;
- tall ruderal;
- bracken;
- amenity grassland; and
- bare ground.

8.7.11 Marshy grassland is scoped out of the assessment. Marshy grassland is the second most dominant habitat across the Survey Area and covers 179.11 ha (21.01%) of the Survey Area. It comprises M23a, M23b, M25 and M25b NVC communities and several rush (*Juncus* spp.) dominated non-NVC rush pasture communities. These communities are overwhelmingly dominated by either rushes or purple moor-grass (*Molinia caerulea*) and are often species-poor and grazed, often consisting of little more than a dense sward of rushes or purple moor-grass with some grasses and common herbs; full descriptions of these communities are provided in **Technical Appendix 8.1**. M25b *Anthoxanthum odoratum* is the most dominant NVC community amongst these (totalling 7.54% of the Study Area). The range of marshy grassland communities present within the Study Area are common habitat types locally, regionally and nationally and the relatively small direct and indirect losses predicted, as per **Table 8.10**, are of minor significance. These marshy grassland communities are considered potential GWDTEs in line with SEPA (2017a[liii]; 2017b[liv]) guidance. However, designation as a GWDTE does not infer an intrinsic biodiversity value, and GWDTE status has not been used as criteria to determine conservation value in the ecology assessment.

There is however a statutory requirement to consider GWDTEs and the data gathered during the NVC surveys has been used to inform this assessment (see **Chapter 10**).

8.7.12 A number of other habitats recorded within the Study Area are of local importance, some due to their listing as Annex I habitats or SBL Priority Habitats (see **Appendix 8.1**). However, as they occupy such small areas within the Study Area, they are species-poor examples, and/or any direct or indirect effects on the habitat will not occur or will be negligible in magnitude (see **Table 8.10**), all effects on them are scoped out of the assessment. These habitats include:

- broadleaved semi-natural and broadleaved plantation woodland;
- scattered broadleaved and coniferous tree;
- dry heath;
- blanket bog;
- acid/neutral flush; and
- swamp.

Aquatic Habitats and Species

8.7.13 Effects on aquatic habitats including standing water, running water and fisheries interests are scoped out of the assessment. Migratory salmonids are unable to access the site as a result of barriers to migration identified downstream of the Proposed Development. Three watercourses surveyed by FRC did contain trout fry, parr and/or adult, suggesting the presence of resident brown trout populations; however, none of these sampling sites were within the site and all sampling locations with trout present were located downstream of the Proposed Development. The minor watercourses that characterise the site were generally considered unsuitable or of very low suitability for fish (see **Appendix 8.4**).

8.7.14 The Proposed Development has the potential to impact negatively on water quality and hydrogeomorphology in the absence of mitigation. However, to avoid direct or indirect impacts on these features, a minimum 50 m buffer distance between infrastructure and watercourses has been maintained where possible, except where an access track watercourse crossing and/or other design constraints cannot be avoided to maintain this buffer (see **Chapter 2** and **Chapter 10**).

8.7.15 Eleven new (or upgrades to existing) watercourse crossings are required within the site as part of the Proposed Development. The design of permanent and temporary access track water crossings would comply with SEPA good practice guidance to minimise impacts on fish and their habitat,

as detailed in paragraphs 8.5.1 - 8.5.6 above. The embedded mitigation includes that construction work would comply with a CEMP developed by the Principal Contractor, which would be monitored by a suitably experienced ECoW. The CEMP would include good practice mitigation for effective silt and pollution prevention and undertaking works in accordance with SEPA best practice guidance. With this embedded mitigation in place, water pollution impacts and associated likely significant effects associated with the Proposed Development on watercourses and aquatic ecology are considered unlikely and therefore these pollution impacts are scoped out of further assessment. Further assessments of watercourses are provided in **Chapter 10.**

Protected Species

8.7.16 Effects on water vole, pine marten, red squirrel, GCN, wildcat, and beaver are scoped out of the assessment due to the absence of protected features, lack of suitable habitat, limited desk-based assessment or field evidence within the Study Area (see Section 8.6 above), and/or lack of potential effects from the Proposed Development.

8.7.17 Effects on otter are scoped out as detailed in paragraph 8.7.6 above.

8.7.18 Effects on brown and mountain hare are scoped out of the assessment. These are mobile species capable of avoiding disturbance except when the juveniles (leverets) are very young. Best practice guidance during construction, as detailed in the SPP (**Technical Appendix 8.5**) will ensure that all reasonably practicable measures are taken during the hares' breeding season to comply with wildlife legislation, and no significant effects are anticipated on the species.

8.7.19 One common lizard was recorded during the surveys; however, these are mobile species capable of avoiding disturbance except during hibernation and are scoped out of the assessment.

8.7.20 Effects on badger are scoped out of the assessment. There are two non-main setts within the site boundary[lv]. The closest infrastructure (borrow pit) to those setts is 93 m and 164 m respectively. As per NatureScot guidance[lvi], this is beyond the recommended 30 m buffer for works (excluding pile driving and blasting work). Badger is widespread across Scotland and is protected for welfare reasons rather than conservation concerns. No mature or semi-mature woodland removal or fragmentation resulting from construction of the Proposed Development is expected. It is possible that unmitigated effects on badger during construction could impact at least three social groups and could include direct injury/mortality

of individuals, disturbance (noise, vibration, light spill, increased vehicle/human presence), and minor loss and fragmentation of foraging habitat. Overall, the SPP will outline best practice measures for minimising disturbance, including carrying out pre-construction surveys and monitoring, complying with protected species legislation, and outlining provisions for species licencing where this may be required (see also paragraphs 8.5.2 - 8.5.6 above). Any direct or indirect effects on badger arising from the Proposed Development are therefore considered negligible and are not considered further.

8.7.21 Effects on bats (roosting) are scoped out of the assessment. Whilst features with the potential to support roosting bats were identified, no key features capable of supporting maternity roosts, significant hibernation roosts and/or swarming sites within 200 m plus rotor radius have been detected. Analysis of bat emergence timings demonstrated that there is unlikely to be any significant roost near a turbine location, and as such the numbers of bat passes recorded on any single night were low enough to suggest that the site does not support many individuals.

8.7.22 Overall, the SPP (draft in **Technical Appendix 8.5**) includes suitable mitigation measures to ensure compliance with protected species legislation during construction, should any evidence by found during pre-construction surveys.

8.7.23 Operational and cumulative effects arising from potential collision mortality for low collision risk bat species are scoped out of the assessment (as per NatureScot *et al.*, (2021)[xxvii]). These effects on brown long-eared, Daubenton's and Natterer's bat are therefore scoped out of the assessment.

8.7.24 Effects on all IEFs during operation of the Proposed Development (with the exception of collision risk to high risk bat species) have been scoped out. Maintenance of the Proposed Development will involve vehicular access along the access tracks only, and any maintenance of turbines will be occasional, typically carried out by a small number of maintenance staff inside the turbines during normal working hours. This is unlikely to result in any operational effects on any species or habitats recorded at and around the Proposed Development.

Other Species

Deer

8.7.25 Effects on deer are scoped out of the assessment. Fallow, roe, red and sika deer may be present in the locality of the site. There are only a relatively

small number of small, isolated and fragmented woodland blocks within and in close proximity to the site (see **Figure 8.3**), which would only potentially support low numbers of deer. Operational effects are not anticipated as there is no deer fencing around the site and therefore deer may use and pass through uninhibited. The Proposed Development footprint is relatively small and habitat loss has been minimised. Due to the extensive amount of similar suitable habitat in the surrounding land, particularly north of the site where there is more extensive woodland, and its availability and accessibility, this loss of grazing and sheltering habitat is expected to be negligible to the wide-ranging species. The size of the Proposed Development is not considered to pose a significant barrier to any local movements or migrations of deer.

8.7.26 Construction effects are expected to be minimal due to the timing of works (i.e., primarily during the day, with deer more active during evening/nights), and a short-term construction period (approximately 24 months). If individuals are displaced during construction, there are suitable routes around the site which will not force deer into areas of risk, including public roads, or towards built-up areas. As a result of the size and location of the Proposed Development, temporary construction period, the retention of woodland, minimal habitat loss, and the extensive suitable habitat and commuting corridors locally within the site and beyond, no negative effects on deer are predicted. Due to minimal displacement expected outwith the site during construction and operation, no negative effects, through increased browsing/trampling on surrounding habitats are expected.

Important Ecological Features (IEFs)

8.7.27 A summary of the Nature Conservation Value of the remaining IEFs identified within the site and Study Area (as confirmed through survey results and consultation outlined above) which have been scoped in to the assessment are detailed in **Table 8.8** below, together with the justification for inclusion. These comprise wet heath, wet and dry modified bog (combined receptor), and high collision risk bat species.

