8 Ecology

8.1 Introduction

8.1.1 This chapter has been prepared by The Environment Partnership (TEP). It provides a description of the baseline ecological conditions present on the site and wider study area and assesses the potential effects associated with the construction, operation and decommissioning of the proposed development as described in Chapter 4 of the Environmental Statement. Talladh-a-Bheithe Wind Farm will consist of 24 wind turbines and associated works.

8.1.2 An ornithological assessment for the development has been provided separately in Chapter 9: Ornithology.

8.1.3 The proposed development is to take place within the Talladh-a-Bheithe estate which is located north of Bridge of Ericht, approximately 30 miles to the west of Pitlochry.

8.1.4 The landscape is characterised by low acidic vegetation and intermittent coniferous plantation woodland. The Talladh-a-Bheithe Estate, where the site is located, is circa 56.9 km^2 in size and is located partially within the Loch Rannoch and Glen Lyon National Scenic Area (NSA) and the Coire Bhachdaidh Site of Special Scientific Interest (SSSI).

8.1.5 A range of surveys were initially undertaken on the Talladh-a-Bheithe estate between July 2009 and September 2010 which focussed on three provisional Study areas known as the *North Study area,* the *Southeast Study area* and the *Southwest Study area.* These areas are illustrated in Figure 8.1. Since 2010 a number of wind farm layout iterations have been considered. The design iteration process has taken account of a range of environmental constraints. Following the completion of surveys in 2010, a decision was made not to propose turbines within the *North Study area* due to ornithology constraints. The current Study area takes account of the findings of ecological surveys and various other environmental studies. This work alongside feedback provided during consultation has allowed an optimum wind farm layout to be identified. This area will be henceforth known as "the site".

8.1.6 When describing the results of ecological surveys it is often necessary to describe the site and an additional 200m survey buffer around the perimeter of the site. This extended area will be henceforth known as the "Study area". The location of the Study area is illustrated in Figure 8.2.

8.1.7 To facilitate access to the site to allow construction and maintenance works, a number of additional works are required. These include:

- Turbine foundations of reinforced concrete;
- On-site stone access tracks incorporating passing bays and wide corners;
- Hard-standings surfaced in stone;
- On-site electricity collection system e.g. cables and equipment housed in single storey substation buildings;
- Bridges across watercourses to form crossing points;
- Site entrances from the public road;
- The connection from the onsite substation to the grid will be subject to with the appropriate consents being obtained by SHE Transmission;

- Construction of site entrance and new track will be required to reach the north end of the Loch from the public highway at Dalwhinnie to allow wind turbine blades to be transported along Loch Ericht by barge or pontoon.

8.1.8 Temporary works will include a construction compound, laydown areas, jetties at either end of Loch Ericht for the transportation of materials during construction, a crossing of the railway between Perth and Inverness to the south of Dalwhinnie. A stockpile of stone is available on site from construction of the dam at the southern end of Loch Ericht. This will be supplemented as necessary by stone won from borrow pits.

8.1.9 For further details see Chapters 1, 2, 3 and 14.

8.2 Methods

Scope of Assessment

8.2.1 The assessment has involved the following:

- Reference to relevant legislation, policy and guidance;
- Consultation with relevant statutory and non-statutory bodies;
- Detailed desk studies and site surveys to establish the existing important wildlife interests on the site, and in its immediate surroundings;
- Evaluation of the potential effects of the proposed development on current wildlife interests both direct and indirect;
- Evaluation of the significance of these effects by consideration of the sensitivity of these interests, the potential magnitude of effects and the probability of their occurrence;
- Identification of appropriate measures to avoid and mitigate against any potential adverse effects resulting from the development, where applicable; and
- The residual significance of the predicted effects following mitigation.

Legislation and Guidance

8.2.2 This assessment takes into account the requirements of and advice given in the following legislation, regulations and other guidance:

- Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (Habitats Directive);
- The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) (Habitats Regulations);
- The Conservation of Habitats and Species Regulations 2010 (the 'Habitat Regulations') which transposes Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora ('the Habitats Directive') into UK law;
- Environmental Impact Assessment Directive 85/337/EEC (as amended).
- The Nature Conservation (Scotland) Act 2004 (as amended);
- Nature Conservation: Implementation in Scotland of the Habitats and Birds Directives: Scottish Executive Circular 6/1995 as amended (June 2000);
- Wildlife and Countryside Act 1981 (as amended);
- Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011;

- Nature Conservation (Scotland) Act 2004;
- Protection of Badgers Act 1992 (as amended);
- The Wildlife and Natural Environment (Scotland) Act 2011;
- Consolidated Scottish Planning Policy (SPP) (February 2010);
- PAN 60: Planning for Natural Heritage;
- European Protected Species, Study area Sites and the Planning System: Interim guidance for local authorities on licensing arrangements (Scottish Executive, updated 2006);
- Institute of Ecology and Environmental Management (IEEM) (2006) Guidelines for Ecological Impact Assessment in the United Kingdom;
- Scottish Renewables *et al*. (2013) Good Practice during Wind Farm Construction;
- Natural England (2009) Bats and Onshore Wind Turbines (interim guidance);
- Hundt (2012) Bat Surveys: Good Practice Guidelines (2nd Edition);
- UK Biodiversity Action Plan (UKBAP);
- Scottish Biodiversity List (SBL); and
- Tayside Local Biodiversity Action Plan (LBAP).

8.2.3 Particular attention has been made to the strategy guidance documents listed below that are applicable to assessing the effects of wind farm developments on the ecological resources:

- Scottish Natural Heritage (2005) Cumulative Effects of Wind farms. Version 2. Revised 13/04/056; and
- Institute of Ecology and Environmental Management (IEEM) Guidelines for Ecological Impact Assessment in the United Kingdom (2006);
- Scottish Natural Heritage (2012) Guidance Note: Assessing the cumulative impact of onshore wind energy developments.
- Good Practice during Wind Farm Construction (Scottish Renewables *et al*, October 2010);

8.2.4 Baseline surveys follow nationally recognised guidelines and the ecological impact assessment takes into account the recognised Institute of Ecology and Environmental Management guidelines (the "IEEM Guidelines").

Baseline Study Methodology

Desk Based Study

8.2.5 Information regarding historic species records, protected sites, land allocation and relevant policies was requested/gathered from the sources listed in Table 8.1.

Table 8.1. Desk based information requested/gathered.

Consultee / Source Of Information	Nature Of Information Supplied By Consultee
Scottish Natural Heritage (SNH)	Scoping advice for field surveys.
SEPA	Scoping advice for field surveys.

Perth Museum	Protected mammal records received.
Perth and Kinross Council	Protected mammal records received.
MAGICMap: Multi-Agency Geographic Information for the Countryside	On line mapping system identifying statutory and rural designations, citations.
SNH on-line tool - SiteLink	On line mapping system identifying statutory and rural designations, citations, Natural Heritage Zones (NHZs) etc.
UK Biodiversity Action Plan	Identification of national priority species and habitats known to occur in the region.
Tayside Biodiversity Action Plan	Identification of local priority species and habitats known to occur in the local area.
National Biodiversity Network Gateway	On-line national records database.

Field Survey Methods

8.2.6 Full details of all ecology survey timings and detailed methodologies is provided in the Vegetation Assessment Technical Appendix 8.1 and the Mammal Technical Appendix 8.2. A brief description/overview of each survey method type is provided below.

8.2.7 All surveys were undertaken by experienced ecologists at TEP between 2009 and 2013 apart from the bat survey which was undertaken by Applied Ecology Ltd in May 2013. TEP ecologists included Tim Ross MCIEEM CEnv, Dr Mike Walker MCIEEM, Chris Booler MCIEEM CEnv, Val Gateley MCIEEM and Lynsey Crellin MCIEEM.

Phase 1 Habitat Survey

8.2.8 A reconnaissance survey of the entire Talladh-a-Bheithe Estate was undertaken in July 2009. The purpose of this survey was to gain an overview and understanding of the vegetation types covering the estate, in order to highlight the requirements for more detailed vegetation surveys. Some initial habitat mapping and NVC data was also gathered during this reconnaissance survey.

8.2.9 During July 2010 a Phase 1 habitat survey was undertaken which covered the original three Study areas and adjacent habitats. The majority of the Study area was also included in this area.

8.2.10 During August 2013 a Phase 1 habitat survey was undertaken which covered the area of land to the south of Dalwhinnie, adjacent to the north shore of Loch Ericht where temporary construction works required for the transportation of materials to the site.

8.2.11 The surveys followed methods laid out in the JNCC Phase1 Habitat survey handbook, last updated by the Joint Nature Conservancy Council in 2010.

National Vegetation Classification (NVC) Survey

8.2.12 In July 2009 and July 2010 NVC surveys were undertaken covering the original three potential wind farm locations and adjacent habitats with partial coverage of the *Study area*. Details of the vegetation along the route of the existing main western track were also recorded, extending along the track southwest to the Loch Ericht dam.

