Figures

11. Ecology

11.1 Summary

11.1.1 This chapter considers the likely significant effects on terrestrial ecology associated with the construction, operation and decommissioning of the Revised Consented Development.

11.1.2 The scope of the ecological assessment was determined through a combination of a desk study using the existing biological data relating to the Consented Development, site surveys, and consultation with relevant nature conservation organisations.

11.1.3 The site is bordered in the west by Caithness and Sutherland Peatlands Special Conservation Area and East Halladale Site of Special Scientific Interest. The main qualifying features for both sites is blanket bog. A further six statutory designated sites lie within 10 km of the site boundary.

11.1.4 Detailed National Vegetation Classification (NVC) and habitat surveys were undertaken within the respective study area during 2011 and were updated in 2021. These surveys resulted in 31 recognised NVC communities being recorded within the study area. The study area is dominated by coniferous plantation with areas of degraded and modified blanket bog evident between the forestry blocks. The remainder of the habitats present consist of a mix of smaller stands of various habitat types such as wet heath, grasslands and other mire habitats.

11.1.5 The majority of the study area is made up of habitats considered to be of county importance or less than local importance for nature conservation; however, approximately 0.8 ha of the study area is made up of blanket bog, which is considered to be of regional nature conservation importance.

11.1.6 Specific surveys were also undertaken for otter, water vole, badger, red squirrel, pine marten and bats, during 2011-2012 and 2019-2020.

11.1.7 Evidence of otter was recorded on both of the watercourses which drain through the site, the Achvarasdal Burn and Reay Burn. Although no protected resting sites were identified.

11.1.8 Water vole were also recorded on Achvarasdal and Reay Burn, approximately 100 m and 80 m from the nearest construction area.

11.1.9 Evidence of pine marten was recorded throughout the study area, although opportunities for den sites are limited.

11.1.10 No evidence of badger, red squirrel or amphibians was recorded from the study area.

11.1.11 Sightings of two common lizards were also made within the study area.

11.1.12 Bat surveys conducted of the study area in 2011 recorded low levels of common pipistrelle using the site and one identified non-breeding roost within the study area. Follow up surveys in 2019, did not confirm presence in roost. Bat surveys conducted in a neighbouring site, Limekiln Wind Farm Extension, recorded low levels of common pipistrelle foraging and/or commuting and one record of soprano pipistrelle.

11.1.13 The Revised Consented Development has been designed to minimise impacts on important habitats or protected species as far as practicable.

11.1.14 The most tangible effect during the construction stage of the Revised Consented Development will be direct habitat loss due to the construction of new infrastructure. Effects upon blanket bog, wet heath and acid flush are assessed. No significant effects are predicted.

11.1.15 A Species Protection Plan, Deer Management Plan and Habitat Management have been developed to provide mitigation measures for during construction, operation and decommissioning of the Revised Consented Development.

11.1.16 No significant operational, decommissioning or cumulative effects are predicted as a result of the Revised Consented Development.

11.1.17 Residual effects on each of these receptors are considered to be not significant under the terms of the EIA regulations.

11.2 Summary of Conclusions – Previous Applications

Technical Topic	**2012 ES (24 Turbine Layout – tip heights 126m and 139m)**	**2016 ES (24 Turbine Layout – tip heights 126m and 139m)**	**2017 SI (21 Turbine Layout – tip heights 126m and 139m)**	**2021 Section 36C Application (21 Turbine layout with 149.9 m tip heights, plus amended tracks)**
Ecology	The assessment found that the development would not have a significant effect on habitat or species interests from a nature conservation perspective. The site is dominated by habitats of Local and Less than Local Importance, however ecologically important features up to International	The footprint of the scheme did not vary. Therefore the assessment of the development did not change.	No further ecological assessments were undertaken for the reduction in the number of turbines.	The assessment found that the development would not have a significant effect on habitat or species interests from a nature conservation perspective. The design, including the amended tracks has taken into consideration the most valuable areas of habitat and mitigation suggested to minimise impacts

	importance are interspersed throughout the wider site, including wet heath and blanket bog. The site was also found to support populations of otter, water vole, pine marten, bats and fish. The design of the scheme had taken into consideration the most valuable areas of habitat and mitigation suggested to minimise impacts on wetlands and minimising disturbance to protected species.			on wetlands and minimising disturbance to protected species.

11.3 Introduction

11.3.1 This chapter considers the likely significant effects on terrestrial ecology from the construction, operation and decommissioning of Limekiln Wind Farm Section 36C variation application (hereafter referred to as the 'Revised Consented Development'). The specific objectives of the chapter are to:

- describe the ecological baseline;
- 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.

11.3.2 The assessment has been carried out by Nevis Environmental Ltd and in accordance with the Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment in the UK and Ireland hereafter referred to as the CIEEM guidelines.

11.3.3 A detailed description of the Revised Consented Development and an overview of the construction methodology is provided within **Chapter 4: Description of Revised Consented Development**; the planning context for the Revised Consented Development is provided within **Chapter 5: Planning Context**.

11.3.4 Effects on birds are addressed in **Chapter 12: Ornithology**. The effects on hydrological features are addressed in **Chapter 13: Geology, Hydrology and Hydrogeology**. Chapter 13 also considers the hydrological impacts on Groundwater Dependent Terrestrial Ecosystems (GWDTEs) identified in the ecology assessment.

11.3.5 Figures and Technical Appendices are referenced in the text where relevant. This chapter is supported by the following figures:

- **Figure 11.1** : Internationally Designated Sites within 5 km
- **Figure 11.2** : Nationally Designated Sites within 5 km
- **Figure 11.3** :NVC Survey Results
- **Figure 11.4** : Ground Water Dependent Terrestrial Ecosystems
- **Figure 11.5** : Protected Species Results 2021

11.3.6 This chapter is supported by the following Technical Appendices:

- Technical **Appendix 11.A:** National Vegetation Classification & Habitats Survey Report;

- Technical **Appendix 11.B:** Protected Species Survey Report;
- Technical **Appendix 11.C:** 2012 Bat Survey Report;
- Technical **Appendix 11.D**: 2019 Bat Survey Report;
- Technical **Appendix 11.E**: Aquatic Ecology Reports
- Technical **Appendix 11.F:** Species Protection Plan;
- Technical **Appendix 11.G**: Habitat Management Plan; and
- Technical **Appendix 11.H**: Deer Management Plan
- Technical **Appendix 11.I**: Deer Fence Management Plan.

11.4 Scope of Assessment

Effects Assessed in Full

11.4.1 The assessment aims to establish the ecological baseline for the site and its zone of influence, and concentrates on the effects of construction and operation of the Revised Consented Development upon those ecological features identified during the baseline review of desk-based information and field surveys.

11.4.2 This chapter considers effects on:

- Designated sites, caused by changes in extent and/or condition, or conservation status either through direct (i.e. derived from land-take or disturbance to habitats or protected species) or indirect (i.e. changes caused by effects to supporting systems such as groundwater).
- Habitats outside of designated sites, including Groundwater Dependent Terrestrial Ecosystems (GWDTE) caused by changes in extent and/or condition as a result of the Revised Consented Development.
- Notable plant species caused by changes in extent and/or conditions as a result of the Revised Content Development.
- Aquatic habitats – effects are limited to the ecological impacts of changes in water conditions through potential pollution effects; hydrological effects are considered in **Chapter 13: Geology, Hydrology and Hydrogeology**.
- Protected and notable species caused by changes in extent and/or condition including direct (i.e. loss of life as a result of the Revised Consented Development; loss of key habitat; displacement from key habitat; barrier effects preventing movement to/from key habitats; and general disturbance) and indirect (i.e. loss/changes of/to food resources; population fragmentation; degradation of key habitat e.g. as a result of pollution).

- The assessment is based on the description of the Revised Consented Development as described in **Chapter 4: Description of Revised Consented Development**.

Potential Effects Scoped Out of Assessment

11.4.3 No construction or operational effects were scoped out prior to commencement of surveys and determination of the presence and distribution of ecological features in relation to the planned infrastructure and activities associated with the Revised Consented Development.

11.4.4 On the basis of the results of the desk based and survey work undertaken, the following important ecological feature have been 'scoped out'.

Designated Sites

11.4.5 Significant effects on the following designated sites have been scoped out of the ecology assessment due to distance and/or lack of ecological connectivity with the site:

- Sandside Bay SSSI –0.3 km from the site at is closest point, however this is at the already existing access point (tarmac road). There is no construction planned at this location and therefore there are no risks considered to this site or its designated features.

- Loch Caluim Flows – has been scoped out as although it is within 1.8 km of the site boundary, the nearest construction feature would be approximately 3 km from this site. Loch Caluim also lies up gradient of the site, and therefore it is not considered there are any pathways for effects in relation to the designated terrestrial habitats.

- Red Point Coast SSSI – has been scoped out due to it being 2.9 km from the site. Due to this separation, it is unlikely any of the construction works or operational aspects of the development will impact the designated, maritime cliff or Scottish primrose features.

- Broubster Leans SAC/SSSI – has been scoped out of the assessment as it lies 3.9 km from the construction area and there is lack of apparent hydrological connectivity between the two sites, so it is unlikely that construction or operation will present a risk to the designated features.

Red Squirrel

11.4.6 There are no records of red squirrel (*Sciurus vulgaris*) within the site or the surrounding 5 km coupled with sub-optimal habitat within the site (e.g. Sitka spruce (*Picea sitchensis*) dominated woodland with relatively small trees), red squirrel are considered absent from the site. Effects on red squirrel have therefore been scoped out of this assessment.

Badger

11.4.7 With a lack of recent records within the site or surrounding 5 km and the suboptimal habitat, lacking in optimal habitat for sett creation, effects on badger (*Meles meles*) have been scoped out of the assessment.

Amphibians

11.4.8 The site is not known to support any significant populations of amphibians, however it is likely that the waterlogged and marshy areas may offer suitability for common amphibians such as common frog or common toad. Effects on amphibians have been scoped out of the assessment.

Freshwater Pearl Mussel

11.4.9 No recent records of freshwater pearl mussel (*Margaritifera margaritifera*) are recorded, and surveys completed on the Reay and Achvarasdal Burn in 2011 did not return any evidence of freshwater pearl mussel. Effects on freshwater pearl mussel have been scoped out of the assessment.

11.5 Assessment Methodology

Assessment Structure

11.5.1 The assessment method follows the principles within the guidance detailed by CIEEM (2019).

11.5.2 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 Revised Consented 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.

Legislation and Guidance

Legislation

11.5.3 This assessment is carried out in accordance with the principles contained within the following European and national legislation:

- the Conservation (Natural Habitats, &c.) Regulations 1994), as amended by the Conservation (Natural Habitats, &c.) (EU Exit) (Scotland) (Amendment) Regulations 2019;
- Water Environment and Water Services (Scotland) Act 2003), as amended by the Environment (EU Exit) (Scotland) (Amendment etc.) Regulations 2019Town and Country Planning and Electricity Works (EU Exit) (Scotland) (Miscellaneous Amendments) Regulations 2019.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.

