7 Ecology and Nature Conservation

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7 Ecology and Nature Conservation

7.1 Executive Summary

7.1.1 This chapter considers the potential effects of the proposed Hagshaw Hill Wind Farm Repowering scheme (the Proposed Development) on non-avian ecology.

7.1.2 The scope of the ecological assessment was determined through a combination of a desk study to identify existing ecological data, by considering the baseline results of those local wind farm projects surrounding the site, consultation with relevant nature conservation organisations, and field surveys.

7.1.3 Ecological field surveys within the Proposed Development site were undertaken in 2018. Detailed National Vegetation Classification (NVC) habitat surveys recorded that the study area is dominated by marshy grassland, blanket bog and wet modified bog habitats with frequent interspersed patches of wet and dry dwarf shrub heaths and acid grasslands. Potential groundwater dependent terrestrial ecosystems (GWDTEs) were recorded in the form of flushes (highly groundwater dependent) and wet heath, and some wet grassland habitats (moderately groundwater dependent). The majority of the study area is made up of habitats that are considered to be no more than local Nature Conservation Value, and many of the habitats within the study area have been modified due to grazing and drainage.

7.1.4 Specific surveys were also undertaken for a range of protected species, including bats. No evidence of otter, water vole, red squirrel, or pine marten was recorded, although some suitable habitat is present for a number of these species, and otter has been recorded during surveys for other local wind farm projects. Evidence of badger was recorded within the study area, with a number of setts recorded, as well as other field signs.

7.1.5 Three bat species (common pipistrelle, soprano pipistrelle, and Daubenton's) and two genus groups (*Nyctalus spp.* and *Myotis spp*.) were recorded during the temporal (static detector) surveys. The most commonly recorded species was common pipistrelle, followed by soprano pipistrelle and *Nyctalus spp*. No bat roosts were recorded during baseline surveys, although some trees were observed to have bat roost potential.

7.1.6 In comparison with the Existing Development, the Proposed Development would take up a larger footprint, resulting in greater habitat loss, and would comprise larger, although fewer, turbines. The Proposed Development has been designed to minimise additional impacts on important habitats or protected species to achieve non-significant effects. Two Important Ecological Features (IEFs) were taken forward for further assessment due to their higher conservation value and sensitivity to impacts: blanket bog (including wet modified bog) during the construction phase, and *Nyctalus spp.* bats during the operational phase.

7.1.7 During the construction stage of the Proposed Development there would inevitably be some direct and indirect habitat loss due to the construction of new infrastructure. Effects of loss of blanket bog and wet modified bog, were assessed. No significant effects were predicted, with the extent of losses (direct loss of 2.11 ha, the equivalent of 1.53 % of the blanket bog within the study area) not being significant in a regional context.

7.1.8 Potential operational effects on *Nyctalus* bats were assessed, with the main identified effect being risk of collision. Due to the low activity rates recorded across the site, no significant effects are predicted.

7.1.9 No significant operational, decommissioning or cumulative effects are predicted as a result of the Proposed Development, particularly when mitigation measures for habitats and protected species are considered.

7.3 Introduction

7.3.1 This chapter considers the potential effects of the Proposed Development on the ecological features present at the site, associated with the construction, operation and decommissioning phase of the Proposed Development. The specific objectives of the chapter are to:

- Describe the ecological baseline of the site and immediate surrounding area;
- Describe the assessment methodology and significance criteria used in completing the impact assessment;
- Describe the potential effects, including direct, indirect and cumulative effects;
- Describe the mitigation measures proposed to address likely significant effects; and
- Assess the residual effects remaining following the implementation of mitigation.

7.3.2 The assessment has been carried out by MacArthur Green and in accordance with the Chartered Institute of Ecology and Environmental Management (CIEEM) Code of Professional Conduct.

7.3.3 A detailed description of the Proposed Development is provided within Chapter 3; the planning context for the Proposed Development is provided within Chapter 5.

7.3.4 Effects on birds are addressed within Chapter 8. The effects on hydrology are addressed in Chapter 11. Chapter 11 also considers the hydrological impacts on Groundwater Dependent Terrestrial Ecosystems (GWDTEs) identified in the ecology assessment.

7.3.5 The chapter is supported by the following Technical Appendices:

- Appendix 7.1: National Vegetation Classification Report;
- Appendix 7.2: Bat Survey Report.; and
- Appendix C1: Confidential Protected Species Survey Report.

7.3.6 Figures 7.1 to 7.8 are referenced within the EIA Report where relevant.

7.3.7 Confidential information relating to the locations of protected species is presented within Appendix C1 and Figure C7.1. This appendix and figure have limited distribution due to the sensitivity of protected feature locations contained within.

7.4 Legislation, Policy and Guidelines

Legislation

7.4.1 Relevant legislation and guidance documents have been reviewed and taken into account as part of this ecological assessment. Of particular relevance are:

- Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora ("Habitats Directive");
- 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 2014/52/EU;
- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017;
- The Water Environment and Water Services (Scotland) Act 2003 (WEWS);
- The Water Environment (Controlled Activities) (Scotland) Regulations 2011;
- The Wildlife and Countryside Act 1981 (as amended);

- Nature Conservation (Scotland) Act 2004 (as amended);
- The Wildlife and Natural Environment (Scotland) Act 2011;
- The Conservation (Natural Habitats &c.) Regulations 1994 (as amended) (''The Habitats Regulations''); and
- The Protection of Badgers Act 1992.

Planning Policy

7.4.2 Chapter 5 sets out the planning policy framework that is relevant to the EIA. The policies set out in Chapter 5 include those from the South Lanarkshire Local Development Plan 2015. This section also considers the relevant aspects of Scottish Planning Policy, Planning Advice Notes and other relevant guidance. Of relevance to the ecological assessment presented within this chapter, regard has been given to the following policies:

- UK Post-2010 Biodiversity Framework (2012);
- Scottish Biodiversity Strategy: It's in Your Hands (2004)/2020 Challenge for Scotland's Biodiversity (2013); and
- Scottish Government (2017). Planning Advice Note 1/2013-Environmental Impact Assessment, Revision 1.0.

Guidance

7.4.3 The assessment is carried out in accordance with the principles contained within the following documents:

- CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester.
- Collins, J. (2016). *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition)*. Bat Conservation Trust;
- Historic Environment Scotland and Scottish Natural Heritage (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*;
- Hundt, L. (2012). *Bat Surveys: Good Practice Guidelines (2nd edition)*. Bat Conservation Trust;
- Joint Nature Conservation Committee (2013). *Guidelines for selection of biological Sites of Special Scientific Interest (SSSI)*;
- Natural England (2014). Natural England Technical Information Note TIN 051. *Bats and Onshore Wind turbines – Interim Guidance (3rd Edition)*;
- Rodrigues L., Bach L., Dubourg-Savage M.J., Karapandza B., Kovac D., Kervyn T., Dekker J., Kepel A., Bach P., Collins J., Harbusch C., Park K., Micevski B., Minderman J. (2014). *Guidelines for consideration of bats in wind farm projects*. Revision 2014. EUROBATS Publication Series No. 6;
- Scottish Government (2017b). Planning Circular 1/2017: *Guidance on The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017*;
- Scottish Executive Rural Affairs Department (SERAD) (2000). *Habitats and Birds Directives, 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 Office Circular No 6/1995*;

- Scottish Government (2001). *European Protected Species, Development Sites and the Planning Systems: Interim guidance for local authorities on licensing arrangements*;
- Scottish Government (2010). *Management of Carbon-Rich Soils*;
- Scottish Government (2016). *Draft Peatland and Energy Policy Statement*;
- Scottish Government (2017c). *Draft Climate Change Plan-the draft Third Report on Policies and Proposals 2017-2032*;
- Scottish Environment Protection Agency (SEPA) (2017) *Guidance Note 4 - Planning guidance on on-shore windfarm developments*;
- SEPA (2017). *Guidance Note 31 - Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems*;
- Scottish Government, SNH and SEPA (2017). *Peatland Survey - Guidance on Developments on Peatland*;
- SNH (2012). *Assessing the Cumulative Impact of Onshore Wind Energy Developments*;
- SNH (2013). *Planning for Development: What to consider and include in Habitat Management Plans*;
- SNH (2015). *Scotland's National Peatland Plan*;
- Scottish Renewables, SNH, SEPA, Forestry Commission (Scotland), Historic Scotland (2015). *Good Practice During Windfarm Construction (3rd Edition);*
- EC (2011). *Wind energy developments and Natura 2000* ; and
- SNH (2018). *Assessing the impact of repowered wind farms on nature. Consultation draft – June 2018*.

7.5 Consultation

7.5.1 In undertaking the assessment, consideration has been given to consultation undertaken with relevant organisations as detailed in Table 7.1 below.

7.5.2 Table 7.1 also summarises the consultation responses and provides information on where and how they have been addressed in the assessment, where relevant. Copies of relevant consultee correspondence are included in Appendix 4.1.

Table 7.1 – Consultation Responses

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action Taken
SNH – 13th July 2018	Direct consultation	Confirmation that the outlined approach for the NVC habitat survey work, protected species, great crested newts and fish will provide sufficient detail for the assessment. Assume that a peat depth survey will be carried out to support the soils assessment and help locate infrastructure.	The results of the NVC and protected species surveys are outlined in Appendices 7.1, 7.2 and C1, and illustrated on Figures 7.2 to 7.8 and Figure C7.1. The results of the peat depth survey are outlined in Chapter 11.

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action Taken
		Bats: Noted that a post-construction monitoring and mitigation regime will be helpful. The presence of *Nyctalus* sp. at other sites around Hagshaw Hill point to the need for a degree of confidence when relying on data collected for surrounding sites. The proposals for additional survey will help provide this information and it would be helpful if some of this additional survey time could be targeted at the high flying behaviour of the *Nyctalus* sp. Recording high levels of *Nyctalus* activity would endorse the need for the suggested mitigation regime.	The result of the bat surveys conducted in 2018 are outlined in Appendix 7.2 and illustrated on Figures 7.6-7.8. Survey frequency was increased from seasonal to monthly in response to consultation request. Specific focus has been paid to the assessment of high risk *Nyctalus* species, and whether any turbine curtailment or other mitigation measures are required, based on results of the 2018 surveys and other available information. At-height survey data were collected for the adjacent Douglas West Wind Farm, and results suggested that *Nyctalus spp.* were not more active at height than at ground level, with the ground detector recording similar activity levels to the detector at height, immediately above it. It was therefore considered that frequent (monthly) surveys at ground level were appropriate for recording activity of *Nyctalus* bats (see section 4.2 of Appendix 7.2 for further survey rationale).

7.6 Assessment Methodology and Significance Criteria

Consultation

7.6.1 As discussed in Chapter 4, a formal Scoping Opinion was not requested from the Scottish Ministers, however direct consultation with relevant consultees was undertaken to discuss and agree the scope and approach to surveys and assessments. An ecology-specific scoping report (MacArthur Green (2018), refer to Appendix 4.1) was provided to SNH, on which SNH provided comments.

7.6.2 Table 7.1 in section 7.5 outlines the consultation responses associated with the Proposed Development. Copies of relevant consultee correspondence are included in Appendix 4.1.

Study Area

7.6.3 The area within which the desk-based research and field surveys were undertaken varies depending on the ecological feature and its search/survey requirements. Details of the extent of each search/study area are described in the relevant 'Baseline Conditions' section of this chapter and associated Appendices 7.1 and 7.2, Appendix C1, and their respective figures. Hereafter in this chapter, the areas covered by field surveys and assessment are collectively referred to as the 'study area'.

Desk Study

7.6.4 A desk study was undertaken to collate available ecological information in relation to the Proposed Development and surrounding environment. The desk study was conducted in line with the proposals set out within the Proposed Development Ecology Scoping Report (MacArthur Green, 2018).

7.6.5 A search was conducted for the presence of any designated sites with ecological qualifying features within 5 km of the Proposed Development.

7.6.6 Ecological information available in the public domain relating to applications for the following seven local wind farm projects (within 2 km) was also considered:

- Douglas West & Dalquhandy DP Renewable Energy Project (DW);
- Douglas West Community Wind Farm (DWCW);
- Dalquhandy Wind Farm (DQ);
- Hagshaw Hill Extension Wind Farm (HH);
- Galawhistle Wind Farm (GA);
- Nutberry Wind Farm (NU); and
- Cumberhead (Nutberry Extension) Wind Farm (CU).

7.6.7 Information from the above wind farm projects included scoping reports, Environmental Statements (ESs) and consultation responses from relevant stakeholders.

7.6.8 Surveys were undertaken at the seven local wind farm projects within the vicinity of the Proposed Development between 2004 and 2017. Table 7.2 as sourced from the Ecology Scoping Report (MacArthur Green, 2018), outlines the timeline of baseline ecological surveys carried out these sites.