Table 8.8 Nature Conservation Value of Scoped In IEFs

IEF	Nature Conservation Value	Relevant Legislation/Guidance & Justification
Wet dwarf shrub heath	Local	Wet heath is an Annex I listed habitat under the Habitats Directive and is part of the SBL upland heathland priority habitat. Wet dwarf shrub heath recorded within the site and Survey Area is all M15 *Trichophorum* germanicum – *Erica tetralix* wet heath community. The majority of wet

IEF	Nature Conservation Value	Relevant Legislation/Guidance & Justification
		heath present is of the M15d Vaccinium myrtillus sub-community, with a very small area of the M15b Typical sub-community recorded. The wet heath recorded is dry, has a very short sward created and maintained by intensive grazing, and overall is considered to be in a poor and degraded condition. Wet heath makes up a relatively small portion of the site, covering 30.99 ha (3.64%). Wet heath within the site and Survey Area is considered of no greater than Local Nature Conservation Value due to its extent and quality. This type of habitat is widespread throughout the local area.
Wet modified bog and dry modified bog	Local	The Proposed Development would result in direct and indirect habitat loss for wet and dry modified bog habitats. Wet modified bog recorded within the site and Survey Area is represented by the M25a *Molinia caerulea - Potentilla erecta* mire *Erica tetralix* sub-community. It covers a very small proportion of the site, covering 6.16 ha (0.72%). The dry modified bog recorded is represented by the M20 *Eriophorum vaginatum* blanket mire community. This habitat is extensive in certain parts of the site, accounting for 106.6 ha (12.5%) of the site. The M20 habitat is associated with Annex I and SBL blanket bog habitat, however due to grazing and anthropogenic effects, it is degraded and is in poor condition. The site also contains an area of Class 1 Peatland from the SNH Carbon and Peatland Map (**Figure 8.2**); see also discussion in paragraphs 8.6.8 to 8.6.10. It is recognised that this definition is not solely for nature conservation and so not directly applicable to evaluating the value of a peatland. Despite the habitats' association with Annex I and SBL blanket bog classifications, the habitat within the site is not considered to be nationally or regionally important due to its size, fragmented distribution, and quality and anthropogenic effects. Therefore, assigning a Nature Conservation Value higher than local is not deemed appropriate. Further, mire habitat of this quality (and greater) is relatively widespread across the local area as well as within Midlothian and beyond, which further reduces the relative value of this habitat within the site.

IEF	Nature Conservation Value	Relevant Legislation/Guidance & Justification
Bats (high-risk collision species/genus: common pipistrelle, soprano pipistrelle, Nyctalus spp., Nathusius' pipistrelle)	Local	All UK bat species are listed on Annex II of the Habitats Directive and are protected under the Habitats Regulations, the Wildlife and Countryside Act 1981 (as amended), and the Nature Conservation (Scotland) Act 2004 (as amended). Nine species/genus (including common pipistrelle, soprano pipistrelle, *Nyctalus* spp., Nathusius' pipistrelle) are also listed on the SBL. Common and soprano pipistrelle are considered to have a favourable conservation status in the UK and Scotland under Article 17 of the Habitats Directive and are listed as Least Concern (LC) under the IUCN Red List criteria (Matthews *et al.*, 2018[lvii], JNCC, 2019[lviii]). Nathusius' pipistrelle have an 'Unknown' conservation status and are listed as Vulnerable (VU) under the IUCN Red List criteria (Matthews et al., 2018[lvii], JNCC, 2019[lviii]). The Proposed Development is outwith the main areas of predicted occurrence and predicted activity for Nathusius' pipistrelle, being located on the northern edge of predicted Nathusius' pipistrelle occurrence (see Matthews *et al*. 2018)[lvii]. *Nyctalus* spp. comprise Leisler's bat (*Nyctalus leisleri)* and noctule bat (*Nyctalus noctule)*. *Nyctalus* spp. are considered to have a favourable conservation status in the UK (no Scotland specific categorisation), with noctule also listed as LC, and Leisler's as Near Threatened (NT), on the IUCN Red List (Matthews *et al.*, 2018[lvii], JNCC, 2019[lviii]). The Proposed Development is outwith the core areas of predicted occurrence and predicted activity for both *Nyctalus* spp., being located on the northern edge of predicted *Nyctalus* spp. occurrence (see Matthews *et al.*, 2018)[lvii]. Reliable population estimates for *Nyctalus* spp. in Scotland are currently not available with some currently used population estimates of only a few hundred bats (e.g., Harris *et al.*, 1995[lix]) outdated and based on expert opinion. Actual populations in Scotland, and their distribution range, are now thought to be much larger than previously reported with populations suggested to be in the region of many thousands (Newson *et al.*, 2017[lx]).

IEF	Nature Conservation Value	Relevant Legislation/Guidance & Justification
		The majority of bat activity (91.59% of overall bat activity, 99.73% high collision risk bat species activity) was attributed to common or soprano pipistrelle bats, which are considered to have a 'common' population relative abundance and are considered of 'medium' potential vulnerability (NatureScot et al. 2021)[xxvii]. Nathusius' pipistrelle and *Nyctalus* spp. are considered to have 'rarest' population relative abundance and are considered of 'high' potential vulnerability (NatureScot et al. 2021)[xxvii]; only 27 Nathusius' pipistrelle and 36 *Nyctalus* spp. registrations were recorded during surveys (i.e., very low number of bat passes). Activity levels of all the high-risk species/genus are deemed as low in the site (**Technical Appendix 8.3**). No bat roosts or potential bat roosts were recorded within the site. Considering the above information, a Nature Conservation Value of Local is considered suitable for all bat species.

Assumptions of the Assessment

8.7.28 The following assumptions are included in the assessment of otherwise unmitigated effects on IEFs:

- The short-term construction period, of approximately 24 months, would include borrow pit creation, construction of access tracks, turbine hardstandings, and other ancillary infrastructure, wind turbine erection, and site restoration.
- All electrical cabling between the wind turbines and the associated infrastructure would be underground in shallow trenches which would be reinstated post-construction and, in all cases, follow the access tracks.
- The construction compound and any temporary laydowns or holding areas will be temporary infrastructure. Any disturbance or earthworks extents areas around permanent infrastructure during construction would be temporary and areas reinstated or restored before the construction phase ends. The only excavation in these areas would be for cabling as noted above and otherwise may only be periodically used for side-casting of spoil until reinstatement.
- The embedded pre-construction and construction phase mitigation described in paragraph 8.5.1 above will be fully applied e.g., the presence of an ECoW, adherence to the SPP and CEMP.

Predicted Construction Effects

8.7.29 This section provides an assessment of the likely effects of the construction of the Proposed Development upon the scoped in IEFs.

8.7.30 The most tangible effect during construction of the Proposed Development would be direct habitat loss due to the construction of infrastructure, such as new access tracks, turbines, hardstandings, substation, and battery energy storage system (BESS)[lxi]. Much of this infrastructure would be permanent, however temporary construction areas and borrow pits would be restored at the end of construction.

8.7.31 There may also be some indirect habitat losses to wetland habitats due to drainage effects. For the purposes of this assessment, it is assumed that wetland habitat losses due to indirect drainage effects may extend out to 10 m from the proposed infrastructure (i.e., in keeping with indirect drainage assumptions within the carbon calculator guidance (SEPA, undated[lxii])). It is expected that any indirect drainage effects would only impact wetland habitats such as wet/dry modified bog and wet heath. No indirect drainage effects are expected to impact or alter the quality or composition of non-wetland habitats such as dry heath, bracken, acid grassland etc., as such only direct habitat loss applies to those habitats.

8.7.32 **Table 8.9** below details the estimated relative losses expected to occur for IEF habitats, for all new temporary and permanent infrastructure (the habitat loss estimated for all habitat types is presented in **Annex A, Table 8.11**).

8.7.33 Temporary habitat losses due to the creation of temporary construction areas and enabling works and up to two borrow pits have been calculated separately and are detailed in **Table 8.9.** These have been considered separately to permanent infrastructure as it is possible that not all borrow pit areas will be required or fully utilised, and although these areas would be restored at the end of the construction period (and therefore would not show a loss in habitat extent), the habitat type resulting after restoration may not be the same as the original due to changes in topographical or hydrological conditions. In particular, areas of land take for this temporary infrastructure may represent permanent losses for habitat types such as wet/dry modified bog due to the effects on the structure and function of the habitat type, and the complexities and long timescales involved in restoring or re-creating these particular habitat types.

Table 8.9: Estimated Loss of IEF Habitats for Permanent and Temporary Infrastructure

Phase 1 Habitat Type	Phase 1 Extent in Study Area (ha)	NVC Community Code or Habitat Type[lxiii]	Direct Habitat Loss (ha)	Direct Habitat Loss as a % of Phase 1 Type	Direct & Indirect Habitat Loss (ha) in Study Area	Direct & Indirect Habitat Loss as a % of Phase 1 Type in Site
Permanent						
Wet dwarf shrub heath (D2)	30.99	M15d	0.53	1.70	1.42	4.58
*Wet modified dry bog (E1.7)	6.16	M25a	0.07	1.19	0.15	2.36
*Dry modified bog (E1.8)	106.61	M20b, M20	1.48	1.39	4.36	4.09
Temporary						
Wet dwarf shrub heath (D2)	30.99	M15d	0.09	0.29	N/A	N/A
*Wet modified dry bog (E1.7)	6.16	M25a	0.01	0.18	N/A	N/A
*Dry modified bog (E1.8)	106.61	M20b, M20	0.25	0.24	N/A	N/A

***Wet modified bog and dry modified bog are a combined IEF receptor however have been separated in Table 8.9 for displaying respective estimated losses of each habitat type.**

8.7.34 The following section assess the effect of these losses for each IEF scoped into the assessment.

Wet Dwarf Shrub Heath

8.7.35 **Effect**: Effects upon wet dwarf shrub heath (wet heath) during construction would be direct (through habitat loss occurring during construction of the Proposed Development) and indirect (through potential drying effects upon neighbouring wet heath habitats occurring from the construction phase into the operational phase). Direct loss would occur in areas where permanent infrastructure such as access tracks, turbines, hardstandings, substation, BESS etc. are sited on these habitat types. The excavation of wet heath for temporary infrastructure may also lead to losses due to the long-term effect on the ecological and hydrological structure and function of the habitat type. In addition, there may be indirect losses as a result of drainage around

infrastructure (around 10 m from infrastructure is assumed) and disruption to hydrological flows.