11.5.4 In addition to those set out in **Chapter 5: Policy Context**, the following planning policy documents that are of particular relevance to this chapter are:

- UK Post-2010 Biodiversity Framework (2012); and
- Scottish Biodiversity Strategy: It's in Your Hands (2004)/2020 Challenge for Scotland's Biodiversity (2013).

Guidance & Policy

11.5.5 This assessment is carried out in accordance with the principles contained within the following documents:

- Scottish Natural Heritage, English Nature, Natural Resources Wales, Ecotricity Ltd, the University of Exeter and the Bat Conservation Trust. (2019). Bats and onshore wind turbines: survey, assessment and mitigation. Version: January 2019.
- Collins, J. (2016). Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition). Bat Conservation Trust;
- 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;

- SEPA (2017b). 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;
- Scottish Biodiversity List (SBL) (2013).
- SNH (2015). Scotland's National Peatland Plan; and
- Chanin, P. (2003). Ecology of the European Otter. Conserving Natura 2000 Rivers Ecology Series No. 10. Peterborough.
- Dean, M., Strachan, R., Gow, D., & Andrews, R. (2016). The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series (3rd ed.). London: The Mammal Society.
- Rob Strachan, T. M. (2011). Water Vole Conservation Handbook, Third Edition. Wildlife Conservation Research Unit.
- W.J Cresswell, J. B. (2012). UK BAP Mammals Interim Guidance for Survey Methodolgies, Impact Assessment and Mitigation. Southampton: The Mammal Society.
- Scottish Renewables, SNH, SEPA, Forestry Commission (Scotland), Historic Environment Scotland, Marine Scotland Science, AEECoW (2019). Good Practice During Windfarm Construction (4th Edition).

11.5.6 In undertaking the assessment, consideration has been given to the scoping responses and other consultation undertaken with relevant organisations as detailed in Table 11.1.

11.5.7 Table 11.1 summarises the consultation responses and provides information on where and how they have been addressed in the assessment, where relevant.

Table 11.1 Consultation Reponses

Consultee and Date	Scoping/Other Consultation	Issue Raised	Response/Action Taken
Highland Council 7th April 2021	Pre-Application	Sites designated for their natural heritage interest should be considered in line with their relative importance (i.e. international, national, local/regional).	A desk study has been undertake to identify the locations of sites designated for their terrestrial ecology features that are relevant to the proposals. Effects on designated sites at all stages of the development are discussed in are discussed in **Sections 11.10-11.13.**
SEPA 7th April 2021	Pre-Application	The layout and design of the development should avoid areas of GWDTE The application should include proposals for habitat improvement or creation to mitigation any loss of GWDTE.	NVC surveys of the study area have been completed to identify areas of potential GWDTE and surveys have covered the required buffer areas as defined by SEPA (2017b) (Technical **Appendix 11.A**; **Figure 11.3**). A map of potential GWDTE areas with the site infrastructure overlain is provided in **Figure 11.4**. As per **Figure 11.4** minimum buffers cannot be achieved; an further site-specific assessment is presented in **Chapter 13: Geology, Hydrology and Hydrogeology**
NatureScot/SEPA 7th April 2021	Pre-Application	NatureScot highlighted the site includes areas of carbon rich soils, deep peat and priority peatland habitat. An assessment of the impact of this proposal on these habitats should be made and any mitigation measures which have been incorporated to ensure the protection	Peat depth surveys and peat stability assessment of the study area are detailed in **Chapter 13: Geology, Hydrology and Hydrogeology** along with a Peat Management Plan (PMP) for the site**.** A carbon calculator assessment for the development is presented in **Chapter 8 (Climate Change and Carbon Balance).** An assessment of the effect of the development on priority

		of the carbon rich soils, deep peat and priority habitats. The assessment should consider and if necessary quantify any loss of this resource and any impacts on the function of the habitats associated with it.	peatland habitats at all stages of the development is presented in **Sections 11.6-11.9.** Figures for loss of habitats as a result of the development are presented in **Section 11.6.**
NatureScot 7th April 2021	Pre-Application	An update to date otter survey will be required to inform the Habitats Regulations Appraisal (HRA) for Caithness and Sutherlands Peatlands SAC.	An otter survey of the site was completed in May 2021 and is detailed in **Technical Appendix 11.B**. An assessment of the effect of the development on otter at all stages of the development is presented in **Sections 11.6-11.10.**
NatureScot 7th April 2021	Pre-Application	Impacts of the proposal on deer and the dispersal of deer onto the surrounding area should be assessed	An assessment of the effect of dispersal of deer with respect to Caithness and Sutherland Peatlands SAC is presented in **Sections 11.10-11.13.** A Deer Management Plan for the site is presented in **Technical Appendix 11.H**

Baseline Characterisation

Study Area

11.5.8 Study areas were defined on the basis of feature ecology. The study area size varied between ecological features depending on their likely distribution and potential for effects e.g habitats and protected species. Details of the extent of each search/study area are described in the relevant sections in the Baseline Conditions' section of this Chapter and associated **Technical Appendices 11.A – 11.E** 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 / Field Survey

11.5.9 A desk study was undertaken to collate available ecological information in relation to the Revised Consented Development and surrounding environment. This comprised a thorough search of available online datasets, such as those

provided by NatureScot and the previous Environmental Statements for Limekiln Wind Farm.

11.5.10 The field surveys undertaken to establish the baseline ecological conditions around the Revised Consented Development (plus appropriate buffers) are detailed in Table 11.2. The following surveys, and were undertaken in line with standard methodologies and guidance (respective study areas are also shown in **Figures 11.3 to 11.5**):

Table 11.2 Summary of Field Surveys Undertaken.

Feature Type	Survey/Scope	Date(s)	Technical Appendix
Habitats	National Vegetation Classification Survey: to map and classify vegetation communities according to the NVC	22nd to 26th September 2012 (updated 3rd – 9th May 2021)	11.A
	Common Standards Monitoring (CSM): to ass the condition of upland habitats	September 2011	11.A
Terrestrial Mammals	Otter: to search for evidence of otter shelters or activity within the site.	6th – 12th May 2021	11.B
	Bats: to assess the site for any potential bat roosts and emergence/re-entry surveys	25th September 2011 – dawn re-entry survey of four structures. 25th May 2012 – Dawn re-entry of one structure. 5th &19th August & 3rd September 2020 – Dusk emergence and dawn re-entry surveys of building at NC 97694 64246 15th August 2019 – Dusk emergence survey of confirmed roost.	11.C 11.C 11.F 11.F

Feature Type	Survey/Scope	Date(s)	Technical Appendix
	Bats: static detector surveys to determine levels of bat activity and species.	July – August 2011 (22 nights at two locations NC 98542 63593 & NC 97306 61286) July – September 2019 (51 nights over 12 locations – Limekiln Windfarm Extension) December 2019 – February 2020. Hibernation survey of building at NC 98914 60888 (38 days)	11.C 11.D 11.F
	Bats: Transect surveys to determine levels of bat activity and species.	May – September 2011. Eleven transects. May 2012 – Eleven transects.	11.C 11.C
	Water Vole: to search for evidence of water vole within the site and within proximity of any potential water crossing locations.	July – August 2011 6th - 12th May 2021	11.C 11.B
	Pine marten: to search for evidence of dens or activity within the site.	May 2012 February 2020 6th – 12th May 2021	11.F 11.B
Aquatic Habitats & Species	Fish Habitat & Fish Population surveys	July 2011 - Reay Burn and Achvarasdal Burn 12th -16th August 2019 – Achvarasdal and Sandside Burn 22nd – 24th & 27th August 2020 – Reay, Achvarasdal and Sandside Burns.	11.E
	Freshwater Pearl Mussels survey	27th -28th July & 17th August 2011.	11.E
	Freshwater macro-invertebrates Survey	24-25th April 2020 26th -27th October 2020.	11.E

11.5.11 The full suite of survey methods, species specific legislation and results are provided within **Technical Appendices 11.A – 11.E**. The field surveys were undertaken following best practice guidance, which are summarised within the relevant Appendices.

Assessment of Effects

Determining Importance of Ecological Features

11.5.12 Importance of ecological features has been considered within a defined geographical context. The following frame of reference has been used and adapted to suit local circumstances where necessary:

- International and European – e.g. SAC or Ramsar site;
- National - e.g. SSSI;
- Regional - e.g. habitats or populations of species of value at a regional (i.e. Highlands) level;
- County or vice-county – Local Wildlife Sites or habitats/species of value at county (i.e. Caithness) level; and
- Local – various approaches can be adopted for defining local importance, including assessment within a district, borough or parish context or within other locally defined areas.

11.5.13 For designated sites, importance reflects the geographical context of the designation. For habitats and species, importance has been based on their conservation status and population/assemblage trends and other relevant criteria (including size, naturalness, rarity and diversity) where appropriate.

11.5.14 Where protected species are present and there is the potential for a breach of the legislation, those species have automatically been considered as 'important' features. This assessment seeks to determine whether there could be a breach of the legislation as a result of the Revised Consented Development, and whether additional mitigation is required to ensure that the law will not be contravened.

11.5.15 Consideration has also been given to ensuring that land use changes do not result in the contravention of laws in relation to legally controlled plant and animal species under Schedule 9 of the Wildlife and Countryside Act 1981 in Britain (e.g. Japanese knotweed, Himalayan balsam, giant hogweed) and under the Wildlife and Natural Environment (Scotland) Act 2011.

11.5.16 This assessment only considered effects on 'important' ecological features, which in this context are features considered to be of local value and above, except where the feature is protected by specific legislation.

Impact Assessment

11.5.17 The assessment includes potential impacts on each of the identified ecological features which is determined as 'important' from all phases of the development (e.g. construction, operation and decommissioning). Impacts are characterised through consideration of their magnitude and/or extent, the pathway through which they occur (direct, indirect, secondary, or cumulative) and their duration and reversibility. Beneficial impacts are assessed as well as adverse ones if they are predicted to occur.

11.5.18 The assessment of impacts aims to take into account the baseline conditions at the site to allow a description of how these could change as a result of the project and associated activities.

- When describing the ecological impacts and effects, reference has been made to the following characteristics. The assessment only describes the characteristics that are relevant to the ecological effect. Beneficial or adverse – i.e. a change that improves or reduces the quality of the environment;
- Extent – the spatial or geographical area over which the impact/effect may occur under a suitably representative range of conditions;
- Magnitude – (See Table 11.3) refers to the duration, size, amount, intensity and volume. It should be quantified if possible and expressed in absolute or relative terms e.g. the amount of habitat lost, percentage change to habitat area, percentage decline in a species population;
- Duration - defined in relation to ecological characteristics (such as the lifecycle of a species). It should be noted activities which are short term in duration can cause long lasting ecological effects. Impacts and effects may be described as short, medium or long-term and permanent or temporary and need to be defined in months/years;
- Frequency and timing – i.e. when and the number of times an effect occurs; and
- Reversibility – i.e. an irreversible effect is one from which recovery is not possible within a reasonable timescale or there is no reasonable chance of action being taken to reverse it. A reversible effect is one from which spontaneous recovery is possible or which may be counteracted by mitigation.