8.2.13 In July 2013 additional NVC survey was undertaken. The survey covered the *Study area* with the existing track forming the western boundary of the survey effort. The NVC survey focussed on the proposed turbine locations and access track locations, as well as mapping vegetation communities present across the Study area. The survey also included the southern shore of Loch Ericht and the habitats within 50m of the proposed access track leading to it (following the path of the existing track) from the *Site.*

8.2.14 All NVC survey was undertaken following guidelines set out in National Vegetation Classification: Users' handbook (J. S. Rodwell, 2006).

Otter Survey

8.2.15 All areas of suitable habitat for otters within the Study area were surveyed for signs of otters on the 26th to the 28th May 2010.

8.2.16 Suitable otter habitat in a number of locations in the wider area were also surveyed for otters, including all watercourses within the north, southeast and southwest Study areas, the south end of Loch Ericht and the River Ericht from Loch Ericht southwards.

8.2.17 The otter survey was repeated on the 16th August 2013, this time specifically targeting otter holts within the site and 200m buffer, within 50m of the access track between Loch Ericht and the site and along the south shore of Loch Ericht itself.

8.2.18 Additional locations on access routes outside of the Talladh-a-Bheithe Estate were also surveyed for otter signs during 2013. These included the western shore of Loch Ericht at Dalwhinnie, and beneath a bridge crossing the Allt Eigheach, just north of Loch Eigheach, approximately 2km east of Rannoch Station.

Water Vole Survey

8.2.19 All areas of suitable habitat for water voles within the Study area were surveyed for signs of water voles on the 26th to the 28th May 2010.

8.2.20 Suitable water vole habitat in a number of locations in the wider area were also surveyed for water voles, including Loch Mheugaidgh, the eastern shore of Loch Ericht, and the Allt Ghlas north of the sluice to the east of Loch Ericht. All watercourses within 50m of proposed access routes were also surveyed.

Pine Marten Survey

8.2.21 During surveys undertaken primarily for otter and water vole on the 26th to the 28th May 2010, any evidence of pine marten was also recorded. This included land within 10m of all watercourses within the Study area, as well as within 10m of the Allt Ghlas and the eastern shore of Loch Ericht to the west of the Study area.

8.2.22 The Garrocher plantation was surveyed for signs of pine marten on the 13th July 2013.

8.2.23 A suitably baited camera trap with a passive infra-red motion sensor was set for pine marten on the northern edge of the Garrocher plantation for a 24hr period between the 14th and 15th May 2013.

Red Squirrel Survey

8.2.24 All areas of suitable habitat for red squirrel within the Study area were surveyed for signs of red squirrel on the 13th July 2013.

8.2.25 During the survey, the Garrocher plantation was searched for field signs of red squirrel, including feeding remains and dreys.

Bat Survey

8.2.26 The bat survey was undertaken by Applied Ecology Ltd in May 2013. Full details are presented within Appendix 3 of the Mammal Technical Report (Appendix 8.2).

8.2.27 The Study area and adjacent land, as described in the Mammal Technical Report was walked on the 20th May 2013 and any suitable habitat for bats was identified. Six SM2 bat detectors were then placed in locations within and immediately adjacent to the Study area, identified as holding the highest potential for bats.

8.2.28 A roost search was carried out at a number of locations throughout the Study area. These included two bridges at NN 51340 62703 and NN 52083 63570, a ruined cottage known as Rhuighe ghlas, and the pump house and control buildings at Loch Ericht dam, to the west of the Study area. These locations were inspected for signs of roosting bats by a licenced bat ecologist.

8.2.29 Following consultation with SNH (J. Burrow, Pers Comm 2013), no further bat surveys were carried out due to the low habitat suitability present and a lack of recorded bat activity.

Survey Limitations

8.2.30 Rain and wintry showers were experienced during the second and third days of the otter survey in 2013. These weather conditions may have resulted in the removal of some evidence, particularly water vole droppings and otter spraints. This is not a significant limitation to the survey.

8.2.31 Temperatures were low (2^0C) at the end of the night when the bat survey was carried out. However for the rest of the night, the temperature and weather conditions were ideal for bat activity. This is therefore not a significant limitation to the bat survey.

8.2.32 All Phase 1 survey work was undertaken between July and August which is within the optimum survey period for upland vegetation. Therefore it is considered there are no limitations to the Phase 1 surveys.

8.2.33 All NVC survey work was undertaken during the month of July which is considered to be within the optimum survey period for the habitats present. It is possible that some early or later flowering plant species may have been missed during the surveys. However, this would be very unlikely to have an overall effect on the results of the surveys and is therefore not considered a significant limitation.

Approach to the Assessment

8.2.34 Assessing the significance of impacts on ecological interests is a staged process based on IEEM guidelines (2006). Although a significance matrix is not included in these guidelines, this has been included as Table 8.4 of this chapter. This is for reasons of clarity and does not prevent the use of the 2006 guidelines to determine significance through reasoned argument.

Determining Nature Conservation Value

8.2.35 Determining the nature conservation value of the ecological interests within the Study area is undertaken in a systematic way using criteria that determine whether that interest is of international, national, regional, local or negligible importance. The term for the ecological interests of nature conservation value is 'Valued Ecological Receptors' (VER). The approach to determining the nature conservation value of each ecological receptor is presented in Table 8.2.

Table 8.2. Approach to valuing nature conservation value of the ecological receptors at the Study area

Conservation Value	QualifyingQualifying Criteria
Very High (International)	Habitats or species that form part of the cited interest within an internationally protected site, such as those designated under the Habitats Directive (Special Areas of Conservation – SACs), the Birds Directive (Special Protection Areas – SPAs) or other international convention (e.g. Ramsar site). A feature (e.g. habitat or population) which is either unique or sufficiently unusual to be considered as being one of the highest quality examples in an international/national context, such that the site is likely to be designated as an SAC/SPA.
High (National)	Habitats or species that form part of the cited interest within a nationally designated site, such as a Special Site of Scientific Interest (SSSI), or a National Nature Reserve (NNR). A feature (e.g. habitat or population) which is either unique or sufficiently unusual to be considered as being one of the highest quality examples in a national/regional context for which the site could potentially be designated as a SSSI. Presence of UKBAP habitat or species, where the action plan states that all areas of representative habitat or individuals of the species should be protected.
Medium (Regional)	Habitats or species that form part of the cited interest of a Local Nature Reserve, or some local-level designated sites designated as a non-statutory Site of Importance for Nature Conservation (SINC) or the equivalent, depending on specific site conditions. A feature (e.g. habitat or population) which is either unique or sufficiently unusual to be considered as meeting criteria for selection as a LNR or SINC. Presence of LBAP habitats or species, where the action plan states that all areas of representative habitat, or individuals of the species should be protected.
Low (Local)	Habitats or species that form part of the cited interest of a local-level designated site and may be designated as a non-statutory e.g. Local Wildlife Site, Ancient Woodland designation. A feature (e.g. habitat or population) that is of nature conservation

	value in a local context only, with insufficient value to merit a formal nature conservation designation.
Negligible	Common place feature of little or no significance. Loss of such a feature would not be seen as detrimental to the ecology of the area.

(Source: Natural Power, 2013)

Determining Magnitude of Effect

8.2.36 The potential effects are determined through understanding how each VER responds to the proposed wind farm. The elements used to define the scale of the effect of a wind farm include determining the following:

- The potential duration, whether short-term (<5 years), medium-term (5-15 years) or long-term (15-25 years or longer);
- Timing and frequency, whether the effects will be timed at a sensitive period, or the frequency will alter the effects;
- Reversibility, whether the effects will be reversible in the short to medium term;
- Confidence in the predictions, whether the predicted effect is certain/near certain (>95%), probable (50-95%), unlikely (5-50%) or extremely unlikely (<5%) to occur;
- Potential effect on the long-term viability of a habitat or population of species; and
- Whether there are any cumulative effects that may affect the long-term integrity of the ecosystem(s) at the site.

Table 8.3. Determining the magnitude of effect on valued ecological receptors

Magnitude	Definition
High	Total loss or loss of a major proportion of a habitat or numbers of a species' population or a permanent or long-term effect on the long-term viability of a habitat/population.
Medium	Loss or alteration of one or more key elements or effects detectable in the medium-term but with no long-term effect on the viability of a habitat/population.
Low	Minor effect of small scale or short duration with no long-term effect on the viability of a habitat/population.
Negligible	A short term reversible effect on the distribution and/or abundance of a habitat/population unlikely to be detectable by monitoring

Determining Significance of Effect

8.2.37 The significance of the potential effects on each VER is determined by considering the value of each nature conservation interest and the degree to which it may be affected (the effect magnitude) by the proposed development, i.e. by using the Tables 8.2 and 8.3 above. These are described as Major, Moderate, Minor and negligible. This is presented as a matrix (Table 8.4).

