

8 Ecology

Contents

8.1	Executive Summary	8-1
8.2	Introduction	8-1
8.3	Legislation, Policy and Guidelines	8-2
8.4	Consultation	8-4
8.5	Assessment Methodology and Significance Criteria	8-13
8.6	Baseline Conditions	8-17
8.7	Standard Mitigation	8-25
8.8	Features Brought Forward for Assessment	8-26
8.9	Potential Effects	8-29
8.10	Additional Mitigation and Enhancement	8-34
8.11	Residual Effects	8-36
8.12	Cumulative Assessment	8-37
8.13	Summary	8-37
8.14	References	8-41

This page is intentionally blank.

8 Ecology

8.1 Executive Summary

- 8.1.1 This chapter considers the potential impacts and their associated effects on ecological features, such as designated nature conservation sites, habitats and protected species in line with best practice guidance from the Chartered Institute of Ecology and Environmental Management (CIEEM).
- 8.1.2 The field study area was surveyed in 2014 and 2020 to provide baseline information on habitats and faunal species. Surveys included an extended Phase 1 habitat survey and National Vegetation Classification (NVC) surveys. The dominant habitats (excluding the coniferous woodland plantation) are M25a *Molinia caerulea-Potentilla erecta* marshy grassland and M17a *Scirpus cespitosus-Eriophorum vaginatum* blanket mire. Thirty areas of potential Groundwater Dependent Terrestrial Ecosystems (GWDTE) were recorded. Protected species surveys identified otter (*Lutra lutra*), pine marten (*Martes martes*) as well as common and soprano pipistrelle (*Pipistrellus sp.*), brown long-eared bat (*Plecotus auritus*) and Daubenton's bat (*Myotis daubentonii*). Salmonid fish species were present at low densities, with the species common and widespread throughout the field study area. No freshwater pearl mussel (*Margaritifera margaritifera*) were recorded in the field study area.
- 8.1.3 Without application of mitigation, significant effects are predicted on habitats, primarily M15c wet heath, M27a mire and W4c wet woodland. Adverse effects, not significant in EIA terms are also considered to occur on otter from disturbance and bat species from collision. Following the application of mitigation, such as implementation of a habitat management plan, keyhole felling and camera trap monitoring of the potential otter couch for disturbance under licence from NatureScot (NS), and standard working methods and good practice measures, such as a CEMP and pollution prevention measures, no significant residual effects are predicted.

8.2 Introduction

- 8.2.1 This chapter considers the potential effects on ecology and nature conservation resulting from impacts associated with the construction, operation and decommissioning of the Proposed Development. The specific objectives of the chapter are to:
- Describe the assessment methodology and significance criteria used in completing the impact assessment;
 - Describe the ecological baseline of the Proposed Development and its zone of influence (ZOI)¹, including designated nature conservation sites, habitats and protected species, and, thereby, identify the ecological features that will be the focus of this assessment;
 - Evaluate the sensitivity of each ecological feature;
 - Describe the potential impacts, including direct and indirect, on ecological features and identify and assess the effects of the Proposed Development on the ecological features;
 - Describe the mitigation measures proposed to avoid, reduce and offset likely significant adverse effects;
 - Assess the significance of residual effects remaining following the implementation of mitigation; and

¹ The area over which ecological features may be subject to significant effects as a result of the Proposed Development and its associated activities.

- Assess the significance of cumulative effects between the Proposed Development and cumulative developments.
- 8.2.2 Effects on ornithological features and forestry are addressed separately in Chapter 7 and Chapter 16, respectively.
- 8.2.3 Ramboll UK Limited (Ramboll) previously completed desk study and field survey work for the Proposed Development in 2014, comprising an extended Phase 1 habitat survey for habitats and protected species, a freshwater invertebrates survey and bat activity surveys. Fish population and habitat surveys were undertaken by Dr Jon Watt of Waterside Ecology.
- 8.2.4 This chapter is based on the Proposed Development as described in Chapter 3 and has been completed in accordance with the CIEEM Ecological Impact Assessment (EclA) guidelines (CIEEM, 2018). The chapter has been written by Nadine Little of Ramboll. Nadine is a senior ecological consultant and Associate member of CIEEM with a Masters in Wildlife Biology and Conservation and over seven years' experience of undertaking ecology surveys and EclAs. Desk study work was updated by Ramboll in 2020, with the field survey work updated by Stagfire Ecological Surveys Ltd. All field surveys were led by surveyors with Associate or Member level of CIEEM.
- 8.2.5 The assessment presented in this chapter is supported by detailed information provided in various appendices (Appendices 8.1 – 8.7), as follows:
 - Appendix 8.1 - Methodologies and Results;
 - Appendix 8.2 - Photolog;
 - Appendix 8.3 - Wildcat Report;
 - Appendix 8.4 - Confidential Freshwater Pearl Mussel Report;
 - Appendix 8.5 - Existing Data on Fish Populations and Stream Hydrochemistry;
 - Appendix 8.6 - Deer Report; and
 - Appendix 8.7 - Outline Habitat Management Plan.
- 8.2.6 The following figures are also referred to in this chapter:
 - Figure 8.1 - Designated Sites;
 - Figure 8.2 - NVC Habitats;
 - Figure 8.3 - GWDTE;
 - Figure 8.4 - 2017 Phase 1 Habitat Survey;
 - Figure 8.5 - Protected Species;
 - Figure 8.6 - Bat Detector Locations; and
 - Figure 8.7 – Confidential Freshwater Invertebrates and Fish Sampling Locations.

8.3 Legislation, Policy and Guidelines

- 8.3.1 The scope of the assessment has been informed by the following policy and legal framework:

Legislation

- 8.3.2 Relevant legislation has been reviewed and taken into account as part of this ecology assessment. Of particular relevance are:
- EC Directive on the Conservation of Natural Habitats and Wild Flora and Fauna, 92/43/EEC (European Commission, 1992);

- Wildlife and Countryside Act (UK Government, 1981) (as amended);
- Conservation (Natural Habitats Etc.) Regulations (UK Government, 1994) (as amended);
- Nature Conservation (Scotland) Act (UK Government, 2004) (as amended);
- Wildlife and Natural Environment (Scotland) Act (UK Government, 2011);
- UK Post-2010 Biodiversity Framework (UK Government, 2012);
- Town and Country Planning (Environmental Impact Assessment) Regulations (UK Government, 2017); and
- the Ramsar Convention on Wetlands (Ramsar Convention, 1971).

Planning Policy

8.3.3 Details of all planning policies are provided in Chapter 5 of the EIA Report. Relevant planning policies reviewed for this ecology assessment are:

- Scottish Planning Policy (Scottish Government, 2014);
- the Scottish Government's Policy on Control of Woodland Removal (Forestry Commission, 2009);
- UK Biodiversity Action Plan (BAP) (Joint Nature Conservation Committee (JNCC), 2010a);
- Scottish Biodiversity List (Scott Wilson, 2005);
- 2020 Challenge (Scottish Government, 2013);
- Highland-wide Local Development Plan (The Highland Council (THC), 2012);
- Caithness and Sutherland Local Development Plan (THC, 2018); and
- the Highland BAP (THC, 2015).

Guidance

8.3.4 Best practice guidance has been recognised when undertaking the following field surveys:

- Phase 1 habitat survey (JNCC, 2010b);
- National Vegetation Classification (NVC) (Rodwell, 2006);
- protected terrestrial mammal species: otter (Chanin, 2003), water vole (*Arvicola amphibius*) (Capreolus Wildlife Consultancy, 2005 and Dean *et al.*, 2016), red squirrel (*Sciurus vulgaris*) (Gurnell *et al.*, 2001), wildcat (*Felis silvestris grampia*) (Scottish Natural Heritage (SNH), 2018) and pine marten (SNH, 2019);
- bat surveys (SNH *et al.*, 2019);
- freshwater invertebrate surveys (Scottish Environment Protection Agency (SEPA), 2001);
- freshwater pearl mussel surveys (Hastie & Cooksley, 2003 and Skinner *et al.*, 2003); and
- fish surveys (Hendry & Cragg-Hine, 1997, Summers *et al.*, 1996, Scottish Fishery Co-ordination Centre (SFCC), 2007 and SEPA, 2010).

8.4 Consultation

8.4.1 Table 8.1 details the consultation responses relevant to ecology and nature conservation and provides information on where and/or how they have been addressed in this assessment.

Table 8.1 – Consultation Responses

Consultee and Date	Scoping/Other Consultation	Response	Action Taken
NatureScot (NS) (previously SNH) 3 April 2020	Consultation	Agreed to the proposed scope of field surveys with the addition of a freshwater pearl mussel survey to update the previous survey undertaken in 2014. NS welcomed the intention to update the protected species surveys, bat surveys and habitat surveys, using NVC.	Freshwater pearl mussel survey undertaken in June 2020. Protected species surveys, bat surveys and NVC surveys undertaken between April and October 2020.
NS 2018	Scoping Opinion 14 February 2018	The Environmental Statement (ES) will need to address, in detail, how the Proposed Development can be constructed without significant effects on deep peat and priority peatland habitat. Opportunities to mitigate impacts through siting, design and other measures should be fully considered within the ES. This may include options for significant habitat restoration to mitigate any loss and damage to this peatland interest. We may object to this proposal if it does not demonstrate that any significant effects on the qualities of these peatland areas have been substantially overcome.	The design of the Proposed Development has avoided areas of deeper peat, where possible, as described in Chapter 2. Compensation for the loss of peat will be achieved through peatland restoration, as described in Appendix 8.7.
		Given the scale of the Proposed Development and its likely impact on nationally important habitats, a habitat management plan will be required. The plan should clearly demonstrate that any impacts on peatland habitats can be substantially overcome and that there will be no overall loss of peatland habitat or the services that peatland delivers. The plan should also take into account other habitats subject to loss and damage from the proposal.	An outline habitat management plan is provided in Appendix 8.7. Peatland management is described in Chapter 9.
		We welcome the inclusion of a Phase 1 habitat map in the scoping report. We advise, however, that a detailed NVC survey is undertaken of the proposal area and any notable plant species,	NVC survey undertaken between June and July 2020. Results included in section 8.6 and detailed in Appendix 8.1.

Consultee and Date	Scoping/Other Consultation	Response	Action Taken
		particularly those which are nationally rare or scarce, should be recorded.	
		We advise that the ES should commit to undertaking pre-construction surveys at an appropriate time of year to inform the presence of protected species prior to construction. Should surveys identify protected species that could be affected by the Proposed Development, a Species Protection Plan (SPP) should be provided identifying appropriate mitigation. Species licences may be required.	Pre-construction surveys will be undertaken, as discussed under standard mitigation measures in section 8.7.
		We note the presence of otter on the site and advise that an assessment of the impacts on otter is provided within the ES. The ES should demonstrate how otter will be protected and an SPP should be provided within the ES for otter.	Assessment of impacts on otter discussed in section 8.9. Mitigation to protect otter is described in Section 8.7 and 8.10. As impacts on otter would be limited to disturbance, with no holts recorded on-site, a specific SPP beyond the mitigation already discussed is not considered to be required.
		We note that wildcat has been scoped out of the survey as the Phase 1 habitat survey did not identify any suitable habitat. i.e. areas of woodland. We consider that the site and adjacent ground could support wildcat and therefore a survey for wildcat should be undertaken.	Wildcat survey and results provided in Appendix 8.3.
		We note that bat records were very low across the site. We advise that guidance on bats and wind farms available from our website is followed. The scoping report does not identify the bat roost location; however, bats could be roosting in trees or in structures that could	Static bat detector surveys were undertaken between April and September 2020. Results are summarised in section 8.6 and detailed in Appendix 8.1.