11.5.19 Table 11.3 relates the terminology used to describe the magnitude of impacts throughout this EIA to the CIEEM approach.

Table 11.3 Magnitude of Change/Impacts - Ecology

Magnitude of Change/Impact	Interpretation in context of CIEEM guidelines
Substantial	The proposed development would cause a major change to existing environmental conditions that would be very likely to adversely or beneficially affect the conservation objectives or conservation status of a particular feature.
Moderate	The proposed development would cause a moderate change to existing environmental conditions that would be of sufficient magnitude that adverse or beneficial effects on the conservation objectives or conservation status of a particular feature cannot be ruled out.
Slight	The proposed development would cause a small change to existing environmental conditions that would be unlikely to adversely or beneficially affect the conservation objectives or conservation status of a particular feature.
Negligible	The proposed development would cause a very small change to existing environmental conditions that would be very unlikely to adversely or beneficially affect the conservation objectives or conservation status of a particular feature.
None	The proposed development would cause no change to existing environmental conditions and would therefore not affect the conservation objectives or conservation status of a particular feature.

Significance

11.5.20 Significance of effect has been determined through consideration of whether the effect in question either supports or undermines biodiversity conservation objectives (e.g. for designated sites) or conservation status (e.g. for species) for important ecological features.

11.5.21 An effect has been deemed significant if it is sufficiently important to require assessment and reporting such that it should be taken into account when judging whether to authorise the project and has been qualified with reference to an appropriate geographic scale.

11.5.22 Table 11.4 provides a guide to how significance has been determined for this assessment. Effects have been determined by a judgement which takes into account the importance of an ecological feature and the magnitude of predicted impact upon it. It is important to note that the scale of significance of an effect may not be the same as the geographic context in which the feature is considered important. In these cases, the assessment deviates from Table 11.4 and the rationale for this is clearly stated.

Table 11.4 Guideline Significant Matrix

Importance/ Impact	Substantial	Moderate	Slight	Negligible	None
International	Significant effect at the international scale		No significant effect		
National	Significant effect at the national scale		No significant effect		
Regional (Highlands)	Significant effect at the regional scale		No significant effect		
County (Sutherland)	Significant effect at the county scale		No significant effect		
Local	Significant effect at the local scale		No significant effect		
Below Local	No significant effect				

Cumulative Assessment

11.5.23 Assessment of cumulative effects follows the guidance in NatureScot (2012) and considered major developments within a 10 km radius of the site for the majority of the important ecological features. With respect to bats only operational wind farms with suitable connectivity to the Revised Consented Development have been assessed

11.5.24 Cumulative effects have been considered for developments that are existing (including under construction), that have been granted planning consent or projects awaiting determination within the planning system. A list of cumulative developments to be considered in this EIA report is presented in section **11.9 Assessment of Cumulative Effects**.

Assessment Limitations

11.5.25 The protected species survey included field survey after a period of heavy rain showers. There is potential that some signs, such as otter spraints or water vole latrines, were washed away by higher water levels. The survey allowed a characterisation of the habitat suitability and, as the majority of the survey was undertaken prior to the heavy rain commencing, this was not considered to be significant limitation.

11.5.26 The digital NVC dataset was used to calculate the areas of the different NVC sub-communities occurring within the site and also to calculate figures for permanent effects on these habitats. It should be noted there are limitations to using this dataset to calculate habitat areas. Most notable is that habitats in a subset of polygons were assigned proportion values over the whole polygon. The survey findings are therefore only accurate at the individual polygon level. As the Revised Consented Development has the potential to impact on parts of the polygons, for the purposes of quantifying effects on vegetation it had to be assumed the proportions were also valid at the sub-polygon level. This is not considered to be a significant limitation to the assessment because the assumption is considered likely to be true in most cases and because a survey which assigned individual polygons to each unique stand of vegetation would not have been reasonably practicable.

11.5.27 Ecological surveys are limited by factors which affect the presence of plants and animals such as the time of year, migration patterns and behaviour. The

ecological surveys undertaken to support the Revised Consented Development have not therefore produced a complete list of plants and animals and the absence of evidence of any particular species should not be taken as conclusive proof that the species is not present or that it will not be present in the future. However, the results of these surveys are considered to be robust and sufficient to undertake this assessment.

11.5.28 Therefore, whilst some limitations have been identified, it is considered that there is sufficient information to enable an informed decision to be taken in relation to the identification and assessment of likely significant effects on ecology.

11.6 Baseline Conditions

Current Baseline

11.6.1 This section details the results of the desk study and field surveys, providing the baseline conditions for the site, and includes:

- designated sites within 5 km;
- habitats and vegetation; and
- protected and notable species.

Designated Sites and Desk Study

11.6.2 There are eight statutory designated sites within 5 km of the Revised Consented Development which have terrestrial ecological qualifying features, sites designated for avian features are described in **Chapter 12: Ornithology**. Details on the designated sites are provided in Table 11.5 and Table 11.6 and their locations are shown on **Figure 11.1 and Figure 11.2**.

Table 11.5 Internationally Important Nature Conservation Sites within 5km of the Revised Consented Development

Site Name	Designation	Distance and Direction from Site Boundary	Description
Caithness and Sutherland Peatlands	SAC	0 km - Adjacent to south west boundary of the site.	Annex I habitats that are a primary reason for selection of the site: 3130 - Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or the *Isoëto-Nanojuncetea* 3160 - Natural dystrophic lakes and ponds Acid peat-stained lakes and ponds 7130 - Blanket bog Annex I habitats present as a qualifying feature, but not a primary reason for selection of the site: 4010 - Northern Atlantic wet heaths with Erica tetralix

Site Name	Designation	Distance and Direction from Site Boundary	Description
			7140 - Transition mires and quaking bogs 7150 - Depressions on peat substrates of the *Rhynchosporion* Annex II species that are a primary reason for selection of this site: 1355 - Otter *Lutra lutra* 1528 - Marsh saxifrage *Saxifraga hirculus*
Caithness and Sutherland Peatlands	Ramsar Site (overlaps with CSPSAC)	0 km - Adjacent to south west boundary of the site.	**Ramsar criterion 1:** The site supports one of the largest and most intact areas of blanket bog in the world. **Ramsar criterion 2:** The site supports a number of rare species of wetland plants and animals. The plants include three nationally rare mosses, eight nationally scarce vascular plants and four nationally scarce mosses.
Broubster Leans	Special Area of Conservation (SAC)	3.9 km - East	Annex I habitats that are a primary reason for selection of the site: 7140 Transition Mires and quaking bogs.

Table 11.6 Nationally Important Nature Conservation Sites within 5km of the Revised Consented Development

Site Name	Designation	Distance and Direction from Site	Description
East Halladale	SSSI	0 km - Adjacent to south west boundary of the site.	Four designated features. One terrestrial habitat and three avian features. The terrestrial habitat feature is: - Blanket Bog
Sandside Bay	SSSI	0.3 km North at nearest point	One designated feature. Terrestrial habitat: Sand Dunes
Loch Caluim Flows	SSSI	1.8 km south-east	Five designated features. One terrestrial habitat and four avian features. The terrestrial habitat feature is - Blanket Bog
Red Point Coast	SSSI	2.9 km North west	Five designated features. Two geological, one terrestrial habitat, one biological and one avian feature. Terrestrial Habitat: - Maritime Cliff Biological Feature: - Scottish primrose *Primula scotica.*

Site Name	Designation	Distance and Direction from Site	Description
Broubster Leans	Site of Special Scientific Interest (SSSI)	3.9 km east	Two designated features. One terrestrial habitat and one avian feature. Terrestrial habitat feature - Hydromorphological mire range.

11.6.3 The Flow country is on the tentative list for World Heritage Site, a non-statutory designation granted by The United Nations Educational, Scientific and Cultural Organization (UNESCO). No definitive boundary of the designation is available; however it is likely that it falls within the site boundary.

11.6.4 Desk study results for protected species are referred to in the relevant species sections below.

Field Surveys

11.6.5 Details regarding field survey methodologies and results are included within Technical **Appendices 11.A – 11.E**. The ecological surveys undertaken to assist in establishing the ecological baseline for the site and inform this impact assessment are summarised in Table 11.3.

Habitat Surveys

11.6.6 NVC surveys of the site were undertaken in September 2012. Surveys followed the general methods outlined in Rodwell (2006). Surveys were undertaken within the survey area as detailed within Technical **Appendix 11.A**. The survey was conducted within the entire site boundary, therefore ensuring sufficient buffer of areas to account for the presence of potential GWDTEs, in line with *SEPA Guidance Note 31*.

11.6.7 The NVC communities recorded within the study area are shown in Table 11.7 and include the proportions of particular communities or habitat types that are found within the study area, including proportions within mosaic habitats. A full description of the habitats, NVC communities and associated flora of the study area is provided in Technical **Appendix 11.A**.

11.6.8 The NVC survey found 31 different plant communities and within these a total of 37 sub-communities were recognised. No nationally rare communities were recorded, however some fen communities that were recorded were considered to be possibly scarce locally or regionally. The site is dominated by commercial plantation of Sitka spruce and lodgepole pine (*Pinus contorta)*. The remainder of the habitats are generally consisting of modified and disturbed forms of blanket bog, wet heath, dry heath and acid grassland.

11.6.9 A follow up survey was undertaken in May 2021, to check if the results of the initial NVC survey were still valid and to map any significant changes to the communities or sub-communities within the site. This survey confirmed that there were no significant changes to the distribution of vegetation communities within the site. Figures below are therefore based on the September 2012 data.