Table 7.2 – Timeline of Baseline Ecological Surveys Undertaken for Nearby Wind Farm Sites

	04	05	06	07	08	09	10	11	12	13	14	15	16	17
HH														
NU														
GA														
DWCW														
DQ														
CU														
DW														

7.6.9 Specific ecology dates for surveys undertaken as part of the baseline for the local wind farm projects are outlined in Table 7.3, as sourced from the Ecology Scoping Report (MacArthur Green, 2018).

Table 7.3 – Timing of Various Ecological Surveys Undertaken for Nearby Wind Farm Sites

Survey	HH	NU	GA	DWCW	DQ	CU	DW
Phase 1 habitats	2004	2005	2008-09	2010	2011	2013	2014
NVC habitats	-	2005	2009	2012	2012	2014	2014
Protected Species	2004	2005	2008-09	2009-10	2011-12	2014	2014, 2017
Bats	2004	2005	2008-09	2010	2011-12	2014	2014-15
Great Crested Newt	-	-	-	2012	2011-12	2014	2014-15
Fish	-	-	2009	2010	-	2014	2012

7.6.10 The ecological information from the desk study was used to inform the scope of surveys for the Proposed Development and give a longer-term overview of the ecological features that may be present, to aid the impact assessment.

Field Surveys

7.6.11 Ecological fieldwork commenced in May 2018 and was completed in September 2018.

7.6.12 The following field survey visits were undertaken to establish the presence of ecological features within the site (plus appropriate buffers), and were undertaken in line with standard methodologies and guidance (respective study areas are also shown in Figures 7.2 to 7.8 and Figure C7.1):

- NVC habitat surveys: May and August 2018;
- Protected species surveys: May and June 2018;
- Great crested newt suitability index assessment: April 2018;
- Bat activity surveys: May to September 2018; and
- Bat roost potential surveys (undertaken as part of the protected species surveys): May and June 2018.

7.6.13 The full suite of survey methods, species specific legislation and results are provided within Appendices 7.1, 7.2 and Appendix C1. The field surveys were undertaken following best practice guidance, which are summarised within the relevant appendices.

7.6.14 Additional survey visits were conducted to account for changes to the proposed infrastructure during the design evolution.

Assessment of Potential Effect Significance

7.6.15 This section defines the methods used to assess the significance of effects through the process of an evaluation of Nature Conservation Importance (a combination of Nature Conservation Value and Conservation Status) and magnitude of impact for each likely effect.

7.6.16 There can often be varying degrees of uncertainty over the sensitivity of receptors or magnitude of impacts as a result of limited information. A precautionary approach is therefore adopted where the response of a population to an impact is uncertain. The assessment focusses on a 'worst-case' Proposed Development as described below.

7.6.17 The assessment method follows the principles within the guidance detailed by CIEEM (2016).

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

- identification of the potential ecological impacts of the Proposed Development, including both beneficial and adverse;
- consideration of the likelihood of occurrence of potential impacts where appropriate;

- defining the nature conservation importance of the ecological features present;
- establishing the feature's conservation status where appropriate;
- establishing the magnitude of the likely impact (both spatial and temporal);
- based on the above information, a professional judgement is made as to whether the identified effect is significant in the context of the EIA Regulations;
- if a potential effect is determined to be significant, measures to avoid, reduce, mitigate or compensate for the effect are suggested where required;
- opportunities for enhancement are considered; and
- residual effects after mitigation, compensation or enhancement are considered.

Determining Nature Conservation Importance

7.6.19 Nature conservation importance (or value) is defined on the basis of the geographic context given in Table 7.4 (which follows the guidance as detailed within CIEEM, 2016). 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, a Special Area of Conservation (SAC) designated under the Habitats Directive is 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 (CIEEM, 2016). 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 rather than national or international).

7.6.20 Where possible, the valuation of habitat/populations within this assessment will make use of any relevant published evaluation criteria (e.g. The Scottish Biodiversity List (Scottish Government, 2013), JNCC on selection of biological SSSIs (JNCC, 2013)). Furthermore, JNCC guidance (JNCC, 2008) has been consulted where relevant so that cross-referencing of classifications within different systems can be standardised (e.g. correctly matching NVC types with Annex I habitats where relevant etc.).

7.6.21 Those ecological features affected at the site and deemed to be of local, regional, national, and international importance are termed 'Important Ecological Features' (IEFs).

7.6.22 Where relevant, information regarding the particular 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.

Table 7.4 – Approach to Valuing Ecological Features[1]

Nature Conservation Importance of Feature in Geographical Context	Description
International	An internationally designated site (e.g. SAC).
	Site meeting criteria for international designations or qualifying species of an SAC where there is connectivity.

1 Adapted from Hill et al. (2005).

Nature Conservation Importance of Feature in Geographical Context	Description
	Species present in internationally important numbers (>1% of biogeographic populations).
National (UK)	A nationally designated site (SSSI, or a National Nature Reserve (NNR)), or sites meeting the criteria for national designation or qualifying species where there is connectivity.
	Species present in nationally important numbers (>1% UK population).
Regional (Natural Heritage Zone or Local Authority Area)	Species present in regionally important numbers (>1% of Natural Heritage Zone population).
	Areas of habitat falling below criteria for selection as a SSSI (e.g. areas of semi-natural ancient woodland larger than 0.25ha).
Local	Local Nature Reserves (LNR).
	Areas of semi-natural ancient woodland smaller than 0.25ha.
	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. Features falling below local value are not normally considered in detail in the assessment process.

Magnitude of Impact

7.6.23 Impact magnitude refers to changes in the extent and integrity of an ecological receptor. A suitable definition of ecological 'integrity' is found within Scottish Executive circular 6/1995 updated by SERAD (2000) which states that, "*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*". Although this definition is used specifically regarding European level designated sites (SACs and SPAs), it is applied to wider countryside habitats and species for the purposes of this assessment.

7.6.24 Determining the magnitude of any likely impacts requires an understanding of how the ecological features are likely to respond to the Proposed Development. This change can occur during construction or operation of the Proposed Development.

7.6.25 Impacts can be adverse, neutral or beneficial.

7.6.26 Impacts are judged in terms of magnitude in space and time. There are five levels of spatial impacts and five levels of temporal impacts as described in Table 7.5 and Table 7.6.

Table 7.5 – Definition of Spatial Impact Magnitude upon the IEFs

Spatial Magnitude	Description
Very High	Would cause the loss of the majority of a feature (>80%) or would be sufficient to damage a feature sufficient to immediately affect its viability.
High	Would have a major impact on the feature or its viability. For example, more than 20% habitat loss or damage.
Moderate	Would have a moderate impact on the feature or its viability. For example, between 10 - 20% habitat loss or damage.
Low	Would have a minor impact upon the feature or its viability. For example, less than 10% habitat loss or damage.
Negligible	Minimal change on a very small scale; impacts not dissimilar to those expected within a 'do nothing' scenario.

Table 7.6 – Definition of Temporal Impact Magnitude upon the IEFs

Temporal Magnitude	Description
Permanent	Impacts 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 impact.

Significance

7.6.27 The significance of potential effects is determined by integrating the assessments of Nature Conservation Importance and Conservation Status and magnitude of impact in a reasoned way, based on the available evidence and professional judgement.

7.6.28 Table 7.7 details the significance criteria that have been used in assessing the effects of the Proposed Development.

Table 7.7 - Significance Criteria

Significance of Effect	Description
Major	Significant effect, as the effect is likely to result in a long term significant adverse effect on the integrity of the feature.
Moderate	Significant effect, as the effect is likely to result in a medium term or partially significant adverse effect on the integrity of the feature.
Minor	The effect is likely to adversely affect the feature at an insignificant level by virtue of its limited duration and/or extent, but there will probably be no effect on its integrity. This is not a significant effect.
Negligible	No material effects. This is not a significant effect.

7.6.29 Using these definitions, it must be decided whether there will be any effects which will be sufficient to adversely affect the IEF to the extent that its Conservation Status deteriorates above and beyond that which would be expected should baseline conditions remain (i.e. the 'do nothing' scenario).

7.6.30 Major and moderate effects are considered significant and minor and negligible not significant in accordance with the EIA Regulations.

Cumulative Assessment

7.6.31 SNH cumulative assessment guidance (SNH, 2012) is used to inform the cumulative assessment in this chapter. It is not possible to evaluate cumulative effects through the study of one development in isolation but the assessment of effects when considered in combination with other developments, projects or activities is required. However, in the interests of focusing on the potential for significant effects, this assessment considers the potential for cumulative effects with other EIA developments. The context in which these effects are considered is heavily dependent on the ecology of the feature 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/Natural Heritage Zone may be the relevant spatial scale. Therefore, an assessment of cumulative effects will be made for each feature, appropriate to its ecology.

Requirements for Mitigation

7.6.32 Mitigation will be required if the assessment determines that there is an unmitigated moderate adverse or major adverse and therefore significant effect on any IEF identified in this chapter.

7.6.33 Even without any significant effects on IEFs, general mitigation will be applied in the form of a Species Protection Plan (SPP) to ensure that disturbance to IEFs or their protected features (e.g. holts, setts) is avoided (see *Project Assumptions* in section 7.8).

Assessment of Residual Effect Significance

7.6.34 If a potential effect is determined to be significant, suggested measures to mitigate or compensate the effect will be considered and the revised significance of residual effects after mitigation will be assessed.

Limitations to Assessment

7.6.35 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.

7.6.36 The proposed access track to the southeast of the Proposed Development site was surveyed for habitats and protected species until the point where it intersects with the existing track for the Existing Development at Douglas West (see Figure 7.2 and Confidential Figure C.1). The short portion of access track to the east of this point overlaps with the survey area for the proposed Douglas West Wind Farm, where habitat surveys were undertaken in 2014, and protected species surveys were undertaken in 2014, 2015 and 2017. Data from these surveys relevant to that stretch of the Proposed Development access road have been used to inform this assessment. It is considered very unlikely that there have been any notable differences to habitat type within this area since 2014, and given that new surveys for all protected species will be required prior to commencement of any works to inform detailed mitigation measures for a Species Protection Plan, it is considered that use of these data for this short stretch of the access road will not affect the integrity of the assessment.

7.6.37 Potential limitations to the assessment relating to bats are detailed in section 4 of Appendix 7.2, but the site-specific issues can be summarised as follows:

- Detector Data Loss and Data Accuracy: there was some evidence of disturbance to bat detectors by cattle in early surveys, although it is not clear how much data were lost, with some log files not recording any microphone sensitivity issues. Detectors were relocated to avoid any further disturbance and it is considered that the amount of data recorded (effort increased to monthly, and from 10 locations) is sufficient to be able to conduct a robust assessment of bat activity across the site.
- Recording Higher Altitude Activity: bat detectors were placed at ground level only. For the Proposed Development, it is however considered that based on the evidence presented in Appendix 7.2, conducting static detector surveys at ground level only is not considered to have affected the ability to adequately determine baseline activity levels and conduct a robust assessment of bat activity at the site. Survey results show that overall *Nyctalus* activity levels were low, and desk studies have shown similar results in the local area, with no known roost sites in the vicinity of the site.

7.7 Baseline Conditions

7.7.1 SNH's consultation draft guidance on assessing the impact of repowered wind farms on nature conservation (SNH, 2018) advises that the baseline for EIA should be the "*expected restored state of the site, excluding the existing turbines*". SNH also notes that "*the current use of the site as a wind farm will be a material consideration. It is therefore likely to be helpful to also present information which compares the full effects of the new proposal with those of the existing scheme*."

7.7.2 As set out in Chapter 4 of this EIA Report, Schedule 4, Part 3 of the EIA Regulations requires that the EIA Report includes, "*A description of the relevant aspects of the current state of the environment (the 'baseline scenario' and an outline of the likely evolution thereof without implementation of the project as far as its natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of relevant information and scientific knowledge*."

7.7.3 This assessment seeks to align with the draft SNH guidance, while remaining compliant with the EIA Regulations, by presenting an assessment of the potential effects of the Proposed Development at the site as if it had been decommissioned and restored, while also acknowledging the presence of the Existing Development and considering the difference in effects between the Existing Development and the Proposed Development.

7.7.4 Surveys have been undertaken at the Proposed Development site in its current condition, and therefore the survey discussion given below and in Appendices 7.1, 7.2 and Confidential Appendix

C.1 necessarily describe the actual current baseline of the site, i.e. reflecting the existence and operation of the Existing Development.

7.7.5 However, the future baseline (i.e. the baseline in the event that the Proposed Development does not progress) is considered as the expected restored state of the site. There is currently no detailed restoration plan for the Existing Development, therefore, it is difficult to provide detail on the expected restored state of the site. It is considered reasonable to assume that, in the event that the proposed repowering project was not pursued, the Existing Development turbines would be removed, with bases left in situ below ground level, and the areas of the turbine bases, associated hardstanding and tracks would be restored to a condition similar to surrounding land. For the purposes of this assessment, relevant areas that would be subject to habitat restoration as part of decommissioning have been classified as 'Restored Upland Habitat', as further detailed in paragraphs 7.8.3 to 7.8.7.