Consultee and Date	Scoping/Other Consultation	Response	Action Taken
		<p>be affected by the Proposed Development. We advise that the roost location for all species of bats recorded is identified. Should the proposal affect a bat roost, a species protection plan should be provided identifying appropriate mitigation. A species licence may be required.</p>	<p>No trees or structures suitable to support a bat roost were recorded on the site, therefore no roost would be affected by the Proposed Development. Potential roost locations in the wider area include farm buildings that are situated more than 800 m from the site, as discussed in section 8.9.</p>
		<p>We advise that a deer assessment is undertaken for this proposal and should be presented with the ES. Depending on the outcome of this assessment, a Deer Management Statement (DMS) may be required.</p> <p>Appropriate deer management will be vital in ensuring habitat restoration is successful and we advise that this should be referenced within the Habitat Management Plan.</p>	<p>An assessment of deer numbers and the current deer management plan is detailed in Appendix 8.6.</p> <p>Outline habitat management plan is provided in Appendix 8.7.</p>
		<p>We note that signs of mink were recorded on the site. This non-native species has an adverse impact on native natural heritage. We advise that the Applicant collaborate with neighbouring landowners to control mink and this should be included as an action in the habitat management plan.</p>	<p>Mink control included in outline habitat management plan, which is provided in Appendix 8.7.</p>
NS 2014	Consultation	<p>An assessment of deer numbers and their use of the site should be made and included within the ES.</p> <p>Depending on the outcome of the assessment, a deer management plan may be required.</p>	<p>An assessment of deer numbers and the current deer management plan is detailed in Appendix 8.6.</p>

Consultee and Date	Scoping/Other Consultation	Response	Action Taken
THC 9 September 2020	Pre-application Response	<p>The Proposed Development is located within a Class 1 and partially within a Class 2 area of carbon rich soils, deep peat and priority peatland habitats. Opportunities to mitigate impacts through siting, design and other measures should be fully considered. This may include options for significant habitat restoration to mitigate any loss and damage to this peatland interest. The current layout focuses on existing forest rides where the higher quality peatland habitats are likely to be found. Mitigation could include, but is not limited to the following:</p> <ul style="list-style-type: none"> ▪ Avoiding locating roads, turbines, hard standings and other infrastructure on areas of deep peat. ▪ Making use of existing infrastructure including that out with the ownership boundary to minimise impacts on peatland habitats. ▪ Compensation for the loss of peatland habitats through restoration of degraded peatland habitats is likely to be required. Ideally this should be within the site boundary, however, given constrained ownership this may not be possible and therefore restoration areas outside the landownership boundary may need to be identified. 	<p>The design of the Proposed Development has avoided areas of deeper peat, where possible, as described in Chapter 2.</p> <p>Compensation for the loss of peat will be achieved through peatland restoration, as described in Appendix 8.7.</p>
		<p>NS advise that a habitat management plan should be provided with the ES and this should be in addition to a peatland restoration plan. The plan should detail what habitat management will be undertaken</p>	<p>An outline habitat management plan is provided in Appendix 8.7. Peatland management is described in Chapter 9.</p>

Consultee and Date	Scoping/Other Consultation	Response	Action Taken
		during the life of the wind farm as well as peatland restoration as discussed above.	
		A full NVC survey should also be undertaken for this proposal.	NVC survey undertaken between June and July 2020. Results included in section 8.6 and detailed in Appendix 8.1.
		NS advise that the species surveys should be updated as those undertaken in 2013/14 would be out of date as per their advice in May 2020. The ES should identify and clearly set out appropriate mitigation for protected species.	Protected species survey undertaken between April and September 2020. Results included in section 8.6.
		<p>The following information must be included in the submission:</p> <ul style="list-style-type: none"> ▪ A map demonstrating that all GWDTE are outwith a 100 m radius of all excavations shallower than 1 m and outwith 250 m of all excavations deeper than 1 m and proposed groundwater water abstractions. If micro-siting is to be considered as a mitigation measure, the distance of survey needs to be extended by the proposed maximum extent of micro-siting. The survey needs to extend beyond the site boundary where the distances require it. ▪ If the above minimum buffers cannot be achieved, a detailed site-specific qualitative and/or quantitative risk assessment will be required. We are likely to seek conditions securing appropriate mitigation for all GWDTE affected. 	<p>Figure 8.3 details the potential GWDTE present on-site and their location in relation to the 100 m and 250 m buffers around infrastructure.</p> <p>Not all potential GWDTE are able to be avoided, therefore a site-specific risk assessment is included in section 8.9. Mitigation for all potential GWDTEs affected is discussed in section 8.7 and 8.10. A risk assessment relating to hydrology for the potential GWDTE identified is also provided in Chapter 9.</p>

Consultee and Date	Scoping/Other Consultation	Response	Action Taken
THC 1 March 2018	Scoping Opinion	The ES should identify rare and threatened habitats, and those protected by European or UK legislation, or identified in national or local BAPs. Habitat enhancement and mitigation measures should be detailed in the contexts of both biodiversity conservation and the inherent risk of peat slide.	Section 8.6 describes the habitats present on-site. Enhancement and mitigation measures are discussed in section 8.7 and 8.10, and in Appendix 8.7. Peat slide risk is discussed in Chapter 9.
THC 2014	Consultation	The ES should address the likely impacts on the nature conservation interests of all the designated sites in the vicinity of the Proposed Development.	This is addressed in section 8.6.
		The ES should provide proposals for any mitigation that is required to avoid these impacts, or to reduce them to a level where they are not significant.	The mitigation proposed is described in section 8.7 and 8.10.
		The ES should provide an account of the habitats present on-site. It should identify rare and threatened habitats, and those protected by European or UK legislation, or identified in national or local Biodiversity Action Plans.	Section 8.6 describes the habitats present on-site.
		Habitat enhancement and mitigation measures should be detailed, particularly in respect to blanket bog, in the contexts of both biodiversity conservation and the inherent risk of peat slide.	Enhancement and mitigation measures are discussed in section 8.7 and 8.10, and in Appendix 8.7. Peat slide risk is discussed in Chapter 9.
		Details of any habitat enhancement programme (such as native tree planting, stock exclusion, deer management, etc.) for the Proposed Development should be provided.	Enhancement and mitigation measures are discussed in section 8.7 and 8.10, and in Appendix 8.7.

Consultee and Date	Scoping/Other Consultation	Response	Action Taken
		<p>The ES should provide a baseline survey of the trees present on or adjacent to the site. The ES should indicate areas of woodland/forestry plantation which may be felled to accommodate the Proposed Development, including any off-site works/mitigation.</p>	<p>Habitat survey results included in section 8.6. Baseline tree survey, discussion of felling requirement and off-site mitigation provided in Chapter 16. Mitigation requirements are also provided in section 8.10.</p>
		<p>The ES should provide a baseline survey of the bird and animal (mammals, reptiles, amphibians, etc) interest on-site. It needs to be categorically established which species are present on the site, and where, before a future application is submitted. The presence of protected species, such as European protected species, must be included and considered as part of the planning application process, not as an issue which can be considered at a later stage.</p>	<p>Section 8.5 and Appendix 8.1 detail the surveys completed to understand the ecological baseline of the site. Section 8.6 details the findings of those surveys.</p>
		<p>The ES needs to address the aquatic interests within local watercourses, including downstream interests that may be affected by the Proposed Development.</p>	<p>Results of aquatic survey for fish, invertebrates and freshwater pearl mussel included in section 8.6 and associated appendices. Potential impacts and mitigation measures considered from section 8.7 onwards.</p>
<p>Scottish Environment Protection Agency (SEPA) 2018</p>	<p>Scoping Opinion 14 February 2018</p>	<p>The following information must be included in the submission:</p> <ul style="list-style-type: none"> ▪ A map demonstrating that all GWDTE are outwith a 100 m radius of all excavations shallower than 1 m and outwith 250 m of all excavations deeper than 1 m and proposed groundwater water abstractions. If micro-siting is to be considered as a mitigation measure, the distance of survey needs to be 	<p>Figure 8.3 details the potential GWDTE present on-site and their location in relation to the 100 m and 250 m buffers around infrastructure.</p> <p>Not all potential GWDTE are able to be avoided, therefore a site-specific risk assessment is included in section 8.9.</p>

Consultee and Date	Scoping/Other Consultation	Response	Action Taken
		<p>extended by the proposed maximum extent of micro-siting. The survey needs to extend beyond the site boundary where the distances require it.</p> <ul style="list-style-type: none"> ▪ If the above minimum buffers cannot be achieved, a detailed site-specific qualitative and/or quantitative risk assessment will be required. We are likely to seek conditions securing appropriate mitigation for all GWDTE affected. 	<p>Mitigation for all potential GWDTEs affected is discussed in section 8.7 and 8.10. A risk assessment relating to hydrology for the potential GWDTE identified is also provided in Chapter 9.</p>
SEPA 2014	Consultation	<p>The ES should demonstrate how the layout and design of the Proposed Development avoids impacts on any GWDTE present on-site.</p>	<p>Details of habitat surveys are in section 8.6, with an assessment of impacts provided in section 8.9. Descriptions of how impacts on wetlands and peatlands would be avoided/mitigated are given in section 8.7 and 8.10.</p>

8.5 Assessment Methodology and Significance Criteria

8.5.1 The assessment methodologies, including desk and field survey methodology, are described in Appendix 8.1. Impact assessment methodology is described below.

Impact Assessment Methodology

Criteria for Evaluating the Importance of Ecological Features

8.5.2 Habitats and species (i.e. ecological features) identified within the study area have been assigned ecological values using the standard CIEEM scale that classifies ecological features within a defined geographic context (CIEEM, 2018). The classification uses recognised and published criteria (Ratcliffe, 1977 and Wray et al., 2010), where the ecological features are assessed in relation to their size, diversity, naturalness, rarity, fragility, typicalness, connectivity with surroundings, intrinsic value, recorded history and potential value. Table 8.2 describes the geographic frame of reference that has been used.

Table 8.2 – Geographic Conservation Importance

Importance	Examples
International	<p>Internationally designated sites including Special Areas of Conservation (SAC), Ramsar sites, Biogenetic Reserves, World Heritage sites, Biosphere Reserves, candidate SACs and potential Ramsar sites; discrete areas which meet the published selection criteria for international designation but which are not themselves designated as such; or a viable area of a habitat type listed in Annex I of the Habitats Directive (European Commission, 1992), or smaller areas which are essential to maintain the viability of a larger whole.</p> <p>Resident or regularly occurring populations of species which may be considered at an international level, such as European Protected Species (EPS), the loss of which would adversely affect the conservation status or distribution of the species at an international level; or where the population forms a critical part of a wider population; or the species is at a critical phase of its life cycle.</p>
National	<p>Nationally designated sites including Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR), Marine Nature Reserves; discrete areas which meet the published selection criteria for national designation but which are not designated as such; or areas of a habitat type identified in the UK Post-2010 Biodiversity Framework (UK Government, 2012).</p> <p>Resident or regularly occurring populations of species which may be considered at the national level, such as species listed in Schedules 5 and 8 of the Wildlife and Countryside Act (UK Government, 1981), the loss of which would adversely affect the conservation status or distribution of the species across Britain or Scotland; or where the population forms a critical part of a wider population; or the species is at a critical phase of its life cycle.</p>
Regional	<p>Areas of a habitat type identified in the Regional BAP; viable areas of habitat identified as being of Regional value in the appropriate Natural</p>

Importance	Examples
	<p>Area Profile (or equivalent); or smaller areas of such habitat which are essential to maintain the viability of a larger whole.</p> <p>Resident or regularly occurring populations of species which may be considered at an international level, or at the national level, the loss of which would adversely affect the conservation status or distribution of the species across the region; or where the population forms a critical part of a wider population; or the species is at a critical phase of its life cycle.</p>
County	<p>Designated nature conservation sites at the local authority level in Scotland including statutory Local Nature Reserves (LNR) and non-statutory Local Nature Conservation Sites; or discrete areas which meet the published selection criteria for designation but which are not designated as such.</p> <p>Resident or regularly occurring populations of species which may be considered at the local authority level, the loss of which would adversely affect the conservation status or distribution of the species across the local authority area.</p>
Local	<p>Features of local value include areas of habitat or populations/communities of species considered to appreciably enrich the habitat resource within the immediate surrounding area, for example, species-rich hedgerows.</p> <p>Resident or regularly occurring populations of species which may be considered at an international level, or at the national level, the loss of which would adversely affect the conservation status or distribution of the species across the immediate surrounding area; or where the population forms a critical part of a wider population; or the species is at a critical phase of its life cycle.</p>

8.5.3 A wide range of sources can be used to assign importance to ecological features, including legislation and policy. In the case of designated nature conservation sites, their importance reflects the geographic context of the designation. For example, sites designated as SACs are recognised as being of importance at an international level. Ecological features not included in legislation and policy may also be assigned importance due to, for example, local rarity or decline, or provision of a functional role for other ecological features. Professional judgement is used to assign such importance.