Table 11.7 Summary of NVC Communities Recorded within the Study Area

Habitat	Community	Sub-community	Code	Area (ha)
Coniferous plantation				860
Broad-leaved plantings				0.2
Scrub	*Salix cinerea – Galium palustre* woodland		W1	0.06
	Betula pubescens – Molinia caerulea woodland	*Sphagnum*	W4c	0.53
	Ulex europaeus – Rubus fruticosus scrub	*Teucrium scorodonia*	W23c	3.1
			Total	**3.7**
Neutral grassland	*Arrhenatherum elatius* grassland	*Festuca rubra*	MG1a	0.07
	Holcus lanatus – Deschampsia cespitosa grassland	*Poa trivialis*	MG9a	4.5
			Total	**4.6**
Marshy grassland	*Holcus lanatus – Juncus effusus* rush pasture	Typical	MG10a	**7.0**
Calcareous grassland	*Festuca ovina – Agrostis capillaris – Thymus polytrichus* grassland	*Carex pulicaris – Carex panicea*	CG10b	**<0.05**
Acid grassland	*Festuca ovina – Agrostis capillaris – Galium saxatile* grassland	Typical	U4a	14
		Holcus lanatus – Trifolium repens	U4b	<0.05
		Vaccinium myrtillus – Deschampsia flexuosa	U4e	0.41
	Nardus stricta – Galium saxatile grassland	*Agrostis canina – Polytrichum commune*	U5b	0.7
	Juncus squarrosus – Festuca ovina grassland	*Agrostis capillaris – Luzula multiflora*	U6d	<0.05
	Pteridium aquilinum – Galium saxatile	Not determinable	U20	3.3
		Anthoxanthum odoratum	U20a	7.5
		Vaccinium myrtillus – Dicranum scoparium	U20b	6.8
		Species-poor	U20c	28
			Total	**60**
Dry heath	*Calluna vulgaris – Erica cinerea*	Not determinable	H10	4.4
		Typical	H10a	41
	Calluna vulgaris – Vaccinium myrtillus	*Calluna vulgaris* sub-community	H12a	0.01
			Total	**45**
Wet heath	*Trichophorum germanicum – Erica tetralix* heath	Not determinable	M15	23
		Carex panicea	M15a	0.12
		Typical	M15b	42
		Cladonia	M15c	9.0
	Erica tetralix – Sphagnum compactum	*Juncus squarrosus – Dicranum scoparium*	M16d	0.13
	Molinia caerulea – Potentilla erecta	Not determinable	M25	47
		Erica tetralix	M25a	36
			Total	**160**
Blanket bog	*Sphagnum denticulatum* bog pool		M1	<0.01
	Sphagnum cuspidatum/fallax bog pool		M2	0.67
		Not determinable	M17	4.3

Habitat	Community	Sub-community	Code	Area (ha)
	Trichophorum germanicum – Eriophorum vaginatum blanket mire	*Drosera rotundifolia – Sphagnum*	M17a	4.3
		Cladonia	M17b	9.8
		Juncus squarrosus – Rhytidiadelphus loreus	M17c	0.3
	Erica tetralix – Sphagnum papillosum raised and blanket mire	*Empetrum nigrum – Cladonia*	M18b	0.2
	Calluna vulgaris – Eriophorum vaginatum blanket mire	Not determinable	M19	9.8
		Erica tetralix	M19a	14
	Eriophorum vaginatum blanket and raised mire	Not determinable	M20	1.9
		species-poor	M20a	2.2
		Calluna vulgaris – Cladonia	M20b	0.45
			Total	**48**
Acid flush	*Carex echinata – Sphagnum fallax/denticulatum* mire	*Carex echinata*	M6a	1.4
		Carex nigra	M6b	0.06
		Juncus effusus	M6c	9.7
			Total	**10**
Marsh/ marshy grassland	*Juncus – Galium palustre* rush-pasture	*Juncus acutiflorus*	M23a	0.63
		Juncus effusus	M23b	4.8
	Iris pseudacorus – Filipendula ulmaria mire	*Juncus*	M28a	0.89
			Total	**6.3**
Transition mire	*Carex rostrata – Sphagnum fallax* mire	-	M4	0.04
	Carex rostrata – Sphagnum squarrosum mire	-	M5	0.03
	Carex rostrata – Calliergonella/Calliergon mire	*Campylium stellatum – Scorpidium scorpioides*	M9a	0.07
			Total	**0.1**
Swamp	*Carex rostrata* swamp	*Menyanthes trifoliata – Equisetum fluviatile*	S9b	0.06
Basic flush and springs	*Carex dioica – Pinguicula vulgaris* mire	*Carex demissa*	M10a	0.03
	Ranunculus omiophyllus – Montia fontana rill	-	M35	<0.05
Lotic water (running water)				0.9
Lentic water (standing water)				0.9
Tracks				7.9
Exposed rock				0.6
Buildings				0.1

Blanket Bog

11.6.10 Blanket bog, a priority habitat listed on Annex I of the European Habitats Directive and the Scottish Biodiversity List, covers approximately 3.9% of the survey area. Blanket bog is also a qualifying feature of Caithness and Sutherland Peatlands SAC and Ramsar site and East Halladale SSSI.

11.6.11 The majority of the blanket bog recorded within the survey area was disturbed and degraded and within the woodland rides between forestry blocks and disturbed through the forestry drainage.

11.6.12 The most widespread blanket bog community recorded is M19 - Calluna vulgaris – Eriophorum vaginatum blanket mire.

11.6.13 A condition assessment of the blanket bog was conducted in 2011, following Common Standards Monitoring (CSM) based on Joint Nature Conservation Committee (JNCC) guidance. Seven locations were assessed and each located failed, through drainage, the presence of alien species (Sitka) or though pressures from deer. Two areas of relatively intact blanket bog were recorded around Cnoncan Dubh nan Euan and Cnocan nan Euan. Diverse bog vegetation was recorded in these locations, although signs of historical peat cutting is evident.

11.6.14 The development design has avoided the moderately good quality blanket bog habitat found around Lochan nan Eun and Cnocan nan Eun.

Wet Heath

11.6.15 Wet heath covers 13 % of the survey area and comprise the most widespread open-habitat communities. Wet heath is also an Annex 1 habitat and an SBL priority habitat. It is found mainly in the woodland rides between the forestry blocks.

11.6.16 Much of the wet heath vegetation is found in areas of apparent deep peat and it is likely that the wet heath communities are a result of the forestry activities, such as drainage of former blanket bog, which have dried out the peat and therefore favoured plants such as purple moor grass and deer grass over cottongrass spp. and *Sphagnum*.

Other Notable Habitats

11.6.17 Fens and flush communities were recorded in wetter ground, near the Achvarasdal Burn and are likely attributed to the base rich groundwater originating from the limestone in and around the abandoned limekiln at Aryleive.

Other Habitats

11.6.18 The dominant habitat within the survey area, is coniferous plantation, comprising of approximately 70.3% of the habitats on site.

11.6.19 Other habitats include grasslands exhibiting characteristics of the neutral, acid and calcareous soils found within the study area. The calcareous grassland (CG10b) is relatively small in extent and is an SBL priority habitat.

Scarce and Notable Plants

11.6.20 A total of 197 different species of vascular plant, moss, liverwort and lichen were identified. None were noted as scarce or rare in Britain, however greater tussock sedge (*Carex paniculata)* which was recorded in the M9 communities near Aryleive Moss, is noted as locally rare, however this may just be a case of under recording in the Caithness area.

Groundwater Dependent Terrestrial Ecosystems

11.6.21 Potential GWDTE within the survey area are represented by wet woodland, mire, and marshy grassland habitats. Table 11.8 presents the frequency and total area of potential GWDTE habitat within the site.

Table 11.8 Frequency and Total Area of Potential GWDTE within the Site

NVC Community	Potential Ground Water Dependency	Number of Polygons in which Community Present	Overall Area of Habitat (ha)
M5	High	1	0.03
M6a	High	6	1.4
M6b	High	1	0.06
M6c	High	11	9.7
M9a	High	1	0.07
M10a	High	1	0.03
M16d	High	1	0.13
M23a	High	3	0.63
M23b	High	8	4.8
M35	High	2	<0.05
M15a	Moderate	1	0.12
M15b	Moderate	48	42
M15c	Moderate	5	9
M25a	Moderate	33	36
MG9a	Moderate	1	4.5
MG10a	Moderate	12	7
U6d	Moderate	1	<0.05
M28a	Moderate	3	0.89
W1	Moderate	1	0.06

11.6.22 **Figure 11.4** shows the potential GWDTE locations derived from the NVC results, that will be impacted by the Revised Consented Development (e.g. within 250 m of infrastructure). The potential for ground water dependency is classified using SEPA guidance (2016). Where a potential high GWDTE exists in a polygon, it outranks any potential moderate GWDTE communities within that same polygon.

11.6.23 The most extensive potential GWDTE are the wet heath communities M15 and M25. Marshy grassland/rush pasture communities including MG9, MG10 and M23 are also quite extensive. The most extensive flush community is M6c. All other potential GWDTE (except M6a) cover less than 1 ha within the site.

11.6.24 GWDTE sensitivity has been assigned here solely on the SEPA listings. 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 dependant on groundwater at all. Further information on groundwater dependency is provided within **Chapter 13: Geology, Hydrology and Hydrogeology**.

Peatland

11.6.25 The Carbon and Peatland Map 2016 identifies the majority of the site as Class 1 Peat and therefore is considered to support nationally important carbon-rich

soils, deep peat and priority peatland habitat, with some areas likely to be of high conservation value.

11.6.26 The map also identifies a smaller area of Class 2 Peat, around the northern extent of the site boundary, this area is also considered to support nationally important carbon-rich soils, deep peat and priority peatland habitat.

11.6.27 As the Carbon and Peatland Map is a high-level tool, peat depth surveys have also been carried out across the study area to inform the detailed site assessment on peatland, which is required to identify the actual effects of the Revised Consented Development, including siting, design and mitigation. The results of these surveys are discussed in **Chapter 13: Geology, Hydrology and Hydrogeology**.

Non-Avian Fauna

11.6.28 Full details pertaining to the survey methods employed and legal status of each species below are included within respective Technical **Appendices 11.B to 11.D**. Results of protected species are shown in **Figure 11.5**.

Otter

11.6.29 No protected features (i.e. holts or couches) of otter were recorded during the surveys in 2021, however two spraints were recorded, one on Reay Burn and the other on Achvarasdal Burn.

11.6.30 The Achvarasdal and Reay Burn (and tributaries) offer limited sheltering opportunities for otter. Both burns are predominately surrounded by wet heath and grasses, with very few rocky crevices or overhangs, which otter could use for shelter, recorded within the survey area. Downstream of the survey area, the habitat surrounding both of the watercourses changes to thick shrubs and broadleaved trees, therefore potentially offering more suitability for holts or hovers.

11.6.31 The Reay and Achvarasdal Burn both offer suitability for temporary resting places such as couches/lay-ups, with the bankside grasses offering the opportunity for otter to opportunistically rest anywhere along these catchments.

11.6.32 The site offers excellent habitat for foraging otter. Both the Reay and Achvarsdal Burns are known to support prey species such as fish and amphibians. The tributaries feeding both these watercourses are also likely to support prey species and act as commuting corridors through the plantation.

11.6.33 Otters are a species capable of exploiting a range of habitats (Strachan et al., 2004) and they can have large home ranges, with records indicating mean length used by males as 38.8 ± 23.4km and 18.7 ± 3.5km by females (Kruuk, 2006). Therefore, it is possible that the watercourses present within the study area are part of an otter's home range.

Water Vole

11.6.34 Fourteen colonies of water vole were recorded during the surveys in 2011. However only two active colonies were recorded during the surveys in 2021. One colony is present on a tributary of the Reay Burn and another present on the Achvarasdal Burn.

11.6.35 The watercourses present throughout the study area varied in suitability for water vole. The smaller tributaries of the main two watercourses, the Reay Burn and Achvarasdal Burn, generally offered sub-optimal or unsuitable habitats for water vole. Either through steep banks or flatter banks prone to flooding.

Badger

11.6.36 There was no evidence of badger recorded during the surveys in 2011 or 2019-2021.

11.6.37 The habitats present within the study area offer limited suitability for supporting badgers. The extensive coverage of the study area by purple moor-grass, wet heath and bog habitats, limit the availability of potential sett building habitat for badgers. The generally wet and peaty soils offer limited sheltering opportunities for badger, even within the coniferous plantation. If badgers are present within the wider area, it is likely they would utilise the more suitable habitats to the north and east of the site and may only periodically use the site for foraging.