7.7.6 This section details the results of the desk study and field surveys, providing the baseline conditions for the site as noted above, and includes:

- Designated sites within 5 km of the Proposed Development;
- Results of the desk study;
- Habitats and vegetation; and
- Protected and notable species.

Desk Study

Designated Sites

7.7.7 There are three designated sites located within 5 km of the Proposed Development that have ecological qualifying features; details of these are provided within Table 7.8 and Figure 7.1.

Table 7.8 – Designated Sites within 5 km of the Proposed Development

Name	Distance	Qualifying Interests	Status
Coalburn Moss SAC and SSSI	2.7 km	Active raised bog Degraded raised bog	Favourable maintained Unfavourable recovering
Muirkirk Uplands SSSI	3.7 km	Blanket bog Upland assemblage	Unfavourable no change Favourable maintained
Miller's Wood SSSI	5 km	Upland birch woodland	Unfavourable declining

Protected Species

7.7.8 The site is approximately centred around grid reference 279240 630238. A search on the NBN Atlas for Living Scotland for species records in a 5 km buffer from this location contained records from 2000 for the following relevant protected or notable species:

- Common pipistrelle (*Pipistrellus pipistrellus)*;
- Mountain hare (*Lepus timidus*);
- Otter (*Lutra lutra*); and
- Red deer (*Cervus elaphus*).

7.7.9 A search was carried out on records from the Scottish Leisler's Bat Project supplied to MacArthur Green by John Haddow in May 2015, which is shown in Table 5-1 of Appendix 7.2 and on Figure 7.6.

In total six *Nyctalus spp*. records were found to be within 20 km of the study area, with the closest 4 km away, near Douglas.

7.7.10 A review of scoping reports, consultation responses and ESs of seven local wind farm projects found evidence of several protected species, as outlined within Table 7.9 below, as adapted from the Ecology Scoping Report (MacArthur Green, 2018).

7.7.11 Table 7.9 states whether a species was found to be present (P) or whether there was no evidence (NE) recorded during surveys, or in the cases where species were not included within the scope of surveys, not surveyed (-).

Table 7.9 – Summary of Ecological Findings for Nearby Wind Farm Projects

Species	HH	NU	GA	DWCW	DQ	CU	DW
Badger	NE	P	P	P	P	P	P
Otter	NE	NE	P	P	P	P	P
Water vole	NE	NE	NE	NE	NE	NE	NE
Pine marten	-	-	-	-	-	NE	NE
Red squirrel	NE	NE	NE	NE	NE	NE	NE
Great crested newt	-	-	-	NE	NE	NE	NE
Common pipistrelle	-	-	P	P	P	P	P
Soprano pipistrelle	-	-	P	P	P	P	P
Myotis sp.	-	-	P	P	P	P	P
Nyctalus sp.	-	-	NE	P	P	P	P
Brown long-eared bat	-	-	P	NE	NE	P	P
Brown trout	P	P	P	P	-	P	P
Atlantic salmon	NE	P	NE	NE	-	NE	NE
European eel	NE	NE	NE	NE	-	NE	NE

Field Surveys

7.7.12 Details regarding field survey methodologies and results are included within Appendices 7.1, 7.2 and C1. The following section summarises the baseline conditions as identified during these surveys.

Habitat Surveys

7.7.13 Habitat surveys for the Proposed Development followed the NVC scheme (Rodwell *et al.,* 1991-2000) using standard methods (Rodwell, 2006). Surveys were undertaken within the study area as detailed within Appendix 7.1 and illustrated in Figures 7.2 to Figure 7.3. The 2018 habitat study area covered 505.38 hectares (ha) and in places extended beyond the site boundary as a consequence of the requirement to ensure sufficient buffer areas were surveyed to account for the presence of potential GWDTEs, in line with SEPA guidance (SEPA, 2017a, 2017b).

The survey data collected in 2018 was supplemented by habitat survey data collected in 2014, to the east of the Existing Development access track at Douglas West, which comprises the easternmost part of the Proposed Development's access route, towards the existing haul road. This area was surveyed as part of the Douglas West Wind Farm project, and survey results are included in Figures 7.2 and 7.3. Phase 1 Habitats

7.7.14 The NVC data was also cross-referenced to the Phase 1 Habitat Survey Classification (JNCC, 2010) to allow a broader characterisation of habitats. The extent of Phase 1 habitat types within the study area was calculated using the correlation of specific NVC communities to their respective Phase 1 types, and their extents within GIS; including within mosaic areas. The results of this analysis are summarised in Table 7.10 below, in order of Phase 1 code. Figure 7.2 displays the NVC survey results; however, standard Phase 1 shading has also been used to broadly characterise stands of vegetation based on the dominant NVC community within a particular area.

Table 7.10 – Phase 1 Habitat Types within the NVC Study Area

Phase 1 Habitat Code	Phase 1 Habitat Description	NVC Communities (and sub-communities) Recorded	Area (ha)	% of NVC Study Area
A1.1.1	Woodland: broadleaved, semi-natural	W7 (c), W11	3.58	0.71
A1.1.2	Woodland: broadleaved, plantation	n/a	0.04	0.01
A1.3	Woodland, Mixed plantation	n/a	0.33	0.07
A1.2.2	Woodland: coniferous, plantation	W18 and non-NVC communities	9.48	1.88
A2	Scrub	W23	0.13	0.02
B1.1	Acid grassland: unimproved	U2, U4 (a & d), U5, U6	128.37	25.40
B1.2	Acid grassland: semi-improved	U4b	14.62	2.89
B2.1/B2.2	Neutral grassland: unimproved/semi-improved	MG1, MG9	1.40	0.28
B5	Marsh/marshy grassland	M23, M25, M25b, MG10, M25-U6 intermediate, non-NVC *Juncus* dominated habitats	140.23	27.75
B6	Poor semi-improved grassland	MG6	1.42	0.28
C1.1	Bracken: continuous	U20 (a)	14.07	2.78
C3.1	Other tall herb & fern: tall-ruderal	OV25	0.02	0.004
D1.1	Dry dwarf shrub heath - acid	H9c, H10	0.15	0.03
D2	Wet dwarf shrub heath	M15d	20.71	4.10
E1.6.1	Bog: blanket	M17 (a,c), M19a, M20 (a,b)	136.73	27.05
E1.7	Bog: wet modified	M2, M3, M25a	1.04	0.21
E2.1	Flush/spring: acid/neutral	M4, M6 (c,d)	18.95	3.75
E2.2	Flush/spring: basic	M10	0.19	0.04
E2.2	Flush/spring: bryophyte dominated	M32b	0.10	0.02
F1	Swamp	S9, S12	0.07	0.01
J3.6	Buildings	n/a	0.51	0.10
J1.2	Amenity grassland	n/a	0.82	0.16
J4	Bare ground	n/a	3.17	0.63
J5	Other habitat (restored upland habitat = Existing Development infrastructure)	n/a	9.26	1.83

NVC Communities

7.7.15 The NVC communities and non-NVC habitat types recorded within the NVC study area are provided in Table 7.11 below and include the proportions of particular community or habitat types that are found within the NVC study area, including proportions within mosaic habitats. Full descriptions of the habitats, NVC communities and associated flora of the NVC study area are provided in Appendix 7.1.

7.7.16 The NVC surveys recorded 30 recognised NVC communities within the NVC study area, with various associated sub-communities; however only a small number of these habitats made up the majority of the study area. A number of non-NVC habitat types are also present.

Annex I Habitats

7.7.17 Certain NVC communities can also correlate to various Annex I habitat types listed under the Habitats Directive. However, the fact that an NVC community can be attributed to an Annex I type 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.

7.7.18 NVC survey data and field observations have been compared to JNCC Annex I habitat listings and descriptions (JNCC, 2016a). Those habitats within the study area which could be considered Annex I habitats are also summarised in Table 7.11.

7.7.19 The extents and often relatively low quality and degraded nature of these potential Annex I habitats within the NVC study area means none are considered of more than local nature conservation value (Table 7.11). Full details and discussion of Annex I habitat types present are provided within Appendix 7.1.

SBL Priority Habitats

7.7.20 The SBL (Scottish Government, 2013) 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. Some of these priority habitats are quite broad and can correlate to many NVC types.

7.7.21 Relevant SBL priority habitat types and corresponding associated NVC types recorded within the NVC study area are also summarised in Table 7.11. These SBL priority habitats also correlate with UK Biodiversity Action Plan (BAP) Priority Habitats (JNCC 2016b).

Groundwater Dependent Terrestrial Ecosystems

7.7.22 The NVC results were referenced against SEPA guidance (SEPA, 2017b), 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 study area are also summarised in Table 7.11; these are shown in Figure 7.3.

7.7.23 The potential GWDTE sensitivity of each polygon containing a potential GWDTE community was classified on a four-tier approach as follows:

- 'Highly – dominant' where potential high GWDTE(s) dominate the polygon;
- 'Highly – sub-dominant' where potential high GWDTE(s) make up a sub-dominant percentage cover of the polygon;
- 'Moderately – dominant' where potential moderate GWDTE(s) dominate the polygon and no potential high GWDTEs are present; and
- 'Moderately – sub-dominant' where potential moderate GWDTE(s) make up a sub-dominant percentage cover of the polygon and no high GWDTEs are present.

7.7.24 Where a potential high GWDTE exists in a polygon, it outranks any potential moderate GWDTE communities within that same polygon.

7.7.25 GWDTE sensitivity has been assigned here solely on the SEPA listings (SEPA, 2017b). However, 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 at all. Further information on groundwater dependency is provided within Appendix 7.1.

Table 7.11 – Summary of NVC Communities Recorded within the NVC Study Area

NVC Community Code and Name		Extent in Study Area (ha)	% of Study Area	Potential GWDTE	Annex I Habitat Type	SBL Priority Habitat
Mires and Flushes						
M2, M2b	*Sphagnum cuspidatum/fallax* bog pool community	0.18	0.04	-	7130 Blanket bog (where associated with M17-M20)	Blanket bogs
M3	*Eriophorum angustifolium* bog pool community	0.07	0.01	-	7130 Blanket bog (where associated with M17-M20)	Blanket bogs
M4	*Carex rostrata - Sphagnum fallax* mire	0.42	0.08	-	7140 Transition mires and quaking bogs	Upland flushes, fens and swamps
M6c, M6d	*Carex echinata - Sphagnum fallax/denticulatum* mire	18.53	3.67	High	-	Upland flushes, fens and swamps
M10	*Carex dioica - Pinguicula vulgaris* mire	0.19	0.04	High	7230 Alkaline fens	Upland flushes, fens and swamps
M17a, M17c	*Trichophorum germanicum – Eriophorum vaginatum* blanket mire	19.11	3.78	-	7130 Blanket bog	Blanket bog
M19a	*Calluna vulgaris – Eriophorum vaginatum* blanket mire	10.97	2.17	-	7130 Blanket bog	Blanket bog
M20, M20a, M20b	*Eriophorum vaginatum* blanket mire	106.64	21.10	-	7130 Blanket bog	Blanket bog
M23, M23a, M23b	*Juncus effusus/acutiflorus*	13.69	2.71	High	-	Upland flushes, fens

NVC Community Code and Name		Extent in Study Area (ha)	% of Study Area	Potential GWDTE	Annex I Habitat Type	SBL Priority Habitat
	– *Galium palustre* rush-pasture					and swamps (M23a)
M25, M25a, M25b	*Molinia caerulea* – *Potentilla erecta* mire	4.84	0.96	Moderate	-	-
M25-U6 intermediate community	M25 - U6 intermediate community	0.37	0.07	-	-	-
Wet Heaths						
M15d	*Trichophorum germanicum* – *Erica tetralix* wet heath	20.71	4.10	Moderate	4010 Northern Atlantic wet heaths with *Erica tetralix*	Upland heathland
Springs						
M32b	*Philonotis fontana* – *Saxifraga stellaris* spring	0.10	0.02	High	-	Upland flushes, fens and swamps
Dry Heaths						
H9c	*Calluna vulgaris* – *Deschampsia flexuosa* heath	0.07	0.01	-	4030 European dry heaths	Upland heathland
H10	*Calluna vulgaris* – *Erica cinerea* heath	0.07	0.01	-	-	-
Calcifugous Grasslands and Bracken-Dominated Vegetation						
U2, U2b	*Deschampsia flexuosa* grassland	1.26	0.25	-	-	-
U4, U4a, U4b, U4d	*Festuca ovina* – *Agrostis capillaris* – *Galium saxatile* grassland	57.58	11.39	-	-	-
U5, U5a, U5b	*Nardus stricta* – *Galium saxatile* grassland	55.89	11.06	-	-	-
U6	*Juncus squarrosus* – *Festuca ovina* grassland	28.25	5.59	Moderate	-	-
U20, U20a	*Pteridium aquilinum* – *Galium saxatile* community	14.07	2.78	-	-	-
Mesotrophic Grasslands						
MG1	*Arrhenatherum elatius* grassland	1.30	0.26	-	-	-