Characterising Impacts

8.5.4 The potential impacts upon ecological features have been considered in relation to the Proposed Development. The impacts have been assessed without consideration of any specific mitigation measures that will be employed. The assessment of likely ecological impacts has been made in relation to the baseline conditions of the study area. The likely impacts of development activities upon ecological features have been characterised according to several variables detailed in Table 8.3.

Table 8.3 – Impact Characterisation

Parameter	Description
Direction	Impacts are either adverse (negative) or beneficial (positive).
Magnitude	<p>This is defined as high, moderate, low or negligible, with these being classified using the following criteria:</p> <p>High: Total/near total loss of a population due to mortality or displacement or major reduction in the status or productivity² of a population due to mortality or displacement or disturbance. Total/near total loss of a habitat.</p> <p>Moderate: Partial reduction in the status or productivity of a population due to mortality or displacement or disturbance. Partial loss of a habitat.</p> <p>Low: Small but discernible reduction in the status or productivity of a population due to mortality or displacement or disturbance. Small proportion of habitat lost.</p> <p>Negligible: Very slight reduction in the status or productivity of a population due to mortality or displacement or disturbance. Reduction barely discernible, approximating to the 'no change' situation. Slight loss of habitat that is barely discernible from the habitat resource as a whole.</p>
Extent	The area over which the impact occurs.
Duration	The time for which the impact is expected to last prior to recovery of the ecological feature or replacement of the feature by a similar resource (in terms of quality and/or quantity). This is expressed as a short-term, medium-term, or long-term effect relative to the ecological feature that is impacted.
Reversibility	<p>Irreversible impacts: permanent changes from which recovery is not possible within a reasonable time scale or for which there is no reasonable chance of action being taken to reverse it.</p> <p>Reversible impact: temporary changes in which spontaneous recovery is possible or for which effective mitigation (avoidance/cancellation/reduction of effect) or compensation (offset/recompense/offer benefit) is possible.</p>
Frequency and Timing	<p>The number of times an activity occurs will influence the resulting effect (if appropriate, described as low to high and quantified, where possible).</p> <p>The timing of an activity or change may result in an impact if it coincides with critical life-stages or seasons e.g. the breeding season.</p>

² Status is defined as the conservation status of the species and indicates whether the species is likely to become extinct in the near future. Productivity is defined as the rate of population growth.

- 8.5.5 The assessment only describes those characteristics relevant to understanding the ecological impact and determining the significance of the effect.

Assessment of Potential Effect Significance

- 8.5.6 Significant effects are assessed with reference to the geographical importance of the ecological feature. However, the scale of significance of an effect may not be the same as the geographic context in which the feature is considered important. For example, a significant effect on a species protected by national legislation does not necessarily equate to a significant effect on its national population.

- 8.5.7 For the purposes of EclA, apart from in exceptional circumstances, a significant effect, as defined by the Town and Country Planning (Environmental Impact Assessment) Regulations (UK Government, 2017) is only considered to be possible where the feature in question is considered to be of regional, national or international importance. That is not to say that impacts from the Proposed Development could not result in significant effects on features of county or local importance, simply that those effects are not likely to be significant under EIA Regulations, unless the effect is likely to undermine biodiversity conservation objectives (such as local policies for no net loss) or biodiversity in general. Whether an effect at local or county importance is considered to be significant or not significant under the EIA Regulations is made clear in the impact assessment of each ecological feature.

Requirements for Mitigation

- 8.5.8 Mitigation and/or compensation is proposed for all effects considered significant under the EIA Regulations. Where appropriate, as part of additional good practice, mitigation and/or compensation may be proposed for significant effects on features of county or local importance, or where required in relation to protected species where legislation may require actions to protect populations or individuals.

Assessment of Cumulative Effect Significance

- 8.5.9 Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a location. Cumulative effects are particularly important in EclAs as many ecological features are already exposed to background levels of threat or pressure and may be close to critical thresholds, where further impacts could cause irreversible decline and significant cumulative effects. Further impacts can also make habitats and species more vulnerable or sensitive to change.

- 8.5.10 Developments included in the cumulative effects assessment are the following types of future development within the same ZOI:

- proposals for which consent has been applied;
- projects that have been granted consent but have not yet been started or have been started but are not yet completed (i.e. under construction);
- proposals that have been refused permission but are subject to appeal; and
- proposed projects that will be implemented by a public body but for which no consent is needed from a competent authority.

- 8.5.11 It may also be necessary to consider developments that are operational but whose full environmental effects are not yet known and cannot be accounted for in the baseline.

- 8.5.12 The zone of influence for cumulative effects is considered to be 10 km for ecological features, primarily bat species, due to the distance they are able to travel.

Consultation

- 8.5.13 Section 8.4 provides full details of the consultation undertaken.

Study Areas

- 8.5.14 The field study area for this assessment includes the area within the site boundary and a buffer distance of up to 250 m beyond the site boundary, as shown on Figure 8.2. There is a separate desk study area, within which desk study information was gathered. The desk study area includes the area within the site boundary and a 10 km buffer around the site boundary, as shown on Figure 8.1.

Limitations to Assessment

- 8.5.15 It should be noted that the availability and quality of the data obtained during desk studies is reliant on third party responses and recorders. This varies from region to region and for different species groups. Furthermore, the comprehensiveness of data often depends on the level of coverage, the expertise and experience of the recorder and the submission of records to the local recorder. The desk study was undertaken in 2015 and not repeated in 2020 as the habitats have remained largely unchanged, therefore similar faunal species are considered to be present in the area. The presence of habitats and species in the area is also well understood due to field surveys, as described below.
- 8.5.16 The habitat and faunal surveys provide a snapshot of ecological conditions and do not record plants or animals that may be present in the field study area at different times of the year. The absence of a particular species cannot definitely be confirmed by a lack of field signs and only concludes that an indication of its presence was not located during the survey effort. However, surveys for faunal species were undertaken during optimal periods for locating field signs. Habitat and faunal data have also been collected on the site and the surrounding area in 2013, 2014 and 2017, therefore the presence of habitats and species in the area is well understood.
- 8.5.17 Due to the remote nature of the site, surveys were not impacted by coronavirus restrictions as local surveyors were able to travel separately to the site and maintain social distancing.

8.6 Baseline Conditions

Current Baseline

Desk Study

Statutory Designated Nature Conservation Sites

- 8.6.1 No statutory designated nature conservation sites for ecological features occur within the site boundary of the Proposed Development. Designated nature conservation sites related to ornithology are considered in Chapter 7. Sites of Special Scientific Interest (SSSIs) notified for geological features are discussed in Chapter 9. Designated sites of ecological importance located within 10 km of the Proposed Development are shown on Figure 8.1. Table 8.4 details the relevant designated nature conservation sites that have potential connectivity with the Proposed Development. All other designated nature conservation sites are detailed in Appendix 8.1.

Table 8.4 – Designated Sites

Site Name	Qualifying Feature(s)	Distance from Proposed Development at Closest Point	Connectivity with Proposed Development
Caithness and Sutherland Peatlands Special Area of Conservation (SAC)	Blanket bog Depressions on peat substrates Otter Acid peat-stained lakes and ponds Wet heathland with cross-leaved heath (<i>Erica tetralix</i>) Marsh saxifrage (<i>Saxifraga hirculus</i>) Transition mires and quaking bogs	5.9 km to the south-west	Separated from the Proposed Development by forestry, open moorland and Loch Shin, therefore no direct or indirect impacts on the habitats are considered to be possible. Otter can travel up to 20 km between watercourses and waterbodies, therefore indirect impacts on otter are possible, but considered to be unlikely.

Non-statutory Designated Nature Conservation Sites

- 8.6.2 No areas of ancient woodland or woodland on the semi-natural woodland inventory (NS, 2018) occur where works are proposed, as shown on Figure 8.1. Planted semi-natural ancient woodland is located within the desk study area along the northern and eastern site boundary. A proposed temporary access track (bellmouth junction) occurs 14.8 m to the south of the woodland on the northern site boundary, as shown on Figure 8.1, therefore indirect impacts are possible on this ecological feature. The woodland on the eastern site boundary is separated from the Proposed Development by 77.8 m of coniferous woodland and open moorland, therefore indirect impacts are not considered likely on this feature. Other areas of ancient woodland or woodland on the semi-natural woodland inventory are separated from the Proposed Development by forestry, the River Tirry and open moorland, therefore direct and indirect impacts are not considered possible on these features. No other non-statutory designated nature conservation sites occur in the desk study area.

Local BAP

- 8.6.3 The Proposed Development and study areas are located in the Highlands BAP area. The BAP covers the period of 2015-2020. The priority habitats and species that are present in the Highlands and included in the BAP and are considered to be relevant to the Proposed Development based on the habitats and species recorded in the field study area are detailed in Table 8.5.

Table 8.5 – Relevant Habitats and Species Included in the Highlands BAP (THC, 2015)

Habitat	Species
Peatland, particularly blanket bog and wet heath	Common toad
	European eel (<i>Anguilla anguilla</i>)
	Brown trout (<i>Salmo trutta</i>)
	Water vole
	Wildcat
	Mountain hare (<i>Lepus timidus</i>)
	Brown hare (<i>L. europaeus</i>)
	Otter
	Pine marten
	Common lizard (<i>Zootoca vivipara</i>)
	Small pearl-bordered fritillary (<i>Boloria selene</i>)
	Small heath (<i>Coenonympha pamphilus</i>)

Previous Desk Study Results

8.6.4 A previous desk study for records of protected and notable species was undertaken in 2015 through the Highland Biological Recording Group (HBRG, 2015) and the National Biodiversity Network (NBN, 2015). The following are considered to be protected and notable species relevant to the Proposed Development:

- otter;
- pipistrelle (*Pipistrellus sp.*);
- Daubenton’s bat (*Myotis daubentonii*);
- Atlantic salmon (*Salmo salar*);
- brown trout;
- European eel;
- pine marten;
- small pearl-bordered fritillary;
- small heath;
- roe deer (*Capreolus capreolus*);
- wildcat;
- mountain hare;
- brown hare;
- common frog (*Rana temporaria*);
- common toad (*Bufo bufo*);

- smooth newt (*Lissotriton vulgaris*);
- palmate newt (*L. helveticus*); and
- common lizard.

8.6.5 Small pearl-bordered fritillary and small heath are both priority species in the Highland BAP.

Field Surveys

8.6.6 Full details of the results of the field surveys undertaken for the Proposed Development are provided in Appendix 8.1. Photographs taken during surveys are provided in Appendix 8.2. The results below only present the information on the ecological features required to undertake the impact assessment.

