9 Ornithology

9.1 Introduction

9.1.1 This chapter has been prepared by The Environment Partnership (TEP). It provides a description of the baseline Ornithological conditions present on the proposed development site and its surroundings and assesses the potential effects associated with its construction, operation and decommissioning as described in Chapter 04 of the Environmental Statement.

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

9.1.3 The landscape of the Talladh-a-Bheithe Estate and the wider locality is characterised by low acidic vegetation and intermittent coniferous woodland. The Talladh-a-Bheithe Estate is circa 56.9km^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).

9.1.4 A single large area within the Talladh-a-Bheithe estate of approximately 7km^2 has been identified as an optimum location for siting wind turbines. This area will be henceforth be referred to as the site. The location of the site is illustrated in Figure 9.1.

9.1.5 An ecological assessment for non-avian species has been provided separately in Chapter 8: Ecology.

Proposed Development Description

Design Iteration

9.1.6 Proposals for the site include the construction and operation of a wind farm consisting of 24 wind turbines each with an approximate height of 125m to the blade tip and an output capacity of 3MW.

9.1.7 A range of bird surveys was 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 study areas are illustrated in Drawing G3968.045A in Technical Appendix 9.1 Ornithological Assessment.. 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 including ornithology. Following the completion of bird surveys in 2010, a decision was made not to propose turbines within the *North study area* due to the proximity of the *North study area* to a golden eagle territory and the presence of a high concentration of golden plover nest sites within and adjacent to the *North study area*.

9.1.8 In early 2012 a revised layout was produced which was known as the *Central study area* and field surveys were undertaken in spring and summer 2012 to take account of this change. The *Central study area* is illustrated in Drawing G3968.044B in Technical Appendix 9.1 Ornithological Assessment.

9.1.9 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 which is simply referred to as the Study Area henceforth. In 2013 micro-siting was undertaken to provide a minimum 300m buffer around Loch Mheugaidh, a waterbody occasionally used by red-throated diver for loafing and feeding. Turbines associated with the ridge known as Coire Odhar Beag, to the north of

Garrocher Plantation, were moved as far south as other constraints would allow, minimising the risk of golden eagle collision mortality.

9.1.10 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.

Construction Access

9.1.11 Construction access is being progressed on the basis of a range of potential options. This includes the transportation of turbine components to the site via the A9 to Dalwhinnie, from there it is proposed that turbine components are transported overland from just south of Dalwhinnie to the northern shore of Loch Ericht, then by barge or pontoon along the Loch and from the southern shore of Loch Ericht overland within the Estate to the proposed turbine locations. Temporary jetty and crane facilities will be required at each end of the Loch.

9.1.12 In addition to the Dalwhinnie option it is also possible to deliver components and construction materials to Rannoch Station by rail. These materials will then be transported by road from Rannoch Station to the Talladh-a-Bheithe Estate. Therefore it is likely that road traffic will increase at Rannoch Station, which is located approximately 20km to the west of the Talladh-a-Bheithe Estate.

9.1.13 The preferred option will be determined based on detailed technical and commercial discussions however the principle of prioritising delivery that seeks to minimise road based transport around Loch Rannoch is central to the approach to the proposed development.

9.2 Methodology

Scope of Assessment

9.2.1 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 ornithological interests on site, and in its immediate surroundings;
- Evaluation of the potential effects of the proposed development on current ornithological 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 these effects occurring;
- Identification of appropriate measures to avoid and mitigate against any potential adverse effects resulting from the proposed development, where applicable;
- The residual significance of the predicted effects following mitigation; and
- Cumulative assessment.

9.2.2 This assessment initially covers the proposed development then in keeping with SNH Guidance considers each species to an appropriate wider geographic level. This is discussed in more detail in the Assessment of Significance section.