8.7.36 **Nature Conservation Value**: Local (as detailed in **Table 8.8**).

8.7.37 **Conservation Status**: Conservation Status of this habitat as assessed in the JNCC report on Northern Atlantic wet heaths with *Erica tetralix* is 'Bad and Deteriorating' at the UK level[lxiv].

8.7.38 **Magnitude of Effect**: The UK has an estimated 508,817 ha of this wet heath type. The majority of which, around 340,000 - 400,000 ha, is in Scotland[lxv]. Wet heath covers 30.99 ha (3.64%) of the site and is indicated by NVC sub-communities M15b and M15d. The direct habitat loss for wet heath is predicted to be 0.53 ha (1.7%) due to permanent infrastructure, with up to an additional 0.09 ha (0.29%) due to temporary works areas (**Table 8.9**). This results in a potential total direct loss of 0.62 ha, equivalent to 1.96% of the wet heath within the site/Study Area.

8.7.39 In addition, there may be some indirect losses because of the zone of drainage around infrastructure. The actual distance of the effects of drainage on a peatland is highly variable and depends on various factors such as the type of peatland and its characteristics and properties of the peat; the type, size distribution and frequency of drainage feature; and whether the drainage affects the acrotelm, penetrates the catotelm, or both. Consequently, drainage effects can be restricted to just a few metres around the feature or extend out to tens of metres, or further (e.g., see review within Landry & Rochefort (2012)[lxvi]). The hydraulic conductivity of the peatland is one of the key variables which affect the extent of drainage. In general, less decomposed more fibric peatlands (which tend to be found commonly in fen type habitats) generally have a higher hydraulic conductivity and drainage effects can extend to around 50 m, whilst in more decomposed (less fibrous) peat drainage effects may only extend to around 2 m. Blanket bog habitats commonly are associated with more highly decomposed peats (Nayak *et al*. 2008[lxvii]), it is assumed the case is similar for wet heath vegetation on shallow peatland. For this assessment, indirect effects are assumed to extend out to 10 m from infrastructure.

8.7.40 If indirect drainage effects are fully realised out to 10 m in all wet heath areas, then predicted losses increase to 1.42 ha for permanent infrastructure. This worst-case scenario of direct and indirect habitat loss for permanent and temporary works areas is a total of 1.51 ha or 4.87% of the Study Area for wet heath.

8.7.41 It is considered unlikely that indirect drainage effects (i.e., out to 10 m either side of infrastructure) would have a significant effect on the degraded wet heath present in the site or result in large-scale vegetation shifts to a lower conservation value habitat type (e.g., acid grassland). If drainage effects materialise then this could, depending on the degree of drying, result in some subtle shifts of community or vegetation type, and this may be shifts to other M15 sub-communities. In response to more severe drying effects, then M15 wet heath would be expected over time to transition towards a dry heath community, which are already present at the site[lxviii]. Here dry heath is considered to be of the same nature conservation value, therefore overall, it is unlikely there would be a decline in locally important habitat types due to drainage effects on present wet heath.

8.7.42 When considering the above habitat losses, and accounting for the abundance, distribution, and quality of the habitat within the site, as well as at the national level, an effect magnitude of **Low Spatial** and **Long-term Temporal** is appropriate.

8.7.43 **Significance of Effect**: Given the above consideration of Nature Conservation Value, Conservation Status and Magnitude of Effect, the effect significance is considered to be **Minor Adverse** and **Not Significant** under the EIA Regulations.

Wet Modified Dry Bog and Dry Modified Bog

8.7.44 **Effect**: Effects are the same as those assessed for wet heath (paragraph 8.7.35).

8.7.45 **Nature Conservation Value**: Local (as detailed in **Table 8.8**).

8.7.46 **Conservation Status**: Conservation Status of this habitat as assessed in the JNCC report on blanket bog is 'Unfavourable-Bad' and 'Stable' at the UK level[lxix].

8.7.47 **Magnitude of Effect**: The UK has an estimated 2,182,200 ha of blanket bog[lxx]. The majority of which, around 1,759,000 - 1,800,000 ha, is in Scotland[lxxi]. Wet modified dry bog and dry modified bog respectively cover 6.16 ha (0.72%) and 106.61 ha (12.51%) of the site and are indicated by NVC community M20 and NVC sub-communities M25a and M20b. The direct habitat loss for wet modified bog is predicted to be 0.07 ha (1.19%), with up to an additional 0.01 ha (0.18%) due to temporary works areas, and direct loss for dry modified bog is predicted to be 1.48 ha (1.39%), with up to an additional 0.25 ha (0.24%) due to temporary works areas (**Table 8.9**).

8.7.48 For this blanket mire resource as a whole (i.e., combining both habitat types), direct losses amount to 1.55 ha for permanent infrastructure, and 0.26 ha for temporary works areas infrastructure, giving a total of 1.81 ha, or 1.61% of the combined resource within the Study Area. If indirect drainage effects are fully realised out to 10 m in wet modified dry bog and dry modified bog areas, then predicted losses increase for wet modified bog to 0.15 ha and increase for dry modified bog to 4.36 ha for permanent infrastructure. This worst-case scenario of direct and indirect habitat loss for permanent and temporary works areas is a total of 0.16 ha or 2.6 % of the Study Area for wet modified bog and 4.61 ha or 4.32 % of the Study Area for dry modified bog. For this combined resource, direct and indirect losses for permanent and temporary works areas amount to 4.77 ha, or 4.23 % of the combined resource within the Study Area.

8.7.49 In addition, there may be some indirect losses because of the zone of drainage around infrastructure, and the general discussion in paragraph 8.7.39 applies here also. However, it is considered unlikely that indirect drainage effects (i.e., out to 10 m either side of infrastructure) would have such an effect on the habitat as to result in any notable effect on the type of bog present or shifts to a lower conservation value habitat type (e.g., acid grassland). For instance, Stewart & Lance (1991)[lxxii] found that a lowering of the water table next to drains was slight and confined to just a few metres either side of the drain, on sloping ground the uphill zone of drawdown was even narrower. Subtle variations in plant species abundance were noted, with species dependent on high water-tables having a lower cover-abundance near to drains, and species with drier heathland affinities having higher cover than at places farther away. However, there were no wholescale changes in vegetation or the species assemblage; for instance, declines in *Sphagna* moss cover were highly localised and took nearly 20 years to achieve statistical significance. Anecdotal observations from wind farms around Scotland also suggest that bog habitats readily persist around infrastructure and within this 10 m zone of possible influence.

8.7.50 It should also be noted that the predicted indirect losses due to drainage are calculated in GIS and based on the habitat survey mapping, there may be small-scale local specific factors such as those relating to natural breaks in hydrology, geology or topography, or the presence of non-wetland habitats that act as a barrier or buffer, that would prevent the full predicted indirect drainage effects from materialising.

8.7.51 Overall, evidence suggests that if some drainage effects materialise locally around infrastructure due to the Proposed Development, the most likely

effect will not be a major change in overall bog habitat type, but rather a potential change in vegetation micro-topography, certain species cover, or abundance that may result in a subtle NVC community or sub-community shift, and which may only be apparent in the long term. If severe indirect drying effects are observed long-term, then the wet modified dry bog/dry modified bog may transition to wet heath (e.g., NVC community M15), dry modified bog, or dry heath. Wet and dry heaths are still habitats of conservation interest, being Annex I and SBL Priority Habitats (see **Table 8.8**).

8.7.52 When considering the scale of the above habitat losses, and accounting for the abundance, distribution and quality of the habitat within the site as well as at the national level, an effect magnitude of **Low Spatial** and **Long-term Temporal** is appropriate.

8.7.53 **Significance of Effect**: Given the above consideration of Nature Conservation Value, Conservation Status and Magnitude of Effect, the effect significance is considered to be **Minor Adverse** and **Not Significant** under the EIA Regulations.

Predicted Operational Effects

8.7.54 This section provides an assessment of the likely effects of the operation of the Proposed Development upon scoped in IEFs.

Habitats

8.7.55 All likely direct and indirect effects on habitats have been considered in the Predicted Construction Effects section above.

8.7.56 Although the majority of habitat loss is associated with infrastructure required for the operation of the Proposed Development (rather than temporary construction infrastructure), the physical loss of habitat would occur during the construction stage and is therefore considered above.

8.7.57 Indirect effects on wetland habitats would largely occur during the operational phase as potential drying effects become established. However, for ease and clarity assessing effects on habitats, these are considered together within Predicted Construction Effects.

Bats

8.7.58 **Effect**: During the operational phase, there is potential for collision risk upon commuting and foraging bat species, together with the risk that bats may be affected by barotrauma[lxxiii] when flying in close proximity to moving turbine blades. For the purposes of this assessment, the potential effects

from barotrauma are assumed to be the same as for collision risk. This is due to the lack of published empirical evidence in causes of bat fatalities around wind farms and the difficulties in determining whether bat fatalities are due to strikes (collisions) with turbine blades or barotrauma.