NVC Habitats

8.6.7 The dominant NVC habitats present in the field study area are M25a *Molinia caerulea*-*Potentilla erecta* marshy grassland (*Erica tetralix* sub-community) and M17b *Scirpus cespitosus*-*Eriophorum vaginatum* blanket mire (*Cladonia* sp. sub-community), as shown on Figure 8.2. All potentially sensitive habitats recorded in the field study area (not only within the site boundary) are detailed in Table 8.6.

Table 8.6 – NVC Habitat Types in Field Study Area

Habitat Type	Area (ha)
H10a <i>Calluna vulgaris</i> - <i>Erica cinerea</i> heath	0.20
M15c <i>Scirpus cespitosus</i> - <i>Erica tetralix</i> wet heath (<i>Cladonia</i> sp. sub community)	0.07
M15d <i>Scirpus cespitosus</i> - <i>Erica tetralix</i> wet heath (<i>Vaccinium myrtillus</i> sub-community)	0.10
M17a <i>Scirpus cespitosus</i> - <i>Eriophorum vaginatum</i> blanket mire (<i>Drosera rotundifolia</i> - <i>Sphagnum</i> sp. sub-community)	0.27
M17b <i>Scirpus cespitosus</i> - <i>Eriophorum vaginatum</i> blanket mire (<i>Cladonia</i> sp. sub community)	45.70
M23a <i>Juncus effusus</i> / <i>acutiflorus</i> - <i>Galium palustre</i> rush-pasture (<i>Juncus acutiflorus</i> sub-community)	0.23
M23b <i>Juncus effusus</i> / <i>acutiflorus</i> - <i>Galium palustre</i> rush-pasture (<i>Juncus effusus</i> sub-community)	1.81
M25a <i>Molinia caerulea</i> - <i>Potentilla erecta</i> marshy grassland (<i>Erica tetralix</i> sub-community)	31.35
M25b <i>Molinia caerulea</i> - <i>Potentilla erecta</i> mire (<i>Anthoxanthum odoratum</i> sub-community)	0.18
M27a <i>Filipendula ulmaria</i> - <i>Angelica sylvestris</i> mire (<i>Valeriana officinalis</i> - <i>Rumex acetosa</i> sub-community)	0.07
S27a <i>Carex rostrata</i> - <i>Potentilla palustris</i> tall-herb fen (<i>Potentillo-Caricetum rostratae</i>)	0.14
U4a <i>Festuca ovina</i> - <i>Agrostris capillaris</i> - <i>Galium saxatile</i> grassland	8.50

Habitat Type	Area (ha)
W4c <i>Betula pubescens</i> – <i>Molinia caerulea</i> woodland (<i>Sphagnum sp.</i> sub-community)	4.63
Total	93.25

8.6.8 A single watercourse, the Feith Osdail, flows from east to west through the southern part of the site and is a tributary of the River Tirry and the confluence of the two watercourses is located 182 m downstream of the site boundary.

8.6.9 The woodland present within the field study area is dominated by coniferous plantation, with some broadleaved plantation, mixed plantation and scattered coniferous trees.

8.6.10 No invasive non-native plant species were recorded during surveys.

GWDTE

8.6.11 Thirty potential GWDTEs were recorded in the field study area, as shown on Figure 8.3. Table 8.7 provides further information on the potential GWDTE recorded in the field study area. Further information on the hydrological and hydrogeological sensitivity of the identified GWDTEs and where there are interactions with the Proposed Development is provided in Chapter 9.

Table 8.7 – Potential GWDTE Types

Groundwater Dependency	Vegetation Community
Moderate	M15c <i>Scirpus cespitosus</i> - <i>Erica tetralix</i> wet heath (<i>Cladonia sp.</i> sub community)
	M15d <i>Scirpus cespitosus</i> - <i>Erica tetralix</i> wet heath (<i>Vaccinium myrtillus</i> sub-community)
	M25a <i>Molinia caerulea</i> - <i>Potentilla erecta</i> marshy grassland (<i>Erica tetralix</i> sub-community)
	M25b <i>Molinia caerulea</i> - <i>Potentilla erecta</i> mire (<i>Anthoxanthum odoratum</i> sub-community)
	M27a <i>Filipendula ulmaria</i> - <i>Angelica sylvestris</i> mire (<i>Valeriana officinalis</i> – <i>Rumex acetosa</i> sub-community)
	S27a <i>Carex rostrata</i> - <i>Potentilla palustris</i> tall-herb fen (<i>Potentillo</i> - <i>Caricetum rostratae</i>)
High	M23a <i>Juncus effusus/acuteiflorus</i> - <i>Galium palustre</i> rush-pasture (<i>Juncus acuteiflorus</i> sub-community)
	M23b <i>Juncus effusus/acuteiflorus</i> - <i>Galium palustre</i> rush-pasture (<i>Juncus effusus</i> sub-community)
	W4c <i>Betula pubescens</i> – <i>Molinia caerulea</i> woodland (<i>Sphagnum sp.</i> sub-community)

Previous Phase 1 Habitats

8.6.12 The dominant habitats present in the field study area in 2017 were coniferous plantation woodland, blanket bog and wet modified bog, as shown on Figure 8.4. Other potentially sensitive habitats recorded in the field study area were broadleaved plantation woodland, marshy grassland and running water. These habitats were not updated in 2020 in consultation with NS but NVC results suggest the areas recorded as blanket bog within the woodland rides in 2017 are more accurately mapped as wet modified bog in 2020, with continued drying of the bog as a result of the dewatering effect of the maturing woodland being a possible explanation for the change.

Protected Terrestrial Mammals

8.6.13 Target notes for protected and notable species are shown on Figure 8.5 and described in Appendix 8.1.

8.6.14 Several otter spraints were recorded along the Feith Osdail, as shown by Target Notes 2-5, 9-11, 16 and 20-21 on Figure 8.5. Two spraints were also recorded away from the watercourse, as shown by Target Notes 6 and 12 on Figure 8.5. A potential couch was also recorded 20.7 m to the north of the temporary access track, as shown by Target Note 17 on Figure 8.5. No otter holts were recorded in the field study area.

8.6.15 No water vole signs were recorded during the surveys although the habitat of the Feith Osdail is considered to be suitable. A historical presence of the predator American mink (*Neovison vison*) may account for the continued absence of water vole.

8.6.16 Several pine marten scats were recorded throughout the field study area, as shown by Target Notes 1, 8, 13, 19 and 22 on Figure 8.5. No protected dens were recorded in the field study area.

8.6.17 No wildcat signs were recorded during surveys although the habitat in the field study area is considered to be suitable for hunting wildcat. No rocky habitat suitable of supporting a den is present within the field study area. No wildcat has been recorded on the four camera traps that have been in operation in the Strath Tirry area of Dalchork Wood since 2012, as described in Appendix 8.3.

8.6.18 The habitat in the field study area is considered to be suitable for red squirrel, however, no signs of the species were recorded during the surveys. More suitable mature coniferous woodland occurs outwith the site boundary.

Bat Species

8.6.19 Full details of the results of the bat surveys are provided in Appendix 8.1.

8.6.20 Four bat species comprising common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*P. pygmaeus*), brown long-eared bat and Daubenton’s bat were recorded in the field study area. Table 8.8 provides a summary of the bat activity recorded at each detector per month. No roosting locations were recorded in the field study area.

Table 8.8 – Summary of Bat Activity in 2020 from Static Detectors

Detector Location	Number of Bat Passes*					Total Number of Passes per Detector
	April	May	June	August	September	
1	2 CP	0	6 CP	18 CP 14 SP	9 CP 7 SP	56
2	0	0	5 CP	398 CP 127 SP	0	533

Detector Location	Number of Bat Passes*					Total Number of Passes per Detector
	April	May	June	August	September	
				3 DB		
3	2 SP 1 BLE	1 CP	0	32 CP 20 SP	14 CP 15 SP	85
4	1 SP 2 BLE	2 CP 2 SP	0	0	0	7
Total Number of Passes per Month	8	5	11	612	45	

*Note on species abbreviations in table: CP = Common pipistrelle, SP = Soprano pipistrelle, BLE = Brown long-eared bat and DB = Daubenton's bat.

8.6.21 Overall bat activity in the field study area was low. Common pipistrelle were the most frequently recorded species with 487 total passes across the bat activity season, followed by soprano pipistrelle with 188 total passes. Three total passes were recorded each for brown long-eared bat and Daubenton's bat across the bat activity season. Common and soprano pipistrelle are at high risk, and brown long-eared bat and Daubenton's bat are at low risk of effects from wind farms at a population level.

8.6.22 The highest bat activity occurred at detector T2 between the 25th and 27th of August 2020 when a maximum number of 149 common pipistrelle passes and 64 soprano pipistrelle passes were recorded on the 25th and 26th of August 2020, respectively.

Freshwater Invertebrates (Excluding Freshwater Pearl Mussel)

8.6.23 The freshwater invertebrate survey in 2014 recorded six families of freshwater invertebrates across all five sample locations within the Feith Osdail. Visual inspection in 2020 confirmed that habitats within the watercourse are similar to those seen in 2014 and, therefore, the results remain valid despite their age.

8.6.24 Table 8.9 presents the water quality analysis scores for each sample.

Table 8.9 – Freshwater Invertebrate Survey Results

Sample Number	Biological Water Monitoring Party (BWMP) Score	Average Score Per Taxon (ASPT)	Number of Scoring Taxa	Percentage Silt Intolerance (PSI) (%)
1	22	7.33	3	75
2	60	7.5	4	100
3	5	5	1	100
4	43	8.6	5	100
5	22	7.33	3	75

- 8.6.25 The BMWP score indicates poor water quality for samples 1, 3 and 5, and moderate water quality for samples 2 and 4. The ASPT score indicates excellent water quality for samples 1, 2, 4 and 5, and very good water quality for sample 3.
- 8.6.26 PSI calculations indicate that samples 1 and 5 are slightly sedimented with samples 2, 3 and 4 unaffected by the presence of silt.
- 8.6.27 In ecological terms, the very good to excellent water quality is capable of supporting a diverse range of species. The Feith Osdail also has connectivity with the surrounding catchment area.

Freshwater Pearl Mussel

- 8.6.28 Full details of the freshwater pearl mussel survey results are provided in Confidential Appendix 8.4.
- 8.6.29 No freshwater pearl mussels were recorded during either the 2014 or the 2020 surveys and the Feith Osdail is considered to be largely unsuitable for this species.

Fish Population and Habitat Surveys

- 8.6.30 A full description of the fish habitat and population survey results can be found in Appendix 8.5. The main findings of the 2014 survey are summarised below.
- 8.6.31 The habitat survey identified no impassable obstacles to upstream migration of salmonid fish in the lower reaches of the Feith Osdail. At the time of survey, the lower 1.4 km of the Feith Osdail provided good quality habitat for juvenile brown trout and Atlantic salmon. However, spawning habitat was extremely scarce and holding pools for adult fish were absent. Further upstream, outwith the site boundary, there was also a lack of spawning opportunity for Atlantic salmon or brown trout.
- 8.6.32 The fish habitat survey also covered approximately 0.7 km of the River Tirry, downstream of the Feith Osdail confluence. The majority of the habitat in this part of the River Tirry appeared suitable for the production of juvenile Atlantic salmon. Some deeper holding areas for adults were present and three substantial areas of spawning habitat were identified.
- 8.6.33 The electric fishing survey found that juvenile Atlantic salmon were present at all four sampling sites along the Feith Osdail. The mean density was classified as very poor by regional standards. Brown trout were also present at all four sites. The mean density was classified as moderate by regional standards. Minnows and three-spined stickleback (*Gasterosteus aculeatus*) were present at most survey sites. No eels or brook lamprey (*Lampetra planeri*) were seen or caught.