Legislation and Guidance

9.2.3 Chapter 6 of the ES sets out the planning policy framework that is relevant to the EIA. The policies set out include those from the 'TAY plan' (the Strategic proposed development Plan), the Highland Area Local proposed development Plan, those relevant aspects of Scottish Planning Policy (SPP), Planning Advice Notes and other relevant guidance. With reference to the Ornithology assessment presented within this chapter, regard has been had to the following policies, legislation, regulations and other guidance:

- The Birds Directive (Council Directive 2009/147/EC on the conservation of wild birds Directive');
- 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; and
- Environmental Impact Assessment Directive 85/337/EEC (as amended).
- Wildlife and Countryside Act (WCA) 1981 (as amended);
- The Nature Conservation (Scotland) Act 2004 (as amended);
- The UK Biodiversity Action Plan (UKBAP);
- Tayside Local Biodiversity Action Plan (LBAP);
- The Wildlife and Natural Environment (Scotland) Act 2011.

9.2.4 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 and ornithological resources:

- Scottish Natural Heritage (2000) Wind farms and birds: calculating a theoretical collision risk assuming no avoidance action. SNH Guidance Note. SNH;
- Scottish Natural Heritage (2005 – Revised 2010) Survey Methods for Use in Assessing the Impacts of Onshore Wind farms on Bird Communities;
- Scottish Natural Heritage (2005) Cumulative Effects of Wind farms. Version 2. Revised 13/04/056;
- Scottish Natural Heritage (2006) Assessing significance of impacts from onshore Wind farms on birds outwith designated areas;
- Scottish Natural Heritage (September, 2009) Environmental Statements and Annexes of Environmentally Sensitive Bird Information: Guidance for Developers, Consultants and Consultees;
- Scottish Natural Heritage (2009). Monitoring the impact of onshore wind farms on birds in Scotland;
- Scottish Natural Heritage (2010) Use of avoidance rates in the SNH wind farm collision risk model;
- 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;
- Scottish Natural Heritage (2014) Guidance Note: Recommended bird survey methods to inform impact assessment of onshore wind farms May 2014[1];
- Band et al. (2007) Developing field and analytical methods to assess avian collision risk at wind farms;

[1] This SNH Guidance Note was published too late for it to influence the survey programme but it has been referred to where relevant.

- De Lucas et al. (2007) Birds and Wind Farms: Risk Assessment and Mitigation;
- Scottish Renewables *et al*, (2013) Good Practice during Wind Farm Construction 2nd Edition ();
- Eaton *et al*. (2009) Birds of Conservation Concern 3: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man;
- Scottish Biodiversity List (SBL);
- Forrester, R.W., Andrews, I. J., McInerny, C. J., Murray, R. D., McGowan, R.Y., Zonfrillo, B., Betts, M.W., Jardine, D. C., & Grundy, D. S. (eds.), (2007) The Birds of Scotland. SOC, Aberlady.

9.2.5 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

Consultation

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

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

9.2.7 Meetings with key consultee stakeholders were held in July 2009, January 2011 and August 2012. The main purpose of the meetings was to discuss the scope of the Environmental Assessment. SNH were also consulted periodically between 2009 and 2013 concerning ornithology survey methods and findings.

Desk Based Study

9.2.8 Information regarding historic species records, protected sites, land allocation and relevant policies was requested/gathered from the sources listed in Table 9.1.

Table 9.1 Ecological information and consultations relevant for birds.

Consultee / Source of information	Nature of information supplied by consultee
Scottish Natural Heritage (SNH)	Scoping advice for field surveys and habitats and vegetation survey findings.
RSPB Scotland	Ornithological records for the Talladh-a-Bheithe Estate and the surrounding area. Scoping advice for field surveys.
SEPA	Scoping advice for field surveys.
Tayside Raptor Study Group (TRSG)	Ornithological records for the Talladh-a-Bheithe Estate and the surrounding area.
Highland Raptor Study Group	Ornithological records for land to the north of the Talladh-a-Bheithe Estate.

Consultee / Source of information	Nature of information supplied by consultee
Perth Museum	No bird records obtained.
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.