8.7.59 Research undertaken by Exeter University on behalf of DEFRA (DEFRA, 2016[lxxiv]) found that most bat fatalities at UK wind farms have been common pipistrelle, soprano pipistrelle and noctule (e.g., *Nyctalus* spp.) bats. Further work (Richardson et al., 2021[lxxv]) found that common pipistrelle activity was higher at turbine locations than at control locations in similar habitat, suggesting that this species may be at particular risk. In the same study, soprano pipistrelle activity was comparable between sites with no attraction or repulsion by wind turbines. It is suggested the observed higher levels of activity could be because there are more individual bats around wind turbines, or because bats spend more time in these locations relative to controls, even if the number of individual bats remains the same; however, it is not possible to distinguish between these possibilities using acoustic bat data (Richardson *et al.*, 2021)[lxxv].

8.7.60 As the turbines have a blade tip height of 180 m, they will require red aviation warning lights. A five-year study by Spoelstra *et al.* (2017)[lxxvi] concluded that foraging bats are not attracted to red lighting. The reason for this is that white and green spectrum lights attract foraging insects whilst red lights do not. Based on this, Spoelstra et al.[lxxvi] advised, *"Hence, in order to limit the negative impact of light at night on bats, white and green light should be avoided in or close to natural habitat, but red lights may be used if illumination is needed"*. A study by Voight *et al.* (2018)[lxxvii] found evidence of attraction of migratory soprano pipistrelle to red lighting. Soprano pipistrelles do not migrate in the UK as they do in continental Europe, so this finding is not relevant to the Proposed Development. However, the explanation for contrasting findings by Spoelstra et al. (2017)[lxxvi] is that *"migratory bats may be more susceptible to light sources of specific wavelength spectra because vision may play a more dominant role than echolocation during migration. Non-migratory bats might use orientation cues that are more involved during general hunting behaviour, for example, echoes reflected from local landmarks, instead of cues from natural or artificial light sources"*.

8.7.61 Bats may also be displaced from their foraging grounds through avoidance of operational wind turbines (Scholz and Voigt, 2022[lxxviii]). Barré *et al.* (2018)[lxxix] recorded a marked reduction in bat activity around operational wind turbines.

8.7.62 Nature Conservation Value: Local (as detailed in **Table 8.8**).

8.7.63 **Conservation Status**: Common pipistrelle are assessed in the 2019 JNCC report as 'Favourable' and 'Improving' at the UK level[lxxx], soprano pipistrelle are assessed as 'Favourable' and 'Stable' at the UK level[lxxxi], there is insufficient data for the conservation status of Nathusius' pipistrelle to be assessed under Article 17 of the Habitats Directive[lxxxii]; and noctule and Leisler's bat (i.e. *Nyctalus* spp.) populations are assessed as 'Favourable' and 'Stable' at the UK level[lxxxiii]. Mathews et al. (2018)[lvii] also consider common pipistrelle, soprano pipistrelle and *Nyctalus* spp. to have a 'Favourable' conservation status.

8.7.64 Further details on the Conservation Status of the high collision risk bat species recorded within the site are provided below. Information on both noctule and Leisler's bats are presented as registrations for both species were present (**Technical Appendix 8.3**), however given the very low total number of registrations recorded for these species (n = 37) these bats are assessed at the genus level (i.e., *Nyctalus* spp.).

8.7.65 Both common and soprano pipistrelle are widespread in Scotland, however there is insufficient data to estimate the population range for Nathusius' pipistrelle. The low population estimates for *Nyctalus* spp. in Scotland are outdated and likely underestimated due to under-recording (Mathews *et al.*, 2018)[lvii]. The survey data indicates that both noctule and Leisler's bats may be present at the site. Studies by Newson et al (2017)[lx] have shown a general east-west geographical divide between the species distribution in southern Scotland; with the Proposed Development located in the east of their research area and more within noctule distribution mapping. The Proposed Development is also on the northern edge of *Nyctalus* spp. distribution range (Mathews *et al.* 2018)[lvii].

8.7.66 The estimated population of common pipistrelle in 2019 ranged from 1,100,600 to 7,843,000 in the UK[lxxxiv], and from 285,000 to 2,160,000 in Scotland[lxxxv], although best single value estimates are not provided due to the uncertainty around population estimates. Matthews et al. (2018)[lvii] provided a UK estimate of 3,040,000 (with a plausible range of 991,000 – 7,510,000); population estimates for Scotland were not provided in that review.

8.7.67 For soprano pipistrelle, the population was estimated to be from 2,024,000 to 8,563,000 in the UK[lxxxvi], and from 512,000 to 2,180,000 in Scotland[lxxxvii], although best single value estimates are not provided due to the uncertainty around population estimates. Matthews et al. (2018)[lvii] provided a UK

estimate of 4,670,000 (with a plausible range of 970,000 – 8,400,000); population estimates for Scotland were not provided in that review.

8.7.68 There is insufficient data to estimate the population range for Nathusius' pipistrelle.

8.7.69 Population estimates of Leisler's bat in 2013 were 28,000 in the UK and 250[lxxxviii] in Scotland (JNCC, 2013[lxxxix]). There is no recent population estimate available for this species across the UK (Mathews et al., 2018[lvii], JNCC, 2019[xc]) or Scotland (JNCC, 2019[xci]) and there is limited accurate data on trends, and population changes, meaning that the detailed population status of this species in the UK and Scotland is currently unknown. However, Newson *et al.* (2017)[lx] in their study stated that the previously used population estimates in Scotland of only a few hundred bats are outdated, with their research indicating actual populations of *Nyctalus* spp. in Scotland, and their distribution range, are much larger than previously reported, with populations suggested to be in the region of many thousands.

8.7.70 Population estimates of noctule bat in 2013 were 50,000 in the UK and 250[lxxxviii] in Scotland (JNCC, 2013[lxxxix]). The 2019 Article 17 of the UK Habitats Directive Reports estimates the population range to be from 20,600 to 2,176,000 in the UK (JNCC, 2019[xcii]) with no population value provided for Scotland (JNCC, 2019[xciii]). Matthews et al. (2018)[lvii] did not provide a UK population estimate; countrywide estimates were provided for England (565,000 with a plausible range of 17,700 - 1,872,000) and Wales (91,900 with a plausible range of 2,900 - 304,000); no estimate was provided for Scotland. As for Leisler's above, Newson et al. (2017)[lx] in their study stated that the previously used population estimates in Scotland of only a few hundred bats are outdated, with their research indicating actual populations of *Nyctalus* spp. in Scotland, and their distribution range, are much larger than previously reported, with populations suggested to be in the region of many thousands.

8.7.71 **Magnitude of Effect**: Evaluating the vulnerability of a bat population to wind farms is based on three factors: activity level recorded, population vulnerability (determined by collision risk of species and population size), and site risk level. These factors are multiplied to generate an overall risk assessment score per species of either Low (0-4), Moderate (5-12) or High (15-25) in line with NatureScot *et al.* (2021) guidance[xxvii]. **Technical Appendix 8.3** sets out the results from this risk assessment for each high collision risk species and provides analysis of four reference sites to assess the overall site risk level. **Figures 8.7 – 8.10** also present the site-specific

spatial and temporal activity levels for high-risk species, based on the results of the monitoring undertaking at locations across the site in 2022. A summary is provided below to inform the assessment.

8.7.72 Average seasonal site activity levels (based on mean bpph) were recorded for the following high collision risk bat species:

- common pipistrelle: No activity to High;
- soprano pipistrelle: No activity to High;
- Nathusius' pipistrelle: No activity to Moderate to High; and
- *Nyctalus* spp.: No activity to Moderate to High.

8.7.73 Due to having a 'high' collision risk and a 'common' population abundance rating, common pipistrelle and soprano pipistrelle are classified as having 'medium' population vulnerability. With a 'high' collision risk and 'rarest' population abundance rating, Nathusius' pipistrelle and *Nyctalus* spp. are classified as having 'high' population vulnerability.

8.7.74 Evidence in the UK demonstrates that most bat activity is close to habitat features e.g., woodland or wetlands. Foraging habitat quality and connectivity in the site is low, with a largely treeless environment, small, open upland burns and a largely homogenous area of open grazed marshy grassland and moorland habitat present. The site risk level for the Proposed Development has been categorised as Low/Lowest, based on having a Medium project size and a Low habitat risk (see **Technical Appendix 8.3**).

8.7.75 The following overall collision risk assessment score based on comparison with reference sites was obtained for common pipistrelle, soprano pipistrelle and Nathusius' pipistrelle: Low-Moderate (2-6); and Low (2) for *Nyctalus* spp.

8.7.76 **Figures 8.7 - 8.10** display the activity levels (based on mean bpph) per season and Anabat. As can be seen in these figures, the activity level varied temporally and spatially between spring, summer and autumn for each species, with spring generally being the season with the greatest bat activity levels across the site. Common and soprano pipistrelle were relatively active across the site and in all seasons (although bpph overall was low with average 0.25 and 0.23 bpph respectively). **Figure 8.9** shows that Nathusius' pipistrelle was most active at the site in the spring, with passes recorded at four Anabat locations. **Figure 8.10** demonstrates the site was mostly used by Nyctalus species in the autumn, with nine Anabat locations recording passes.