Reptiles and Amphibians

- 8.6.34 No reptile or amphibian species were recorded in the field study area and the habitat was considered to have low suitability for these species.

Deer

- 8.6.35 The field study area contains a resident population of sika deer (*Cervus nippon*), with low numbers of seasonally occurring red deer (*C. elaphus*) and occasional roe deer, as described in Appendix 8.6.

Future Baseline

- 8.6.36 The future baseline of the field study area under the “do nothing” scenario is unlikely to change significantly in the absence of the Proposed Development. The coniferous plantation is likely to be harvested by clear fell methods before the trees reach maturity at 40-70 years. Without the Proposed Development, the forest would be felled within approximately the next two decades. These areas would typically be restocked with coniferous species.
- 8.6.37 The peatland habitats are considered unlikely to change significantly in the absence of the Proposed Development as the open habitats would continue to be impacted and shaped by afforestation and grazing. The majority of habitats are already modified by the surrounding coniferous plantation and

grazing by deer, which are expected to continue. Therefore, the distribution of species present within the field study area is unlikely to change significantly in the future. However, climate change may have an effect on future species distribution. Temporary to long term displacement of forest species is likely as coniferous plantations are clear felled and replanted and species recolonise the previously displaced area.

8.7 Standard Mitigation

- 8.7.1 The layout of the Proposed Development has, where possible, been designed to avoid habitats of highest ecological importance and with the highest sensitivity to impacts, as detailed in Chapter 2. As far as possible, wind turbines have been placed outwith or away from the middle of the mire and wet heath habitats, i.e. close to the edge of areas, with the majority placed in areas of poorer quality peatland. It should be noted that where the Proposed Development occurs in areas of mire, the locations have been selected to avoid areas of deep peat, where possible, as detailed in Chapters 2 and 9. Where peat depth is >1 m, track construction will generally be of a floating design where practicable rather than a cut design, in order to minimise the disturbance to peat. The track design will have due regard to key principles set out in the joint SNH (now NS) and Forestry Commission Scotland (FCS) guide to floating roads on peat (SNH *et al.*, 2010). Measures already taken into account during design include track micro-siting to avoid deep peat and, where required, features will be incorporated into the track, such as hydrological culverts to minimise the potential effects on the hydrological characteristics of mire and wetland habitats. Further details of hydrological mitigation to reduce the significance of potential adverse effects on the hydrology are described in Chapter 9.
- 8.7.2 Felling of coniferous woodland plantation has been designed to minimise the loss of linear features and woodland for bat species by keyholing rather than clear-felling. The minimum buffer distance from the turbine blade tip to the nearest woodland required by best practice guidance (SNH *et al.*, 2019) is 92.2 m from turbine to woodland edge, assuming a tree height of 15 m. The keyholing proposed will have a distance of 100 m from turbine to woodland edge.
- 8.7.3 Standard mitigation also includes the following:
- Overseeing of all work by an Ecological Clerk of Works (ECoW).
 - Compliance with the requirements of the Construction Environmental Management Plan (CEMP) (refer to Appendix 3.2). SPPs will form part of the CEMP and will address the protected species known to be present in the field study area and will provide details on the actions required if other species not recorded during surveys (such as wildcat) are encountered during construction of the Proposed Development. The CEMP will also include an outline of the proposed approach to construction methods and environmental protection during all aspects of the construction work, including details of ecological constraints and standard pollution prevention guidelines to ensure no water or air borne pollutants will reach ecological features, such as the Feith Osdail. The CEMP will also include the procedures for surface water management during construction.
 - Appropriate pollution response spill kits and silt mitigation measures installed at the watercourse crossing location. As a minimum, these will follow SEPA Guidelines for Water Pollution Prevention from Civil Engineering Contracts (SEPA, 2006a) and Special Requirements (SEPA, 2006b). The risk of pollution from surface run-off to watercourses and aquatic habitats will be avoided by ensuring that run-off control measures, such as interceptor drains and silt traps to assist in maintaining water quality, are in place. Additionally, interceptor drains will be used to control the flow of any run-off from construction or operational activities. Pollution control measures will be included in the CEMP.

- Provision of a slope at one end of, or mammal ramps at, excavations that remain uncovered overnight, where there would be the potential for mammals to become trapped. This will prevent otters, pine marten and other species from becoming trapped. These measures will be included in the SPPs within the CEMP. Additionally, all pipes will be capped, and chemicals stored securely.
- Suitable design of the watercourse crossing to allow continued mammal movement along the Feith Osdail and minimise riparian habitat loss (refer to Figure 3.5a-c).
- A pre-construction protected species survey following best practice guidance, similar to the one undertaken during this assessment, undertaken no later than eight months prior to the start of construction, particularly for otter and pine marten, which are known to be present, and red squirrel, water vole and wildcat, which may be present in future. This will identify any protected species that were not present during previous surveys that have started using the habitats of the Proposed Development and/or that are present in the future as a result of changes in usage of the Proposed Development by species recorded to date. This will also involve a survey of suitable habitat where amphibians or reptiles may be found. A suitably qualified ecologist will be appointed to undertake this survey. If the work is undertaken outwith the active months for amphibians and reptiles then the ecologist will search construction areas for suitable hibernation sites for relocation. Any amphibians or reptiles discovered during construction will be moved by the ECoW to suitable areas outwith the construction area. SPPs will be included in the CEMP. The SPPs will be followed during construction of the Proposed Development.

8.8 Features Brought Forward for Assessment

Summary of Important Ecological Features

- 8.8.1 A summary of the ecological features identified as being sensitive to the potential impacts of construction, operation or decommissioning of the Proposed Development and that have been ‘scoped-in’ to the assessment is given in Table 8.10, together with the rationale for their inclusion.

Table 8.10 – Summary of Important Ecological Features

Feature	Importance	Rationale
Caithness and Sutherland Peatlands SAC - otter	Regional	SACs are designated as internationally important sites for nature conservation for habitats and non-avian species. No direct or indirect impacts are considered to be possible for the qualifying habitats of the SAC, as discussed in Table 8.2. Indirect impacts may be possible on otter travelling outwith the SAC. Otter are listed as an EPS under the EC Habitats Directive (European Commission, 1992) and are included in the Highlands BAP (THC, 2015). One resting place was recorded in the field study area on the Feith Osdail. If otter from the SAC are using the site, given the high level of activity recorded, the population of otter using the field study area would be considered to be of regional importance.
Semi-natural ancient woodland	County	Ancient woodland contains remnants of Scotland’s original forests, preserving the integrity of ecological processes in the soil and its associated biodiversity. Once destroyed, ancient woodland cannot be recreated. Although no legislation specifically protects ancient woodland, there is a

Feature	Importance	Rationale
		strong presumption against removal of ancient semi-natural woodland or plantations on ancient woodland sites (SNH, 2011). Semi-natural ancient woodland is present in large, scattered areas in the Highlands and the area present in the field study area consists of mature planted conifer. As a result, this feature is considered to be of county importance.
Habitats (H10a, M17a, M17b and U4a)	Regional (H10a, M17a, and M17b in east and west of site) County (U4a)	H10a and M17 are included in Annex 1 of the EC Habitats Directive (European Commission, 1992) and the Highlands BAP (THC, 2015) and are sensitive to environmental change, such as changes to hydrology, carbon function, species composition and nutrient status. Much of the peatland habitat in the UK is in poor condition due to drainage, grazing pressure and damage from peat extraction. The examples of these habitat types within the field study area are of varying condition and subject to modification but do include areas of increased diversity. The areas of M17 in the east and west of the site are better quality examples of this habitat type and are considered to be functional mire and less influenced by the lowering of the water table by the coniferous woodland plantation. These areas are considered to be of regional importance and have been avoided by the Proposed Development. The remaining habitats are considered to be of county importance as they are subject to modification from grazing and drainage from the surrounding forestry. The habitats within the forest rides are no longer functioning as an active bog and are now dominated by marshy grassland. There are large areas of peatland and grassland within the Highlands in better condition than those observed in the field study area.
GWDTEs (M15c, M15d, M23a, M23b, M25a, M25b, M27a and S27a)	County	M15, particularly M15d (wet heath), is included in Annex 1 of the EC Habitats Directive (European Commission, 1992). GWDTEs are sensitive to changes in hydrology and hydrogeology. The examples of potential GWDTEs in the field study area are generally in good condition, with increased diversity and naturalness compared to surrounding habitats, such as coniferous woodland plantation. Due to the small areas present in the field study area, with larger expanses present in the wider area, this feature is considered to be of county importance.
Bat species	County	Bats are an EPS under the EC Habitats Directive (European Commission, 1992). Bat activity is low across the field study area and is dominated by common pipistrelle and soprano pipistrelle, which are two common species that are at a

Feature	Importance	Rationale
		high risk of adverse effects on their populations, with two other species present (brown long-eared bat and Daubenton's bat) that are at a low risk of adverse effects on their populations, therefore bat species are considered to be of county importance.
Otter	County	Otter are listed as an EPS under the EC Habitats Directive (European Commission, 1992) and are included in the Highlands BAP (THC, 2015). One resting place was recorded in the field study area on the Feith Osdail. Given the high level of activity recorded, the population of otter using the field study area is considered to be of county importance. Most otter recorded on the site are not considered to be from the SAC as, although the SAC is within the distance travelled by otter along watercourses, there are intervening features, such as Loch Shin, and more suitable watercourses closer to the SAC, such as the River Tirry. The otter present on the site are considered to be local to the area.
Pine marten	County	Pine marten are protected under Schedule 5 of the Wildlife and Countryside Act (UK Government, 1981). A moderate level of activity was recorded in the field study area, although no protected dens were recorded. As a result, pine marten is considered to be of county importance.
Deer	Local	Deer are widespread throughout the field study area and in the surrounding area. As a result, they are considered to be of local importance.

Effects Scoped Out of Assessment

Habitats

- 8.8.2 Habitats assessed to be of less than local value are scoped out from further consideration in this assessment on the basis that effects on these habitats would not be considered significant in terms of the EIA regulations given their low ecological value. Accordingly, coniferous woodland plantation has been scoped out of this assessment. Other impacts and effects on coniferous woodland plantation are considered in Chapter 16.
- 8.8.3 The Feith Osdail is also scoped out of further assessment as there is not considered to be the potential for a significant effect following the application of standard mitigation measures, such as pollution prevention measures.

Protected Species (Badger, Wildcat, Red Squirrel and Water Vole)

- 8.8.4 As the field study area does not contain habitats suitable to support badger (*Meles meles*) and no records of this species were made during field surveys, the species is not considered further in this assessment.

- 8.8.5 No records of wildcat or red squirrel were recorded and the habitats in the field study area are considered to be of low suitability for these species, therefore, they are not considered further in this assessment.
- 8.8.6 No water vole signs were recorded during field surveys and although the habitat is considered to be suitable for this species, they are not considered further in this assessment as there is not considered to be the potential for a significant effect following the application of standard mitigation measures, such as a pre-construction protected species survey and pollution prevention measures.

Freshwater Invertebrates (Including Freshwater Pearl Mussel) and Fish

- 8.8.7 No significant effects are considered to be possible on the Feith Osdail following the application of standard mitigation measures, such as pollution prevention measures, therefore freshwater ecology is scoped out of this assessment. Standard mitigation measures, such as pollution prevention measures, would also avoid significant effects from pollution on the River Tirry.

Reptiles and Amphibians

- 8.8.8 No reptiles or amphibians were recorded during field surveys and although the habitat is considered to be suitable for these species, they are not considered further in this assessment as there is not considered to be the potential for a significant effect following the application of standard mitigation measures, such as a pre-construction protected species survey and pollution prevention measures.

Invertebrates

- 8.8.9 Surveys of this species group were considered unnecessary as the EclA adopts a precautionary approach and includes appropriate mitigation, where required, to avoid significant effects.