Target Species

9.2.9 SNH guidance suggests that assessment of the effects of wind farms on birds should, in most circumstances, be limited to those protected species and other species of conservation concern that, as a result of their flight patterns or response behaviour, are likely to be affected by or subject to significant and adverse impacts from wind farms. The guidance states that there are three overarching lists describing protected species and species of conservation concern:

- Species listed in Annex I of the Birds Directive;
- Species protected under Schedule 1 of the WCA; and
- Red-listed Birds of Conservation Concern (BoCC)(Gregory *et al*., 2009).

9.2.10 Consideration should also be given to UKBAP species, LBAP species, SBL species and any other species for which the site hosts a particular concentration.

9.2.11 Within these lists, greatest attention should be paid to the species most likely to be affected by wind farms, such as raptors and species which are less manoeuvrable in flight (e.g. geese and swans) as these are considered to be particularly vulnerable to collision with turbines. These species are known as 'target species'.

9.2.12 Conversely there are species which do not require special consideration as they are currently thought to be less susceptible to impacts from wind farms, such as upland breeding passerines.

9.2.13 The target species for the proposed development were:

- Raptors listed in Annex I of the EU Birds Directive and/or Schedule 1 of the Wildlife and Countryside Act 1981 (as amended);
- Geese and ducks (all species except mallard);
- Breeding waders (all species);
- Black grouse
- Diver species; and
- Other species included in the Red List of Birds of Conservation Concern (BoCC).

Field Survey Methods

9.2.14 Full details of all ornithology survey timings and detailed methodologies as well as the survey experience of the ornithologists are provided in the Ornithology Technical Appendix, Appendix 9.1. A brief description/overview of each survey method type is provided below.

9.2.15 All surveys were undertaken by TEP between 2009 and 2013 apart from field surveys in July and September 2013, which were undertaken by Natural Power.

Reconnaissance survey

9.2.16 A reconnaissance survey of the Talladh-a-Bheithe Estate was undertaken from 20th to 22nd July 2009. During the survey a line transect was walked within the site and adjacent habitat up to 1km from these areas. All bird activity observed whilst walking the line transect was recorded being careful to note behavioural observations such as bird alarm calls and flight activity. Ten mini-vantage point surveys were also undertaken at appropriate locations along the line transect route which typically lasted 30 minutes in duration.

Vantage point survey

9.2.17 The purpose of the Vantage Point (VP) surveys was to identify flight patterns of selected target bird species within the study area. These selected target species were identified using Scottish Natural Heritage generic guidance which identifies bird species established to be vulnerable to collision with wind farms (Scottish Natural Heritage, 2010). VP survey results were used to determine the collision risk associated with the proposed wind farm.

9.2.18 VP surveys were undertaken for one non-breeding period (2009-2010) and three breeding periods (2010, 2012 and 2013). It was necessary to repeat the breeding period VP surveys in 2012 and 2013 since the resident golden eagle pair were recorded as having a nest failure in 2010, therefore it was not possible to record foraging flight lines associated with an active golden eagle nest site. The priority of the VP survey in 2013 was to update the collision risk model for golden eagle to take account of changes in the site layout.

9.2.19 SNH guidelines (2005) indicate that at least 36 hours survey per VP are needed, spread across the breeding and non-breeding periods. Table 9.2 summarises the minimum number of VP survey hours completed during each survey period. For each VP survey the survey area included a 200m survey buffer. A detailed breakdown of VP survey effort and maps to illustrate the viewsheds associated with each VP survey year are provided in Ornithology Technical Appendix, Appendix 9.1.

Table 9.2 Minimum number of VP survey hours completed.

	Non-breeding 2009-2010	Breeding period 2010	Breeding period 2012	Breeding period 2013
Number of VP survey hours completed	36	48	48	43.5

Brown and Shepherd survey

9.2.20 The purpose of the Brown and Shepherd survey was to map the distribution and abundance of waders within the site and land within 500m of the site. A two visit Brown and Shepherd survey was undertaken in 2010 but it was necessary to re-survey in 2012 due to changes in the extent of the site making it necessary to cover areas not previously surveyed in 2010. In 2013 a three visit Brown and Shepherd survey was undertaken covering the full extent of the site including a 500m survey buffer. SNH confirmed that three visits were acceptable in light of the poor weather preventing survey work in April and early May (Burrows, *pers. comm*., Aug 2013).