8.7.77 The embedded mitigation described in paragraph 8.5.7 with respect to bats, namely reduced rotor speed when idling by feathering, will be implemented throughout operation during the bat active period (April to October), reducing the risk of bat fatalities. The guidance by NatureScot et al. (2021)[xxvii] notes that, *"The reduction in speed resulting from feathering compared with normal idling may reduce fatality rates by up to 50%"*. The presence of this mitigation measure has been taken into account when assigning the Significance of Effect.

8.7.78 All high collision risk species were calculated to have an overall collision risk assessment score of Low to Low-Moderate. While there may be an effect on individuals, the assessment determines that the effect would be unlikely to occur in sufficient numbers to affect the local populations.

8.7.79 Due to the levels of activity on site, and analysis of site risk, an effect magnitude of **Low Spatial** and **Long Term temporal** is considered appropriate for all species.

8.7.80 **Significance of Effect:** Given the above consideration of Nature Conservation Value, Conservation Status and Magnitude of Effect, the effect significance of collision risk on all high collision risk bat species recorded at the site is considered **Minor Adverse** and **Not Significant** in the context of the EIA Regulations.

Predicted Decommissioning Effects

8.7.81 Due to the distant time frame until their occurrence (>35 years), decommissioning effects are difficult to predict with confidence. In general, decommissioning effects are usually considered for the purposes of assessment to be similar to (or likely less than) those of construction effects in nature and are likely to be of shorter duration. Prior to decommissioning, a Decommissioning Environmental Management Plan (DEMP) would be prepared and agreed with the relevant statutory consultees, which would include the need for pre-works surveys.

8.7.82 The decommissioning of the Proposed Development would involve the removal of infrastructure and restoration of the associated ground (details provided in **Chapter 3**). Restoration would seek to return areas to their pre-construction habitat type, or as similar as feasible depending on local substrates, topography, hydrology etc. As a result, decommissioning will not lead to any further direct or indirect habitat losses above those already occurred during construction, rather, it is predicted that due to restoration of habitats in these areas, there would be a net positive effect.

8.8 Cumulative Effects

8.8.1 The primary concern regarding the assessment of cumulative effects is to identify situations where effects on habitats or species populations that may be non-significant from individual developments, are judged to be significant when combined with nearby existing or proposed projects that are subject to an EIA process. In the interests of focusing on the potential for similar significant effects, this assessment considers the potential for cumulative effects with other wind farm developments, including those that are operational, under construction, consented or at application stage. Wind farm projects at scoping stage have been scoped out of the cumulative assessment because they generally do not have sufficient information on potential effects to be included, as the baseline survey period is ongoing, or results have not been published. Projects that have been refused or withdrawn have also been scoped out.

8.8.2 Small projects with three or fewer turbines have also been excluded from the cumulative assessment as often these projects are not subject to the same level of detail of assessment, and so there are no directly comparable data. Because of the small scale of such projects, effects are likely to be negligible on the IEFs assessed.

8.8.3 There is a single wind farm development that falls within 5 km of the Proposed Development and fulfils the criteria outlined in the preceding paragraphs, this is the proposed eight turbine Wull Muir Wind Farm. The application for Wull Muir was originally submitted in 2019, this was refused by Scottish Borders Council, and a subsequent planning appeal was also dismissed. A revised application was submitted in December 2022 and remains undetermined (planning reference 22/01960/FUL) with Further Environmental Information (FEI) for ecology and ornithology submitted in August 2023.

Predicted Cumulative Construction Effects

8.8.4 Wet dwarf shrub heath and wet/dry modified bog, i.e., the habitat IEFs considered in relation to the Proposed Development (as per above), have been scoped-out of the cumulative assessment. It is considered unlikely that any significant ecological cumulative effects will arise as a consequence of the Proposed Development adding to habitat loss associated with other projects (this applies to both the construction phase and also any limited drainage effects which may continue into the operational phase).

8.8.5 For the IEFs considered here, the information contained within the Wull Muir EIA Report indicates that direct and indirect habitat losses for the project would include up to 0.12 ha of wet modified bog, with no impacts on wet heath.

8.8.6 Furthermore, in general for wind farm developments, mitigation and/or additional management/restoration/enhancement/creation of habitats is usually proposed to compensate and offset any effects on IEFs. These mitigation and enhancement areas also tend to be larger or many orders of magnitude greater than the area of predicted loss. The requirement for each development project to provide significant biodiversity enhancement is also now imperative through NPF4 Policy 3. The Proposed Development proposes significant biodiversity enhancement via the OBEMP, including peatland restoration of an area over seven times larger than the area of potential direct and indirect loss, as summarised in Section 8.9 below and detailed in **Technical Appendix 8.6**. An outline Habitat Management Plan (HMP) has also been submitted as part of the Wull Muir Wind Farm FEI.

8.8.7 Therefore, it is considered unlikely that any significant residual cumulative effects at a local or regional level will arise as a consequence of the Proposed Development adding to habitat loss associated with other projects. This is due to the small nature and not significant levels of habitat losses associated with the Proposed Development (and Wull Muir Wind Farm) and the Applicant's commitment to the delivery of a BEMP for the Proposed Development which would include provisions for the maintenance, creation, restoration and/or enhancement of various habitats and would be used to provide significant biodiversity enhancements in line with NPF4. As such, no adverse cumulative effects are predicted.

Predicted Cumulative Operational Effects

8.8.8 Bats may be affected by cumulative wind farm developments because of the distances that some foraging bats travel, and the cumulative risks to bat populations because of barotrauma and/or collision with wind turbines during operation. High collision risk species recorded at the site were common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle and *Nyctalus* spp. These species are all considered here to be of Local Nature Conservation Value (**Table 8.8**) with common pipistrelle, soprano pipistrelle and *Nyctalus* spp. having Favourable Conservation Status and Nathusius' pipistrelle having Unknown Conservation Status (as per discussion in Section 8.7).

8.8.9 The information contained within the Wull Muir Wind Farm EIA Report also indicated the presence of pipistrelle species and low numbers of *Nyctalus* spp. In total 10,437 bat registrations were recorded over 336 monitoring nights during anabat surveys for that project (c.f. 2,959 over 477 monitoring nights for the Proposed Development). The activity levels for these species were analysed through Ecobat and were generally considered 'Moderate', with *Nyctalus* spp. considered 'Low'.

8.8.10 In considering any predicted cumulative effect that may materialise as a result of the addition of the Proposed Development it is important to note the following:

- the now-standard application of embedded mitigation in the form of buffer distances between turbine blade tip and habitat features such as forest edges and wetlands to minimise effects on foraging and commuting bats (paragraph 8.5.1);
- the watercourse buffers that are incorporated into wind farm designs as standard;
- the now-standard adoption of reduced rotor speed when idling, by feathering[xxvii];
- the minor adverse and non-significant effect of the Proposed Development and Wull Muir Wind Farm on these species;
- the Low-Moderate risk assessment scores for the Proposed Development and Wull Muir Wind Farm for all high collision risk species.

8.8.11 With the mitigation for bats already incorporated into the Proposed Development as noted above, and with similar mitigation at Wull Muir Wind Farm, and further considering their distribution, population size, sensitivity and Conservation Status (as discussed above), cumulative effects on common, soprano and Nathusius' pipistrelle, and Nyctalus spp., are considered to be **Low Spatial** and **Long Term Temporal** magnitude.

8.8.12 **Significance of Effect**: Considering the above, cumulative effects on high collision risk bat species are considered to be **Minor Adverse** and **Not Significant** in the context of the EIA Regulations.

8.9 Mitigation, Compensation and Enhancement

Construction Phase

8.9.1 General and embedded mitigation measures for habitats and species, such as complying with best practice, micrositing, presence of an ECoW and

adherence with a detailed CEMP and SPP are included in paragraphs 8.5.1 - 8.5.6.

8.9.2 No significant construction effects were identified, and no non-standard mitigation is proposed for the construction phase. However, a number of additional mitigation, compensation and significant enhancement measures are proposed as part of the Proposed Developments OBEMP, as detailed in **Technical Appendix 8.6** and outlined below.

8.9.3 Enhancement and restoration of habitats through the delivery of a BEMP would reduce effects on habitats further. Overall, the BEMP would aim to achieve significant biodiversity enhancement at the Proposed Development, in line with objectives outlined in NPF4 Policy 3 (Scottish Government, 2023) the Onshore Wind Policy Statement (Scottish Government, 2022a), and the Scottish Biodiversity Strategy to 2045 (Scottish Government, 2022b). The BEMP would include provisions for the protection, maintenance, restoration and/or enhancement of bog habitats locally. Furthermore, the BEMP would deliver broadleaved woodland creation, hedgerow creation, species-rich grassland creation, and bracken control for grassland restoration.

8.9.4 The OBEMP is provided in **Technical Appendix 8.6**, also see **Figure 8.12**. The OBEMP is based on a number of identified search areas for each respective habitat management and biodiversity enhancement proposal. These search areas will likely be refined following further specialist surveys and feedback from relevant consultees, and all search areas may not be taken forward for the final BEMP, and other search areas and/or proposals may also be considered; however, the Applicant remains committed to delivering significant biodiversity enhancement at the Proposed Development.