Table 8.4. Significance of the effects defined by the relationship between the nature conservation value and effect magnitude

Magnitude	Definition				
	Very High (international)	High (National)	Medium (Regional)	Low (Local)	Negligible
High	Major	Major	Moderate	Moderate	Minor
Medium	Major	Moderate	Moderate	Minor	Negligible
Low	Moderate	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Minor	Negligible	Negligible	Negligible

8.2.38 The significance of effects can be two-way; either adverse or beneficial. This results in a seven point scale:

- Major adverse;
- Moderate adverse;
- Minor adverse;
- Negligible;
- Minor beneficial;
- Moderate beneficial; and
- Major beneficial.

8.2.39 Residual effects are considered to be significant under the Electricity Works (Environmental Impact Assessment) (Scotland) Amendment Regulations 2008 if they are at a level of Moderate or Major (i.e. "a likely significant effect"). The use of the category of minor significance is in recognition of the fact that measurable effects can occur that are not significant. These can also be important to consider for cumulative assessment purposes where multiple effects of minor significance could become significant.

8.3 Baseline Conditions

Consultation

8.3.1 Key conservation organisations were consulted during the preparation of this chapter. The purpose of the consultation was:

- To identify and obtain relevant existing ecological data;
- Determine any notable information gaps;
- Establish requirements for new ecological surveys;
- Identify potential Study area design modifications that might address ecological sensitivities; and
- Identify preferred mitigation and enhancement options.

8.3.2 A summary of the key points raised by consultees is provided in Table 8.5 below.

Table 8.5. Summary of Consultations and Responses

Consultee	Summary of Response	Action Taken
SEPA Perth 27th January 2011 Ian Thomas (IT) Meeting in Perth	• IT in agreement with SNH that invertebrates should be scoped out of the EIA. • IT stated that freshwater pearl mussels are a protected species and their presence towards the Loch Rannoch end of the River Ericht should be checked out. • IT also stated that the mussels require salmon to complete their life cycle. But the salmon may not be able to get up the River Ericht beyond Loch Rannoch • IT stated that the main concern of SEPA was pollution control and the engineering of river crossings. Any excavations would require a means of escape for animals. • Bridges to cross watercourses would be preferred to pipe crossings. • IT also stated that provided sufficient pollution prevention measures were put in place throughout the duration of the wind farm development then there would be no need to gather further baseline information for fish species. • Need to demonstrate how layout, including associated borrow pits, hard standing and roads avoid impacts on wetlands/peatlands.	Invertebrates are therefore not considered in this assessment. A desktop search revealed no records of freshwater pearl mussel within the vicinity of the development. Pollution control measures are provided in Chapter 1111 and will be detailed in the Construction Environmental Management Plan (CEMP). Mitigation measures to allow escape of animals from any excavations are provided in para 8.5.9 and will be detailed further in the CEMP. The assessment of the water course crossings are provided in Chapter 11. No further baseline data was gathered concerning fish as agreed during consultation with SEPA, but pre-construction surveys will be carried out to provide a baseline against which post construction monitoring can be assessed if required These issues are addressed in this assessment.
Scottish Natural Heritage 27th January 2011 Mike Shepherd (MS) Meeting in Perth	MS agreed that provided sufficient pollution prevention measures were put in place throughout the duration of the wind farm development then there would be no need to gather further baseline information for fish species.	No further baseline data was gathered concerning fish. Pre-construction surveys will be carried out to provide a baseline against which post construction monitoring can be assessed if required.
Perth and Kinross Biodiversity Officer 28th April 2011 David Williamson - email	• The proposed access tracks should avoid disturbing any protected species. Otters will probably not be unduly disturbed by construction traffic using the access tracks, but water voles are more localised so any work within 50m of water vole records should be avoided, and a further survey 50m both upstream and downstream of any construction should be checked prior to commencement. • A method statement for the access routes confirming the surveys prior to construction would suffice.	A Construction Environmental Management Plan (CEMP) will be prepared which will include a method statement specifically addressing monitoring and protective measures required to protect otters and water voles during the construction phase.
Scottish Natural Heritage 12th December	• NBN Gateway for animal and plant species should be used. • Mitigation proposals for rare/nationally scarce plant species should be presented.	NBN gateway was used to search for protected species records Mitigation proposals are identified within this

Consultee	Summary of Response	Action Taken
2011 John Burrow Scoping Response - Email with letter attached	• Consideration to be given to depth of peat. Secondary effects on vegetation should be considered and mitigation proposals presented. • Vegetation should be surveyed at the correct time of year. The results should be shown on figures with turbines overlaid. • Species surveys should be conducted to record distribution of protected animal species. • Within the ES should be presented the likely key species which may be adversely affected, reasons why species may be affected and methods for surveying. • Otter to be included as a key species. Surveys for water vole should inform the final site layout.	assessment. Consideration was given to peat depth Secondary effects on vegetation and mitigation are presented in this assessment. Vegetation surveys were undertaken within the optimum survey time period. Drawings overlaying turbine locations are included (G3968.009A) Locations of protected species, targeting likely key species that could be affected were surveyed and the methods and results are presented in this assessment. Information gained from the water vole and otter surveys were used throughout to inform the design process of the site layout and minimise potential impacts on these species.
SEPA (Scottish Environmental Protection Agency) Perth 5th December 2011 Fraser Blackwood Scoping Response - Email with letter attached	• NVC needs to include areas required for access tracks and associated infrastructure. • Phase 1 habitat survey should be carried out for whole site and NVC should be completed for any wetlands identified. Figures need to be included showing infrastructure overlain on vegetation maps. • Detailed maps of peat depths need to be submitted. • Need to identify if wetlands are groundwater dependent terrestrial ecosystems, and if so, further assessment is required if infrastructure in close proximity. Any roads, tracks or trenches within 250m of groundwater dependent terrestrial systems should be reconsidered. Mitigation measures to be included where avoidance impossible. • Detailed information on waste management required. • Include details of volumes of peat to be excavated, quantification of catotelmic and acrotelmic peat and how surplus peat will be reused/disposed of. Demonstrate how peat excavation has been minimised.	NVC and habitat assessment is included in this chapter addressing these issues and figures are included. Peat depth maps are provided in Chapter 11 (Hydrology, Geology and Hydrogeology). A detailed assessment of GWDTEs is provided in Chapter 11. Detailed information on waste management will be provided at pre-construction stage in the Construction Method Statement, see Chapter 4 (Construction and Decommissioning) for details. . Volumes of peat to be excavated and details of how it will be reused/disposed of are provided in Chapter 11 (Hydrology, Geology and Hydrogeology) and Chapter 17 (Carbon Balance).
Marine Scotland (Freshwater Team) 17th January 2012 Scoping Response - Sent via ECDU	Marine Scotland stated that the following species should be considered: Atlantic salmon, sea lamprey, river lamprey and brook lamprey are listed under the European Habitat Directive. Atlantic salmon, trout (ancestral forms and sea trout), European eel, river lamprey, sea lamprey and Arctic charr. Potential effects could include: • Potential for increased sediment transport and deposition • Pollution	SNH and SEPA stated that provided sufficient pollution prevention measures were put in place throughout the duration of the wind farm development then there would be no need to gather further baseline information for fish species. Pre-construction surveys will be undertaken to identify any fish interest within downstream watercourses (including River Ericht and Killichonan Burn).

Consultee	Summary of Response	Action Taken
	• Altered hydrological pathways • Removal or degradation of fish habitat, including spawning areas • Reduction in food supply • Obstruction to migration of fish	
Scottish Natural Heritage 1st August 2013 John Burrows (JB) Email	• Following the findings of the bat survey of the site JB agreed that landscape features and roost opportunities which may be favourable for bats are absent from the site. • Watercourses appear to be the only feature offering any reasonable foraging opportunities across the site, although because of the upland and windy nature of the site this use is not expected to be great. • The work done to date supports the impression that as an upland site with few of the favoured needs of bats, it actually has very little bat activity and the development presents little risk to bats. • JB concluded that little more will be learned about bat utilization of the site by further bat survey work.	Following the initial bat survey prior to this consultation, no further bat survey work was undertaken.

Desk-based Study

8.3.3 Records of any protected species within the vicinity of the Site were obtained from Perth Museum and Perth and Kinross Council. These records are summarised below in Table 8.6 and detailed within the Mammal Technical Report (Appendix 8.2). Although non-mammal protected species records were requested, no further records were received.)

Table 8.6: Records of protected species obtained within the vicinity of the Talladh-a-Bheithe Estate.