9.2.21 Numbers of skylark and meadow pipit within each 1km square were also recorded to identify which parts of the Talladh-a-Bheithe estate supported the highest abundance of prey for raptors such as hen harrier and merlin.

9.2.22 In addition a two-visit breeding bird survey was undertaken at the north end of Loch Ericht on 13th May and 19th June 2013. Each survey visit commenced prior to 09:00hrs and was commenced in suitable weather conditions. During each survey visit the surveyor walked a line transect which passed within 100m of all parts of the survey area mapping all breeding bird activity.

Rannoch railway siding scoping bird survey

9.2.23 A two-survey visit scoping bird survey was undertaken at the site of the proposed railway sidings development approximately 1.5km to the north of Rannoch Station. During the scoping survey an ornithologist walked a line transect from Rannoch station across moorland habitat to the west of the railway line to access the proposed site of the railway sidings development. All bird activity including behaviour within 100m of the railway sidings development was recorded. Each survey commenced at approximately 09:00hrs and had a duration of 90 minutes. This development is being taken forwards by another developer and is not a part of the Talladh-a-Bheithe development. However a scoping survey was considered appropriate in order to understand if any cumulative impacts might need considering.

Raptor nest surveys

9.2.24 The golden eagle nest site located within the Coire Bhachdaidh SSSI was monitored each year from 2009 to 2013 by the TRSG working closely with TEP ornithologists.

9.2.25 TEP ornithologists undertook hen harrier and merlin nest surveys in 2010 and 2013 to identify nest sites located within 2km of the site. The hen harrier and merlin survey methods complied with the methodology described by Hardey *et al.* (2009).

Other nest surveys

9.2.26 TEP ornithologists undertook red-throated diver surveys in 2010 and 2013 to identify nest sites located within 2km of the site. A greenshank nest survey was also undertaken in 2013 to confirm the location of a suspected breeding site within the study area.

Black grouse lek survey

9.2.27 Black grouse lek surveys were undertaken by TEP ornithologists in 2010 and 2013 to confirm the location and importance (peak number of males) of lek sites located within 1.5km of the site. In 2013 additional survey effort was made to determine the locations of favoured feeding areas occupied by the black grouse after lek sites had disbanded each morning.

Red-throated diver flight line surveys and feeding loch observations

9.2.28 SNH guidance (2005) states that specialist red-throated diver surveys should focus on breeding sites located landward of proposed wind farm sites since divers usually fly to the sea to feed. Surveys in May 2010 confirmed a pair of divers was nesting on the neighbouring Craiganour Estate to the east of the site warranting further study of these birds.

9.2.29 SNH guidance states that observations of the nest site should be undertaken around dawn and dusk with the aim of recording 15 incoming flights to the lochan when adult birds return to feed young at the nest. Dawn and

dusk surveys were undertaken in June 2010 from VP locations within the Talladh-a-Bheithe Estate, however flight lines were difficult to detect due access being restricted within 1km of the nest. Therefore daytime VP surveys were also undertaken in July and August 2010 to obtain the necessary incoming flight lines.

9.2.30 Regular observations of Loch Mheugaidh (located within the Talladh-a-Bheithe Estate immediately to the south of the site) were undertaken from early May to the end of July 2010. These surveys were to determine how red-throated diver used the loch after a red-throated diver was observed on the loch in May 2010. A further 15 observations of Loch Mheugaidh were undertaken in 2010. Observations of the Loch were also combined with the 2013 VP survey.

Prey study

9.2.31 A prey study was carried out on the Talladh a Bheithe estate in order to quantify potential prey resource for golden eagle. This involved a systematic survey recording all signs of red grouse (*Lagopus lagopus scoticus*) and mountain hare (*Lepus timidus*). The study area comprised the golden eagle pair's core range (within the estate boundary), the wind farm area and c.1km south of the wind farm (which is approximately the maximum southerly extent of the range based on the PAT model). Detailed prey study survey methods are provided in Technical Appendix 9.2 – Part 9.2B Eagle Assessment.