8.9.5 In summary the OBEMP includes the following proposals (full details are provided in **Technical Appendix 8.6**):

- 36.69 ha of peatland restoration/enhancement in Search Area A, likely primarily delivered through livestock exclusion/management, peat hagg reprofiling, drain blocking and removal of self-seeding trees;
- 17.27 ha of broadleaved woodland creation through the replacement of conifer planation with native broadleaves in Search Area B;
- 45.16 ha of grassland restoration through the removal and management of dense/continuous bracken in Search Area C;
- 5.69 ha of species-rich meadow/grassland creation through the conversion of arable land in Search Area D; and

- Creation of approximately 2,500 m of new native species-rich hedgerows in Search Area E.

8.9.6 As part of the OBEMP a Biodiversity Net Gain (BNG) assessment was undertaken using a BNG metric. This demonstrates the measures proposed for the creation and enhancement of habitats would result in an increase in the biodiversity value of the site post construction. The BNG metric was applied to the Proposed Developments baseline habitats, considered predicted habitat losses, and the habitat creation and enhancement measures as proposed in the OBEMP. The BNG metric indicates that following construction, site restoration, BEMP implementation and subsequent habitat management, the Proposed Development would compensate for predicted habitat and biodiversity losses and provide further enhancement that would result in an increase and net gain for biodiversity of 11.8% over and above the baseline and pre-development value (see **Technical Appendix 8.6**).

8.9.7 The detailed BEMP will be agreed with Midlothian Council and NatureScot in advance of construction and would ensure the Proposed Development secures significant biodiversity enhancements through restoring degraded habitats and strengthening nature networks.

Operational Phase

8.9.8 Bats are the IEF scoped in to the assessment of potential operational effects, and mitigation during operation is detailed in paragraphs 8.5.1 - 8.5.6. This embedded mitigation has been considered as part of the assessment. No significant operational effects were identified, and no non-standard mitigation is proposed for the operational phase.

8.9.9 Creation of woodland habitat and hedgerows, as well as other valuable foraging habitats, through the delivery of a BEMP, as detailed in the OBEMP (**Appendix 8.6**), would create and enhance bat foraging and commuting habitat within the site and locally.

Decommissioning Phase

8.9.10 None proposed.

Cumulative

8.9.11 As per paragraphs 8.9.8 and 8.9.9.

Residual Effects

8.9.12 No significant effects identified with all scoped in IEFs remaining as Minor adverse, or less, and Not Significant (as per paragraphs 8.7.43, 8.7.53, 8.7.80, and 8.8.12).

8.10 Summary

8.10.1 For all IEFs assessed above, the predicted residual levels of significance of effects during the construction, operational and decommissioning phases of the Proposed Development, alone or cumulatively with other projects, are considered to be no more than Minor adverse and therefore Not Significant.

8.10.2 **Table 8.10** below provides a summary of effects detailed within this chapter.

Table 8.10: Summary of Effects

IEF	Potential Effect	Significance of Effect	Mitigation Proposed	Residual Effect
Construction Phase				
Wet dwarf shrub heath	Direct and indirect habitat loss	Minor adverse – Not significant	In addition to embedded mitigation, the implementation of a BEMP which includes bog and upland habitat restoration.	Minor adverse – Not significant
Wet modified bog and dry modified bog	Direct and indirect habitat loss	Minor adverse – Not significant	In addition to embedded mitigation, the implementation of a BEMP which includes bog and upland habitat restoration.	Minor adverse – Not significant
Bats (high-risk collision species/genus: common pipistrelle, soprano pipistrelle, Nyctalus spp., Nathusius' pipistrelle)	Fatality through barotrauma or collision	Minor adverse – Not significant	In addition to embedded mitigation (i.e., maintenance of a 50 m buffer from turbine blade tip to feature height and feathering whilst idling), proposals included as part of biodiversity enhancements detailed in the OBEMP (Appendix 8.6) would create and improve bat foraging habitat and corridors.	Minor adverse – Not significant

IEF	Potential Effect	Significance of Effect	Mitigation Proposed	Residual Effect
Decommissioning Phase				
None identified. Generally, as for Construction (or less). No further direct or indirect habitat losses; potential net positive effect on habitats after site restoration.				
Cumulative				
Bats (high-risk collision species/genus: common pipistrelle, soprano pipistrelle, *Nyctalus* spp., Nathusius' pipistrelle)	Fatality through barotrauma or collision	Minor adverse – Not significant	In addition to embedded mitigation (i.e., maintenance of a 50 m buffer from turbine blade tip to feature height and feathering whilst idling), proposals included as part of biodiversity enhancements detailed in the OBEMP (Appendix 8.6) would create and improve bat foraging habitat and corridors.	Minor adverse – Not significant

Annex A

Table 8.11: Habitat Baseline Composition and Habitat Loss Calculations for Study Area

		Study Area (Baseline)				Permanent Direct Loss		Permanent Indirect Loss (only applies to Wetland Habitats)[1]		Permanent Direct + Indirect Loss		Temporary Direct Loss	
Phase 1 Description (Code)	NVC	Phase 1 Area (ha)	Phase 1 % of Study Area	NVC Area (ha)	% of NVC Type within Study Area	NVC Area (ha)	% Loss of Phase 1 Type within Study Area	NVC Area (ha)	% Loss of Phase 1 Type within Study Area	NVC Area (ha)	% Loss of Phase 1 Type within Study Area	NVC Area (ha)	% Loss of Phase 1 Type within Study Area
Totals		852.31	100%	852.31	100%	13.72	1.61%	9.23	1.08%	22.94	2.69%	14.90	1.75%
Broadleaved Semi-Natural Woodland (A1.1.1)	W7	1.61	0.19%	0.03	<0.01%	0	0	0	0	0	0	0	0
	W11			1.49	0.17%	0	0	0	0	0	0	0	0
	W10			0.09	0.01%	0	0	0	0	0	0	0	0
Broadleaved Plantation Woodland (A1.1.2)	YBP	10.43	1.22%	10.43	1.22%	0.42	4.00%	0	0	0.42	4.00%	0.06	0.59%
Coniferous Plantation Woodland (A1.2.2)	CP	16.73	1.96%	16.73	1.96%	0	0	0	0	0	0	0	0
Scattered Broadleaved Tree (A3.1)	SBT	0.01	<0.01%	0.01	<0.01%	0	0	0	0	0	0	0	0
Scattered Coniferous Tree (A3.2)	SCT	0.03	<0.01%	0.03	<0.01%	0	0	0	0	0	0	0	0
Unimproved Acid Grassland (B1.1)	U6c	293.81	34.47%	0.01	<0.01%	0	1.93	0	0	0	1.93%	0	0.35%
	Cn			0.21	0.02%	<0.01		0	0	<0.01		<0.01	
	U6			0.27	0.03%	0		0	0	0		0	
	U2b			4.02	0.47%	0.11		0	0	0.11		0.01	
	U4a			103.66	12.16%	2.49		0	0	2.49		0.50	
	U5a			185.64	21.78%	3.08		0	0	3.08		0.52	
Semi-Improved Acid Grassland (B1.2)	U4b	42.90	5.03%	42.90	5.03%	0.96	2.24	0	0	0.96	2.24	3.22	7.51%
Unimproved Neutral Grassland (B2.1)	MG9x	0.30	0.04%	0.30	0.04%	<0.01	0.69	<0.01	1.20%	0.01	1.89%	0	0
Semi-Improved Neutral Grassland (B2.2)	HL	25.36	2.98%	5.85	0.69%	0.07	1.74%	0	0	0.07	4.54%	0.01	3.11%
	MG10a			19.51	2.29%	0.38		0.71	2.80%	1.09		0.77	
Improved Grassland (B4)	MG7	59.91	7.03%	0.04	<0.01%	0	2.13%	0	0	0	2.13	0	12.69%
	MG6			59.87	7.02%	1.28		0	0	1.28		7.60	
Marsh/Marshy Grassland (B5)	M23b	179.11	21.01%	1.43	0.17%	0.01	1.57%	0.02	2.60%	0.04	7.47%	0.03	0.75%
	M23a			2.19	0.26%	0		0		0		0	
	Ja			24.31	2.85%	0.42		0.77		1.19		0.04	
	JaN			19.43	2.28%	0.44		0.88		1.32		0.82	
	M25			23.88	2.80%	0.38		1.11		1.50		0.08	