Species	Location of closest record(s) and proximity to site	Location of further description
Water vole	Bridge of Ericht, approximately 4km to south of site.	MTR Para 4.4
Otter	Bridge of Ericht, approximately 4km to south of site.	MTR Para 4.8
Pine marten	Killichonan, approximately 4km south of site.	MTR Para 4.19
Red squirrel	Woodlands approximately 3.5km to south of site.	MTR Para 4.26
Wild cat	South shore of Loch Rannoch – approximately 5.5km south of site.	MTR Para 4.36
Bat roosts (Daubenton's, Natterer's, pipistrelle, brown long-eared).	Near to Loch Rannoch and the B848, approximately 4km south of the site.	MTR Para 4.30

Designated sites

8.3.4 A search of the SNH online tool Sitelink was used to identify and provide information on areas designated at a local, national or international level for ecological interests within 10 km of the Site.

8.3.5 Ten designated sites were identified within 10 km. A summary of their citations is provided in Table 8.77 and their locations shown in Figure 8.3.

Table 8.7: Protected sites located in the vicinity of the Talladh-a-Bheithe Estate.

Protected Site	Location	Reason for designation
Coire Bhachdaidh SSSI	Approximately 250m to the west of the site.	The site is nationally important for its assemblage of habitats, rare plants and breeding birds. A number of rare plants are present including the endangered whortle-leaved willow.
River Spey SAC	320 m east of Dalwhinnie site	The site is considered to be one of the best areas in the UK for freshwater pearl mussel, sea lamprey, Atlantic salmon and otter.
River Tay SAC	5km to the southwest of the site.	The site is considered to be one of the best in the UK for Atlantic salmon. The site also supports significant numbers of otter, sea lamprey, brook lamprey and river lamprey. A qualifying feature for this site also includes the habitat 'Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea'*
Rannoch Lochs SPA	5km to the southwest of the site.	Designated for breeding birds only*
Rannoch Lochs SSSI (Lochan Loin nan Donnlaich)	5km to the southwest of the site.	Designated for breeding birds only*
Black Wood of Rannoch SSSI	5km to south of the site.	This site is a remnant part of the former Caledonian pine and birch woods of Scotland. The site is of particular importance for its lichen, fungi, birds and invertebrates. It supports a range of highland woodland, upland and open water breeding birds. Part of the SSSI overlaps with the Rannoch Lochs SPA.
Ben Alder and Aonach Beag SPA	5.5km to the north west of the site.	Designated for breeding birds only*
Ben Alder and Aonach Beag SSSI	5.5km to the north west of the site.	Designated for breeding birds only*
Drumochter Hills Special Protection Area (SPA)	5.8km to the north of the site.	Designated for breeding birds only*
Drumochter Hills Site of Special Scientific Interest (SSSI)	5.8km to the north of the site.	Botanical interest including western blanket mire, *Calluna* heath, high mire levels and poor fen.

*Sites designated for breeding birds are described in Chapter 9 Ornithology.

Field Surveys

8.3.6 A summary of the results of each survey is provided below; full results of all vegetation surveys are provided within Appendix 8.1 (Vegetation Technical Appendix) and Appendix 8.2. (Mammal Technical Appendix).

Phase 1 Habitat Survey

8.3.7 The Phase 1 survey of the Study area is illustrated at Figure 8.4. The Phase 1 survey of the Study area shows that blanket bog communities are prevalent with occasional heath habitat. Mire habitats are extensive within the Study area and are mainly encompassed within the Phase 1 defined blanket bog category, comprising *Sphagnum*-rich vegetation on deep peat forming a blanket over both concave and convex surfaces on moderately sloping and level areas of upland regions. On hilltops and upper slopes heath and acid grassland vegetation is present where the underlying rocks protrude through the blanket of peat, but there are also occasional small heath patches on hummocks of moraine scattered through the mire vegetation on the lower slopes of the Study area. In Phase 1 Habitat survey terms the various NVC heath communities found here fit the D1 dry dwarf shrub heath found in montane areas, with coverage of dwarf ericoid shrubs.

8.3.8 South of Dalwhinnie, Loch Ericht is flanked by strips of wet heath/acid grassland mosaic habitat with wide bands of coniferous plantation woodland in the wider area. The sloped bank of the dam is dominated by acid grassland, spreading east of this is in an area of blanket bog. Adjacent to this area are two areas of wet modified bog with recently planted mixed plantation woodland amongst the bog habitat.

National Vegetation Classification (NVC) Survey

8.3.9 The NVC survey is illustrated at Figure 8.5. The majority of the *Study area* is a mix of blanket bog/wet heath communities. M15 and M17 are most prevalent with occasional M19, M20 and M25. There is also small-scale occurrence of M2 *Sphagnum cuspidatum/recurvum* bog pools scattered in this area.

8.3.10 As well as blanket bog and wet heath habitats, small scattered areas of dry heath are present on hummocks of moraine in this central area of the *Study area*. H10 and H9 are the most abundant heath vegetation communities found to occur on these hummocks. The most extensive area of heath is present on the summit of Sron Bheag in the southwest of the *Study area.*

8.3.11 During the NVC survey, numerous plants of the nationally scarce plant interrupted clubmoss (*Lycopodium annotinum*) was noted in north of the *Study area.* It is present adjacent to the proposed access track leading to turbines 10 and 14. One specimen of the nationally scarce plant dwarf birch (*Betula nana*) was noted on the edge of one small hummocks of moraine the central area of the Study area, south of Allt a Choire Odhar Beag, some distance from the proposed turbines and access tracks.

8.3.12 Additionally, the vegetation communities associated with southern shore of Loch Ericht and those adjacent to the adjoining track were assessed during the NVC survey in 2013. A range of mire, grassland and heath communities were recorded.

8.3.13 The extent of the habitats present within the Study area is detailed in table 8.8 below.

Table 8.8. Extent of habitat types within the Study area

Habitat Type	Area (ha) of habitat within Study area	% of Study area
Blanket bog (M20, M17, M19, M20)	586.27	86.28
Wet heath (M15)	41.18	6.06
Coniferous plantation	44.41	6.54

Dry heath (H1, H9, H10, H12)	7.51	1.11
Acid grassland (U4, U5)	0.12	0.02

Ground Water Dependent Terrestrial Ecosystems (GWDTEs)

8.3.14 SEPA have requested that Groundwater Dependent Terrestrial Ecosystems (GWDTEs) are considered in the assessment and this is presented in detail in Chapter 11 Geology, Hydrogeology & Hydrology. A summary of that assessment is provided here. GWDTEs are wetlands that are influenced by groundwater flow and quality and are protected under the Water Framework Directive (WFD). The GWDTE assessment considers whether any habitats present on site are likely to be GWDTEs. This is done through topographic analysis and using British Geological Survey permeability and groundwater flooding datasets, together with NVC habitat data. This identifies that the underlying bedrock geology is a weakly permeable strata of low primary permeability, which is unlikely to contain ground water in exploitable quantities. The superficial geology is of variable permeability resulting in variable groundwater flow. This means that superficial and bedrock aquifers are not likely to be extensive beneath the proposed development and are likely to be dominated by fracture flow of low productivity. Comparing this with the NVC data and topography suggests potential GWDTE habitats are in this case largely dependent on rainfall and are therefore not classified as GWDTEs under the WFD.

Otter

8.3.15 The locations of otter evidence found during the otter survey is illustrated at Figure 8.6.

An otter holt was identified in an area of peat bog south of the Garrocher Plantation during 2010, which was likely to have been used as a maternity holt in 2010. During the 2013 otter survey no otter evidence was observed at the same holt. Evidence suggested that the holt was now in use by a fox. Otter holt locations are illustrated within the Confidential Annex (Part A).

8.3.16 Two recently used otter holts were identified in 2013 along the Allt Ghlas. Both holts were more than 500m west of the site.

8.3.17 Otter evidence including fresh spraints identified in 2010 suggested that otters used the entire of the Allt a' Choire Odhair Bheag water course to the north of the Study area. Otters were also found to use Loch Mheugaidh, and the River Ericht to the south west of the Study area.

8.3.18 A single spraint was observed at the eastern edge of Loch Ericht at Dalwhinnie during 2013. An additional spraint was observed adjacent to a nearby pool. No holts were observed in this location.

8.3.19 No otter evidence was recorded near to the bridge crossing Loch Eigheach, east of Rannoch Station in 2013.

Water vole

8.3.20 The locations of water vole evidence found during the water vole survey are illustrated at Figure 8.7.

8.3.21 Within the Study area, water vole evidence in the form of droppings and burrows was found in two locations along the tributary between the Garrocher plantation and Loch Mheugaidh which joins to the Allt Ghlas in the west of the site.

8.3.22 Evidence was also identified in the upper reaches of the Alt Coire a' Mhor-fhir Alt Loch Mheugaidh just south of Loch Mheugaidh. These locations were outside of the Study area to the south.