8.9 Potential Effects

- 8.9.1 This section considers the potential impacts and associated effect significance of the construction, operation and decommissioning of the Proposed Development based on the typical activities described in Chapter 3.

Construction

Statutory Designated Nature Conservation Sites

- 8.9.2 No direct impacts within statutory designated nature conservation sites have been identified. However, construction of the Proposed Development in the vicinity of the Feith Osdail could result in indirect impacts, such as disturbance, on otter travelling outwith the SAC. It should be noted that this is assuming all otter using the Feith Osdail are from the SAC, although this is considered to be unlikely.
- 8.9.3 Construction activities in the vicinity of the watercourse have the potential to disturb otter moving along the watercourse and using the potential resting area as a result of noise, vibration or light. Disturbance would occur during construction of the temporary access track and the watercourse crossing in the south of the site. Watercourse crossings will be suitably designed to allow continued otter movement along watercourses and will minimise riparian habitat loss. A small area of habitat is likely to be permanently lost but is unlikely to extend beyond 15 m at the watercourse crossing. Disturbance would be a short-term, low magnitude impact on this species. As a result, the effect of construction of the Proposed Development on otter is considered to be **not significant**.
- 8.9.4 Construction activities could also result in the direct injury/accidental death of individual otter from increased vehicle traffic on new tracks. However, the design of the watercourse crossing that allows continued mammal passage to avoid otters crossing tracks and low vehicle speed limits will reduce the magnitude and frequency of this impact. The access track that would run parallel to the Feith

Osdail in the south of the site is temporary and will be removed, with the habitats reinstated, following construction. As a result, the effect is considered to be **not significant**.

Non-statutory Designated Nature Conservation Sites

- 8.9.5 No direct impacts within non-statutory designated nature conservation sites have been identified. However, construction of the Proposed Development could result in disturbance of the planted semi-natural ancient woodland along the northern site boundary, as shown on Figure 8.1. Dust produced from increased vehicle movement could smother small plants in the ground flora and leaves of tree species. This is considered to be a temporary, low magnitude, low frequency, short-term impact on a small extent of the edge of the habitat, particularly as rainfall will naturally mitigate the effects and because the majority of construction activities will occur within the coniferous woodland plantation present on the site, which will act as a natural barrier. As a result, the effect is considered to be **not significant**.

Habitats

- 8.9.6 Construction activities have the potential to degrade or destroy terrestrial habitat either directly through excavation, compaction, or modification (e.g. vegetation removal) or indirectly as a result of dewatering or from the accidental release of fuels, lubricants or other chemicals. The construction of four turbine foundations, four hardstanding areas, permanent access tracks, a meteorological mast, a switching station and an energy storage system would cause permanent habitat loss. The construction of four small hardstanding areas, three borrow pits, temporary access tracks, two entrance compounds and a construction compound plus the laying of cables between turbines would cause temporary habitat degradation or loss in the short- to medium-term until habitats are reinstated following completion of the Proposed Development. The significance of these effects per habitat type is considered below.
- 8.9.7 As described in Chapter 3, floating stone road or trackway panel construction will be used in sensitive areas, such as Annex 1 (European Commission, 1992) peatland or GWDTEs. The track construction will ensure hydraulic connectivity is maintained by including measures such as the inclusion of a non-alkaline porous horizon within the track sub-base to prevent the track structure acting as a barrier to natural hydrogeological processes.
- 8.9.8 Figure 8.2 shows the Proposed Development overlaid on the habitats mapped using NVC survey methodology.
- 8.9.9 Table 8.11 and Table 8.12 set out the percentage of permanent and temporary habitat loss by habitat type within the field study area, respectively. Direct habitat loss during construction includes the working areas for each turbine site (turbine base and hardstanding area), the area of proposed new access track (at 5 m width), and the working areas for the switching station, entrance compounds and construction compound. Indirect habitat modification is calculated as a 10 m buffer around the areas of direct habitat loss as this is considered to represent the worst-case scenario of habitat that is likely to be indirectly modified by the Proposed Development.

Table 8.11 – Permanent Habitat Loss from Proposed Development During Construction

		Direct Habitat Loss		Indirect Habitat Modification	
Habitat	Total Habitat in Survey Area (ha)	Area Lost (ha)	Percentage Lost (%)	Area Modified (ha)	Percentage Modified (%)
H10a dry heath	0.20	0	0	0.005	2.50

		Direct Habitat Loss		Indirect Habitat Modification	
Habitat	Total Habitat in Survey Area (ha)	Area Lost (ha)	Percentage Lost (%)	Area Modified (ha)	Percentage Modified (%)
M15c wet heath	0.07	0.02	28.57	0.02	28.57
M17a mire	0.27	0.007	2.60	0.03	11.11
M17b mire	45.7	0.17	0.37	0.21	0.46
M23b rush-pasture	1.81	0.03	1.66	0.02	1.11
M25a marshy grassland	31.25	0.64	2.05	1.17	3.74
U4a grassland	8.50	0	0	0.005	0.06
W4c wet woodland	4.63	0.004	0.09	0.03	0.65
Totals	92.43	0.87	0.94	1.49	1.61

Table 8.12 – Temporary Habitat Loss from Proposed Development During Construction

		Direct Habitat Loss		Indirect Habitat Modification	
Habitat	Total Habitat in Survey Area (ha)	Area Lost (ha)	Percentage Lost (%)	Area Modified (ha)	Percentage Modified (%)
M15c wet heath	0.07	0.005	7.14	0	0
M17b mire	45.7	0.07	0.15	0.14	0.31
M23b rush-pasture	1.81	0.02	1.11	0.04	2.21
M25a marshy grassland	31.25	0.65	2.08	0.56	1.79
M25b mire	0.18	0.001	0.56	0.02	11.11
M27a mire	0.07	0.01	14.29	0.03	42.86
U4a grassland	8.50	0.05	0.59	0.18	2.13
W4c wet woodland	4.63	0.26	5.62	0.58	12.53
Totals	92.21	1.07	0.01	1.55	1.68

8.9.10 Without consideration of mitigation, the only habitat that has a permanent direct loss of greater than 5% is M15c (28.57%), with a potential loss of 0.02 ha. The only habitats that have a permanent

indirect modification of greater than 5% are M15c (28.57%) and M17a (11.11%), with a potential modification of 0.02 ha and 0.03 ha, respectively. M15 is moderately groundwater dependent.

8.9.11 Without consideration of mitigation, the only habitats that have a temporary direct loss of greater than 5% are M27a (14.29%), M15c (7.14%) and W4c (5.62%), with a potential loss of 0.01 ha, 0.005 ha and 0.26 ha, respectively. The only habitats that have a temporary modification of greater than 5% are M27a (42.86%), W4c (12.53%) and M25b (11.11%), with a potential modification of 0.03 ha, 0.58 ha and 0.02 ha, respectively. W4c is highly groundwater dependent and M15c, M27a and M25b are moderately groundwater dependent.

8.9.12 The loss of M15c would be a moderate adverse impact since the Proposed Development would permanently remove almost one third of the habitat present within the site boundary, with potential temporary loss of a further 7% and modification of almost a further third, therefore potentially affecting the functioning of the habitat. This would be a **significant adverse effect** at the county level on a habitat that is present in small, discrete areas within the site. The modification of M17a would be a low magnitude adverse impact that would still leave functioning habitat. As a result, the effect on this habitat is considered to be **not significant**. The temporary loss of 14% and modification of almost half of the M27a could potentially impact the functioning of the habitat in the short to medium-term until the habitat is able to recover following reinstatement. This would be a moderate adverse but reversible impact and is considered to be a **significant adverse effect** at the county level. The loss and modification of W4c would be a low magnitude adverse impact that is reversible over the long-term, as the wet woodland habitat recovers following reinstatement. As a result, this is considered to be a **significant adverse effect** at the county level until the habitat has recovered. The temporary modification of M25b would be a low magnitude, short-term and reversible effect and would still leave a functioning habitat. This habitat is dominated by rush (*Juncus sp.*) and is considered to be marshy grassland rather than functioning mire. As a result, the effect is considered to be **not significant**.

Bat Species

8.9.13 No bat roosts would be disturbed, destroyed or damaged as a result of construction activities. Construction has the potential to result in a short-term, low magnitude displacement impact on bats that forage and commute in the coniferous woodland plantation, particularly as areas of the plantation are removed. However, the effect of this is considered to be **not significant** as the plantation will not be clear felled but keyholed around the proposed infrastructure, leaving the majority of functioning habitat and linear features for foraging and commuting bats.

Otter

8.9.14 Otter are considered under statutory designated nature conservation sites in paragraphs 8.9.2 to 8.9.4. However, the otter present on the site are considered unlikely to be individuals from the SAC and are more likely local to the surrounding area.

Pine Marten

8.9.15 No protected dens would be disturbed, destroyed or damaged during construction. Construction of the Proposed Development would result in the permanent loss of coniferous woodland plantation suitable for use by pine marten. This is considered to be a low magnitude impact in the context of the available habitat resource remaining in the field study area and in the surrounding area, taking into account that the plantation will be keyholed around the proposed infrastructure rather than clear felled. Construction activity would also likely have a localised, low magnitude disturbance impact on this species that uses the site at a moderate level, but infrequently. As a result, the effect of construction on pine marten is considered to be **not significant**.

8.9.16 Construction activities could also result in the direct injury/accidental death of individual pine marten from increased vehicle traffic on new tracks. However, the low vehicle speed limits will reduce the magnitude and frequency of this impact. As a result, the effect is considered to be **not significant**.

Deer

- 8.9.17 Construction activities could result in the direct disturbance and displacement of deer into habitats surrounding the Proposed Development. The effect of this is considered to be **not significant** as the displacement would be temporary and short-term onto habitat that is common in the surrounding area and deer would return to displaced areas following the completion of construction.
- 8.9.18 Construction activities could potentially increase the risk of vehicle collisions and result in the direct injury/accidental death of individual deer from increased vehicle traffic on new tracks. However, the low vehicle speed limits will reduce the magnitude and frequency of this impact. As a result, the effect is considered to be **not significant**.

Operation

- 8.9.19 No operational impacts that would result in significant effects following the application of standard mitigation are considered to occur on statutory designated nature conservation sites, habitats, otter, pine marten or deer. No further habitat suitable for protected species would be lost during operation of the Proposed Development. No operational impacts are considered to occur on non-statutory designated nature conservation sites as all wind farm activities would occur from access tracks and infrastructure that were established during the construction stage.

Bat Species

- 8.9.20 The main operational impact on bat species is direct collision with wind turbines leading to bat fatalities. It is also possible for bat mortality to result from internal haemorrhaging due to indirect barotrauma (Baerwald *et al.*, 2008), however this is considered to occur far less frequently than collision. The current low level of activity by any bat species in the field study area indicates that significant effects associated with indirect barotrauma are unlikely.
- 8.9.21 Given the pattern of low activity and recorded number of bat passes across the site throughout the bat activity season, it is considered to be very likely that the high number of passes recorded in August 2020 represents repeated passes by a low number of individual bats. This could possibly have been caused by a foraging opportunity i.e. the hatch of a large number of flying invertebrates at that time. Additionally, there are no features, such as a suitable mature tree or potential roost locations, in the vicinity that would account for the sudden increase in bat passes detected at this location in August 2020.
- 8.9.22 Overall, the site is considered to support a low number of individual foraging and commuting bats dominated by common and widespread species, such as common and soprano pipistrelle. Whilst direct collision would be an adverse impact, this is considered to involve a low number of individuals from roosts in unknown locations in the wider area. Potential roost locations in the wider area include farm buildings that are situated more than 800 m from the site boundary. At this distance and with more suitable foraging habitat present in the wider area, much of it closer to these potential roosts, it is considered likely that the site only supports a low number of individuals from these potential roost locations, therefore the impact is considered to be adverse but of low magnitude for the duration of the Proposed Development operational period. As a result, the effect is considered to be **not significant**.
- 8.9.23 Indirect impacts of wind turbines on bats also include disturbance and displacement from foraging, commuting or migrating areas. As bat activity is considered to be low in the field study area, the effects are considered to be **not significant**.