Pine Marten

11.6.38 Evidence of pine marten was recorded throughout the site in all surveys (2011 and 2019-2021). No confirmed dens have ever been recorded within the site. Although coniferous plantation covers the majority of the site, the trees are relatively short and thin and do not offer the potential for the favoured elevated den sites used by pine marten (e.g. tree cavities).

11.6.39 Suitable denning sites were recorded at the east of the site, in the rocky outcrops of Cnocan nan Eun and within the numerous log stacks which are present throughout the entire survey area. However, there was no evidence that any of these sites were currently occupied by pine marten during the 2021 survey. (see **Figure 11.4**).

11.6.40 The home ranges of pine marten can be highly variable in Scotland, depending on the quality of suitable habitat availability. In the Scottish Highlands, in highly fragmented cover, home range sizes can exceed 20km^2 for males and 8km^2 for female pine marten (W.J Cresswell, 2012) Due to the lack of good natal den habitat, it is assumed that the site supports a small population of pine marten and that it is probably mainly used for foraging.

Bats

11.6.41 Bat surveys were conducted during the period of May to October 2011 and May 2012. Further surveys were undertaken in August 2019, winter 2019/20 and September 2020.

11.6.42 Bat surveys were conducted in the neighbouring Limekiln Wind Farm Extension site during July – September 2019.

11.6.43 The bat survey field methods followed standard guidance and are fully outlined within Technical **Appendix 11.C** ; the bat study area is shown in **Figure 11.5**.

11.6.44 *Pipistrellus spp.*, were the only species of bat recorded throughout all of the bat surveys completed.

11.6.45 During the 2011-2012 surveys the only species recorded on site was common pipistrelle (*Pipistrelle pipistrellus*). One non-breeding roost was identified at NC 97351 62832. A remote detector deployed along the Reay Burn recorded 15 bat passes over a period of 51 nights (0.8 passes per night) and another detector, deployed in the north-east of the site recorded 3168 passes in 73 survey nights (48.1 passes per night).

11.6.46 A dusk emergence survey of the roost, conducted in August 2019, did not confirm the presence of roosting bats, however a common pipistrelle was recorded foraging during the survey. The foraging bat was first recorded close to sunset and therefore was assumed to be roosting nearby, potentially in the houses to the north east of the site.

11.6.47 The hibernation surveys during winter 2019/2020 of the ruined buildings and old limekiln did not return any positive records of bats.

11.6.48 The August/September 2020 emergence and re-entry surveys of the buildings located at Milton (north east of site) did not record any bats emerging or foraging.

11.6.49 The results of the static detector surveys on the adjacent Limekiln Wind Farm Extension site in 2019, noted similar results to the surveys completed within the site in 2011/2012, with 2053 bat passes being recorded within the survey area over a period of 29 days (July – August) and 603 bat passes during a period of 22 days recording (September). The detector set up closest to the Revised Consented Development, recorded 140 bat passes over 51 recording days.

11.6.50 Common pipistrelle was the most commonly recorded bat, with potential records of Nathusius' pipistrelle (*Pipistrellus nathusii)* and one record of soprano pipistrelle (*Pipistrellus pygmaeus)*.

11.6.51 For all bat species recorded, the total overall activity rates are considered to be very low. The greatest amount of activity recorded throughout the surveys was a result of common pipistrelle bats.

Reptiles

11.6.52 Specific reptile surveys were not carried out within the site, however incidental sightings were recorded.

11.6.53 Two common lizards (*Zootoca vivipara)* were observed during the 2021 surveys (**Figure 11.5**). No sightings of adder (*Vipera berus)* or slow-worm (*Anguis fragilis)* were recorded during protected species surveys.

Amphibians

11.6.54 No suitable ponds or aquatic habitat for great crested newt (*Triturus cristatus)* was recorded within the study area and the site is outwith the known distribution of the species. No incidental records of any newt or other amphibian species were made.

Fish and Fish Habitats

11.6.55 Fish habitat surveys were conducted in August 2011 and population studies were conducted in July 2012, August 2019 and August 2020.

11.6.56 The Reay Burn and Achvarasdal Burn, drain the site, both running south to north. The Reay Burn runs close to the western edge of the site and the Achvarasdal Burn runs along the eastern boundary of the site.

11.6.57 Sandside Burn, to the west of Reay Burn, was introduced into the study during 2019; a fish habitat survey and fish population survey were undertaken in August 2019.

11.6.58 The Reay Burn was found to have no significant obstacles to fish migration within its lower reaches. The habitats within the burn were well suited to trout (*Salmo trutta*) production. Three electrofishing sampling points were undertaken on the Reay Burn. Trout fry and parr were caught within the burn and the burn was classified as excellent by regional standards for trout parr densities.

11.6.59 The Achvarasdal Burn includes extensive areas that are suited to the production of salmonid fish. The burn offers habitats suitable for all life stages, including pools which were considered deep enough to hold salmon during spawning. Five sites were electrofished, including two control sites, upstream of the development. Small numbers of salmon were caught during the electrofishing surveys in 2020, including a single salmon (*Salmo salar*) fry, which indicates successful spawning within the burn.

11.6.60 The Sandside Burn offers good habitats for juvenile salmonids and was considered to offer excellent spawning opportunities. Three electrofishing sites were undertaken on the Sandside Burn, including one site upstream of all works (control). Salmon fry and parr were caught during the electrofishing surveys. Fry densities were assessed as very poor to fair by regional standards. The evidence from the electrofishing suggested that successfully spawning within the Sandside may not be an annual event.

11.6.61 Eels (*Anguilla anguilla*) were caught on all three watercourses and at all electrofishing sites, except for one, during 2020.

11.6.62 The comparison of the data collected during 2012 and data collected in 2020 suggest that there is considerable inter-annual variation in juvenile trout densities.

Deer

11.6.63 Red deer (*Cervus elaphus*) were encountered frequently during the surveys and signs of damage to the bog habitats through tramping and grazing was observed during the vegetation and protected species surveys.

11.6.64 A Deer Management Plan (Appendix 11.H) was developed for the Consented Development. The key objectives for the management of deer within the site include;

- Preventing unacceptable levels of damage to the enclosed woodland.
- Establish and enhance long term deer habitat.
- Monitor deer populations.
- Monitor deer welfare.

- Maintain the condition of the SAC peatland habitats.

11.6.65 The current estimate of the deer population within Limekiln Forest, is thought to be approximately 150 – 200 individuals.

11.6.66 In conjunction with the Deer Management Plan, a Deer Fence Management Plan (DFMP) was produced. The purpose of the DFMP is to outline the monitoring and management measures to restrict deer movements between the site and the neighbouring land, such as the Caithness and Sutherland Peatlands SAC/Ramsar site and East Halladale SSSI.

11.6.67 CSM survey of an areas of Caithness and Sutherland Peatlands SAC/Ramsar which falls within the fenced study area, at the south west of the site boundary was undertaken in September 2020.

11.1.1 Twenty five quadrats were surveyed and the assessment results showed that this part of the SAC is in good condition, although drier than average for a blanket bog site. Grazing impacts, although recorded, were considered to be significantly below the threshold for causing deleterious impacts on the condition of the blanket bog vegetation.

Importance of Ecological Features

11.6.68 In accordance with the CIEEM Guidelines and based on the baseline information, each ecological feature recorded within the study area is considered to have the following importance (Table 11.9).

Table 11.9 Importance of Ecological Features

Feature	Importance	Rationale
Caithness and Sutherland Peatlands SAC	International	SAC designated under European legislation for standing waters, blanket bogs, wet heath, transition mire, bog pools, otter and marsh saxifrage.
Caithness and Sutherland Peatlands Ramsar Site	International	Wetland of International Importance under the Ramsar Convention
East Halladale SSSI	National	SSSI designated under national legislation for blanket bog.
Blanket Bog (outside of designated sites)	Regional	EU Annex I priority habitat and nationally important peatland soils. Priority habitat on SBL. However generally in sub-optimal condition and patchily distributed within site.
Wet Heath	Local	EU Annex 1 Habitat. Likely to be on some nationally important peatland soils. Priority SBL. Habitat generally represents degraded blanket bog and is ubiquitous in Caithness.
M10 Flush	Local	Upland flushes, fens and swamps a priority habitat on Scottish Biodiversity List. M10 of restricted distribution, due to association with alkaline springs/seepages.
M6 Flush	Local	Upland flushes, fens and swamps a priority habitat on Scottish Biodiversity List. M6 flushes ubiquitous within uplands.

Feature	Importance	Rationale
Otter	County	Otter are linked to Caithness and Sutherlands Peatlands SAC and are known to use the site.
Bats	Local	Low levels of pipistrelle bats using the site, this species is frequent throughout the Caithness area.
Water vole	Local	Priority SBL species, although widespread throughout the Scottish Highlands and known to occur frequently within Caithness.
Pine Marten	Local	Priority SBL species, it is likely that the site offers potential to support a small population of pine marten.
Reptiles	Local	Common lizard are likely to be very common locally and widespread in Caithness.
Salmonid Fish	Local	Some spawning potential present in Achvarasdal and Sandside Burns but none supporting a significant fishery.
Deer	n/a	Deer are not considered to be an ecologically important feature but have been included as have potential to affect important ecological features as a result of potential changes in distribution.

11.7 Assessment of Effects

Construction Effects

11.7.1 This section provides an assessment of the potential effects of construction phases on important ecological features.

Designated Sites

11.7.2 The Revised Consented Development does not include construction within any part of the designated sites listed in Table 11.5 and Table 11.6. Caithness and Sutherland Peatlands SAC/Ramsar is 400 m from the nearest construction area and is separated from much of the construction with a deer fence. The exception to this is approximately 118 ha to the south west of the Revised Consented Development, however at this point, the designated site is approximately 600 m from the construction area. Therefore, there would be no direct effect of construction upon the habitats of either Caithness and Sutherland Peatlands SAC or East Halladale SSSI.

11.7.3 There may be some indirect loss of condition within wetland habitats due to drainage effects, and changes to the hydrological regime as a result of the Revised Consented Development. 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). It is expected that any indirect drainage effects will only impact wetland habitats such as blanket bog, wet modified bog, marshy grassland, flushes, wet heath and wet woodland; no indirect drainage effects are expected to impact or alter the quality or composition of 'dry' habitats such as dry heath, acid grassland etc. Due to the distance between the construction area and Caithness and Sutherland Peatlands SAC or East Halladale SSSI, no indirect effects on either of these sites are anticipated.

Habitats

11.7.4 Habitats within the site would be impacted in two ways during construction:

- permanent loss, i.e. habitats occurring in areas where infrastructure would be permanently sited and afforested areas that would not be restocked (e.g. buffer zones around turbine locations); and
- temporary disturbance, i.e. habitats occurring in areas that would be subject to disturbance during the construction phase only, for example installing cables for access to grid and borrow pit locations which would be reinstated prior to operation of the site and afforested areas which would be restocked after felling

11.7.5 The most tangible effect on habitats would be the direct loss during construction of the Revised Consented Development, due to the construction of new tracks, hardstanding and substation buildings. Impacts on forestry are discussed in **Chapter 14: Forestry.**

11.7.6 Table 11.10 details the estimated direct loss of each habitat expected to occur during construction of the new infrastructure.