Pine Marten

8.3.23 The locations of pine marten evidence found is illustrated on Figure 8.7. Pine marten scats were identified adjacent to the River Ericht at the west of the Study area during 2010 but no evidence of pine marten was recorded during the 2013 pine marten survey.

Red squirrel

8.3.24 A red squirrel was observed crossing the B846 approximately 4km south of the Study area both during April 2013 and July 2013. A red squirrel was also recorded on a feeder at the lodge within the south of the Estate approximately 4km south of the Study area during July 2013. Red squirrels are therefore known to be present in the wider area.

8.3.25 No evidence of red squirrel was found during the 2013 red squirrel survey. No red squirrels were sighted during black grouse and merlin surveys of the Garrocher Plantation in 2010 and 2013.

Bat

8.3.26 A single soprano pipistrelle bat pass was recorded at the sluice pond on the Allt Ghlas, just west of the Study area, during surveys undertaken using static detectors (Appendix 3 of the Mammal Technical Report (Appendix 8.2)).

8.3.27 The buildings outside of the Study area and the bridges inspected for signs of bats were all considered to be unlikely to support roosting bats. No signs of bat activity were found at each of these locations. The woodland plantation within the Study area and within its near vicinity was considered unlikely to support roosting bats.

Other Mammal Observations

8.3.28 Evidence of fox was found along the Allt a' Choire Odhair Bhig, south of the Garrocher Plantation, including droppings and fox dens.

8.3.29 Evidence of stoat and mink were found along the River Ericht to the south west of the Study area.

8.3.30 Mountain hare was observed adjacent to the tributary on Sron Bheag within the south of the Study area north of Loch Mheugaidh. During additional ecological surveys undertaken for the Talladh-a-Bheithe wind farm between 2009 and 2013, incidental observations of mountain hare were made on a number of occasions, however almost all observations were outside the Site. The majority of observations were either north of the Site, or further south in the Talladh-a-Bheithe Estate. The prey study carried out as part of the eagle assessment work also recorded signs of mountain hares (droppings) with the majority of these being to the north and north-west of the Site.

8.4 Assessment of Potential Effects

8.4.1 This section provides an assessment of the likely effects of the proposed wind farm on the Valued Ecological Receptors (VERs). For each VER, the potential effect is assessed for each of the construction, operation and decommissioning phases of the proposed wind farm.

8.4.2 Throughout the iterative design process ecological factors have been considered and as such the final proposed layout avoids much of the sensitive habitats and areas occupied by protected species where possible. During the later stages of the design process, the most sensitive areas of peat habitat were identified (as described at Chapter 11) and the proposed siting of turbines and design of access routes was adjusted to avoid sensitive areas as far as practicable. However; the final layout will result in some negative effects on the ecological receptors prior to additional mitigation. These effects and the proposed mitigation measures are discussed in the sections below.

Assessment of Conservation Value of VERs identified during Baseline Studies

8.4.3 On the basis of the description of the ecological baseline and the definitions provided in Table 8.2, a summary of the habitats and species identified as Valued Ecological Receptors (VERs) at the Study area is provided in Table 8.99, together with the legislation and guidance defining their value.

Table 8.9. Summary of the Confirmed Valued Ecological Receptors within the Study area

Species/Habitat	Covering Legislation and Guidance	Rationale	Conservation Value within the Study area	Valued Ecological Receptor (VER)
Blanket bog (M20, M17, M19, M20)	Blanket bog qualifies as an Annex 1 priority habitat in the EC Habitats Directive. Blanket bog qualifies as UKBAP priority habitat and is the subject of Habitat Action Plans nationally at both the UK and Scottish levels and is also priority habitat under the Tayside Biodiversity Action Plan. Blanket bog is also listed on the Scottish Biodiversity list	Blanket bog is widespread locally, but has been vastly reduced in area both UK and Europe wide. Blanket bog is the dominant habitat across the Study area. Areas of deep peat are present, particularly in the centre and south of the Study area. The largest area being between T16 and T18.	Medium	Yes
Wet heath (M15)	Wet heath qualifies as an Annex 1 priority habitat in the EC Habitats Directive. Wet qualifies as UKBAP priority habitat and is the subject of Habitat Action Plans nationally at both the UK and Scottish levels and is also priority habitat under the Tayside Biodiversity Action Plan. Wet heath is also listed on the Scottish Biodiversity list	Wet heath is widespread locally, but has been vastly reduced in area both UK and Europe wide. Wet heath vegetation community M15 is concentrated in the south west of the Study area. Elements of wet heath vegetation are also present amongst much of the blanket bog vegetation communities within the Study area.	Medium	Yes
Coniferous plantation	None	The plantation comprises a limited mix of non-native densely planted coniferous trees it is therefore	Negligible	No

Species/Habitat	Covering Legislation and Guidance	Rationale	Conservation Value within the Study area	Valued Ecological Receptor (VER)
		considered to be of limited ecological value. However, there are some areas of blanket bog (heavily modified) prevailing in areas where the canopy is less dense.		
Dry heath (H1, H9, H10, H12)	Dry heath qualifies as an Annex 1 priority habitat in the EC Habitats Directive. Dry heath qualifies as UKBAP priority habitat and is the subject of Habitat Action Plans nationally at both the UK and Scottish levels and is also priority habitat under the Tayside BAP. Heathland is also listed on the Scottish Biodiversity list	The most extensive area of dry heath is present on the summit of Sron Bheag in the southwest of the Study area. There are small scattered areas of dry heath present on hummocks of moraine in this central area of the Study area.	Low - medium	Yes
Acid grassland (U4, U5)	Lowland (normally below c. 300m) acid grassland qualifies as UKBAP priority habitat.	There is a limited amount of acid grassland present within Study area and it is all associated with areas of heathland. Study area is at an altitude of greater than 300m. However the habitats present have similar characteristics as to some of those described in the lowland acid grassland action plan.	Low	Yes
GWDTEs	Water Framework Directive	Based on examination of geology, hydrology, topography and habitats it is considered unlikely that any GWDTEs are present	N/A	No
Dwarf birch	No protected plant species were noted within the Study area. However, dwarf birch (*Betula nana*) is nationally scarce in the UK and is listed as a UK species of conservation concern.	One small colony of dwarf birch was noted within the low lying area of blanket bog in the centre of the Study area.	Low	Yes
Interrupted club-moss	Interrupted club-moss (*Lycopodium annotinum*) is nationally scarce in the UK and is listed as a UK species of conservation concern.	Scattered individual plants were recorded in the northwest of the Study area.	Low	Yes

Species/Habitat	Covering Legislation and Guidance	Rationale	Conservation Value within the Study area	Valued Ecological Receptor (VER)
Otter	Otter is listed on Annexes II and IV of the Habitats Directive. A Species Action Plan is included in the UKBAP and the Scottish Biodiversity List. It is protected under The Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2007.	Evidence of otters was recorded along watercourses throughout and adjacent to the Study area. Otter evidence was also recorded at the Dalwhinnie access location. Three otter holts were identified, however only one of these was within the Study area and was found to be inactive in 2013.	Low	Yes
Water vole	In Scotland, water vole habitat (rather than water voles themselves) is protected under the WCA, 1981 (as amended). Water vole is also a UKBAP and LBAP priority species and is included on the Scottish Biodiversity List.	Evidence of water voles was found along a few locations along watercourses south of the Garrocher plantation within the Study area. Water vole evidence was also found just south of the Study area. Water voles are common in Scotland, and numbers present within the site are not of sufficient to be of regional value.	Low	Yes
Pine marten	Pine marten are listed on Schedule 5 of the WCA, 1981 (as amended). WCA, 1981 (as amended). Pine marten is also a UKBAP priority species.	Some evidence of pine marten was found near to an access track in 2010. Pine marten evidence was found approximately 200m from the nearest proposed turbine (T1) at the south western end of the Study area.	Low (Local)	Yes
Red squirrel	Red squirrels are listed on Schedule 5 of the WCA, 1981 (as amended). WCA, 1981 (as amended). Red squirrel is also a UKBAP and LBAP priority species and is included on the Scottish Biodiversity List.	No evidence of red squirrel was found within the Study area.	Negligible	No
Bat species	All bat species are protected under Schedule 2 of the Conservation (Natural Habitats, &c.) Regulations 1994. Pipistrelle is a UKBAP and LBAP priority species.	Only one bat species pass was recorded, and this was just outside of the Site. No evidence of bat roosts was found within or near to the Study area.	Low	Yes

Species/Habitat	Covering Legislation and Guidance	Rationale	Conservation Value within the Study area	Valued Ecological Receptor (VER)
Fish species (Atlantic salmon, sea lamprey, brook lamprey and river lamprey)	These fish species are is listed on Annexe II of the Habitats Directive	These fish species are qualifying features for the River Tay SPA which includes Loch Rannoch. Water courses which pass through the site flow into this SPA.	Low	Yes

Predicted Effects

Site preparation and construction effects

Habitats

8.4.4 The site preparation and construction phase of the development will result in the loss of habitat due to the construction of turbine bases, crane hardstandings, access tracks, construction compounds and other associated infrastructure. Borrow pits would also result in habitat loss, followed by reinstatement, although the extent to which each borrow pit would be used and excavated is not yet known. The indicative location of four possible borrow pits is shown on the Site Layout Drawing.