[1] *Based upon the precautionary 10 m indirect drainage assumption.*

		Study Area (Baseline)				Permanent Direct Loss		Permanent Indirect Loss (only applies to Wetland Habitats)[1]		Permanent Direct + Indirect Loss		Temporary Direct Loss	
Phase 1 Description (Code)	NVC	Phase 1 Area (ha)	Phase 1 % of Study Area	NVC Area (ha)	% of NVC Type within Study Area	NVC Area (ha)	% Loss of Phase 1 Type within Study Area	NVC Area (ha)	% Loss of Phase 1 Type within Study Area	NVC Area (ha)	% Loss of Phase 1 Type within Study Area	NVC Area (ha)	% Loss of Phase 1 Type within Study Area
Totals		852.31	100%	852.31	100%	13.72	1.61%	9.23	1.08%	22.94	2.69%	14.90	1.75%
	Je			43.63	5.12%	0.45		1.09		1.54		0.18	
	M25b			64.25	7.54%	1.10		0.77		1.87		0.20	
Continuous Bracken (C1.1)	U20a	47.12	5.53%	5.17	0.61%	0	0.06%	0	0	0	0.06%	0	1.03%
	U20			41.95	4.92%	0.03		0	0	0.03		0.48	
Tall Ruderal (C3.1)	OV27	0.06	0.01%	0.04	<0.01%	0	2.10%	0	0	0	2.10%	0	0.25%
	OV25			0.02	<0.01%	<0.01		0	0	<0.01		<0.01	
Acid Dry Dwarf Shrub Heath (D1.1)	H9-H12	1.01	0.12%	0.31	0.04%	0	0	0	0	0	0	0	0
	H12c			0.25	0.03%	0	0	0	0	0	0	0	0
	H12a			0.45	0.05%	0	0	0	0	0	0	0	0
Wet Dwarf Shrub Heath (D2)	M15b	30.99	3.64%	0.10	0.01%	0	1.70%	0	2.87%	0	4.58	0	0.29%
	M15d			30.89	3.62%	0.53		0.89		1.42		0.09	
Blanket Bog (E1.6.1)	M19	19.05	2.23%	19.05	2.23%	0	0	<0.01	0.02%	<0.01	0.02%	0	0
Wet Modified Bog (E1.7)	M25a	6.16	0.72%	6.16	0.72%	0.07	1.19%	0.07	1.19%	0.15	2.36%	0.01	0.18%
Dry Modified Bog (E1.8)	M20b	106.61	12.51%	38.65	4.54%	0.53	1.39%	1.03	2.70%	1.56	4.09%	0.07	0.24%
	M20			67.95	7.97%	0.95		1.85		2.80		0.19	
Acid/Neutral Flush (E2.1)	M6d	4.28	0.50%	0.01	<0.01%	<0.01	0.08%	<0.01	0.23%	<0.01	0.23%	<0.01	0.07%
	M6c			4.27	0.50%	<0.01		0.01		0.01		<0.01	
Standing Water (G1)	SW	0.02	<0.01%	0.02	<0.01%	0	0	0	0	0	0	0	0
Quarry (I2.1)	QY	4.91	0.58%	4.91	0.58%	0	0	0	0	0	0	0	0
Building (J3.6)	BD	0.01	<0.01%	0.01	<0.01%	0	0	0	0	0	0	0	0
Bare Ground (J4)	BG	1.90	0.22%	1.90	0.22%	0.01	0.35%	0	0	0.01	0.35%	0	0

8.11 References

[i] 8.1.1 Scottish Natural Heritage and Historic Environment Scotland (2018). Environmental Impact Assessment Handbook - Version 5: Guidance for competent authorities, consultation bodies, and others involved in the Environmental impact Assessment process in Scotland. Version 5. (Note – Scottish Natural Heritage (SNH) is the former name for NatureScot).

[ii] 8.1.1 CIEEM (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.1, updated September 2019.

[iii] 8.1.3 Includes **Confidential Annex E** for sensitive protected species information.

[iv] 8.4.2 Available at: https://hub.jncc.gov.uk/assets/cb0ef1c9-2325-4d17-9f87-a5c84fe400bd.

[v] 8.4.2 Available at: https://www.nature.scot/doc/scottish-biodiversity-list.

[vi] 8.4.5 The 'site' in this chapter means the area outlined in red on **Figure 8.1** and further described in **Chapter 2: Site Selection & Design Evolution** and **Chapter 3: Project Description**.

[vii] 8.4.5 Available at: https://scotland.nbnatlas.org. Accessed August 2023.

[viii] 8.4.5 Available at: https://sitelink.nature.scot/home. Accessed August 2023.

[ix] 8.4.5 Available at: https://bds.org.uk/science-research/deer-surveys/deer-distribution-survey/. Accessed August 2023.

[x] 8.4.5 Available at: https://map.environment.gov.scot/sewebmap/. Accessed August 2023.

[xi] 8.4.5 Available at: https://map.environment.gov.scot/sewebmap/?layers=ancientWoodlandInventoryScotland. Accessed August 2023.

[xii] 8.4.5 Available at: https://www.sepa.org.uk/data-visualisation/water-environment-hub/. Accessed August 2023.

[xiii] 8.4.10 Section 5 - Impact Assessment.

[xiv] 8.4.10 SERAD (2011). European Protected Species, Development Sites and the Planning Systems: Interim guidance for local authorities on licensing arrangements.

[xv] 8.4.11 i.e. The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017.

[xvi] 8.4.11 See Section 5.1 of the CIEEM (2018) guidance.

[xvii] https://jncc.gov.uk/our-work/guidelines-for-selection-of-sssis/

[xviii] 8.4.16 See Section 4.1 of the CIEEM (2018) guidance.

[xix] Table 8.2 As adapted from Hill, D., Fasham, M., Tucker, G., Shewry, M and Shaw, P. (2005). Handbook of Biodiversity Methods – Survey, Evaluation and Monitoring. Cambridge University Press, Cambridge.

[xx] 8.4.17 Annex E, Appendix A, Section 2.

[xxi] 8.4.20 See Section 5.19 of the CIEEM (2018) guidance.

[xxii] 8.4.20 NatureScot (2021). Guidance - Assessing the cumulative landscape and visual impact of onshore wind energy developments (update to 2012 guidance). Available at: https://www.nature.scot/doc/guidance-assessing-cumulative-landscape-and-visual-impact-onshore-wind-energy-developments.

[xxiii] 8.4.20 i.e. 5 km for habitats and most protected species, and 10 km for bats.

[xxiv] 8.4.22 See Section 5.24 of the CIEEM (2018) guidance.

[xxv] 8.4.22 See Section 5.25 of the CIEEM (2018) guidance.

[xxvi] 8.4.26 Adapted from Royal Town Planning Institute (2000). *Planning for Biodiversity*. This principle is reiterated in the NPF4 (Policy 3, Biodiversity), and NatureScot guidance.

[xxvii] 8.5.1 See NatureScot, Natural England, Natural Resources Wales, RenewableUK, Scottish Power Renewables, Ecotricity Ltd, the University of Exeter & Bat Conservation Trust (BCT) (2019, updated 2021). Bats and Onshore Wind Turbines – Survey, Assessment and Mitigation.

[xxviii] 8.6.3 Available at: https://sitelink.nature.scot/site/8326.

[xxix] 8.6.3 SNH (2011). Moorfoot Hills, Site of Special Scientific Interest, Site Management Statement.

[xxx] https://www.midlothian.gov.uk/downloads/file/3437/midlothian_local_biodiversity_action_plan_2019-2024

[xxxi] 8.6.8 Available at: https://www.nature.scot/professional-advice/planning-and-development/planning-and-development-advice/soils/carbon-and-peatland-2016-map. Accessed September 2023.

[xxxii] 8.6.8 Available at: https://soils.environment.gov.scot/maps/thematic-maps/carbon-and-peatland-2016-map/#:~:text=The%20map%20is%20a%20high,area%2C%20at%20a%20coarse%20scale.

[xxxiii] 8.6.9 Class 0 - Mineral soil - Peatland habitats are not typically found on such soils. No peatland vegetation.

[xxxiv] 8.6.9 Dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type. Occasional peatland habitats can be found. Most soils are carbon-rich soils, with some areas of deep peat.

[xxxv] 8.6.9 Area unlikely to be associated with peatland habitats or wet and acidic type. Area unlikely to include carbon-rich soils.

[xxxvi] 8.6.9 Soil information takes precedence over vegetation data. No peatland habitat recorded. May also include areas of bare soil. Soils are carbon-rich and deep peat.

[xxxvii] 8.6.11 Available at: https://www.sepa.org.uk/data-visualisation/water-environment-hub/. Accessed September 2023.

[xxxviii] 8.6.13 Available at: https://scottishsquirrels.org.uk/squirrel-sightings/. Accessed September 2023.

[xxxix] 8.6.13 Cloich Forest Wind Farm EIA Report, Volume 1, Chapter 7: Ecology, June 2021.

[xl] 8.6.14 Forth District Salmon Fishery Board (2020), Annual Report, Table 2 and Table 3.

[xli] 8.6.19 See Section 14 of the Wildlife and Countryside Act 1981.

[xlii] 8.6.22 JNCC (2010). Handbook for phase 1 habitat survey – a technique for environmental audit.

[xliii] 8.6.22 The habitat extents provided and discussed within this Chapter relate only to those within the site (i.e., the habitats Study Area), as these form the baseline conditions and the basis for the assessment of potential effects and habitat loss.

[xliv] The Survey Area covers 1528.3 hectares (ha), whereas the site boundary (i.e., Study Area) covers 852.3 ha.

[xlv] 8.6.24 The Phase 1 characterisation has been utilised to allow a broader visual representation of the habitats within the Survey Area. Polygons or areas where there are mosaic NVC communities have generally been assigned a single Phase 1 classification based on the dominant NVC type (despite some polygons containing multiple Phase 1 types, often in low percentages). Therefore, the Phase 1 characterisation is generally a broader overview, and the NVC data should be referred to for further detail in any specific area.

[xlvi] 8.6.24 SEPA (2017). Land Use Planning System Guidance Note 4 - European Commission, Directorate-General for Environment (2010); and SEPA (2017). Land Use Planning System Guidance Note 31 – Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems.

[xlvii] 8.6.30 Available at: https://sac.jncc.gov.uk/habitat/.

[xlviii] 8.6.31 Available at: https://www.nature.scot/doc/scottish-biodiversity-list.

[xlix] 8.6.33 JNCC (2019). UK BAP Priority Habitats. Available at: https://jncc.gov.uk/our-work/uk-bap-priority-habitats/.

[l] 8.6.43 Mammal Society (2017).