NVC Community Code and Name		Extent in Study Area (ha)	% of Study Area	Potential GWDTE	Annex I Habitat Type	SBL Priority Habitat
MG6	*Lolium perenne – Cynosurus cristatus* grassland	1.42	0.28	-	-	-
MG9	*Holcus lanatus-Deschampsia cespitosa* grassland	0.10	0.02	Moderate	-	-
MG10, MG10a	*Holcus lanatus – Juncus effusus* rush-pasture	12.01	2.38	Moderate	-	-
Woodland and Scrub						
W7, W7c	*Alnus glutinosa – Fraxinus excelsior – Lysimachia nemoreum* woodland	0.47	0.09	High	-	Wet woodland
W11	*Quercus petraea – Betula pubescens – Oxalis acetosella* woodland	3.11	0.61	-	-	-
W18c	*Pinus sylvestris – Hylocomium splendens* woodland	0.72	0.14	-	-	-
W23	*Ulex europaeus-Rubus fruticosus* scrub	0.13	0.02	-	-	-
Swamps and Tall Herb-Fens						
S9	*Carex rostrata* swamp	0.07	0.01	-	-	Upland flushes, fens and swamps
Vegetation of Open Habitats						
OV25	*Urtica dioica – Cirsium arvense* community	0.02	0.004	-	-	-
Non-NVC Community or Feature Type						
RuH	Restored Upland Habitat (Existing Development infrastructure)	9.26	1.83	-	-	-
MP	Mixed Plantation	0.33	0.07	-	-	-
CP	Conifer plantation	5.18	1.02	-	-	-
YCP	Young conifer plantation	3.58	0.71	-	-	-

NVC Community Code and Name		Extent in Study Area (ha)	% of Study Area	Potential GWDTE	Annex I Habitat Type	SBL Priority Habitat
YBP	Young broadleaved plantation	0.04	0.01	-	-	-
BG	Bare ground, soil, rock, hardstandings	3.17	0.63	-	-	-
BD	Buildings and associated driveways	0.51	0.10	-	-	-
PG	Gardens and amenity grassland	0.82	0.16	-	-	-
Je	*Juncus effusus* acid grassland community	80.86	16.00	Moderate [2]	-	-
Ja	*Juncus acutiflorus* acid to neutral grassland community	29.26	5.79	Moderate [2]	-	-

Habitat Descriptions

7.7.26 A brief description of the main Phase 1 habitats and associated NVC types recorded within the NVC study area, roughly in order of abundance, is presented below (full descriptions provided in Appendix 7.1). In the following paragraphs where reference is made to NVC community codes, the full community name can be cross-referred to Table 7.11 above.

7.7.27 **Acid grassland** of the NVC types U2, U4, U5 and U6 is the most abundant habitat type at the site covering 142.99 ha (28.29 %) of the study area (Table 7.11); U4 and U5 are common, whilst U2 is rare (see Table 7.11). Acid grasslands are found as stands of varying size across the study area. U4 grasslands across the site are all subject to grazing, with area on the elevated sections of the site generally unimproved, smaller and patchier. There were a few large stands of U5 recorded, present on the middle to upper slopes on a number of the hills within the study area. Each of the acid grassland NVC communities recorded within the study area contain typical and characteristic species assemblages (see Appendix 7.1 for full community descriptions).

7.7.28 **Marshy grassland** habitats cover 140.23 ha (27.75 %) of the study area, and is made up of M23, M25, MG10 and M25-U6 intermediate habitats. M23 is relatively common across the NVC study area (13.69 ha, 2.71 %), with larger expanses present at the lower altitudes associated with watercourse floodplains and in damp grazing pastures, and on the gently sloping ground to the south of the study area and along the southeast access corridor to Douglas West. M25 (M25 & M25b) is uncommon, covering 4.06 ha (0.80 %) in small scattered patches across the study area, and is relatively dry and located on shallow peat within a wider matrix of acid grassland, wet heaths and mires. MG10 is relatively common throughout the southern study area, covering 12.01 ha (2.38 %), and is associated with the damp grazed pastures and poor pastoral ground present in the area. Non-NVC types Je and Ja are also considered within the marshy grassland habitat (16.00 % and 5.79 % of the NVC study area respectively), these habitat types are present across the study area where *Juncus effusus* and *J.acutiflorus* grow abundantly within a few shorter acid grassland swards.

7.7.29 **Blanket bog and wet modified bog** habitats cover 137.77 ha (27.26 %) of the study area, and consist of M2, M3, M17, M19, M20 and M25a NVC communities and sub-communities. Annex I type 7130

[2] *In light of the SEPA classification on potential GWDTEs (SEPA, 2017b), the non-NVC types 'Je' and 'Ja' should also qualify for potential GWDTE status. The classification of moderate sensitivity is keeping in line with similar Juncus spp. dominated grassland communities (e.g. MG10).*

blanket bog correlates directly with a number of NVC communities within the NVC study area including M17, M19 and M20. The majority of the blanket bog present is of the NVC type M20 *Eriophorum vaginatum* blanket mire covering 106.64 ha (21.10 %), and is found on the plateaus and many of the lower slopes of the main hills. M17, and more specifically, M17c *Juncus squarrosus* – *Rhytidiadelphus* sub-community is found within the lower altitudes of the southern study area. A single area of M17a *Drosera rotundifolia – Sphagnum* spp. sub community was also recorded. M19 habitat exists as M19a *Erica tetralix* sub-community, and is restricted to the higher altitude plateaus in the north western study area. Examples of bog pool communities including M2 and M3 recorded within the NVC study area occurred within blanket mires (M17, M19 and M20 mire) and were therefore included as blanket bog. M2 habitat is rare within the study area, covering 0.18 ha (0.04 %), and is found as a few small pools and runnels within the blanket mire habitat in the north of the study area. A single narrow band of NVC community M3 was recorded within an area of M19 and M20 blanket mire within the northern study area. M25a mire which is very scarce within the NVC study area (0.15 %) is classified as wet modified bog but it can also fall within the blanket bog Annex I type where the underlying peat depth is greater than 0.5m.

7.7.30 **Wet dwarf shrub heath** habitat covers 20.71 ha (4.10 %) and is present as a small number of stands of M15 habitat, most of which are found across the upper-middle slopes of Common Hill and Broomerside Hill. Annex I type 4010 Northern Atlantic wet heaths correlates with the M15 NVC community. All of the wet heath habitat that is present within the study area exists as the M15d *Vaccinium myrtillus* sub-community. The habitat has been intensively grazed within the study area which has resulted in quite dry, open, mossy and grassy wet heath.

7.7.31 **Flush and spring: acid neutral** habitat is made up of NVC types M4 and M6 within the study area. M6 makes up 18.53 ha (3.67 %) and is widespread across the study area, present mostly as small flushes, runnels or soakaways. M4 is rare, covering 0.42 ha (0.08 %), with only one mappable stand in the north-west of the study area and the remaining areas found as a small percentage of some flush mosaics. Annex I type 7140 transition mire and quaking bog correlates with the NVC community M4 (M6 is not included as an Annex I habitat type).

7.7.32 **Flush and spring: basic** habitat of the NVC type M10 does not cover extensive areas (0.04 % of the NVC study area) but consists of a number of small, dry stands on the slopes of Broomerside Hill and within the gully slopes of Windrow Burn. Annex I type 7230 alkaline fen correlates with the M10 flushes and appear as seepages from the slopes and low, stony swards.

7.7.33 **Flush and spring: bryophyte dominated** habitat was recorded within the study area; the NVC type M32 makes up 0.10 ha (0.02 %) of the NVC study area. Four springs, all of the M32b *Montia fontana – Chrysosplenium oppositifolium* sub-community, were recorded in three areas along the western slopes of Burnt Rig and in one location on Broomerside Hill.

7.7.34 All other habitat types added together make up less than 9 % of the habitats study area (Table 7.11) and none are considered to be of more than local nature conservation value at the site. Given their limited extents, details of these habitats are not provided within this chapter but can be found in Appendix 7.1.

7.7.35 A number of non-NVC vegetation or feature types (including conifer plantation, young conifer plantation, young broadleaved plantation, bare ground, buildings, and gardens and amenity grassland) were also mapped during the survey. This includes the existing Douglas West bing, which is proposed as a borrow pit to provide materials for site construction, as shown in Figure 1.2b and Figure 3.10. The main heap is around 200 m long, and is around 20 m high above surrounding ground level. The bing continues northward for circa a further 200 m at a lower level from the main heap and is more heavily landscaped, comprising non-standard NVC habitats such as conifer and mixed woodland. The top of the southern area is relatively flat and exposed, with some succession vegetation and trees. Most of the top and northern area has been partially landscaped.

7.7.36 The non-NVC features recorded within the study area either lacked vegetation or were floristically poor and were of negligible botanical importance. They are therefore not discussed further within this chapter.

Peatlands

7.7.37 The Carbon and Peatland Map (SNH, 2016) was consulted to determine likely peatland classes present in the study area; the map provides an indication of the likely presence of peat at a coarse scale. The Carbon and Peatland map has been developed as "*a high-level planning tool to promote consistency and clarity in the preparation of spatial frameworks by planning authorities*". It identifies areas of "*nationally important carbon-rich soils, deep peat and priority peatland habitat*" 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*".

7.7.38 There is no Class 1 or Class 2 peatland present on site according to the Carbon and Peatland Map (SNH, 2016).

7.7.39 As the Carbon and Peatland Map is a high-level tool, peat depth surveys were also carried out across the study area, as outlined within Chapter 11 and Appendix 11.1.

Non-Avian Fauna

7.7.40 This section summarises the results of the protected species surveys carried out in 2018 across the site, and in 2014, 2015 and 2017 within the portion of the site (access route and potential bing working) to the east of the Existing Development track at Douglas West. Full details of the results for each species are included in the following Appendices and Figures:

- Protected species (including otter, water vole, badger, pine marten, red squirrel, reptiles and great crested newt): Appendix C.1 and Figures C7.1 and 7.4; and
- Bats: Appendix 7.2, Figures 7.5 to 7.8.

Otter

7.7.41 No protected features (i.e. holts or couches) or other field signs of otter were recorded during the surveys in 2018. Some spraints and a predated frog attributable to otter were recorded during Douglas West baseline surveys in 2014-15 along the Alder Burn, where the proposed access track to the east is located (Figure C7.1). A structure, potentially suitable for use as a holt, was recorded in 2017, on the northern edge of the waterbody connected to the Alder Burn, which is to the north of the proposed eastern access track, but there were no signs of usage.

7.7.42 The study area therefore offers some suitable habitat for otter. Several of the watercourses offered suitable foraging opportunities and the habitats in the surrounding area were suitable for supporting amphibian species which could act as a prey source. The upper reaches of the watercourses and their tributaries offer less suitability, given their limited size and impact from heavy grazing. The watercourses increase in suitability as they flow downstream and offer greater foraging and commuting potential. Suitable sheltering opportunities exist along Windrow and Robshill Burn, offered by bankside vegetation and exposed tree root plates. The watercourses on site feed into the Douglas Water which is known to support otter.

7.7.43 Otter are known to be present in the vicinity of the site, with signs indicating their presence recorded during surveys of five local wind farm projects (see Table 7.9). Given the close vicinity of the sites and hydrological connectivity of some of the sites, it is likely that otter will occasionally use the watercourses and habitats within the Proposed Development.

Water Vole

7.7.44 No evidence of water vole was recorded within the study area in 2018, or during baseline surveys for Douglas West in the area of the proposed eastern access track route in 2014, 2015 or 2017.

7.7.45 The watercourses within the study area are considered to have limited suitability for water vole. Many of the watercourses are subject to heavy grazing and the poaching of the banks by livestock. There are several areas in which the banks were deemed to have limited opportunities for burrowing, given their hard mineral soil and stone mix based substrates. There are areas of watercourses that are considered to have a suitable flow rate and suitable bankside habitat to

support water vole. It is possible that water vole could utilise the habitats which offer greater suitability although no evidence of their presence was recorded during the surveys.

7.7.46 There was no evidence of water vole recorded during any of the ecological surveys conducted on the surrounding wind farm projects (see Table 7.9).

Badger

7.7.47 Evidence of badger was recorded within the study area in 2018, with six setts recorded and numerous badger field signs, including prints, guard hairs, paths, scratching posts, dung pits and a latrine.

7.7.48 Badger signs were also observed within the proposed eastern access route area in 2014, with a single-hole sett and an adjacent path recorded.

7.7.49 Further information on the badger activity on site and their locations is outlined within Confidential Appendix C1 and illustrated on Figure C7.1.

7.7.50 The site offers suitable habitat for supporting badger, with good substrate existing for sett building. There are numerous opportunities for foraging provided by the surrounding farmland habitat and pockets of woodland located to the south of the study area. There is also good habitat present for commuting between the site and the surrounding area.

7.7.51 Badgers are known to be present within the wider area, with signs indicating their presence recorded at six of the seven local wind farm projects (see Table 7.9).