11.7.7 During construction an estimated loss of 0.872 ha of Annex 1 blanket bog habitat is expected, this loss is approximately 1.8% of the blanket bog habitats found within the study area is expected. The areas of higher quality bog habitats will be avoided during construction and the impacts will be limited to the degraded habitats within the woodland areas, therefore this loss is not considered a significant effect.

11.7.8 Approximately 3.05 ha of Annex 1, wet heath habitat will be lost during construction. This is approximately 1.9 % of the wet heath habitats within the study area and is not considered a significant effect on this habitat.

11.7.9 Approximately 0.12 ha (1%) of the acid flush communities within the study area will be lost to construction. This loss is not considered a significant effect.

11.7.10 The Revised Consented Development would be constructed under a Construction Environmental Management Plan (CEMP). This document will seek to identify appropriate controls to prevent direct and indirect effects to habitat outside the infrastructure footprint during construction. The CEMP and the Construction Method Statements (CMSs) would be developed by the Principal Contractor in collaboration with the design team prior to construction works commencing on the site. These finalised documents would contain the detail for habitat reinstatement. Implementation of the controls identified in the CEMP would be monitored on site by a suitably experienced Ecological Clerk of Work (ECoW) who would have the power to implement additional measures if required to ensure protection of retained habitats. Therefore, there would be no direct effect of construction upon retained habitats within the site.

Otter

11.7.11 Construction would be covered under a Species Protection Plan (SPP) for otter (**Appendix 11.F**). This document identifies appropriate control measures to prevent harm to otter during construction. Controls include measures to prevent otter from falling into any open excavations, standard pollution control

measures to avoid contamination of watercourses and impact upon otter prey species and measures to prevent disturbance to otter behaviour through lighting during construction. Implementation of the mitigation would be monitored on site by a suitably qualified ECoW. Therefore, no significant effects from construction activities are predicted on otter abundance or distribution as a feature of Caithness and Sutherland Peatlands SAC.

11.7.12 Construction of the seven watercourse crossings, through installing culverts/bridges has the potential to impact on habitat connectivity for otter and could potentially result in injury or death to an otter, if they attempt to use culverts during periods of high-water flow or if they are forced to divert away from the watercourse (i.e. onto the track) during flood events to avoid impassable structures. Killing or injuring an otter would constitute a slight adverse effect on otter as a feature of Caithness and Sutherland Peatlands SAC. This effect would not be considered significant but could constitute an offence under the Conservation (Natural Habitats, &c.) Regulations 1994.

11.7.13 Otter is a qualifying feature of Caithness and Sutherlands Peatlands SAC. Based on the evidence of otter activity recorded during the surveys, it can be assumed that otter are present on both the Reay and Achvarasdal Burns catchments. Given the potential sized of otter home ranges and the proximity of the site to Caithness and Sutherland Peatlands SAC it is possible that any individual otter using the site will also range into the SAC. The SAC is assessed as being in favourable condition for otter, and although the site does not lie within the SAC boundary, the proximity of the site to the SAC, may mean that the site has a role to play in supporting the favourable condition of the otter population within the designated site. Indirect effects on otter may include pollution events effecting the population of prey (i.e. fish).

GWDTEs

11.7.14 Impacts on GWDTE during the construction phase of the Revised Consented Development are assessed in **Chapter 13: Geology, Hydrology & Hydrogeology.**

Peat

11.7.15 Direct impacts during construction, including volumes of peat excavated are assessed in **Chapter 13: Geology, Hydrology & Hydrogeology**.

Water Vole

11.7.16 Water vole population on Reay Burn is approximately 80 m from the nearest construction area and the water vole population on Achvarasdal Burn is approximately 100 m from the nearest construction area. An SPP for water vole would cover mitigation measures to prevent disturbance to water vole during construction. Mitigation includes, checking upstream and downstream of all watercourse crossings prior to construction and standard pollution protection measures to prevent pollution events from impacting upon water quality. Therefore, no significant effects are predicted on water vole populations within the site.

11.7.17 Construction of the seven watercourse crossings through culverting/bridging the watercourses has the potential to impact on habitat connectivity for water

vole and could possibly lead to injury or death of animals attempting to use such structures during high water levels. Death or injury to water vole would constitute a slight adverse effect on the local water vole populations. This effect would not be significant, but it could constitute an offence under the Wildlife and Countryside Act 1981 (as amended).

Pine Marten

11.7.18 Construction would be covered under an SPP for pine marten. This document includes measures to prevent animals falling into open excavations, sensitive lighting scheme to prevent disturbance to pine marten behaviour and pre-construction checks of suitable pine marten habitat in advance of any works. Therefore, no significant effects are predicted on the pine marten population within the site.

11.7.19 Once construction is completed, boxes suitable for pine marten will be installed within the permanently retained woodland areas, to offer denning provisions for pine marten, and will include boxes suitable for breeding (e.g. elevated and protected from the elements).

Bats

11.7.20 Low levels of activity by common pipistrelle bats were recorded using the site, during transect and static detector surveys carried out in 2011-2012 and 2019. This suggests the site is not used by large numbers of bats. No suitable roost sites would be impacted by construction or felling works. Therefore no significant effects are predicted on the abundance or distribution of bat species within the site.

11.7.21 There is potential for disturbance to bat foraging or commuting behaviour during construction if works are conducted at night. Sensitive lighting is covered within an SPP for bats to avoid disturbance to bat behaviour during any night works (**Appendix 11.F**). Therefore, no significant effects on bats are predicted during construction works within the site.

Reptiles

11.7.22 Construction of the Revised Consented Development would be covered under the CEMP and SPP (**Appendix 11.F**) for reptiles. These documents will identify appropriate controls to prevent harm to reptiles during construction. Controls include pre-construction checks in appropriate habitats (such as woodland rides and riparian corridors). Implementation of the controls identified in the CEMP and SPP would be undertaken and monitored on site by a suitably experienced ECoW who will have the power to implement additional measures, if required, to ensure protection of reptiles. Therefore, no significant effects from construction activities are predicted on reptiles.

11.7.23 Construction of the Revised Consented Development would also result in the loss of approximately 4ha of potential habitat for reptiles (e.g. dry heath, acid grassland). The loss of a small amount of habitat, in relation to the total available within the site, and the wider area, is predicted to result in a negligible effect on reptiles. This effect would not be significant. It is also considered construction of the access road would have no significant effect on reptiles as

a result of barrier effects, as common lizard are able to cross short sections of hardstanding.

Fish

11.7.24 The Achvarsadal Burn supports a modest population of salmon and trout and the Reay supports trout. The electrofishing results suggest that both burns support breeding by both species, however habitat quality is the mostly likely a limiting factor in terms of carrying capacity for each. With the exception of the seven watercourse crossings, no construction within 50 m of the watercourses is anticipated. Any construction within 50 m of a watercourse i.e. the water crossings will be covered within the CEMP. This document will include details on mitigation measures for water protection which will be implemented prior to and during construction. These measures will include but are not limited to: control of construction site drainage; controls during watercourse crossings; and containments of fuel and other chemicals.

11.7.25 The SPP for aquatic ecology (**Appendix 11.F**) includes appropriate timing for installing watercourse crossings, to prevent any in-stream works during spawning periods. Therefore, no significant effects on the local fish populations are predicted during construction.

Deer

11.7.26 There is potential for displacement of the deer population during construction, due to increased noise and vehicle movements within the site.

11.7.27 Deer fencing (**Appendix 11.G**) will be installed prior to commencement of construction to prevent any displaced deer impacting on habitats outwith the footprint construction (e.g. SAC within the site boundary).

11.7.28 A Deer Management Plan and Deer Fence Management Plan (**Appendix 11.G**) are provided and provide timescales for monitoring deer numbers, including indicative culling numbers to maintain a healthy population.

11.7.29 No significant effects on the local deer population are predicted during construction.

Table 11.10 Estimated Loss of Habitat for Permanent Infrastructure

NVC Community or Habitat Type	Phase 1 Habitat Type[1]	Total Extent in Study Area (ha)	Direct Habitat Loss: NVC (ha)	Direct Habitat Loss: Phase 1 (ha)
M2	E1.6.1 Blanket bog	48	0.002	0.872
M17, M17a			0.61	
M19, M19a, M19b			0.17	
M20, M20a			0.09	
M15, M15b	D2 Wet dwarf shrub heath	160	1.24	3.05
M25, M25a			1.81	
W4c	A2.1 Scrub: dense/continuous*	3.7	0.00003	0.00303
W23c			0.003	
M6a, M6c	E2.1 Acid Flush	10	0.12	0.12004
M4			0.00004	
M23a, M23	B5 Marshy Grassland*	13.3	0.022	0.044
M28a			0.002	

[1] Effects upon habitats with a '*' in Tables 11.10 have been scoped-out of the assessment due to the minor nature of habitat loss involved or their low nature conservation value or importance, as per the sections above.

NVC Community or Habitat Type	Phase 1 Habitat Type[1]	Total Extent in Study Area (ha)	Direct Habitat Loss: NVC (ha)	Direct Habitat Loss: Phase 1 (ha)
MG10a			0.02	
H10a	D.1.1 Dry Heath*	45	0.03	0.03
MG9a	B2.2 Neutral Grassland*	4.6	0.02	0.02
U4a	B1.2 Acid Grassland*	60	0.03	0.164
U20a, U20b, U20c			0.134	
CP	A1.2.2 Coniferous woodland – plantation *	860	-	73.90
Track	J4 Bare ground *	8	-	0.031
Rock			-	
Lotic Water	G2 Running Water*	0.9	0.001	0.001
Lentic Water	G1 Standing Water*	0.9	0.000001	0.000001
STUDY AREA TOTALS		**1214[2]**	**4.33**	

[2] The total habitats study area covered 456.61ha as per Table 11.7. Only NVC communities or Phase 1 habitat types where habitat loss is predicted are listed within Table 11.10. Those habitat types present within Tables 11.7 and 11.8 that are not listed in Table 11.10 are not subject to habitat loss.

11.8 Operational Effects

11.8.1 This section provides an assessment of the likely effects of the operation of the Revised Consented Development on the identified ecological receptors.

Designated Sites

11.8.2 There are no additional likely impacts either direct or indirect on the designated sites and all effects are considered within construction.

Habitats

11.8.3 No direct effects of operational phases on habitat are expected, as operational works will be contained to constructed tracks and hardstanding areas.

11.8.4 Operational works, such as increased visitors and traffic within the woodland may lead to a displacement of deer into neighbouring land, however the site will operate under a DFMP, which will prevent deer accessing the neighbouring Caithness and Sutherland Peatlands SAC/Ramsar site and will limit the movement of the deer within the wind farm through fencing and management of deer numbers to prevent unacceptable damage to retained habitats. Therefore it is considered that displacement of deer during operation would likely result in no significant effect on either Caithness and Sutherland Peatlands SAC or any retained habitats.

11.8.5 Proposed restoration areas have been identified in a Habitat Management Plan (HMP) (**Appendix 11.G**). Proposed restoration includes areas highlighted as potential suitable for bog restoration works, upon completion of the scheme, further investigation of these areas will be undertaken to ensure suitability for bog restoration. Areas adjacent to the boundary with the SAC/Ramsar have been chosen to improve habitat connectivity.