8.4.5 The extent of loss of each of the habitats present on site is shown in Table 8.10. Habitat loss has been calculated with and without a 5 m buffer of ground which could be disturbed during the construction process. If disturbed, the ground within the 5 m disturbance buffer will be reinstated following construction but there is a possibility it won't return to the habitat that was present prior to construction. For example, 9.01ha of blanket bog would be directly affected, and a further 12.09ha in the buffer zone may be affected, totalling 21.10ha Table 8.10 excludes borrow pit areas as discussed in the above paragraph. It should be noted that the difference in footprint between Table 8.10 and the areas given in the Carbon Calculator (chapter 17) is because the carbon calculation includes the full extent of borrow pits (as a worst-case scenario), although does not include buffer habitats where vegetation composition may alter but carbon losses would be insignificant.

Table 8.10 Percentage of habitats which will be lost due to construction within the Study area (calculations exclude borrow pit areas)

Habitat Type	Including 5m disturbance buffer		Excluding 5m disturbance buffer	
	Area which may be lost (ha)	% of habitat within development lost	Area which will be lost (ha)	% of habitat within development lost
Blanket bog (M20, M17, M19, M20)	21.10	3.10	9.01	1.33
Wet heath (M15)	2.55	0.37	1.03	0.15
Coniferous plantation	0.87	0.13	0.35	0.05
Dry heath (H1, H9, H10, H12)	0.46	0.07	0.24	0.04
Acid grassland (U4, U5)	0.08	0.01	0.03	0.01

Blanket Bog

8.4.6 The Study area falls within two Scottish Natural Heritage Zones (NHZ) Cairngorms Massif (Zone 11) and Lochaber (Zone 13). At total of 12,412.5ha of blanket bog communities (M17, M18, M19 and M20) are recorded in Zone 11 with a further 4,092.8ha recorded in Zone 13.

8.4.7 Throughout the design process of the site layout, vegetation survey results have been taken into account so as to minimise any potential impacts on blanket bog vegetation. Where possible, areas of sensitive blanket bog (where peat erosion occurs or areas especially sensitive to water table fluctuations, such as bog pools) were avoided.

8.4.8 Blanket bog habitat covers 86.28% of the Study area, the extent of loss of this habitat due to construction of access tracks, turbines and associated crane pads and foundations, including the 5m buffer zones, but excluding borrow pits, would be 3.1% of the study area (or 0.13% of the extent of habitat in the two relevant NHZ's). As well as direct loss of habitat, construction activities could have indirect effects on the surrounding blanket bog caused by changes to hydrology via drainage. Compaction of peat (particularly associated with construction of access tracks) could potentially result in the drying of adjacent blanket bog, thus making these areas more susceptible to erosion. If it is recognised that some of the buffer zone would be disturbed but not damaged, but some blanket bog would be lost for borrow pits, the unmitigated effect of site preparation and construction of the proposed development on blanket bog is predicted to be of medium magnitude and therefore of moderate significance.

8.4.9 Mitigation measures are detailed in Section 8.5 of this document, and include construction-stage measures to reduce encroachment, preparation of drainage plans, use of cross-drainage to maintain hydrological connectivity, use of floating roads, prior surveys to assist with micrositing, peat-handling protocols and reinstatement measures

Wet heath

8.4.10 The Study area falls within two Scottish Natural Heritage Zones (NHZ) Cairngorms Massif (Zone 11) and Lochaber (Zone 13). At total of 2,895.4ha of wet heath communities (M15 and M16) are recorded in Zone 11 with a further 5,034.4ha recorded in Zone 13.

8.4.11 Throughout the design process of the site layout, vegetation survey results have been taken into account so as to minimise any potential impacts on wet heath.

8.4.12 Wet heath habitat covers 6.06% of the Study area, the extent of loss of this habitat due to construction of access tracks, two turbines and associated crane pads and foundations, including the 5m buffer zones but excluding the borrow pits, would be 0.37% of its extent in the study area (or 0.03% of the extent of the habitat in the two relevant NHZ's). As well as direct loss of habitat construction activities could have indirect effects on the surrounding wet heath caused by changes to hydrology via drainage. Compaction of peat (particularly associated with construction of access tracks) could potentially result in the drying of adjacent wet heath, thus making these areas more susceptible to erosion. If it is recognised that some of the buffer zone would be disturbed but not damaged, but some wet heath would be lost for borrow pits, theunmitigated effect of site preparation and construction of the proposed development on wet heath is predicted to be of medium magnitude and therefore of moderate significance.

8.4.13 Mitigation measures are detailed in Section 8.5 of this document. Similar measures for those described above for blanket bog would apply to wet heath.

Dry heath

8.4.14 Throughout the design process of the site layout, vegetation survey results have been taken into account so as to minimise any potential impacts on dry heath habitat.

8.4.15 Dry heath habitat covers 1.11% of the Study area, the extent of loss of this habitat due to construction of access tracks, two turbines and associated crane pads and foundations, including the 5m buffer zones but excluding the borrow pits, would be 0.07%. Indirect effects brought about by construction activities will be much reduced compared to wet heath habitats as the associated substrate is much less susceptible to compaction and therefore significant changes in hydrology are unlikely. If it is recognised that some of the buffer zone would be disturbed but not damaged, but some dry heath would be lost for borrow pits, the unmitigated effect of site preparation and construction of the proposed development on dry heath is predicted to be of low to medium magnitude and therefore of negligible to low significance.

Acid grassland

8.4.16 Throughout the design process of the site layout, vegetation survey results have been taken into account so as to minimise any potential impacts on acid grassland habitat.

8.4.17 Acid grassland habitat covers 0.12% of the Study area, the extent of loss of this habitat will be limited to 0.01%. This loss is due to construction of access tracks. Indirect effects brought about by construction activities will be much reduced in relation to acid grassland habitats as the associated substrate is much less susceptible to compaction and therefore significant changes in hydrology are unlikely. Therefore, any unmitigated effect of site preparation and construction of the proposed development on acid grassland is predicted to be of low magnitude and therefore of negligible significance.

Dwarf birch

8.4.18 Throughout the design process of the site layout, vegetation survey results have been taken into account so as to minimise any potential impacts on nationally scarce plants present within the Study area.

8.4.19 A small population of dwarf birch was recorded in one location within the Study area. This area is not to be affected by the current proposals; there is however suitable habitat for this species within the construction layout and this species could potentially spread to these areas over time. Therefore, any unmitigated effect of site preparation and construction of the proposed development in relation to this species is predicted to be of low magnitude and therefore of low significance.

Interrupted club- moss

8.4.20 Throughout the design process of the site layout, vegetation survey results have been taken into account so as to minimise any potential impacts on nationally scarce plants present within the Study area.

8.4.21 Scattered individual plants of interrupted club-moss were recorded in a number of locations in the northwest of the Study area. As a result of the design process a reduced level of construction is proposed in this section of the Study area, but this does not rule out the potential loss of this species in this area. Therefore, any unmitigated effect of site preparation and construction of the proposed development could have a detrimental

effect on his species at a local level and is predicted to be of medium magnitude and therefore of low significance.

Otter

8.4.22 Throughout the design process of the site layout, otter survey results have been taken into account so as to minimise any potential impacts on otter. This means that most otter mitigation measures are already embedded within the overall design.

8.4.23 Otter evidence was recorded on the majority of watercourses within the Study area. Only one otter holt was recorded within the Study area, however this was found to be inactive in 2013. No otter holts were recorded within 100m of access tracks.

8.4.24 The risk of disturbance of otters during construction is therefore considered to be low.

8.4.25 Otters use the water courses for foraging. Therefore a pollution incident would pose a threat to this species, however pollution prevention control measures will be implemented as detailed in the mitigation section below.

8.4.26 Any unmitigated effect of site preparation and construction on otter is predicted to be of low magnitude and therefore of negligible significance.

Water vole

8.4.27 Throughout the design process of the site layout, water vole survey results have been taken into account so as to minimise any potential impacts on water vole. This means that most water vole mitigation measures are already embedded within the overall design.

8.4.28 The only location recorded during the 2010 water vole survey where the water vole population appeared to be large was outside of the Study area. The surveys suggest that the water vole population present within the Study area is low. Burrows and other associated signs of water voles found within the Study area during the 2010 survey were over 100 m from turbines and other proposed onsite infrastructure and on the edge of the Study area. There is therefore a low risk of disturbance by construction.