Pine Marten

7.7.52 No evidence of pine marten was recorded within the study area in 2018, or baseline surveys for Douglas West in 2014, 2015 or 2017.

7.7.53 There is limited suitable habitat within the study area for pine marten. The study area is considered to be sub-optimal for the species considering its open nature and limited of tree cover. Pine marten prefer forested areas (Halliwell, 1997), although there is the potential for pine marten to use open land for hunting due to the increased access to prey species. However, these habitats offer an increased risk of predation from foxes and raptor species (MacPherson, 2014). The forestry plantation to the north of the study area offers suitable habitat for pine marten, as the species is known to exploit coniferous plantation to create dens, access prey and gain protection from predators (Caryl, 2008). There are also a number of larger mature broadleaved trees present within the wider vicinity of the study area which may present cavities suitable for denning. There is some limited potential for the Proposed Development site to support pine marten, if they are present within the wider area.

7.7.54 There were no records of pine marten from the local wind farms surveys, where these surveys were conducted (see Table 7.9).

Red Squirrel

7.7.55 There was no evidence of red squirrel recorded within the study area in 2018, or baseline surveys for Douglas West in 2014, 2015 or 2017.

7.7.56 There is limited suitable habitat for squirrel within the study area, with suitable forestry habitat restricted to the Windrow Wood to the south and plantation to the north. The Proposed Development is located to the south of the Tadlaw and Cumberhead woodland, which was identified by Poulsom *et al.* (2005) as a red squirrel priority woodland within the Strathclyde region of Scotland. In the study, the Tadlaw and Cumberhead woodlands were noted as having conifers present that were of cone bearing age, making it suitable to support foraging squirrels, and that the red squirrel population was also considered to be stable (Poulsom *et al.,* 2005). However, the plantation is also close to an area that has been highlighted as a priority for grey squirrel control (SNH, 2010), meaning that grey squirrels could be present within the wider woodland area.

7.7.57 The limited tree cover within the study area makes drey building and foraging opportunities within the study area limited for red squirrel. There is the potential that they could utilise the areas of more suitable woodland if they are present within the wider area.

7.7.58 There was no evidence of red squirrel recorded during any of the ecological surveys for the seven local wind farm projects (see Table 7.9).

Reptiles

7.7.59 A single common lizard was recorded during the survey in May 2018. There were no reptile sightings during baseline surveys for Douglas West in 2014, 2015 or 2017.

7.7.60 Three features with the potential to act as hibernaculum were recorded within the study area, including a stone ruin, corrugated metal sheeting and an old fence post stack.

7.7.61 The site offers suitable habitat for supporting reptiles. There are numerous sunny aspects which are suitable for basking, whilst the damper areas offer foraging potential. There are opportunities for hibernation offered by the potential hibernaculum as well as dead bracken stands.

Great Crested Newt

7.7.62 Eight ponds were surveyed for their suitability for supporting great crested newt (GCN) in 2018. Six ponds were identified within 500 m of the Proposed Development from Ordnance Survey (OS) mapping prior to the Habitat Suitability Index (HSI) assessment for GCN taking place. Two additional ponds were recorded during the field survey visit.

7.7.63 Four of the ponds identified pre-survey were found to no longer exist and no further survey was required. HSI assessments were undertaken on the two remaining ponds, which were found to have 'good' habitat suitability for GCN, and the two ponds identified during the field survey visit, which were found to have 'average' habitat suitability for GCN.

7.7.64 In line with the proposals outlined within the Ecology Scoping Report (MacArthur Green, 2018), further surveys for GCN would only be conducted if a pond previously surveyed had increased in suitability or if new previously unrecorded ponds were identified. The two 'good' habitat suitability ponds were found to remain unchanged from their previous suitability assessment.

7.7.65 GCN surveys were conducted at four of the seven local wind farm projects. None of these surveys recorded presence or field signs of GCN (Table 7.9). At Douglas West, a combination of habitat suitability surveys and eDNA presence/absence surveys in 2015 confirmed that the species was absent within the Douglas West survey area.

Fish

7.7.66 As stated within the Ecology Scoping Report (MacArthur Green, 2018), and based on the information from other local wind farm projects (primarily Galawhistle which shares the same catchment of watercourses), it was considered that there is sufficient information existing to be able to robustly assess potential effects on fish. No further surveys were conducted for fish.

7.7.67 Table 7.9 shows that trout are present in the local area, with salmon recorded at Nutberry only. Surveys for Galawhistle recorded brown trout (*Salmo trutta*) at all sample points, and included a sampling point on the Podowrin Burn at Low Broomerside (directly downstream from the Existing Development) which recorded a relatively high abundance and diversity of 0+ and 1+ age trout.

Bats

7.7.68 No roost sites were recorded during baseline surveys in 2018. Sixteen potential bat trees were recorded, with 11 of these trees having moderate potential roost features, three trees having moderate to low potential roost features, and two trees having low potential roost features (Figure 7.7, Appendix 7.2). All of these potential bat trees are situated along the proposed access track to the south-east of the site. Daytime inspection surveys for Douglas West in 2014 recorded two potential roost structures within the vicinity of the eastern access track route: a dead tree with

cavities and cracks; and a stone railway bridge, where cavities that could be reached with a ladder were investigated with an endoscope. Cavities were mostly shallow with loose mortar and there were no sign of bats. The bridge was considered to be of low roost potential.

7.7.69 Three bat species (common pipistrelle, soprano pipistrelle, and Daubenton's) and two genus groups (*Nyctalus spp.* and *Myotis spp.*) were recorded during the temporal (static detector) surveys in 2018 with a total registration count of 674, and a mean Bat Activity Index per hour (BAI/hr), or bat records per hour (brph) of 0.14.

7.7.70 The most commonly recorded species was common pipistrelle (359 registrations and 0.07 brph), followed by soprano pipistrelle (222 registrations and 0.05 brph), *Nyctalus spp.* (66 registrations and 0.01 brph), *Myotis spp*. (18 registrations and 0.004 brph) and Daubenton's (3 registrations and 0.001 brph).

7.7.71 There was a very low activity rate in May with only two registrations (0.002 brph). No high-risk species were recorded during this month. In June activity rates increased to 171 registrations (0.23 brph) with 11 (0.01 brph) high risk species (*Nyctalus spp.*) registrations recorded. In July bat activity numbers again increased to 303 registrations (0.10 brph) with 25 high risk species (*Nyctalus spp.*) registrations (0.03 brph) for this genus. In August the total registrations decreased with 160 registrations recorded, but for high risk species (*Nyctalus spp.*) their activity rate increased to 29 registrations (0.03 brph). Activity numbers in September dropped to 38 registrations (0.3 brph). One registration (0.001 brph) was recorded for a high risk species during this time period.

Design Layout Considerations

7.7.72 As part of the iterative design process for the Proposed Development, ecological constraints identified through baseline survey results were considered in order to prevent or minimise adverse effects on ecological receptors. This involved:

- a minimum 50 m buffer for any infrastructure or construction activity around all watercourses, except where a minimum number of watercourse crossings are required. This will minimise effects on associated habitats and protected species;
- avoidance of blanket bog habitat for the location of turbines and infrastructure as far as practicable; and
- avoidance of areas of potentially high GWDTEs for infrastructure as far as practicable.

Micrositing

7.7.73 Any micrositing of infrastructure will take into consideration the potential for direct encroachment onto sensitive habitats or GWDTEs, or indirect alteration of hydrological flows supporting sensitive habitats or GWDTEs. Any micrositing will also take consideration of any disturbance buffer distances on protected species' features identified by the SPP to be prepared prior to construction commencing.

7.8 Potential Effects

7.8.1 This section provides an assessment of the likely effects of the Proposed Development on the IEFs identified through the baseline studies. The assessment of potential effects is based on the Proposed Development description in Chapter 3 and is structured as follows:

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

Project Assumptions

7.8.2 The following assumptions are included in the assessment of otherwise unmitigated impacts on IEFs:

- The construction period will last for up to 24 months, comprising a two-phase construction programme as described in Chapter 3. This will include borrow pit creation (including potential for bing working), construction of access tracks, hardstandings, foundations, turbines and other infrastructure, and site restoration. Alongside the second phase of construction, the Existing Development turbines will be decommissioned and removed.
- All electrical cabling between the 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.
- Any disturbance areas around permanent infrastructure during construction would be temporary and areas reinstated or restored before the construction phase ends or shortly thereafter. The only excavation in these areas would be for cabling and otherwise may only be periodically used for side-casting of spoil until reinstatement.
- To ensure reasonable precautions are taken to avoid adverse 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 the site during the construction phases and will carry out monitoring of works and briefings with regards to any ecological sensitivities on the site to the relevant staff within the Contractor and subcontractors.
- A SPP will be agreed prior to construction commencing and implemented during the construction phase. The SPP details measures to safeguard protected species known to be in the area. The SPP will include pre-construction surveys to check for any new protected species in the vicinity of the construction works, and good practice measures during construction.
- Implementation of appropriate pollution prevention measures (particularly in relation to watercourses) and standard good practice construction environmental management will occur across the site as standard and form part of a robust Construction Environmental Management Plan (CEMP).

Restored Upland Habitat

7.8.3 It is assumed that in the absence of the Proposed Development the future baseline for the areas of infrastructure (such as access tracks, turbine locations and associated hardstandings) relating to the Existing Development and encompassed within the study area would, as part of the decommissioning of the Existing Development, be subject to habitat reinstatement and restoration.

7.8.4 For the purposes of this assessment relevant areas that would be subject to habitat restoration as part of decommissioning have been classified as 'Restored Upland Habitat'. This category has been used to identify areas where habitats would be restored and to acknowledge that the resulting future baseline habitats may be modified habitats that may not directly correspond to the habitats that existed in the study area at their respective locations prior to the Existing Development, or to the current existing adjacent habitats; for instance, due to peatland disturbance and corresponding loss of structure, and/or changes in hydrology, hydrological connectivity and topography etc.

7.8.5 As described within Appendix 7.1 the study area is a mosaic of typical upland habitats, all of which have been, and continue to be, grazed by livestock. The study area contains areas of blanket mire, upland acid grasslands, rush dominated marshy grasslands and small patches of other typical upland habitats such as wet heath, flushes and bracken (Figure 7.2). The areas of the Existing Development

infrastructure for the most part are located in areas of wet modified bog and small patches of acid and marshy grasslands over Hagshaw Hill, Common Hill and Broomerside Hill.

7.8.6 Upon restoration, these infrastructure areas would initially be bare soils before vegetation re-establishment, which may need to be augmented by a suitable seed-mix or nurse crop in the short-term. Due to the difficulties in effectively restoring small areas of habitats such as blanket mire into a self-sustaining functioning habitat due to the historical changes in hydrology, and substrate characteristics and structure, it could be assumed that with an appropriate programme of sustained aftercare in the long-term a modified bog habitat may result in areas where bog previously existed. However, as is evident from the current situation at the Existing Development, and indeed as anecdotally observed on large numbers of wind farms around Scotland, the most likely outcome for upland restored areas is a species-poor rush dominated habitat of low conservation value that persists and effectively prevents the establishment of other habitat types. This habitat type is similar to the rush dominated communities described within Appendix 7.1, i.e. MG10 and 'Je'. Rushes, particularly soft rush (*Juncus effusus*) tend to invade the damp bare soils created in these restored upland areas, once the dense tussocky sward is established it generally prevents the establishment of other habitat types, although there can be small interspersed patches of acid grassland (e.g. U4); blanket bog rarely returns to these areas. The persistence of such species-poor rush habitats is seen at the Existing Development, the wind farm was built in 1995 and upon completion road verges etc were restored. During NVC surveys in 2018, 23 years later, areas restored can still be easily identified as areas of rush dominated habitat standing out against areas of blanket mire and acid grasslands along road verges and other restoration areas.

7.8.7 Consequently, the areas of 'Restored Upland Habitat' are predicted to most likely revert to a rush based habitat, or with much aftercare modified bog habitat dependent on location; in each case the habitat is likely to be of lower conservation value than respective corresponding semi-natural communities. It is also entirely possible that the access tracks for the Existing Development would be retained in perpetuity, as they are, to aid agricultural management of the landholding.

Scoped-Out IEFs

7.8.8 With consideration of the desk-study and baseline data collected and following the design mitigation and those measures described in the design layout considerations and project assumptions sections above, several potential effects on IEFs can be scoped out of further assessment based on the professional judgement of the EIA team and experience form other relevant projects and policy guidance or standards. The following paragraphs detail the ecological receptors and effects scoped out following surveys.

Designated sites

7.8.9 There are no designated sites within the Proposed Development site. Based on the qualifying features and distance from the Proposed Development site, all designated sites have been scoped out of the assessment due to a lack of likely connectivity.