11.8.6 Additional restoration proposed, includes broadleaved planting in key areas to improve habitat connectivity within the site, and potentially offers the opportunity to enhance the site for pine marten, with the eventuality of offering elevated resting sites.

GWDTE's

11.8.7 Impacts on GWDTE during the operational phase of the Revised Consented Development are assessed in **Chapter 13: Geology, Hydrology & Hydrogeology**

Otter

11.8.8 Operational effects which may impact upon otter are likely to be limited to occasional disturbance from routine maintenance (e.g. traffic on site). Such disturbance is not considered to be greater than the current levels of activity noted within the site, e.g. through the core path and estate activities. Therefore, no significant effect is considered likely.

Water Vole

11.8.9 Operational activities are unlikely to impact on water vole on site. Routine visits and maintenance will utilise the tracks and hard standing areas and therefore, no significant effects are considered likely.

Pine Marten

11.8.10 Operational activities are unlikely to impact on pine marten. Any routine visits or maintenance around wind turbine locations is unlikely to increase disturbance over the current disturbance levels (e.g. core path and estate activities). Therefore, no significant effects are considered likely.

Bats

11.8.11 A minimum distance of 50 m from the tip of the turbine blade to the edge of any edge habitat which may be used by commuting or foraging bats (e.g. woodland rides) will be maintained to reduce the risk of turbine collision as per *Bats and Onshore Wind Turbines* (2019).

11.8.12 Nevertheless, operation poses potential threat to bats through collision with the wind turbines, with fatalities recorded widely throughout European countries (Rodrigues et al., 2008). A large proportion of the fatalities are recorded in later summer and autumn with migratory species as likely the most vulnerable (Rydell et al., 2010). Death may also occur through barotrauma (changes in pressure around the turbine leading to death of bat) although a recent study of UK windfarms (Mathews et al., 2016) found that it was collision which was the leading cause of mortality in wind farm locations.

11.8.13 The matrix approach within the current guidance (NatureScot, 2019) was used to undertake an initial site risk assessment of the Revised Consented Development on bats. Applying the matrix approach, the habitat risk is low (lack of roosting sites and relatively isolated site) and the project size is considered as large (although less than 40 turbines each of the wind turbines height exceeds 100 m). With these factors the initial risk assessment returned a score of 3 (medium risk to bats).

11.8.14 Incorporating the most recent bat data collected for Limekiln Windfarm Extension (**Appendix 11.D**), the Stage 2/overall risk assessment for the Revised Consented Development returned a score of 10 (medium risk). However it should be noted, that there were limitations to the dataset within the assessment tool (Ecobat), with a lack of comparative data points for running the analysis leading the tool to overestimate bat activity at each static location. The static detectors closest to the Revised Consented Development, returned levels of low to high activity (as determined by Ecobat). As a precautionary measure, a score of high activity was used in the overall assessment for the Revised Consented Development, primarily due to the difference in size between the two developments, with the Revised Consented Development, containing substantially more turbines and the presence of 'high' activity categories recorded on other static detectors (further from the shared boundary).

11.8.15 The data from 2019 and 2011-2012 and professional opinion, suggests that overall bat activity is low throughout the study area, with some nights returning no bat data at all and the lack of roosting sites within the site itself.

11.8.16 As a standard guidance for wind farm developments within woodland, a minimum buffer of 50 m will be designed and maintained between the wind turbine blade tip and the edge of the woodland. This standard buffer is

suggested in *Bats and Onshore Wind Turbines* (2019) to mitigate against collision within the wind turbines and potential foraging and/or commuting bats.

11.8.17 With the limited data available regarding bats and wind farm sites in the UK, there is potential for a slight adverse impact on the bat population due to the operational effects of the Revised Consented Development. However this is considered as not significant in terms of the EIA regulations.

11.8.18 Following construction, bat boxes will be installed to enhance the site for bats by providing suitable roosting locations. The bat boxes will be situated outwith the footprint of the turbines, to avoid accidental collisions and will be installed on the control building in the northeast of the site.

Fish

11.8.19 During the operational phase, no effects are considered likely to fish populations. Any potential effects on water quality during the operational phase will be controlled through the drainage scheme for the site, which is detailed in **Chapter 4: Description of Revised Consented Development**.

Deer

11.8.20 Operational activities are unlikely to impact on deer. Any routine visits or maintenance around wind turbine locations is unlikely to increase disturbance over the current disturbance levels (e.g. core path and estate activities).

11.8.21 The DMP and DFMP will remain fully operational during the life of the Revised Consented Development, therefore, no significant effects are considered likely.

11.9 Potential Effect During Decommissioning

11.9.1 The development has a lifespan of 40 years, after which it will be decommissioned. Decommissioning effects are expected to be slightly less than those predicted during the construction phase, as no or only limited associated felling of coniferous plantation would take place.

11.9.2 Updated surveys would be undertaken prior to decommissioning to update the baseline in respect of the protected species found on site.

11.10 Assessment of Cumulative Effects

11.10.1 For the purpose of the Revised Consented Development, cumulative effects would be those which have the potential to impact on the same ecological features using the site, i.e. mobile species such as bats and otter, such that the effects from the Revised Consented Development could be raised, in aggregate, when combined with those from other developments. In this regard, the two developments listed in Table 11.12 have been reviewed as both are within 10 km of the Revised Consented Development.

11.10.2 The original planning documentation for Baillie Wind Farm, operational since 2013, and Forss Wind Farm, operational since 2003, was not available to review. Considering the length time that each wind farm has been operational for, it is likely that any effects of these developments on ecological features are accounted for within the baseline surveys undertaken for the Revised Consented Development.

Table 11.12 Developments Considered within the Assessment of Cumulative Effects.

Development Name	Planning Status	Application Reference	Residual Effects (Features Potentially Affected by Revised Consented Development only)
Ackron Wind Farm	In Planning	20/05050/FUL	**Construction** • Blanket Bog – habitat loss • Wet heath – habitat loss • Otter • Bats **Operation** • Bats
Baillie Wind Farm	Operational	04/00342/S36CA	Original documentation not available.
Forss Wind Farm	Operational	01/00380/FULCA	Original documentation not available.
Forss Wind Farm Extension 3	In Planning	20/04455/FUL	**Operation** • Bats
Hill of Lybster	Operational	17/04934/FUL; 18/00064/RBREF	**Operation** • Bats
Limekiln Wind Farm Extension	In Planning	20/01905/S36:WIN-270-13	**Construction** • Otter • Water vole • Pine marten • Bats • Fish **Operation** • Bats

Designated Sites

11.10.3 The Environmental Impact Assessment Report (EIAR) for Ackron Wind Farm, identified that although the development lies outwith the boundary for Caithness and Sutherland Peatlands SAC/Ramsar and East Halladale SSSI, areas of the development will impact upon blanket bog, which may have connectivity to the SAC/Ramsar/SSSI. The effect of this development on the SAC/Ramsar/SSSI was assessed as not significant and no adverse effect is anticipated from the Revised Consented Development.

11.10.4 Limekiln Wind Farm Extension was assessed as having no direct impact on the SAC/Ramsar site.

11.10.5 The assessed impacts of Baillie, Forss, and Hill of Lybster Wind Farms could not be discerned from the documentation available through THC's planning portal, however due to the distance of each of these wind farms from the boundary of the SAC/Ramsar site, no cumulative effects are likely.

Habitats

11.10.6 The EIARs for the following projects identified that they would result in the loss of small areas of blanket bog: Ackron (1.11 ha) and Limekiln Wind Farm Extension (not quantified) assessed as no significance.

11.10.7 Although the total loss of blanket bog cannot be calculated for all of the developments cumulatively, Caithness and Sutherlands Peatlands SAC has an estimated total of 400,000 ha. Therefore, with the limited loss from Ackron, and the presumed limited loss from Limekiln Wind Farm Extension, it is unlikely there will be any significant cumulative effects on blanket bog or other habitats during the construction phase.

GWDTE

11.10.8 Cumulative impacts on GWDTE are assessed within **Chapter 13: Geology, Hydrology and Hydrogeology**

Otter

11.10.9 The EIARs for Ackron Wind Farm and Limekiln Wind Farm Extension both identified otter activity and therefore potential impacts on otter. As Limekiln Wind Farm Extension shares a site boundary with the Revised Consented Development it is likely that the otters recorded are the same population recorded within the site. Ackron Wind Farm is approximately 8.5 km from the site boundary (at the nearest point) and this is within an otters home range (NatureScot), therefore the habitats at Ackron Wind Farm potentially support the same population of otter as recorded within the site. However both of the EIARs reported no significant effects on otter and it is considered unlikely there will be any significant cumulative effects on otter during the construction or operation phase.

Bats

11.10.10 Although it is likely that all the developments considered within the cumulative assessment will have varying impacts bat populations local to their respective sites, there is a distinct lack of connecting habitats between each of the wind farms, with extensive open areas present between the Revised Consented Developments and the other wind farms; Akron, Baillie, Forrs and Hill of Lybster. Therefore, it is considered unlikely the wind farms will impact upon the same population of bats and therefore cumulative effects will be avoided.

11.10.11 Bats recorded during baseline surveys for the Consented Development ES and Limekiln Wind Farm Extension are likely to be from the same populations as the sites have a shared boundary. No significant effect was predicted for Limekiln Wind Farm Extension and with the low numbers of bats using the site, it is unlikely there will be any significant cumulative effects on bats during the construction or operational phases of these developments.

Water Vole

11.10.12 The water vole colony recorded on Achvarasdal Burn is likely part of a similar population recorded during surveys for the Limekiln Wind Farm Extension EIA. As there is no significant impact on this water vole colony predicted, it is

considered unlikely there will be any significant cumulative effects on water vole either during construction or operation.

Pine Marten

11.10.13 Pine marten were recorded at Limekiln Wind Farm Extension, due to the proximity of the pine marten signs within the Revised Consented Development, it is likely that the site supports the same population of pine marten. No significant effects were considered likely by the extension application, therefore no significant cumulative effects are considered likely either during construction or operation.

11.11 Mitigation

Construction Phase

Designated Sites

11.11.1 No additional mitigation is required for either direct or indirect impacts on the designated sites, as there would be no significant impacts as a result of construction of the Revised Consented Development

Habitats

11.11.2 The Revised Consented Development would be constructed under a Construction Environmental Management Plan (CEMP). This document will seek to identify prevent direct and indirect effects to habitat outside the infrastructure footprint during construction and would contain the detail for habitat reinstatement.

11.11.3 As the CEMP would ensure adequate controls to prevent damage to retained habitats within the site, no additional mitigation is required as there would be no significant effects on habitats as a result of construction.

Otter

11.11.4 Watercourse crossings will be designed to guidance in Design Manual for Roads and Bridges to avoid potential effects on otter associated with potential habitat fragmentation. Unless a sufficient area of the bank can be maintained under the culvert or bridge structure during flood events, a separate mammal pass will be installed to offer mammals 'safe' passage.