8.4.29 As water voles are dependent on clean water, a pollution incident would pose a threat to this species however pollution prevention control measures will be implemented as detailed in the mitigation section below.

8.4.30 Any unmitigated effect of site preparation and construction on water vole is predicted to be of low magnitude and therefore of negligible significance.

Pine marten

8.4.31 Throughout the design process of the site layout, pine marten have been considered, so that any impacts on potential pine marten habitats are minimised. This means that most pine marten mitigation measures are already embedded within the overall design.

8.4.32 The surveys suggest that pine marten occasionally use land near to the proposed access track to the east of Loch Ericht, probably for foraging or commuting. Evidence of pine marten was found within the Study area,

however this was more than 200m from the nearest turbine location. No evidence of dens or resting places were observed within the Study area.

8.4.33 Any unmitigated effect of site preparation and construction on pine marten is predicted to be of **negligible magnitude** and therefore of **negligible significance**.

Bats

8.4.34 Due to the lack of landscape features and roost opportunities favourable for roosting bats within the development area. SNH agreed that watercourses within the site provide the only feature providing reasonable foraging opportunities for bats within the site, however due to the windy and exposed nature of the site, the use of these features is not likely to be great. Very little bat activity was recorded at the site and the proposed development presents little risk to bats.

8.4.35 Any unmitigated effect of site preparation and construction on bats is predicted to be of **negligible magnitude** and therefore of **negligible significance**.

Fish

8.4.36 Prior to construction, surveys will be undertaken to determine any sensitive Annex II fish species present within water courses throughout the site, although it is considered highly unlikely that fish will be affected by the works. These surveys will provide a baseline against which post construction monitoring can be assessed, if required.

8.4.37 Pollution control measures will be put in place to ensure water courses are not subjected to any pollution events during construction works. These are detailed within the mitigation section.

8.4.38 Without mitigation it is likely that there would be repeated siltation events that would affect fish. Any unmitigated effect of site preparation and construction on Annex II fish species is predicted to be of **medium magnitude** and therefore of **moderate significance**.

Operation effects

Habitats

8.4.39 Operation of the proposed wind farm development will not cause any additional habitat loss. However there is a risk that, over time some of the more sensitive areas of deep peat with water level dependent vegetation could be affected by any changes in hydrology brought about by the development. There is also a small risk of pollution incidents or major maintenance/repair works causing damage.

8.4.40 Prevention and the consideration of these effects is discussed further in Chapter 111 (Hydrology, Geology and Hydrogeology). Any unmitigated effect of operation on habitats is predicted to be of **low magnitude** and therefore of **negligible significance**.

Nationally scare flora

8.4.41 Operation of the proposed wind farm development will not cause any additional loss of dwarf birch or interrupted club-moss. However there is a risk that, over time some of the more sensitive areas of deep peat which may support these species (in particular dwarf birch could be affected by any changes in hydrology brought about by

the development. There is also a small risk of pollution incidents or major maintenance/repair works causing damage.

8.4.42 Prevention and the consideration of these effects is discussed further in Chapter 11 (Hydrology, Geology and Hydrogeology). Any unmitigated effect of operation on habitats is predicted to be of low magnitude and therefore of negligible significance.

Otter

8.4.43 Any disturbance to otters will be limited during the operational phase as human presence within the Site will be limited. There is a potential risk of contamination of watercourses within the Study area from oil or other leaks from turbine machinery. Contamination may also occur from spills during maintenance or leaks from maintenance vehicles. Prevention and the consideration of these effects are discussed further in Chapter 111 (Hydrology, Geology and Hydrogeology).

8.4.44 Any unmitigated effect of operation on otter is predicted to be of low magnitude and therefore of negligible significance.

Water vole

8.4.45 Any disturbance to water voles will be limited during the operational phase as human presence within the Site will be limited. There is a potential risk of contamination of watercourses within the Site from oil or other leaks from turbine machinery. Contamination could also occur from spills during maintenance or leaks from maintenance vehicles. Prevention and the consideration of these effects is discussed further in Chapter 111 (Hydrology, Geology and Hydrogeology).

8.4.46 Any unmitigated effect of operation on water vole is predicted to be of low magnitude and therefore of negligible significance.

Pine Marten

8.4.47 Any disturbance to pine martens during the operational phase will be limited as human presence within the Site will be limited.

8.4.48 Any unmitigated effect of operation on pine marten is predicted to be of low magnitude and therefore of negligible significance.

Bats

8.4.49 Any disturbance to bats during the operational phase will be limited as operation of the proposed wind farm development will not cause any additional habitat loss and human presence within the Site will be limited.

8.4.50 Any unmitigated effect of operation on bats is predicted to be of low magnitude and therefore of negligible significance.

Fish

8.4.51 There is a potential risk of contamination of watercourses within the site from oil or other leaks from turbine machinery. Contamination could also occur from spills during maintenance or leaks from maintenance vehicles.

Prevention and the consideration of these effects is discussed further in Chapter 10 (Hydrology, Geology and Hydrogeology.

8.4.52 Any unmitigated effect of operation on Annex II fish species is predicted to be of **negligible magnitude** and therefore of **negligible significance**.

Decommissioning effects

8.4.53 Decommissioning effects would be of similar or of lower magnitude to the construction phase effects in terms of disturbance to habitats and fauna that would arise from engineering operations and access. Following decommissioning, there would be a process of habitat restoration, which would result in an overall positive effect for this stage of the project.

8.5 Mitigation

8.5.1 A number of mitigation measures have been identified to address potential impacts on VERs identified within this assessment. Appropriate mitigation measures have been identified for the construction, operational and decommissioning phase of the proposed development.

8.5.2 The principal mitigation measure adopted to minimise the ecological impact of the Development has been the use of an iterative design process. Use has been made of ecological constraints plans and ecological issues have been taken into account throughout the design process. This means that most mitigation measures are embedded within the overall design, allowing the opportunity to microsite turbines away from sensitive habitats or species. This rest of this section presents specific measures to be adopted throughout the different phases of the Development.

Construction

8.5.3 All relevant mitigation measures will be implemented through a Construction Method Statement (CMS) which will be prepared in consultation with SNH.

8.5.4 It is proposed that a Construction Environmental Management Plan (CEMP) will be completed prior to construction and this would be included in the CMS. It would detail mitigation measures to be implemented. This will be signed by contractors prior to works commencing to ensure that the mitigation is implemented.

8.5.5 It is proposed that a preconstruction survey is undertaken to highlight any nationally scarce plants that are located in areas that are to be affected by any construction processes. Any nationally scarce plants present within the construction areas that cannot be avoided by micrositing would be translocated to an appropriate habitat within the Study away from possible harm/loss that could be brought about through construction, and this habitat would be included in the Outline Habitat Management Plan.

8.5.6 It is recommended that an Ecological Clerk of Works (ECoW) is present on site to oversee enabling works and construction. This would be a suitably experienced individual who would ensure that works are completed in accordance with the CMS, good practice guidelines, and relevant legislation. The EcoW would have authority to stop any works that could potentially have a significant negative ecological impact. Contractors would be given toolbox talks prior to working on site. The toolbox talks would make them aware of ecological issues present on site including the presence of protected species. Micrositing of any infrastructure would first be agreed with the ECoW prior to construction.

8.5.7 A number of mitigation measures are proposed to ensure the retained blanket bog and wet heath habitat is not affected by changes in hydrology brought about by construction works. Measures including the use of floating roads in areas of deep peat and the use of cross drains to maintain hydrological connectivity are detailed in Chapter 11 (Hydrology, Geology and Hydrogeology). Peat management measures are detailed in Appemndix 11.2 of Chapter 11 which includes details of re-use of peat on site and reinstatement methodologies. Measures will be designed to encourage water retention within peat/soils. Long-term monitoring of peat/soils will be undertaken to determine any issues with stability.

8.5.8 Mitigation measures for fish, otter and water vole are required to ensure that pre-construction quality of watercourses is maintained during and post-construction. The details of measures to be undertaken to protect the watercourses are presented in Chapter 10: Hydrology, Geology and Hydrogeology and Appendix 11.3 Watercourse Crossing assessment which includes details on the appropriate design of crossings and provision for mammal passage. So as to avoid any impact on the River Tay SAC silt mitigation measures and peat handling control measures will be implemented. The CEMP will include details of silt mitigation measures including silt traps, sumps and cut off drains to direct clean water away from the working areas. The peat management plan is detailed within Appendix 11.2 of Chapter 11.

8.5.9 The ECoW would have the power to halt works should it be found that siltation prevention measures are not working sufficiently to avoid affecting the River Tay SAC.

8.5.10 A small part of the conifer plantation will be felled for wind farm infrastructure the remainder will be felled to restore the underlying area back to blanket bog/heath vegetation communities. Other restoration measures including the use of grip blocking and deer management to aid the restoration and to protect areas of eroded peat are detailed in the Outline Habitat Management Plan. These measures will offset any residual non-significant impacts upon the blanket bog and wet heath habitats.