Habitats

7.8.10 Marshy grassland, which within the study area is made up of M6, M23, M25, MG10, Je, Ja and M25-U6 intermediate NVC types, is scoped out of the assessment. M23 is a rush dominated habitat generally of low ecological value unless particularly species-rich examples are found. The M23 within the study area is generally species-poor and is dominated by soft rush (*Juncus effusus*) or sharp-flowered rush (*Juncus acutiflorus*) (see Appendix 7.1). This is a common habitat locally, regionally and nationally and the small direct and indirect losses predicted at the site, as per Tables 7.13 and 7.14, below, are of negligible significance. M23 is considered a potentially high GWDTE (SEPA, 2017a; 2017b), however designation as a GWDTE does not infer an intrinsic biodiversity value, and GWDTE status has not been used as criteria to determine conservation importance 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 the assessment; see Chapter 11.

7.8.11 The following habitats are identified as being of local importance at the site due to their intrinsic value as being listed as Annex I or SBL habitats (see Table 7.11 and Appendix 7.1), however they occupy such small areas within the study area, they are species-poor examples, or any direct or indirect effects on the habitat are so minor that they are scoped out of the assessment: semi-natural broadleaved woodland; dry dwarf shrub heath (acid); wet dwarf shrub heath; flushes and springs (acid/neutral, basic and bryophyte dominated); and swamp (see also Table 7.13 and 7.14). All other habitats are of low conservation value (e.g. plantation forestry) and have been scoped out of the assessment.

Protected Species

7.8.12 Effects on otter, water vole, red squirrel, pine marten and reptiles are scoped out of this assessment.

7.8.13 Although otter is known to be present within the local area, being recorded as present in five of the seven local wind farm projects surrounding the Proposed Development site (including Douglas West), suitable habitat for supporting otter was limited within the study area and no otter signs, including potential protected features, were recorded during surveys in 2018. There were no confirmed structures during surveys for Douglas West in the area of the eastern access track in 2014-17, although some spraints were recorded along the Alder Burn. The Proposed Development site is therefore likely to be of low importance to this species. As outlined in the *Design Layout Considerations* section, all infrastructure would be buffered by a minimum of 50 m from watercourses (except for watercourse crossings) and measures would be employed during construction which would avoid impacts on otter.

7.8.14 No evidence of water vole was recorded during baseline surveys for the Proposed Development or any other local wind farm projects. The species is likely to be locally absent.

7.8.15 There is limited habitat present within the site for supporting pine marten or red squirrel given its open nature and therefore low suitability. There was no evidence of either species recorded during the surveys of the local wind farm projects.

7.8.16 A common lizard was sighted during the survey and three potential hibernacula habitats were recorded. The proposed SPP will ensure that all reasonably practicable measures are taken so that provisions of the relevant wildlife legislation are compiled in relation to all these protected species, should evidence of their presence be found.

7.8.17 Badger is not identified as an IEF and are therefore scoped out of the assessment. Six badger setts were recorded within the study area in 2018, along with numerous field signs. The closest badger sett in 2018 was located approximately 112 m away from the nearest proposed turbine location and 83 m from the nearest proposed track. Given the recommended SNH disturbance buffer distances for badger (30 m, or 100 m if blasting/piling), it is considered unlikely that these setts will be affected by the works, as long as the appropriate buffers are applied.

7.8.18 During baseline surveys for Douglas West in 2014 a badger sett was recorded within the eastern access route area. Should this be located within 30 m of construction activities (or within 100 m of any piling activity), the proposed SPP will ensure that all reasonably practicable measures are taken to safeguard badgers associated with this, or any other sett, so that the relevant wildlife legislation is compiled with. It is recommended that pre-construction surveys are undertaken to check the status of setts recorded during the baseline surveys and to determine the presence of any new setts within the vicinity of the works.

7.8.19 Great crested newts are scoped out of this assessment. Two ponds that were found to have 'good' habitat suitability for GCN were previously recorded as such, and therefore their HSI assessment remained unchanged. In line with the proposals outlined within the Ecology Scoping Report (MacArthur Green, 2018), no further survey was deemed necessary. Two previously unrecorded ponds were identified and assessed for their HSI during the field survey visit, both of which were considered to have 'average' suitability for supporting GCN. SNH was consulted as part of the protected species surveys for the Douglas West Extension regarding the GCN surveys. Some of the ponds within 500 m of the Proposed Development overlap with those that were considered for the Douglas West Extension. No evidence of GCN was found during presence surveys and eDNA

sampling for Douglas West in 2015 and update HSI assessments conducted in 2018 deemed there to be only minor changes in the habitat since the 2015 surveys were conducted. The access road to the Douglas West Extension is already in existence and any upgrade works will likely be completed prior to the construction of the Proposed Development. Given this information and accounting for the site being outwith the recognised range of distribution for the species in Scotland (O'Brien, 2017), it is considered unlikely that GCN would be present within the study area.

7.8.20 Fish species (brown trout) are scoped out of this assessment. Brown trout were recorded during the surveys for Galawhistle in 2009. Brown trout is a UKBAP priority species and the Douglas Water and Monks Water are considered to be important for brown trout. The surveys conducted for Galawhistle recorded significant numbers of brown trout within the Monks Water and Podowrin Burn (Infinis, 2010). The species was also recorded within the Galawhistle Burn. The ES classed brown trout as regionally important for the Galawhistle Wind Farm site (Infinis, 2010). The ES stated the potential effects on brown trout would be of low magnitude and therefore of minor significance following mitigation. The Proposed Development sits within the same hydrological catchment as Galawhistle Wind Farm, and it is likely that any effect on brown trout will remain similar, provided appropriate mitigation is implemented. In order to avoid direct or indirect impacts on these features, a minimum 50 m buffer distance will be kept between turbine locations and watercourses (with the exception of a limited number of watercourse crossings). A SPP will be produced prior to the commencement of construction and will be implemented throughout the duration of construction, with works being monitored by an ECoW. It is also assumed that pollution prevention measures and a CEMP will be implemented during construction and operation of the Proposed Development to ensure no adverse impacts occur from pollution, sedimentation etc.

Bats (construction period)

7.8.21 In accordance within BCT Guidelines (Hundt, 2012) potential roost features such as buildings, stone walls, and trees within 200 m of a proposed turbine or up to 30 m from a proposed access track were surveyed for potential roost features as part of the protected species surveys.

7.8.22 No bat roots were recorded during baseline surveys. However, standard mitigation requires that if felling and/or lopping a potential bat tree, and/or working within the root plate, any cavities must be checked.

7.8.23 Two potential bat trees recorded in 2018 are within 30 m of the proposed access track to the south of the site, and are located within a section of woodland which runs alongside the southern boundary of the track (see target notes (TN) 7 and 8 of Figure 7.7 and Appendix 7.2). A pre-construction tree climbing survey of trees TN 7 and TN 8, and any other potential bat trees located within 30 m of the access track (including any recorded in 2014 in the vicinity of the eastern access route) will be completed to locate any roosting bats. An external tree survey will ideally be completed in the winter when there is no foliage on the trees and potential roost features can be identified. If required, a tree climbing survey would ideally be completed during the active bat season from May to September which increases the likelihood of finding bat signs. If a tree cannot be climbed then dusk and dawn surveys would be required.

7.8.24 With these embedded mitigation measures deemed sufficient to remove impacts of construction on bats, no further assessment is required.

Bats (operational period)

7.8.25 Medium risk species (common and soprano pipistrelle) did not record a BAI of >20 bat records per night (brpn). The highest mean activity rates for medium risk species were recorded in July at location 9 (14.20 brpn) and at location 10 (6.70 brpn) and pipistrelle activity is therefore classed as low. Both locations 9 and 10 are situated in the northern section of the study area along the edge of conifer plantation, which indicates a potential feeding corridor along the planation edge in the northern section.

7.8.26 The BAI for *Myotis* spp. and brown-long eared bats within the study area are also considered to be low for these low collision risk species as shown in Table 5-8 and graph 7 of Appendix 7.2.

7.8.27 The mitigations measures as described in *Mitigation During Operation* in Section 7.8 are also applicable to medium and low risk species, and deemed sufficient to minimise potential impacts. These medium- and low-risk bat species have therefore been scoped out of the assessment for the operational period.

Scoped-In IEFs

7.8.28 The assessment of likely effects will be applied to those 'scoped-in' IEFs of local, regional, national, and international Nature Conservation Importance (see Table 7.4) that are known to be present within the site or surrounding area (as confirmed through survey results and consultations outlined above). As outlined within Table 7.12 below, these comprise:

- blanket bog and wet modified bog (construction period only); and
- *Nyctalus spp.* bats (operational period only).

Table 7.12– Nature Conservation Importance of Scoped-In IEFs

IEF	Nature Conservation Importance	Relevant Legislation/Guidance & Justification
Blanket bog and wet modified bog	Local	Blanket bog and wet modified bog within the study area is scattered, but tends to be associated with the higher altitude plateaus and lower slopes of the main hills. Blanket bog within the study area is indicated by the presence of NVC types M17-M20, predominantly M20 (Table 7.11). Wet modified bog within the study area is indicated by NVC types M2, M3, M17-M20 and M25. Many of these blanket bog and wet modified bog stands show evidence of anthropogenic attempts at drainage as well as evidence of heavy grazing, whilst fewer remain intact and in relatively good condition. The Carbon and Peatland Map (SNH, 2016) indicates that there is no Class 1 or Class 2 peatland within the site, and classes the peatland within the study area as Class 4, Class 5 or Class 6. In line with the classification categories within the Carbon and Peatland Map, none of the aforementioned categories are considered to be priority peatlands. It is recognised that this definition is not purely for nature conservation and so not directly applicable to evaluating purely the Nature Conservation Importance of a peatland. All of these blanket bog and wet modified bog communities (with the exception of M25) are also associated with Annex I and SBL blanket bog classifications. Blanket bog and wet modified bog within the study area is not considered to be nationally or regionally important due to its limited extent and high degree of modification through grazing and drainage. The Nature Conservation Importance is considered to be Local.

IEF	Nature Conservation Importance	Relevant Legislation/Guidance & Justification
Bats (*Nycatlus* Species)	Regional	All bats species are protected under the following legislation: ▪ The Habitats Directive 92/43/EEC and respective domestic legislation; ▪ The Wildlife and Countryside Act 1981 (as amended); and ▪ The Nature Conservation (Scotland) Act 2004 (as amended). Recent research work has estimated through spatial modelling that between 16% and 24% of the regional populations of high risk species (*Nyctalus* spp. and *Pipistrellus nathusii*) in southern Scotland overlaps existing or approved wind farms, with 50% of this overlap concentrated at just 10% of wind farms (Newson et al., 2017), indicating that there are very localised risk areas for *Nyctalus* spp. The study used spatial modelling to stratify the region (southern Scotland) according to potential impact on high risk species by highlighting areas of risk. According to this spatial modelling the predicted occurrence of *Nyctalus* spp. is distributed in the south and south-eastern areas of Dumfries and Galloway. The Proposed Development is therefore close to this area of predicted occurrence for *Nyctalus* species, and so the value has been categorised as Regional as a precaution, although reliable population estimates are currently not available.

Construction

7.8.29 This section provides an assessment of the potential effects of the construction of the Proposed Development upon the scoped-in IEFs.

7.8.30 Impacts on habitats may include direct loss of habitat, e.g. derived from permanent land-take for infrastructure or temporary land-take for the land required to accommodate construction site compounds etc. Impacts on habitats can also be indirect through increased habitat fragmentation, or changes caused by pollution, or effects to supporting systems such as groundwater or water-table levels.

7.8.31 The most tangible effect during the construction stage of the Proposed Development will be direct habitat loss due to the construction of the new turbines and associated tracks, hardstandings, laydown area, compounds, substation/energy storage facility and borrow pits. Much of this infrastructure will be permanent, however the temporary construction compounds, borrow pits and a proportion of each crane hardstanding will be restored at the end of construction. Despite the post-construction restoration, and taking a precautionary approach, it is assumed for the assessment that the areas of land-take for these parts of the infrastructure also represent permanent losses of habitat due to the uncertainties in re-creating functioning habitat types such as blanket bog.

7.8.32 There may also be some indirect habitat losses to wetland habitats due to drainage effects, and changes to the hydrological regime may also occur. 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

infrastructure (i.e. in keeping with indirect drainage assumptions within the carbon calculator (Scottish Government, 2017d). In practice it is expected that any indirect drainage effects will only impact wetland habitats at the site such as blanket bog, flushes & springs, wet heath and swamp. No indirect drainage effects are expected to impact or alter the quality or composition of 'dry' habitats such as dry dwarf shrub heath, acid grassland etc and so the inclusion of indirect effects on dry habitats is precautionary.

7.8.33 Table 7.13 details the estimated direct and indirect relative losses expected to occur, by habitat type, for all new infrastructure. A total of 10.6 ha additional habitat would be directly lost due to the Proposed Development, as well as 2.44 ha of the 9.26 ha of Restored Upland Habitat which would otherwise have developed had the Existing Development been decommissioned. These values include habitat loss associated with all three proposed access routes at the eastern end of the site, where it joins the existing haul road. In practice, only one of these routes will be constructed, and therefore habitat loss values are seen as precautionary.