Bats

11.11.5 The Revised Consented Development would be constructed under a CEMP which will identify controls for preventing disturbance to bats during construction, detailed within a Species Protection Plan (SPP).

11.11.6 As the SPP will include adequate mitigation to prevent disturbance during construction, no additional mitigation is required as there would be no significant effects on bats as a result of construction.

Water Vole

11.11.7 The Revised Consented Development would be constructed under a CEMP which will identify controls for preventing disturbance to water vole habitats during construction and specific mitigation measures would be detailed within an SPP.

11.11.8 No additional mitigation measures are required for water vole as there would be no significant effects on bats as a result of construction

Pine Marten

11.11.9 The Revised Consented Development would be constructed under a CEMP which will identify controls for preventing disturbance to pine marten and any pine marten den sites during construction and specific mitigation measures would be detailed within an SPP.

11.11.10 No additional mitigation measures are required for water vole as there would be no significant effects on bats as a result of construction

Reptiles

11.11.11 The Revised Consented Development would be constructed under a CEMP which will identify controls for preventing disturbance to reptile habitats during construction and specific mitigation measures would be detailed within an SPP.

As the SPP will include adequate mitigation to prevent injury or death to any reptile species encountered during construction, no additional mitigation is required as there would be no significant effects on bats as a result of construction. Deer

11.11.12 A Deer Management Plan (DMP) and Deer Fence Management Plan (DFMP) will be in place prior to construction commencing which identifies management measures to prevent displacement of deer during the construction phase, therefore no additional mitigation is required as there would be no significant effects as a result of construction.

Aquatic Ecology

11.11.13 The Revised Consented Development would be constructed under a CEMP which will identify controls for protecting aquatic habitats and ecology during construction and specific mitigation measures would be detailed within an SPP.

11.11.14 As the CEMP will ensure adequate controls to protect the water environment, no additional mitigation for aquatic ecology is required as there would be no significant effects.

Operational Phase

Designated Sites

11.11.15 No mitigation required as there would be no significant effects as a result of the operation of the Revised Contented Development

Habitats

11.11.16 No additional mitigation is required for habitats as there would no significant effects as a result of the operation of the Revised Consented Development.

Otter

11.11.17 No additional mitigation is required for otter as there would be no significant effects as a result of the operation on otter.

Bats

11.11.18 The Revised Consented Development would be monitored under an active Habitat Management Plan (HMP) which includes monitoring methods to maintain an adequate buffer between wind turbines and surrounding suitable habitats, therefore no additional mitigation measures are required for bats as there would be no significant effects as a result of the operation on bats.

Water vole

11.11.19 No additional mitigation is required as there would be no significant effects as a result of the operation on water vole.

Pine Marten

11.11.20 No additional mitigation is required as there would be no significant effects as a result of the operation on pine marten.

Reptiles

11.11.21 No additional mitigation is required as there would be no significant effects as a result of the operation on reptiles.

Deer

11.11.22 The Revised Consented Development would be operated under the DMP and DFMP which includes adequate measures to protect the habitats and welfare of the deer within the site throughout the operational phase, therefore no additional mitigation is required as there would no significant effects..

Aquatic Ecology

11.11.23 No additional mitigation is required as there would no significant effects as a result of the operation of the Revised Consented Development.

Decommissioning Phase

11.11.24 To mitigate against potential significant effects on peat and habitats, decommissioning should be undertaken in accordance with a Site Restoration Plan (SRP) that specifies methods for reinstating peat and vegetation disturbed during the works. The SRP should contain methodologies for revegetating any residual ground and should be submitted for approval in advance of decommissioning the site.

11.11.25 To mitigate against indirect effects, decommissioning should also be undertaken in accordance with a DEMP (Decommissioning Environmental Management Plan). This document would be similar in scope to the CEMP.

11.11.26 Any mitigation specific to protected species would need to be identified through updated surveys of the site. Any mitigation measures required would be implemented through a SPP or similar document.

11.12 Assessment of Residual Effects

Residual Effects During Construction

11.12.1 Provided that the management and mitigation measures, such as CEMP, SPP and DMP as described in Section 11.10 in respect of the construction phase are implemented, all residual adverse effects on designated sites, habitats,

GWDTE, peat and protected animal species and aquatic ecology would not be significant.

Residual Effects During Operational Phase

11.12.2 Provided the management and mitigation measures as described in Section 11.10 in respect of the operational phase are implemented, all residual adverse effects on designated sites, habitats, GWDTE, peat and protected animal species and aquatic ecology would not be significant.

Residual Effects During Decommissioning Phase

11.12.3 Provided decommissioning takes place under suitable management and mitigation measures, it is considered unlikely there would be any significant residual effects during the construction phase.

Residual Cumulative Effects During Construction Phase

11.12.4 Provided the mitigation measures described in Section 11.10 are implemented for the Revised Consented Development and all relevant mitigation and compensation is implemented for the developments listed in Table 11.12, it is considered unlikely there would be any significant residual cumulative effects during the construction phase.

Residual Cumulative Effects During Operational Phase

11.12.5 Provided the mitigation measures described in Section 11.10 are implemented for the Revised Consented Development and all relevant mitigation and compensation is implemented for the developments listed in Table 11.12, it is considered unlikely there would be any significant residual cumulative effects during the operational phase.

Residual Cumulative Effects During Decommissioning Phase

11.12.6 Provided decommissioning takes place under suitable mitigation measures, it is considered unlikely there would be any significant residual cumulative effects during the decommissioning phase.

11.13 Monitoring

11.13.1 Monitoring is proposed for the following ecological features as detailed within the HMP (and to ensure compliance with protected species legislation:

Designated Sites

11.13.2 CSM monitoring will be undertaken within Caithness and Sutherland Peatlands SAC/Ramsar which lies within the site boundary, on an annual basis during construction.

Habitats

11.13.3 Full details of the monitoring that would be undertaken for any potential areas restored under the HMP are provided in Technical **Appendix 11.G**: Habitat Management Plan. In summary, monitoring would include:

11.13.4 Monitoring of vegetation condition and grazing effects to be carried out once a year prior to construction and in years one, three, five, and at five-yearly intervals thereafter for the life of the Revised Consented Development.

Pine Marten

11.13.5 Monitoring surveys of pine marten activity around the installed den boxes will be carried out in years one, three, five, and at five-yearly intervals thereafter for the life of the Revised Consented Development.

Bats

11.13.6 Bat box monitoring surveys will be carried out in years one, three, five, and at five-yearly intervals thereafter for the life of the Revised Consented Development.

11.14 Summary of Likely Significant Effects

Likely Significant Effect	Mitigation Proposed	Means of Implementation	Outcome/Residual Effect
Construction			
None predicted	n/a	n/a	Not significant
Operation			
None predicted	n/a	n/a	Not significant
Decommissioning			
None anticipated if SRP and DEMP are produced	SRP & DEMP	Planning Condition	Not significant
Cumulative Construction			
None predicted	n/a	n/a	Not significant
Cumulative Operation			
None predicted	n/a	n/a	Not significant
Cumulative Decommissioning			
None predicted	n/a	n/a	Not significant

11.15 References

Arnett, E. B., Brown, W.K., Erickson, W.P et al (2008). Patterns of Bat Fatalities at Wind Energy Facilities in North America. Journal of Wildlife Management 72, p. 61 – 78.

BSG Ecology (2020) *Limekiln Wind Farm Extension Bat Report*

Chanin, P. (2003). Ecology of the European Otter. Conserving Natura 2000 Rivers Ecology Series No. 10. Peterborough.

CIEEM (2016). *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial Freshwater and Coastal*. (2nd edn.). Chartered Institute of Ecology and Environmental Management, Winchester.

Collins, J. (ed.). (2016). *Bat Surveys for Professional Ecologists: Good Practice Guidelines*. (3rd edn.) The Bat Conservation Trust, London. ISBN-13 978-1-872745-96-1.

Cresswell, W.J., J. B. (2012). UK BAP Mammals Interim Guidance for Survey Methodologies, Impact Assessment and Mitigation. Southampton: The Mammal Society.

Dean, M., Strachan, R., Gow, D., & Andrews, R. (2016). The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series (3rd ed.). London: The Mammal Society.

EnviroCentre (2019). *Limekiln Windfarm Year 1 Pre-Construction Electro-fishing.*

EnviroCentre (2019). *Phase 1 Ecology Support Summary*.

Highways Agency. (1999). *Design Manual for Roads and Bridges: Volume 10*

Infinergy Ld (2012). *Environmental Statement*.

Infinergy Ltd. (2020) *Limekiln Wind Farm Extension EIAR Report*.

Mathews, F., Richardson S., Lintott, P. & Hosken, D. (2016) *Understanding the Risk to European Protected Species (bats) at Onshore Wind Turbine Sites to Inform Risk Management*. Final Report. University of Exeter.

Natural England (2014). Natural England Technical Information Note TIN 051. Bats and Onshore Wind turbines – Interim Guidance (3rd Edition);

NatureScot. (2012). *Assessing the Cumulative Impacts of Onshore Wind Energy Developments*.

NatureScot (2013). Planning for Development: What to consider and include in Habitat Management Plans;

NatureScot, English Nature, Natural Resources Wales, Ecotricity Ltd, the University of Exeter and the Bat Conservation Trust. (2019). *Bats and onshore wind turbines: survey, assessment and mitigation. Version: January 2019.*

NatureScot. 2015. *The Peatlands of Caithness and Sutherland - Management Strategy 2015 - 2025 - Consultative draft*

NatureScot. (2015). *Spatial Planning for Onshore Wind Turbines – Natural Heritage Considerations*.

NatureScot (2015). *Scotland's National Peatland Plan*

NatureScot. (2017). *Carbon and Peatland Map.*

Nevis Environmental Ltd. (2020) *Species Protection Plan*.

PlantEcol (2012). *Vegetation Survey of Limekiln Wind Farm, Reay*

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;

Rodwell, J.S. (Ed.), et al. (1991 – 2000). *British Plant Communities* (5 volumes). Cambridge University Press, Cambridge.

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

Scottish Biodiversity List (SBL) (2013).

Scottish Government, NatureScot and SEPA (2017). Peatland Survey - Guidance on Developments on Peatland;

Scottish Renewables, SNH, SEPA, Forestry Commission (Scotland), Historic Scotland (2015). Good Practice During Windfarm Construction (3rd Edition).

SEPA. (2017a). Land Use Planning System SEPA Guidance Note 4. *Planning guidance on on-shore windfarm developments*. Version 3. Issue date: 11/09/2017.

SEPA. (2017b). Land Use Planning System SEPA Guidance Note 31. *Guidance on Assessing the Impacts of Windfarm Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems.* Version 3. Issue date: 11/09/2017.

Strachan, T. M. (2011). Water Vole Conservation Handbook, Third Edition. Wildlife Conservation Research Unit.

Waterside Ecology (2012) Limekiln Wind Farm: *Survey of Freshwater Pearl Mussels Margaritifera margaritifera*

Waterside Ecology. (2012). *Survey of Pine Marten Martes martes L*.

Waterside Ecology (2012). *Survey of Water Vole Arvicola amphibius*.