Decommissioning

- 8.9.24 Decommissioning impacts would involve personnel and machinery accessing locations across the site to dismantle and remove infrastructure, including turbines, hardstanding and site buildings, as detailed in Chapter 3. The wind turbines and switching station would be removed to ground level, with the concrete turbine foundations left in-situ and broken down to approximately 1 m below ground level. Switching station foundations would also be removed. The access tracks and electrical

cables would be left in-situ to minimise habitat disturbance. The overall impacts of decommissioning would be short-term, intermittent and temporary and last approximately six months. Existing access tracks would be used to access the infrastructure to be decommissioned. Construction compounds would be re-installed on the site and the southern access into the site would be re-opened but these would occur at the same locations used during construction i.e. on habitats previously disturbed by the construction of the Proposed Development. As a result, no effects on habitats are predicted, with habitats allowed to recover and regenerate following the removal of infrastructure.

- 8.9.25 There may be a temporary and short-term disturbance impact on protected species, such as otter and pine marten, in the field study area but this would be restricted to the access tracks and other infrastructure. The effect of this is considered to be **not significant**.

8.10 Additional Mitigation and Enhancement

Mitigation During Construction

- 8.10.1 In the absence of mitigation, significant effects are predicted on the M15c, M27a and W4c habitats due to loss and modification. Specific mitigation for these ecological features is therefore provided below. No specific mitigation is required for the other ecological features; however, the Applicant proposes to implement a suite of standard good practice working measures that will provide additional protection. These are summarised below and will be detailed in the CEMP.

Habitat Reinstatement

- 8.10.2 Areas of temporary infrastructure, such as the access track in the south of the site, the construction compounds and the borrow pits, will be reinstated as soon as possible after construction has been completed to allow the recolonisation of natural habitats. Further details on the proposed approach to habitat reinstatement will be set out in the CEMP.

Minimising Disturbance of Potential Otter Couch

- 8.10.3 Although no significant effects are predicted from the temporary disturbance of otter, in order to comply with protected species legislation, a NS licence will be required for works within 30 m of the potential otter couch in the south of the site. A suitably qualified and experienced ECoW will monitor the potential otter couch under the NS licence using camera traps to determine the level of disturbance. If the couch is considered to be disturbed by construction works, further measures will be put in place by the ECoW to minimise disturbance in consultation with NS, where required. All construction work within 30 m of the potential couch will avoid the times when otter are most active, stopping a minimum of two hours before sunset and resuming a minimum of two hours after sunrise.

Good Practice Measures

- 8.10.4 Standard mitigation measures will be implemented during the construction work, as detailed in section 8.7. The following measures will also be implemented.

Deer Management Plan

- 8.10.5 Appendix 8.6 details the measures that would be undertaken during construction to ensure deer numbers are kept at a low level to avoid damage to habitats in the field study area from deer displacement during construction. Measures include the continuation and monitoring of the current annual deer cull plan in conjunction with the proposed restriction of speed limits within the construction site boundary.

Micro-siting

- 8.10.6 Micro-siting of infrastructure and/or the configuration of the construction working areas within the Proposed Development will seek to avoid localised ecological sensitivities wherever possible. This will include, but will not be limited to:

- maximising the distance of infrastructure and the associated construction working areas from watercourses and the potential otter couch; and
- minimising the extent of construction work within wetland, such as M15c wet heath, M27a mire and W4c wet woodland.

Maintaining Hydrological Connectivity

- 8.10.7 Suitable drainage and surface water measures will be used to maintain hydrological connectivity in peatland and wetland habitats, particularly M15c wet heath, M27a mire and W4c wet woodland. This will include measures such as diverting drainage around working areas and maintaining hydraulic connectivity in track design by using small diameter pipes in the sub-base. Further details are provided in Appendix 3.1.
- 8.10.8 Greenfield run-off (i.e. non-silty surface water flow that has not yet passed over any disturbed construction areas) will be kept separate from potentially contaminated water from construction areas, where possible. Where appropriate, interceptor ditches and other drainage diversion measures will be installed immediately in advance of any excavation works in order to collect and divert greenfield run-off around areas disturbed by construction activities. All surface water within disturbed areas will be managed in accordance with sustainable drainage system techniques, using a multi-tiered approach to provide both flow attenuation and treatment through infiltration, where possible, and physical filtration prior to discharge.
- 8.10.9 In accordance with industry guidance (SNH *et al.*, 2019), ditches will follow the natural flow of the ground with a generally constant depth to ditch invert. They will have shallow longitudinal gradients, where possible. Regular check-dams will be used where necessary to control the rate of run-off. The ditches will be designed to intercept any stormwater run-off and to allow clean water flows to be transferred independently through the works without mixing with construction drainage. The regular interception and diversion of clean run-off around infrastructure will prevent significant disruption to shallow groundwater flow, mire areas, wet heath and wet woodland. This will also reduce the flow of water onto any exposed areas of rock and soil, thereby reducing the potential volume of silt-laden run-off requiring treatment.
- 8.10.10 Greenfield run-off will be discharged into an area of vegetation for dispersion or infiltration, mimicking natural flows, so as not to alter downstream hydrology or soil moisture characteristics.

Mitigation During Operation

- 8.10.11 In the absence of mitigation, no significant operational effects are predicted on the ecological features discussed in this chapter. However, habitat restoration is discussed here as mitigation that will be undertaken during operation to compensate for the loss and modification of habitats during construction. The Applicant also proposes to implement a suite of standard good practice working measures that will provide additional protection. These are detailed below.

Habitat Restoration

- 8.10.12 Active restoration of the peatland habitats in the field study area will be carried out in line with Appendix 8.7 and will be secured by planning condition. Active restoration is defined here as the process of actively encouraging the regeneration of degraded peatland habitats. A minimum of 0.46 ha of peatland will be restored in areas that were formerly mire but are no longer functioning as an active mire, such as areas of M25a marshy grassland in the south of the site and areas of felled coniferous woodland. The overall aim will be to restore a larger area of peatland than the area lost in order to achieve a net biodiversity gain. This will mitigate the permanent loss and modification of peatland as a result of the Proposed Development.

Woodland Offset Planting and Habitat Enhancement

- 8.10.13 Woodland offset planting for the W4c wet woodland and the coniferous woodland plantation felled during construction will be undertaken off-site at a location determined post-consent, as detailed

in Chapter 16. Where possible, this will aim to plant species of similar ecological value to the W4c wet woodland and of higher ecological value than the coniferous woodland plantation that will be removed from the site. This will include native broadleaved species, such as silver birch (*Betula pendula*), downy birch (*B. pubescens*) and alder (*Alnus glutinosa*).

- 8.10.14 There is also the opportunity for habitat enhancement on-site, as detailed in Appendix 8.7. To compensate for the loss of W4c wet woodland, riparian planting of birch and alder species will occur along the Feith Osdail. This will also have the added benefit of providing shelter for fish, aquatic invertebrates and otter.

Mitigation During Decommissioning

- 8.10.15 In the absence of mitigation, no significant decommissioning effects are predicted on the ecological features discussed in this chapter. As a result, no specific mitigation is required, however, the Applicant proposes to implement a suite of standard good practice working measures that will provide additional protection. It is anticipated that these measures will be similar to those detailed in the CEMP; however, the proposed measures would be refined to account for changes in good practice, amendments to existing legislation, future enactment of pertinent legislative instruments (e.g. regulation in relation to waste), policy direction and recorded, site-specific environmental data gathered during the Proposed Development operational phase. Decommissioning proposals will be agreed with THC prior to decommissioning works commencing.

Habitat Reinstatement

- 8.10.16 Many elements of the infrastructure will be removed as part of the decommissioning of the Proposed Development and reinstated as soon as possible to allow the recolonisation of natural habitats. Decommissioning proposals will be agreed with THC prior to decommissioning works commencing and will consider site-specific habitat and species data gathered during the Proposed Development operational phase and pertinent legislation and guidance available at the time of decommissioning.

8.11 Residual Effects

Construction

Habitats

- 8.11.1 Following completion of construction of the Proposed Development (including reinstatement work), residual adverse effects are anticipated for the short- to medium-term (approximately five to ten years), until habitats (excluding woodland) have re-established. Permanent habitat loss would occur in peatland (0.46 ha) and wet woodland (0.034 ha) due to the excavation of turbine bases, other infrastructure and access tracks. This effect is considered to be of low magnitude due to the small footprint involved. As a result, **no significant** residual effects are predicted.
- 8.11.2 A minimum of 0.46 ha of peatland will be restored towards good quality active mire following the completion of construction and in the medium- to long-term would provide a local beneficial effect, particularly as the majority of peatland is currently dominated by rush-pasture that was formerly mire. The aim is that by restoring peatland, it would become actively peat-forming mire, which is able to store increased levels of water and carbon dioxide, helping with flood prevention and climate change, respectively. The aim is also to restore a larger area of peatland than the area lost in order to achieve a net biodiversity gain. As a result, **no significant** residual effects are predicted.
- 8.11.3 Following completion of construction of the Proposed Development (including reinstatement work), residual adverse effects are anticipated for the long-term (approximately ten to 20 years) until woodland has re-established. Woodland planting will offset the loss of W4c wet woodland and coniferous plantation woodland. In the long-term, this would provide a local beneficial effect, particularly as the coniferous woodland will be replaced with higher value native broadleaved species, where possible. As a result, **no significant** residual effects are predicted.

8.11.4 Overall, with the completion of the mitigation and good practice measures detailed in this chapter, whereby the most ecologically valuable and sensitive habitats have been avoided and measures to reduce impacts on all other habitats of higher value and sensitivity have been employed, the effects on habitats are considered to be **not significant**.

Protected and Notable Species

8.11.5 Overall, with the completion of the mitigation and good practice measures detailed in this chapter, such as the disturbance of the potential otter couch under an NS licence and a deer management plan, the residual effects on protected species are considered to be **not significant**.

Operation

8.11.6 Following the application of standard mitigation and good practice measures, such as pollution prevention measures and keyhole felling, the residual effects on ecological features during operation are considered to be **not significant**.

Decommissioning

8.11.7 There would be no significant decommissioning effects pre-mitigation and, consequently, residual effects as a result of decommissioning are considered to be **not significant**

8.12 Cumulative Assessment

8.12.1 This section considers the potential for cumulative effects on ecological features from those applied, under construction and consented schemes closest to the field study area. Table 8.13 shows the cumulative developments that could result in cumulative effects on ecological features in combination with the Proposed Development.

Table 8.13 – Developments Considered in Cumulative Assessment

Development	Number of Turbines	Status	Distance from Proposed Development (km)
Lairg II	10	Consented	11.4
Braemore	18	Consented	13.0
Creag Riabhach	22	Consented	13.4
South Kilbraur	7	Application	20.8
Meall Buidhe	9	Application	22.0
Gordonbush Extension	11	Under Construction	26.0
Strathrory	8	Application	35.6

8.12.2 However, as no developments occur within 10 km of the Proposed Development, no cumulative developments are considered to occur in the same zone of influence as the Proposed Development. As a result, no cumulative effects are predicted.

8.13 Summary

8.13.1 This chapter has considered potential impacts and their associated effects on ecological features, such as designated nature conservation sites, habitats and protected species in line with best practice guidance from CIEEM.