7.8.34 Included in habitat loss calculations is an area of 1.9 ha which may be subject to extraction from the bing to the north of the Existing Development access track at Douglas West, with material used for construction of wind farm roads. When extraction is complete it is proposed to retain some of these platforms for landscape planting and to grade the slopes of the new excavated faces to provide shallower gradients which can be topsoiled and seeded.

7.8.35 Habitat losses due to the creation of two borrow pits have been calculated separately and are detailed in Table 7.14. Borrow pits have been considered separately to permanent infrastructure as although the existing habitat will be lost, the areas will be restored. However, the habitat type which results after restoration may not be the same as the original habitat type due to changes in topographical or hydrological conditions. The habitat losses are based on a total borrow pit search area of 4.5 ha. However, as only around 1.7 ha of habitat would be lost within the borrow pit search area (based on project engineer's calculations), the habitat losses presented in Table 7.14 represent a precautionary scenario. GWDTE habitats present within the borrow pit search areas would be avoided where possible.

Table 7.13 – Estimated Loss of Habitat for Permanent Infrastructure

NVC Community or Habitat Type[3]	Phase 1 Habitat Type	Total Extent in Study Area (ha)	Direct Habitat Loss: NVC (ha)	Direct Habitat Loss: Phase 1 (ha)	Direct & Indirect Habitat Loss: NVC (ha)	Direct & Indirect Habitat Loss: Phase 1 (ha)	Direct & Indirect Habitat Loss as % of Extent in Study Area
U2, U2b	B1.1/B1.2 Acid grassland: unimproved/semi-improved	1.26	0.02	4.36	0.09	11.52	6.92
U4, U4a, U4b, U4d		57.58	1.58		5.00		17.56
U5, U5a, U5b		55.89	0.86		2.93		5.24
U6		28.25	1.90		3.50		12.37

[3] Only NVC communities where habitat loss is predicted are listed within Tables 7.13 and 7.14, habitat types not listed are not subject to habitat loss.

NVC Community or Habitat Type[3]	Phase 1 Habitat Type	Total Extent in Study Area (ha)	Direct Habitat Loss: NVC (ha)	Direct Habitat Loss: Phase 1 (ha)	Direct & Indirect Habitat Loss: NVC (ha)	Direct & Indirect Habitat Loss: Phase 1 (ha)	Direct & Indirect Habitat Loss as % of Extent in Study Area
M23, M23a, M23b	B5 Marsh/marshy grassland	13.69	0.12	3.11	1.04	13.93	7.62
M25, M25b		4.06	0.01		0.11		2.64
MG10, MG10a		12.01	0.77		3.51		29.22
Je		80.86	1.94		7.65		9.46
Ja		29.26	0.27		1.62		5.53
M2, M2b	E1.6.1: Bog: blanket & E1.7 Bog: wet modified	0.18	0.0005	2.11	0.01	10.56	4.31
M17a, M17c		19.11	0.34		1.62		8.50
M19a		10.97	0.21		1.17		10.63
M20, M20a, M20b		106.64	1.50		7.48		7.01
M25a		0.78	0.05		0.29		37.06
M15d	D2 Wet dwarf shrub heath	20.71	0.35	0.35	1.07	1.07	5.16
M4	E2.1 Flush/spring: acid/neutral	0.42	0.0001	0.22	0.001	1.25	0.15
M6c, M6d		18.53	0.22		1.25		6.75
M32b	E2.2 Flush/spring: bryophyte dominated	0.10	0.01	0.01	0.03	0.03	27.54
U20, U20a	C1.1 Bracken: continuous	14.07	0.06	0.06	0.27	0.27	1.94
W7, W7c		0.47	0.02	0.02	0.02	0.03	3.75

NVC Community or Habitat Type[3]	Phase 1 Habitat Type	Total Extent in Study Area (ha)	Direct Habitat Loss: NVC (ha)	Direct Habitat Loss: Phase 1 (ha)	Direct & Indirect Habitat Loss: NVC (ha)	Direct & Indirect Habitat Loss: Phase 1 (ha)	Direct & Indirect Habitat Loss as % of Extent in Study Area
W11	A1.1.1 Woodland: broadleaved, semi-natural	3.11	0.001		0.01		0.43
MG1	B2.1/B2.2 Neutral grassland: unimproved/semi-improved	1.30	0.19	0.20	0.74	0.84	56.92
MG9		0.10	0.01		0.10		100.00
MG6	B6 Poor semi-improved	1.42	0.18	0.18	0.50	0.50	35.46
H10	D1.1 Dry dwarf shrub heath-acid	0.07	0.003	0.003	0.07	0.07	100.00
S9	F1 Swamp	0.07	0.001	0.001	0.003	0.003	3.95
OV25	C3.1 Other tall herb & fern: tall-ruderal	0.02	0.005	0.005	0.02	0.02	98.88
RuH	Restored Upland Habitat (Existing Development infrastructure)	9.26	2.44	2.44	5.24	5.24	1.03

Table 7.14 – Estimated Loss of Habitat by Borrow Pits

NVC Community or Habitat Type	Phase 1 Habitat Type	Total Extent in Study Area (ha)[4]	Direct Habitat Loss: NVC (ha)	Direct Habitat Loss: Phase 1 (ha)	Direct & Indirect Habitat Loss: NVC (ha)	Direct & Indirect Habitat Loss: Phase 1 (ha)	Direct & Indirect Habitat Loss as % of Extent in Study Area
U4	B1.1/B1.2 Acid grassland:	57.58	0.43	1.40	0.56	1.73	0.97
U5, U5b		55.89	0.96		1.74		3.11

[4] Total extent in study area is the total of each NVC community plus associated sub-communities within the Phase 1 habitat type

NVC Community or Habitat Type	Phase 1 Habitat Type	Total Extent in Study Area (ha)[4]	Direct Habitat Loss: NVC (ha)	Direct Habitat Loss: Phase 1 (ha)	Direct & Indirect Habitat Loss: NVC (ha)	Direct & Indirect Habitat Loss: Phase 1 (ha)	Direct & Indirect Habitat Loss as % of Extent in Study Area
	unimproved/semi-improved						
M23a	B5 Marsh/marshy grassland	13.69	0.38	2.81	0.44	3.47	3.20
M25		4.06	0.28		0.32		7.89
MG10a		12.01	0.03		0.05		0.45
Ja		29.26	2.12		2.66		9.10
M15d	D2 Wet dwarf shrub heath	20.71	0.22	0.22	0.28	0.28	1.33
U20	C1.1 Bracken: continuous	14.07	0.08	0.08	0.14	0.14	0.97
W23	A2 Scrub	0.13	0.002	0.002	0.01	0.01	4.89

Potential Construction Effects

7.8.36 The following sections assess the effect of these losses for each IEF scoped-in.

Blanket Bog and Wet Modified Bog

7.8.37 Effect: Effects upon blanket bog habitat during construction would be direct (through habitat loss occurring during construction of the Proposed Development) and indirect (through potential drying effect upon neighbouring bog habitats occurring from the construction period into the operational period). Direct loss would occur in areas where access tracks pass through this habitat type or where infrastructure such as turbine foundations, crane pads, hardstandings, compounds etc. are sited on these habitat types. In addition, there may be indirect losses as a result of drainage around infrastructure and disruption to hydrological flows.

7.8.38 Nature Conservation Importance: As per Table 7.12, blanket bog and wet modified bog within the study area is considered to be of Local Nature Conservation Importance.

7.8.39 Conservation Status: Conservation Status of this habitat as assessed in JNCC report on blanket bog (JNCC, 2012) is 'Bad' and 'Declining' at the UK level.

7.8.40 Magnitude: The UK has an estimated 2,196,736 ha of blanket bog (JNCC, 2012) of which around 1,759,000 to 1,800,000 ha is in Scotland (approximately 23% of the land area) (JNCC, 2012; SNH, 2017b).

7.8.41 Blanket bog, including wet modified bog, covers 137.77 ha (27.26 %) of the NVC study area, with 106.64 ha of this being M20 blanket mire; the small remainder is made up of M17, M19 and M25

blanket mire as well as M2 and M3 bog pools (Table 7.11). Borrow pit search areas or the bing extraction area do not include blanket bog habitats and therefore no habitat loss is predicted for borrow pit extractions.

7.8.42 Direct habitat loss due to permanent infrastructure is predicted to be 2.11 ha (Table 7.13), equivalent to 1.53 % of the blanket bog within the NVC study area. As outlined in paragraphs 7.8.3 to 7.8.7, areas of 'Restored Upland Habitat' are predicted to most likely revert to a rush based habitat, or with much aftercare modified bog habitat likely to be of lower conservation value than semi-natural communities. Direct loss of blanket bog, particularly that of higher conservation value, is therefore of a very small extent in the local and regional context.

7.8.43 In addition, there may be some indirect losses because of the zone of drainage around infrastructure (as a worst-case assumed to extend out to 10 m from infrastructure in line with the carbon calculator assumptions*).* If indirect drainage impacts are *fully realised* out to 10 m in all blanket bog areas then predicted blanket bog losses due to all infrastructure increase to 10.56 ha or 7.66 % of the NVC study area and 0.0005 % of the national resource. The distance of the impacts 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 impacts 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)). 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 impacts can extend to around 50 m, whilst in more decomposed (less fibrous) peat drainage impacts may only extend to 2 m or so. Blanket bog habitats commonly are associated with more highly decomposed peats (Nayak *et al*., 2008).

7.8.44 Peat depth survey work identified only a small number of highly localised areas of proposed infrastructure with peat depth greater than 1 m. Tracks crossing these small, localised areas would be floated, this would further reduce the potential impacts of rockfill tracks acting as an open land drain in deeper peat in comparison to traditional cut and fill road construction. Guidance on floating roads would also be followed during construction (FCE & SNH, 2010). For example, in localised peat areas intercepting ditches would only be created where deemed necessary; for instance, they are unlikely to be required on areas of flat bog. Where intercepting ditches are required the preference will be for a 'flat ditch' excavated into the acrotelm only and avoiding deeper 'V-shaped' ditches that disrupt or penetrate the catotelm, as ditches excavated into the catotelm are more likely to lower the groundwater table locally. Track construction would also seek to maintain hydrological connectivity and flows throughout the Proposed Development site.

7.8.45 With the use of localised floating roads as appropriate, the adoption of good practice and environmental management techniques, and an appropriate and considered drainage design, it is considered unlikely that indirect drainage impacts of this scale (i.e. out to 10 m either side of infrastructure) on an already modified peatland would occur or would have such an impact on the habitat as to result in large-scale vegetation shifts to a lower conservation value habitat type (such as acid grassland for example).

7.8.46 For instance, Stewart & Lance (1991) in their study 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 was 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 cover were highly localised and took nearly 20 years to achieve statistical significance.

7.8.47 If drainage impacts materialise locally around infrastructure the most likely effect would not be a major change in overall habitat type (i.e. bog) but rather a potential change in vegetation micro-topography, species cover, or abundance that may result in a subtle NVC community or sub-community shift to a relatively drier type (e.g. a potential shift from M17 mire to M19 mire, or a

transition to a drier sub-community such as a shift from the M17a Sphagnum sub-community to the M17b *Cladonia* sub-community of that NVC type). If more severe drying impacts are observed then blanket bog may transition to wet heath (NVC types M15 and M16). In extreme cases drying may result in the appearance of dry heath vegetation, although this is considered unlikely. Wet and dry heaths are still habitats of conservation interest, being Annex I, UKBAP and SBL Priority Habitats.

7.8.48 When considering the likely direct and indirect habitat losses, a magnitude of impact across the site is negligible to low.

7.8.49 Significance: Given the above consideration of Nature Conservation Importance, Conservation Status and Magnitude, the effect significance is considered to be Minor adverse and Not Significant under the terms of the EIA Regulations.

Operation

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

Potential Operational Effects

7.8.51 All likely direct and indirect effects on habitats have been considered in the Construction Effects section above[5]. No further impacts on any other habitat IEF are predicted during the operational phase. Potential operational effects are therefore limited to those on *Nyctalus* bats.

Nyctalus Bats

7.8.52 Effect: During the operational phase, there is potential for collision risk upon bat species, together with the risk that bats may be affected by barotrauma when flying in close proximity of the turbine blades. For the purposes of this assessment, the potential impacts 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 the turbine blades or barotrauma.

7.8.53 Recent research work by Exeter University (DEFRA, 2016) found that most bat fatalities at UK wind farms have been common pipistrelle, soprano pipistrelle and noctule bats. In addition, single carcasses of Nathusius' pipistrelle bat and Natterer's bat have been recorded.