8.5.11 Prior to commencement of works on site pre-construction surveys for protected and nationally scarce species based on the existing data will be carried out in order to check for changes in baseline conditions. This will enable any refinements to be made (if necessary to micro-siting and/or the construction programme) to take into account any updated distribution or presence of species such as interrupted club-moss, otter, water vole, pine marten and red squirrel..

8.5.12 Pre-construction surveys will be undertaken to identify any fish interest within downstream watercourses, including the River Ericht and the Killichonan Burn.

8.5.13 Although the otter holt within the Study area was found to be inactive during 2013, it is possible that this site could be used by otters again in the future. It is therefore recommended that the holt is re-examined for any signs of otter activity prior to the commencement of construction works within 250m of this location.

8.5.14 All relevant mitigation measures will be implemented through a Construction Method Statement (CMS) which would be prepared in consultation with SNH. Further details of procedures relating to pollution are presented in Chapter 10: Hydology, Geology and Hydrogeology.

8.5.15 Good practice measures for minimising effects on otter water vole and potentially pine marten and hare will be necessary as described by SNH and Natural England. These include safe storage of chemicals in bunded containers at a minimum distance of 100 m from a waterbody, and covering pipes and holes to avoid

entrapment. A Pollution Incident Response Plan will be created to minimise potential pollution effects (see Chapter 111: Hydrology, Geology and Hydrogeology).

8.5.16 A speed limit of 15mph will be enforced for any vehicle on site in order to reduce the risk of collision with protected species.

8.5.17 Additionally pre-construction survey to map the distribution of the nationally scarce plant interrupted clubmoss which is known to occur immediately adjacent to proposed access track and turbine locations in the north of the Study area would be undertaken to identify any individual plants likely to be affected and highlight potential translocation areas.

8.5.18 Should an otter holt or couch be found, or a pine marten den or red squirrel drey, all works within 250m of this location would stop immediately and the SNH local office contacted for advice on how best to proceed. SNH would also be contacted regarding advice for any other ecological issues that arise during construction works where appropriate.

Operation

8.5.19 Apart from turbine operation and maintenance, there will be little on-site activity during the operational phase. Mitigation requirements for the operational phase are therefore minimal.

8.5.20 Where potential effects do exist, control measures adopted during the construction phase will be continued into the operational phase where appropriate. The potential of pollution incidents to occur during routine maintenance will be minimised through the adoption of SEPA good practice guidance (see Chapter 10: Hydrology, Geology and Hydrogeology).

8.5.21 Any maintenance works will take place during the day. This will minimise disturbance to protected species such as otter and pine marten.

8.5.22 A minimum on-site speed limit of 15mph will be enforced to minimise vehicle collision risk to protected species.

Decommissioning

8.5.23 Good practice measures as described in the construction phase will be followed. New guidance available at the time of the decommissioning phase will be applied if appropriate.

Summary of Mitigation

Table 8.11 summarises the mitigation measures proposed for different stages of the project

Table 8.11 Summary of Mitigation Measures and Delivery mechanism

Mitigation Measures	Purpose	Recommended mechanism for securing measure
Pre – construction survey	To highlight any changes to baseline conditions that may require the need for additional	Condition of consent

	mitigation measures. To identify and locate any protected or nationally scarce species present within the site layout. This will ensure individual plants can be avoided or suitable translocation provided.	
Construction Environmental Management Plan	To provide details of all mitigation measures required during construction including protected species and water quality	Condition of consent
Ecological Clerk of Works	To ensure all mitigation measures are adhered to during construction and to provide ecological advice	Condition of consent
Outline Habitat Management Plan	To provide details of habitat enhancement measures and methods for implementation	Condition of consent and Legal Agreement

8.6 Potential Cumulative Impacts

8.6.1 Based on the ecology of each VER considered in this assessment, otters are most likely to be affected by another wind farm development in the surrounding area, as these have the largest home ranges of the species considered. The average home range of an otter is 32km for a male and 20km for a female (SNH, 2008).

8.6.2 A search for existing and proposed wind farms within 30km of the Talladh-a-Bheithe Estate was undertaken to assess any cumulative impacts that may occur as a result of the proposed site. No wind farms were found within this search area. There is therefore no cumulative risk on any of the VERs and any cumulative impact is assessed to be of negligible significance.

8.7 Summary and Conclusions

8.7.1 The level of significance of potential effects on each VER during the construction and operational phases of the proposed Study area are summarised in Table 812.

Table 8.12. Summary of the level of significance of potential effects on Valued Ecological Receptors (VERs) and residual effects following mitigation.

VER	Level of Significance of potential effect pre-mitigation	Proposed Mitigation	Level of Significance of Residual Effect

VER	Level of Significance of potential effect pre-mitigation	Proposed Mitigation	Level of Significance of Residual Effect
Blanket bog and wet heath (M20, M17, M19, M20, M15)	Medium	A Construction Environmental Management Plan (CEMP) will be completed prior to construction, detailing mitigation measures to be implemented. These measures are set out below. An Ecological Clerk of Works (ECoW) will be present on site to oversee enabling works and construction. There is a risk that, over time some of the more sensitive areas of deep peat with water level dependent vegetation could be affected by changes in hydrology brought about by the development. Prevention and the consideration of these effects is discussed further in Chapter 10 (Hydrology, Geology and Hydrogeology) Existing areas of peat erosion with the Study area will be stabilised and enhanced through the use of grip locking were appropriate. The pressure on these areas will be further reduced through the reduction in the levels of deer grazing. Additionally, peat extracted to allow for construction of access tracks will be translocated into areas with significant peat erosion. Areas of blanket bog south of Loch Mheugaidgh highlighted as being sub-optimal due to drying are to be enhanced through a re-wetting program this is discussed further in Chapter 10 (Hydrology, Geology and Hydrogeology) Further enhancement of blanket bog will be brought about through the felling of Garrocher plantation and the restoration of the degraded peat bog which is present beneath. Restoration measures are detailed in the Outline Habitat Management Plan	Negligible
National scarce flora (dwarf birch and interrupted club-moss)	Low	A pre-construction survey will be undertaken to identify any individual plants that could be affected by the construction works. These plants will be subject to translocation to appropriate receptor sites ensuring the longevity of these species in this locality.	Negligible
Otter	Low	A CEMP will be completed prior to construction, detailing mitigation measures to be implemented. Details of measures to be undertaken to protect the watercourses are presented in Chapter 10: Hydology, Geology and Hydrogeology. Chemicals will be stored safely in bunded containers at a minimum distance of 100 m from a waterbody, and	Negligible

VER	Level of Significance of potential effect pre-mitigation	Proposed Mitigation	Level of Significance of Residual Effect
		covering pipes and holes to avoid otter entrapment. A speed limit of 15mph will be enforced for any vehicle on site in order to reduce the risk of collision. An ECoW will be present on site to oversee enabling works and construction. Should an otter holt or couch be found, all works within 250m of this location would stop immediately and the SNH local office contacted for advice on how best to proceed. Any maintenance works will take place during the day so as to minimise disturbance to otter.	
Water Vole	Low	A CEMP will be completed prior to construction, detailing mitigation measures to be implemented. Details of measures to be undertaken to protect the watercourses are presented in Chapter 10: Hydrology, Geology and Hydrogeology. Chemicals will be stored safely in bunded containers at a minimum distance of 100 m from a waterbody, and covering pipes and holes to avoid water vole entrapment. A speed limit of 15mph will be enforced for any vehicle on site in order to reduce the risk of collision. An ECoW will be present on site to oversee enabling works and construction.	Negligible
Pine Marten	Negligible	A CEMP will be completed prior to construction, detailing mitigation measures to be implemented. Chemicals will be stored safely in bunded containers, covering pipes and holes to avoid pine marten entrapment. A speed limit of 15mph will be enforced for any vehicle on site in order to reduce the risk of collision. An ECoW will be present on site to oversee enabling works and construction. Should a pine marten den be found, all works within 250m of this location would stop immediately and the SNH local office contacted for advice on how best to proceed. Any maintenance works will take place during the day so as to minimise disturbance to pine marten.	Negligible
Fish species (Atlantic salmon, sea lamprey, brook lamprey and river	Medium	A CEMP will be completed prior to construction which will provide details of silt mitigation and peat handling measures. These will include silt traps, sumps and cut off drains to direct clean water away from working areas. An ECoW will be present on site to oversee enabling works and construction. The ECoW will be able to halt works should it be found that siltation prevention measures are not working sufficiently to avoid affecting the SAC.	Negligible

VER	Level of Significance of potential effect pre-mitigation	Proposed Mitigation	Level of Significance of Residual Effect
lamprey)			