- 8.13.2 The field study area was surveyed in 2020 following previous surveys in 2017 and 2014 to provide baseline information on habitats and faunal species. Surveys included an NVC survey. The dominant habitats are M17 blanket mire and M25 mire. Potential GWDTE were recorded throughout the site, including M15, M23 and W4. Protected species surveys identified the presence of otter, pine marten, common and soprano pipistrelle, brown long-eared bat, Daubenton's bat, Atlantic salmon, brown trout, and resident sika deer. The fish species were present at low densities, with the rest of the species common and widespread throughout the desk and field study area.
- 8.13.3 Without application of mitigation, significant effects are predicted on habitats, primarily M15c wet heath, M27a mire and W4c wet woodland. Adverse effects not significant in EIA terms are also considered to occur on otter from disturbance and bat species from collision. Following the application of mitigation, such as a habitat management plan, camera trap monitoring of the potential otter couch under NS licence, keyhole felling and standard working methods and good practice measures, such as a CEMP and pollution prevention measures, **no significant residual effects** are predicted.

Table 8.14 – Summary of Effects

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Construction					
Disturbance of semi-natural ancient woodland	Not significant	Adverse	Standard pollution prevention measures.	N/A	N/A
Loss and modification of habitat: M15c, M27a, W4c and potential GWDTEs	Significant	Adverse	Implementation of Habitat Management Plan (HMP), including habitat reinstatement, restoration and enhancement.	Not significant	Beneficial
Disturbance of protected species: otter and pine marten	Not significant	Adverse	Construction works around potential otter couch carried out under NatureScot (NS) licence. Pre-construction protected species survey. Installation and monitoring of two artificial pine marten boxes.	N/A	N/A
Pollution of watercourse	Not significant	Adverse	Standard pollution prevention measures.	N/A	N/A
Operation					
Accidental spillage of fuels, chemicals or lubricants affecting habitats, otter and fish	Not significant	Adverse	Standard pollution prevention measures.	N/A	N/A

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Accidental injury/death from vehicle collisions with otter, pine marten and deer	Not significant	Adverse	Restricted speed limits on-site during construction and operation. Deer management plan to control population numbers.	N/A	N/A
Collison of bats with wind turbines	Not significant	Adverse	Woodland felling by keyholing rather than clear felling.	N/A	N/A
Decommissioning					
Disturbance of habitats from removal of infrastructure	Not significant	Adverse	Habitat reinstatement.	Not significant	Beneficial
Disturbance of protected species	Not significant	Adverse	A suite of good practice measures will be implemented during decommissioning to provide additional protection for protected species. These measures will be agreed with THC prior to decommissioning commencement.	N/A	N/A

Table 8.15 – Summary of Cumulative Effects

Ecological Feature	Effect	Cumulative Developments	Significance of Cumulative Effect	
			Significance	Beneficial/ Adverse
N/A	N/A	N/A	N/A	N/A

8.14 References

- Baerwald, E.F., D'Amours, G.H., Klug, B.J. and Barclay R.M.R. (2008). *Barotrauma is a Significant Cause of Bat Fatalities at Wind Turbines*. *Current Biology*, Volume 18, Issue 16, 26 August 2008, pp. R695-R696.
- Capreolus Wildlife Consultancy (2005). *The Ecology and Conservation of Water Voles in Upland Habitats*. Scottish Natural Heritage Commissioned Report No. 099 (ROAME No. F99AC320).
- Chanin, P. (2003). *Monitoring the Otter *Lutra lutra**. Conserving Natura 2000 Rivers Monitoring Series No 10, Peterborough: English Nature.
- CIEEM (2018). *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Marine*. Version 1.1. Chartered Institute of Ecology and Environmental Management, Winchester.
- Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016). *The Water Vole Mitigation Handbook*. The Mammal Society Mitigation Guidance Series.
- European Commission (1992). *EC Directive on the Conservation of Natural Habitats and Wild Flora and Fauna, 92/43/EEC*. Available at: http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm. Accessed on: 29 September 2020.
- Forestry Commission (2009). *The Scottish Government's Policy on Control of Woodland Removal*. ISBN 978 0 85538 781 5.
- Forestry Commission (2011). *The UK Forestry Standard: The Governments' Approach to Sustainable Forestry*. ISBN 978-0-85538-830-0.
- Gurnell, J., Lurz, P. and Pepper, H. (2001). *Practical Techniques for Surveying and Monitoring Squirrels*. Forestry Commission.
- Hastie, M.R. and Cooksley, S.L. (2003). *Monitoring the Freshwater Pearl Mussel, *Margaritifera margaritifera**. Conserving Natura 2000 Rivers Monitoring Series No. 2. English Nature, Peterborough.
- HBRG (2015). *Sutherland Dataset*. Available at: <http://www.hbrg.org.uk/Dataset/Dataset.html>. Accessed on: 1 June 2015.
- Hendry, K. and Cragg-Hine, D. (1997). *Restoration of Riverine Salmon Habitats*. Fisheries Technical Manual 4, Environment Agency, Bristol.
- Horn, J.W., Arnett, E.B. and Kunz, T.H. (2008). *Behavioural Responses of Bats to Operating Wind Turbines*. *Journal of Wildlife Management*, 72 (1), pp. 123-132.
- JNCC (2010a). *UK BAP*. Available at: <http://jncc.defra.gov.uk/default.aspx?page=5155>. Accessed on: 29 September 2020.
- JNCC (2010b). *Handbook for Phase 1 Habitat Survey – a Technique for Environmental Audit*. JNCC, Peterborough.
- Natural England (2009). *TIN051: Bats and Wind Farms*. Advice Note.
- NBN (2015). *NC51 Data*. Available at: <https://data.nbn.org.uk/Reports/Sites/NC51/Groups>. Accessed on: 1 June 2015.

- NS (2018). *A Guide to Understanding the Ancient Woodland Inventory*. Available at: <https://www.nature.scot/sites/default/files/2018-11/A%20guide%20to%20understanding%20the%20Scottish%20Ancient%20Woodland%20Inventory%20%28AWI%29.pdf>. Accessed on: 1 October 2020.
- Ramsar Convention (1971). *Ramsar Convention on Wetlands*. Available at: <http://www.ramsar.org/about-the-ramsar-convention>. Accessed on: 29 September 2020.
- Ratcliffe, D. (1977). *A Nature Conservation Review*. Cambridge University Press.
- Rodwell, J.S. (2006). *National Vegetation Classification: User's Handbook*. JNCC, Peterborough.
- Scotland's Soils (2020). *Carbon and Peatland 2016 Map*. Available at: <https://soils.environment.gov.scot/maps/thematic-maps/carbon-and-peatland-2016-map/>. Accessed on: 02 November 2020.
- Scottish Government (2008). *Calculating Carbon Savings from Wind Farms on Scottish Peat Lands – A New Approach* (amended 2010).
- Scottish Government (2013). *The 2020 Challenge*. Available at: <http://www.gov.scot/Publications/2013/06/5538>. Accessed on: 29 September 2020.
- Scottish Government (2014). *Scottish Planning Policy*. Available at: <https://www.gov.scot/publications/scottish-planning-policy/pages/2/>. Accessed on: 29 September 2020.
- Scott Wilson. (2005). *Production of the List of Species and Habitats Considered to be of Principal Importance for the Purpose of Conservation of Biodiversity in Scotland (The Scottish Biodiversity List)*. Available at: <https://www.nature.scot/scottish-biodiversity-list-documents>. Accessed on: 29 September 2020.
- SEPA (2001). *Sampling of Freshwater Benthic Invertebrates*. Method number NWM/ECOL/002.
- SEPA (2006a). *Prevention of Pollution from Civil Engineering Contracts: Guidelines for the Special Requirements*. Available at: https://www.sepa.org.uk/media/152220/wat_sg_31.pdf. Accessed on: 29 September 2020.
- SEPA (2006b). *Prevention of Pollution from Civil Engineering Contracts: Special Requirements*. Available at: https://www.sepa.org.uk/media/152233/wat_sg_32.pdf. Accessed on: 29 September 2020.
- SEPA (2010). *Guidance for Applicants on Supporting Information Requirements for Hydropower Applications*. Scottish Environment Protection Agency.
- SFCC (2007). *Scottish Fisheries Co-ordination Centre Electrofishing Team Leader Training Manual*. Inverness College. June 2007.
- Skinner, A., Young M. and Hastie L. (2003). *Ecology of the Freshwater Pearl Mussel*. Conserving Natura 2000 Rivers Ecology Series No. 2. English Nature, Peterborough.
- SNH and FCS (2010). *Floating Roads on Peat*. Available at: <http://www.roadex.org/wp-content/uploads/2014/01/FCE-SNH-Floating-Roads-on-Peat-report.pdf>. Accessed on: 29 September 2020.
- SNH (2018). *Wildcat Survey Methods*. Available at: <https://www.nature.scot/sites/default/files/2018-04/Guidance-Wildcat-Survey-Methods.pdf>. Accessed on: 1 April 2020.

SNH (2019). *Standing Advice for Planning Consultations, Protected Species: Pine Marten*. Available at: <https://www.nature.scot/sites/default/files/2019-10/Species%20Planning%20Advice%20-%20pine%20marten.pdf>. Accessed on: 1 April 2020.

SNH, Natural England, Natural Resources Wales, RenewableUK, Scottish Power Renewables, Ecotricity Ltd, the University of Exeter and the Bat Conservation Trust (2019). *Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation*.

SNH, Scottish Renewables, SEPA, FCS, Historic Environments Scotland, MSS and AEECoW (2019). *Good Practice During Wind Farm Construction*. Available at: <http://www.snh.org.uk/pdfs/strategy/renewables/Good%20practice%20during%20windfarm%20construction.pdf>. Accessed on: 29 September 2020.

Summers, D., Giles, N. and Wouldis, D.J. (1996). *Restoration of Riverine Trout Habitats: A Guidance Manual*. Fisheries Technical Manual 1, R&D Technical Report W118, Environment Agency, Bristol.

THC (2005). *The Highland BAP*. Available at: <http://www.highlandbiodiversity.com/highland-bap.asp>. Accessed on: 29 September 2020.

THC (2012). *Highland-wide Local Development Plan*. Available at: https://www.highland.gov.uk/info/178/local_and_statutory_development_plans/199/highland-wide_local_development_plan. Accessed on: 29 September 2020.

THC (2018). *Caithness and Sutherland Local Development Plan*. Available at: https://www.highland.gov.uk/info/178/local_and_statutory_development_plans/283/caithness_and_sutherland_local_development_plan. Accessed on: 29 September 2020.

UK Government (1981). *The Wildlife and Countryside Act (as amended)*. Available at: <http://www.legislation.gov.uk/ukpga/1981/69>. Accessed on: 29 September 2020.

UK Government (1994). *The Conservation (Natural Habitats Etc.) Regulations (as amended)*. Available at: <http://www.legislation.gov.uk/uksi/1994/2716/contents/made>. Accessed on: 29 September 2020.

UK Government (2004). *Nature Conservation (Scotland) Act (as amended)*. Available at: <http://www.legislation.gov.uk/asp/2004/6/contents>. Accessed on: 29 September 2020.

UK Government (2011). *Wildlife and Natural Environment (Scotland) Act*. Available at: <http://www.legislation.gov.uk/asp/2011/6/enacted>. Accessed on: 29 September 2020.

UK Government (2012). *UK Post-2010 Biodiversity Framework*. Available at: <http://jncc.defra.gov.uk/page-6189>. Accessed on: 29 September 2020.

UK Government (2017). *Town and Country Planning (Environmental Impact Assessment) Regulations*. Available at: <https://www.legislation.gov.uk/uksi/2017/571/part/1/made>. Accessed on: 02 November 2020.

Wray, S., Wells, D., Long, E. and Mitchell-Jones, T. (2010). *Valuing Bats in Ecological Impact Assessment*. In Practice. December 2010 pp23-25. CIEEM, Winchester.