7.8.54 Because the proposed turbines have a blade tip over 150 m, they will need to be lit with red aviation warning lights. There is some recent evidence that migratory pipistrelle bats may be attracted to red lights, which according to the authors, may lead to an increased collision risk of migratory bats at wind turbines (Voigt *et al.* 2018). The authors did however note a lack of insect hunting at the red light sources, which indicates that the attraction of migratory bats to red light sources was not caused by foraging. Although migratory activities of bats within the UK are relatively poorly known, baseline results suggest that no significant migratory movements were likely to have occurred within the study area, and the risk of additional collisions associated with local foraging bats being attracted to red lights is low.

7.8.55 Nature Conservation Importance: The Nature Conservation Value of *Nyctalus spp*. has been assessed as Regional (Table 7.12).

7.8.56 Conservation Status: The Conservation Status of *Nyctalus spp.* bats in the UK is considered to be Favourable, according to JNCC species reports[6]. The Scottish Leisler's and noctule bat populations were both given as 250 individuals (out of a UK population of 28,000 and 50,000 individuals respectively), but these low estimates are likely due to under-recording and an underestimate of the populations occurring here. The recent discovery of breeding Leisler's bat colonies in south-west Scotland confirm that the estimate of 250 individuals is too low, however no further data are

[5] Indirect habitat loss tends to occur during the operational phase however for completeness and ease of assessing impacts they are considered together in the construction effects section.

[6] JNCC Individual Species Reports - 3rd UK Habitats Directive Reporting 2013 (http://jncc.defra.gov.uk/page-6391)

available to update these estimates. Due to the data deficiency for this species in Scotland, there is some uncertainty whether the favourable conservation status also applies here.

7.8.57 Magnitude: *Nyctalus* spp. are assessed by Natural England guidance to be of high risk in terms of both collision and threat to national populations.

7.8.58 *Nyctalus* species were generally recorded infrequently during baseline surveys, with an average registration per survey period of >1 BAI/night (brpn) only recorded at location 24 in August (2.00 brpn). Location 24 was situated along the eastern central boundary of the study area and is approximately 182 m from turbine T6 (Figure 7.8). T6 is separated from location 24 by a steep gully, where the Windrow Burn flows south towards a block of conifer woodland at Windrow Wood, before joining the Douglas Water. It is possible that the connectivity of suitable bat habitats in this area resulted in location 24 recording >1 BAI/night at this location. A bat detector at location 4 was located on the proposed location of T6 from May to June – however, no *Nyctalus* species were recorded during this time period (and no survey hours lost).

7.8.59 Local wind farm projects have recorded similar results to the Proposed Development. At the nearby Douglas West Wind Farm site, low levels of *Nyctalus sp.* were recorded every month, apart from in September and October when they were absent. Passes were also recorded at every static location and highest numbers of records were associated with foraging over the tree canopy adjacent to the detector. The data suggested that *Nyctalus spp*. were not more active at height than at ground level with the ground detector recording similar activity levels to the detector at height, immediately above it.

7.8.60 At Dalquhandy, *Nyctalus* bats were recorded at low activity rates, and made up 1 % of all bat passes. Bat activity rates within edge habitats were higher than in open water, closed habitats, or at height.

7.8.61 At Cumberhead, *Nyctalus* activity was recorded across the majority of static locations within the survey area, mainly in July, albeit at very low frequency (5.1 % of total bat activity). Only one *Nyctalus* species call was recorded during at-height surveys.

7.8.62 Despite the species being of high potential risk in terms of collision, the levels of activity recorded within the study area and wider local area would indicate the collision risk to *Nyctalus* spp. populations to be low on average, apart from potentially around location 24 where the risk may reach medium. *Nyctalus* bats have a long life-span (over 10 years can be reached) and slow reproduction rate (maximum of one young per year per female bat in the UK), therefore populations of *Nyctalus spp*. are vulnerable to decline after loss of reproductive females, even in small numbers. Without knowledge of the regional population, accurate estimates of effects are difficult. However, taking into account the low levels of activity within the study area and wider local area, currently available data on *Nyctalus* spp. and also taking into consideration the distance of location 24 to the nearest proposed turbine location (and lack of records from location 4 at T6), the overall magnitude of impact on the populations of *Nyctalus* spp. is considered to be Low spatial and Long-term temporal.

7.8.63 Significance: Given the above consideration of Nature Conservation Importance, Conservation Status and Magnitude, the effect significance of collision risk on *Nyctalus* bats is considered to be Minor adverse and Not Significant under the terms of the EIA Regulations.

Decommissioning

7.8.64 Decommissioning effects, because of the distant timeframe until their occurrence (typically >30 years) are difficult to predict with confidence. They are however considered for the purpose of this assessment to be similar to (or less than) those of construction effects in nature, and are likely to be of shorter duration. The significance of effects predicted for IEFs in the construction effects section above are therefore considered appropriately precautionary for assessing decommissioning effects.

7.9 Mitigation

Mitigation During Construction

7.9.1 General mitigation for habitats includes the standard in-built mitigation and adoption of good practice; for instance, the presence of an ECoW and implementation of appropriate pollution prevention and standard good practice construction environmental management as part of a robust CEMP. To ensure standard good practice measures are effective, pollution prevention proposals will be site specific and adapted to the local ground conditions.

Mitigation During Operation

7.9.2 For high risk bat species (*Nyctalus spp.*) an average BAI of >1 BAI/night (brpn) was reached at location 24 in August 2018 (2.0 brpn) only. A BAI >1 brpn is considered to be of an activity rate high enough to require an evaluation for curtailment of any nearby turbines at this location.

7.9.3 It is possible that connectivity of suitable bat habitats close to location 24 was the reason why a relatively high BAI >1 brpn was recorded. The habitat at the nearest proposed turbine location (T6) is comparatively homogenous and sub-optimal for *Nyctalus* spp. apart from the gully which is located 51 m away. As the habitat at T6 is sub-optimal with no *Nyctalus* species recorded from May to June at location 4 (on the proposed T6 location), and with location 24 separated by a gully from T6, it can be reasonably concluded in this instance that curtailment is not required for T6.

7.9.4 Detector surveys did identify a potential feeding corridor along the planation edge in the northern section of the survey area for medium collision risk pipistrelle species, at locations 9 and 10. Locations 9 and 10 are closer to the planation edge than the proposed turbines in this area, at a distance of 5 m and 15 m from the plantation edge, respectively. The closest proposed turbine locations in this area at T13 and T14 are approximately 50 m and 100 m from the planation edge, respectively. Natural England (2014) recommends that turbines should be positioned at least 50 m (measured from blade-tip) from a feature used by bats (in this case, planation edge). As recommended by Natural England (2014), the exact distance between the turbine base and planation edge is dependent on turbine specifications, based on a combination of rotor blade length, hub height and tree height, and the calculation to determine the distance is shown below and is illustrated in Annex 6 of Appendix 7.2.

buffer (b), blade length (bl), the hub height (hh) and feature height (fh))

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

7.9.5 If it is assumed that during the operational period, trees would be up to 15 m tall, then a set-back distance of 65.7 m is estimated, based on a turbine hub height of 122.5 m and a blade length of 76 m. Although the base of T13 is slightly closer to the plantation edge at c.50 m, this distance is considered sufficient for this one turbine, as it should be noted that there were very few *Nyctalus spp.* records at detector locations 8, 9 and 10, close to plantation (see Figure 7.8), with a total of nine passes during the 2018 survey period, reflecting their preference for more open habitats (rates were higher at detector locations 22-24 to the south of the study area). *Nyctalus* collision risk would therefore be low. All other turbines would be located beyond the estimated set-back distance.

7.9.6 At present, the closest turbines in the Existing Development are c. 50 m from the plantation edge, and based on their turbine specifications (a blade length of 20 m and hub height of 35 m), a larger set-back distance of 67.1 m would be advised based on the Natural England 2014 guidance. The replacement of these turbines with the taller repowering turbines may therefore represent a reduction in collision risk along this plantation edge than is presently the case.

Mitigation During Decommissioning

7.9.7 Mitigation measures are likely to be similar to those outlined for the construction phase (paragraph 7.9.1).

Enhancement Measures

7.9.8 None required.

7.10 Residual Effects

7.10.1 Although no unmitigated significant effects were predicted for any IEF, the inclusion of mitigation measures outlined in section 7.9 will further reduce the likelihood of any adverse effects. However, the residual significance of construction effects on blanket bog and operational effects on *Nyctalus spp.* bats are considered to remain Minor adverse and Not Significant.

7.11 Cumulative Assessment

7.11.1 The primary concern regarding the assessment of cumulative effects is to identify situations where impacts on habitats or species populations that may be acceptable from individual developments, are judged to be unacceptable combined with nearby existing or proposed projects. In the interests of focusing on the potential for significant effects, this assessment considers the potential for cumulative effects with other wind farm projects.

7.11.2 As shown in Table 3-1 of Chapter 3: Proposed Development, nine wind farms projects, at either operational, consented or in planning, are within 5km of the Proposed Development turbines. These include the Hagshaw Hill Extension, Douglas West, Dalquhandy, Cumberhead, Nutberry and Galawhistle Wind Farms within 2 km, with ecology baselines as described in the *Desk Study* section, plus Poniel and Glentaggart which are >2 km distant, and the two-turbines at Hazelside Farm. An extension to the Douglas West Wind Farm and a revised scheme for the Cumberhead Wind Farm are also presently at Scoping stage and given their proximity to the Proposed Development site have also been considered.

Blanket Bog and Wet Modified Bog

7.11.3 Blanket bog has been scoped-out of the cumulative assessment as it is considered unlikely that any significant ecological cumulative effects at a regional level would arise as a consequence of the Proposed Development adding to habitat loss associated with other projects. This is due to the negligible/low magnitude of loss of blanket bog habitat, particularly that of good quality, due to the Proposed Development, as outlined above. Other wind farm projects within 5 km have been located on similarly lower quality habitats common to the area, and as such no significant cumulative effects are predicted for blanket bog and wet modified bog (Minor adverse and Not Significant).

Nyctalus Spp. Bats

7.11.4 *Nyctalus spp.* were recorded during baseline surveys for the nearby Doulgas West, Douglas West Extension (data not yet fully analysed), Dalquhandy, and Cumberhead projects, but were absent on the Galawhistle site. Low activity rates were observed at all of these sites, and no roosts were identified. Although a small cumulative collision risk may exist for bats due to the operation of wind farms within the 5 km study area, this level of risk is unlikely to create an adverse effect at a population level. As such, no significant cumulative effects are therefore predicted for *Nyctalus spp*. bats (Minor adverse and Not Significant).

7.12 Summary

7.12.1 This chapter has considered the potential effects on the ecological features present at the site associated with the construction, operation and decommissioning of the Proposed Development. The assessment method followed the guidance detailed by CIEEM (2018).

7.12.2 It was possible to scope out most species and habitats recorded in the study area from the assessment by virtue of their low conservation value, the type and frequency of field signs present, the small extent of the sensitive habitat, or the negligible scale of potential effects. The two IEFs taken forward for assessment were blanket bog (including wet modified bog) and *Nyctalus* bat species.

7.12.3 Potential construction effects on blanket bog (including wet modified bog) were assessed. The main effect is direct and indirect habitat loss due to land take for infrastructure. In a worst-case scenario, indirect blanket bog habitat losses, in most cases to already degraded habitat, could be up to 10.56 ha or 7.66 % of the NVC study area, which would not reach significance at a regional level. No significant effects are therefore predicted (Minor adverse and Not Significant).

7.12.4 Potential operational effects on *Nyctalus* bats were assessed. The main effect addressed was risk of collision with turbines. Due to the largely low levels of activity recorded during baseline surveys, no significant effects are predicted (Minor adverse and Not Significant).

7.12.5 No significant operational, decommissioning or cumulative effects are therefore predicted as a result of the Proposed Development.

7.12.6 As no significant effects are predicted upon IEFs as a result of the Proposed Development, no further specific mitigation or enhancement is required in addition to the in-built mitigation and assumed mitigation (e.g. CEMP, SPP, presence of an ECoW, set-back distances from watercourses and plantation edge) to be implemented as standard, as described above.

7.12.7 **Residual effects on IEFs are therefore considered to be at worst, Minor adverse and Not significant.**

Table 7.15 – Summary Table

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect		Comparison with the Existing Development
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse	
During Construction / Decommissioning						
Loss of habitat: blanket bog and wet modified bog	Minor	Adverse	CEMP, ECoW monitoring	Minor	Adverse	Larger extent of habitat loss but no greater level of significance of effects are anticipated beyond those arising from operation of the Existing Development.
During Operation						
Bats: collision risk for *Nyctalus* species	Minor	Adverse	Minimum turbine set-back distance of 50 m from blade tip to plantation edge.	Minor	Adverse	Fewer, but larger turbines compared to the Existing Development. Due to lack of roost sites and relatively low activity levels, no increase in significance is predicted when considered in the context of species' regional populations.
Cumulative Effects						
All IEFs	Minor	Adverse	No further mitigation required	Minor	Adverse	Minimal increase in blanket bog habitat loss and collision risk for bats compared to the Existing Development, but unlikely to reach significance at a regional level.

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