[li] 8.6.44 Longpark Wind Farm Extension, Pogbie Windfarm, Cloich Forest Wind Farm, and Wull Muir Wind Farm.

[lii] 8.7.6 NatureScot (2018). The handling of mitigation in Habitats Regulations Appraisal – the People Over Wind CJEU judgement. NatureScot Guidance Note. Available at: https://www.nature.scot/doc/natura-casework-guidance-how-consider-plans-and-projects-affecting-special-areas-conservation-sacs.

[liii] 8.7.11 Scottish Environment Protection Agency (SEPA) (2017a). Land Use Planning System Guidance Note 4 – Planning guidance on on-shore windfarm developments.

[liv] 8.7.11 SEPA (2017b). Land Use Planning System Guidance Note 31 – Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystem.

[lv] 8.7.20 See Appendix 8.2: Confidential Annex E, Table E-1, PS ID PS005 and PS007.

[lvi] 8.7.20 NatureScot (2023). Standing advice for planning consultations – Badgers.

[lvii] Table 8.7 Matthews, F., Kubasiewicz, L.M., Gurnell, J., Harrower, C.A., McDonald, R.A., Shore, R.F. (2018). A Review of the Population and Conservation Status of British Mammals: Technical Summary. A report by the Mammal Society

under contract to Natural England, Natural Resources Wales and Scottish Natural Heritage. Natural England, Peterborough.

[lviii] Table 8.7 JNCC (2019). Article 17 Habitats Directive Report 2019: Species Conservation Status Assessments 2019. Available at: https://jncc.gov.uk/our-work/article-17-habitats-directive-report-2019-species/#regularly-occurring-species-vertebrate-species-mammals-terrestrial.

[lix] Table 8.7 Harris S., Morris, P., Wray, S. & Yalden, D. (1995). A review of British mammals: population estimates and conservation status of British mammals other than cetaceans. JNCC, Peterborough.

[lx] Table 8.7 Newson, S.E., Evans, H.E., Gillings, S., Jarrett, D., Wilson, M.W. (2017). A survey of high risk bat species across southern Scotland. Scottish Natural Heritage Commissioned Report No. 1008.

[lxi] With regards the habitat loss calculations associated with the BESS, a worst-case scenario has been considered. The area of permanent hardstanding is indicatively anticipated to be 8,325m^2, however there may be some drainage works required around the perimeter of the BESS. For the purpose of this assessment these works have been included within the area of potential permanent habitat losses, and as such the BESS permanent habitat loss calculations have been based upon an area of 8,845m^2, which is 520m^2 greater than the predicted permanent hardstanding required.

[lxii] 8.7.31 Available at: https://informatics.sepa.org.uk/CarbonCalculator/assets/Carbon_calculator_User_Guidance.pdf. Accessed September 2023.

[lxiii] Table 8.8 Only specific IEF habitats, communities or features subject to habitat losses are presented within this table. Any IEF communities not listed here are not subject to any predicted direct or indirect habitat losses. Full details of habitat losses for all habitat types are presented in **Annex A, Table 8.11**.

[lxiv] 8.7.37 JNCC (2019). Conservation status assessment for the habitat: H4010 – Northern Atlantic wet heaths with *Erica tetralix*. United Kingdom.

[lxv] 8.7.38 JNCC (2019). Conservation status assessment for the habitat: H4010 – Northern Atlantic wet heaths with *Erica tetralix*. Scotland.

[lxvi] 8.7.39 Landry, J. & Rochefort, L. (2012). The Drainage of Peatlands: Impacts and Rewetting Techniques. Peatland Ecology Research Group, Université Laval, Quebec.

[lxvii] 8.7.39 Nayak, R.A., Miller, D., Nolan, A., Smith, P., Smith, J. (2008). Calculating carbon savings from wind farms on Scottish peat lands - A New Approach.

[lxviii] 8.7.41 Acid Dry Dwarf Shrub Heath (D1.1) covers a very small portion of the site, covering 1.01 ha (0.12%).

[lxix] 8.7.46 JNCC (2019). Conservation status assessment for the habitat: H7130 - Blanket bogs. United Kingdom.

[lxx] 8.7.47 JNCC (2019). Conservation status assessment for the habitat: H7130 - Blanket bogs. United Kingdom.

[lxxi] 8.7.47 JNCC (2019). Conservation status assessment for the habitat: H7130 - Blanket bogs. Scotland.

[lxxii] 8.7.49 Stewart, A.J.A. & Lance, A.N. (1991). Effects of Moor Draining on the Hydrology and Vegetation of Northern Pennine Blanket Bog. Journal of Applied Ecology 28: 1105-1117.

[lxxiii] 8.7.58 Barotrauma describes injuries that occur when a bat (or other animal) encounters sudden and extreme changes in atmospheric pressure. The rapid pressure fluctuations can rupture air-containing structures in the bodies of mammals which causes internal bleeding and, potentially, death.

[lxxiv] 8.7.59 DEFRA (2016). Understanding the Risk to European Protected Species (bats) at Onshore Wind Turbine Sites to inform Risk Management. University of Exeter.

[lxxv] 8.7.59 Richardson, S.M., Lintott, P.R., Hosken, D.J., Economou, T and Mathews, F. (2021). Peaks in bat activity at turbines and the implications for mitigating the impact of wind energy developments on bats. Sci Rep. 11, 3636.

[lxxvi] 8.7.60 Spoelstra, K., van Grunsven, R. H. A., Ramakers, J. J. C., Ferguson, K. B., Raap, T., Donners, M., Visser, M. E. (2017). Response of bats to light with different spectra: Light-shy and agile bat presence is affected by white and green, but not red light. Proceedings Royal Publishing B, 284, 20170075.

[lxxvii] 8.7.60 Voigt, C.C., Rehnig, K., Lindecke, O., Pētersons, G. (2018). Migratory bats are attracted by red light but not by warm white light: Implications for the protection of nocturnal migrants. Ecology and Evolution. 2018;8:9353–9361.

[lxxviii] 8.7.61 Scholz, C. and Voigt, C.C. (2022). Diet analysis of bats killed at wind turbines suggests large-scale losses of trophic interactions. Conservation Scient and Practice, Volume 4, Issue 7.

[lxxix] 8.7.61 Barré, K., Le Voil, I., Bas, Y., Julliard, R., and Kerbirou, C. (2018) Estimating habitat loss due to wind turbine avoidance by bats: Implications for European siting guidance. Biological Conservation, 2018, 226, pp.205-214. ff10.1016/j.biocon.2018.07.011.

[lxxx] 8.7.63 JNCC (2019). Conservation status assessment for the species: S1309 - Common pipistrelle (*Pipistrellus pipistrellus*). United Kingdom.

[lxxxi] 8.7.63 JNCC (2019). Conservation status assessment for the species: S5009 - Soprano pipistrelle (*Pipistrellus pygmaeus*). United Kingdom.

[lxxxii] 8.7.63 JNCC (2019). Conservation status assessment for the species: S1317 - Nathusius' pipistrelle (*Pipistrellus nathusii*). United Kingdom.

[lxxxiii] 8.7.63 JNCC (2019). Conservation status assessment for the species: S1331 - Leisler's bat (*Nyctalus leisleri*). United Kingdom; and JNCC (2019). Conservation status assessment for the species: S1312 - Noctule (*Nyctalus* noctula). United Kingdom.

[lxxxiv] 8.7.66 JNCC (2019). Conservation status assessment for the species: S1309 - Common pipistrelle (*Pipistrellus pipistrellus*). United Kingdom.

[lxxxv] 8.7.66 JNCC (2019). Supporting documentation for the conservation status assessment for the species: S1309 - Common pipistrelle (*Pipistrellus pipistrellus*). Scotland.

[lxxxvi] 8.7.67 JNCC (2019). Supporting documentation for the conservation status assessment for the species: S5009 - Soprano pipistrelle (*Pipistrellus pygmaeus*). United Kingdom.

[lxxxvii] 8.7.67 JNCC (2019). Supporting documentation for the conservation status assessment for the species: S5009 - Soprano pipistrelle (*Pipistrellus pygmaeus*). Scotland.

[lxxxviii] 8.7.69 Estimate based on expert opinion with no or minimal sampling, expected to be an underestimate as per Newson, S.E., Evans, H.E., Gillings, S., Jarrett, D. & Wilson, M.W. (2017). A survey of high risk bat species across southern Scotland. Scottish Natural Heritage Commissioned Report No. 1008.

[lxxxix] 8.7.69 JNCC (2013). Individual Species Reports – 3rd UK Habitats Directive Reporting 2013.

[xc] 8.7.69 JNCC (2019). Article 17 Habitats Directive Report 2019: Species Conservation Status Assessments 2019 for the species: S1331 - Leisler's bat (*Nyctalus leisleri*). United Kingdom.

[xci] 8.7.69 JNCC (2019). Article 17 Habitats Directive Report 2019: Species Conservation Status Assessments 2019 for the species: S1331 - Leisler's bat (*Nyctalus leisleri*). Scotland.

[xcii] 8.7.70 JNCC (2019). Article 17 Habitats Directive Report 2019: Species Conservation Status Assessments 2019 for the species: S1312 - Noctule (*Nyctalus noctule*). United Kingdom.

[xciii] 8.7.70 JNCC (2019). Article 17 Habitats Directive Report 2019: Species Conservation Status Assessments 2019 for the species: S1312 - Noctule (*Nyctalus noctule*). Scotland.