Data Analysis

PAT Modelling

9.2.32 PAT (Predicting Aquila Territories) modelling was undertaken by Natural Research to determine the extent of overlap between the range use of the resident golden eagle pair and the site. Detailed methods for the PAT modelling are presented in the Technical Appendix 9.2 Confidential Annex.

Collision risk modelling

9.2.33 Collision risk modelling was carried out for golden eagle. The model used was that used by Band (2007). The collision risk model was run separately for adult and sub adult birds using VP survey data collected between 2009 and 2013. Detail methods for the collision risk modelling for golden eagle are presented in Appendix 9.2 – Part 9.2B Eagle Assessment.

9.2.34 The risk of collision was calculated for species with more than three flights in the collision risk zone at Potential Collision Height (PCH), as species where fewer than three flights were observed in the collision risk zone were considered to be low risk. The only exception to this was greylag goose, the flight lines of which were not subject to further analysis since it was confirmed that the geese observed were part of a local feral population.

Assessment of Significance

9.2.35 The approach taken to the assessment of ornithological impacts follows the guidance produced by the Institute of Ecology and Environmental Management (IEEM). These guidelines set out the process for assessment through the following stages:

- Identification of Valued Ecological Receptors (VERs) (the ecological components of highest value present at a site);
- Determining the nature conservation value of the VERs present within the zone of influence that may be affected by the development;

- Identifying the potential effects based on the nature of the construction, operation and decommissioning of the proposed development;
- Determining the magnitude of the impacts including consideration of the sensitivity of the receptor and the duration and reversibility of the effect;
- Determining the significance of the impacts based on the interaction between the effect magnitude/duration, and the nature conservation value and the likelihood of the effect occurring. In addition, sensitivity of the receptor affected is also considered for potential ornithological impacts;
- Identifying mitigation measures required to address significant adverse effects;
- Determining the residual impact significance after the effects of mitigation have been considered, including a description of any legal and policy consequences; and
- Identification of any monitoring requirements.

9.2.36 The assessment process involves identifying VERs. These ornithological receptors and their values are determined by the criteria defined in Table 9.3. It should be noted that these criteria are intended as a guide and are not definitive. The results of the desk study were combined with the results of the baseline surveys and used to assess the context of the populations within the site and surrounding area in terms of their regional importance. Comparisons were made with local sites designated for important breeding and wintering bird assemblages, and in the case of golden eagle, the Tayside golden eagle breeding population.

Table 9.3 Approach to valuing nature conservation value of the ecological receptors at the development

Conservation Value	Examples
Very High (International)	A species listed as a qualifying feature of an internationally designated site (e.g. SPA or Ramsar wetland site). A regularly occurring, nationally important population of any internationally important species listed under Annex 1 of the Birds Directive, or regularly occurring migratory species listed under Annex II/2 of the Birds Directive connected to a SPA designated for this species.
High (National)	A species listed as a qualifying feature of an internationally designated site (e.g. SSSI). A regularly occurring, regionally important population of any nationally important species listed as a UKBAP priority species and species listed under Schedule 1 of the Wildlife and Countryside Act (as amended) or Annex 1 of the Birds Directive.
Medium (Regional)	A regularly occurring, locally important population of any nationally important species listed as a UKBAP priority species and species listed under Schedule 1 of the Wildlife and Countryside Act (as amended) or Annex 1 of the Birds Directive.
Low (Local)	Other species of conservation concern, including species listed under the Local BAP (LBAP) and the UK Birds of Conservation Concern.
Negligible	All other species that are widespread and common and which are not present in locally, regionally, nationally or internationally important numbers which are considered to be of low or poor ecological value (e.g. UK Birds of Conservation Concern Green List species).

(Source: Natural Power, 2013).

Determining Magnitude of Effect

9.2.37 Effects on VERs are judged in terms of magnitude and duration. The magnitude of effects is predicted quantitatively where possible. Where this is not possible, a more qualitative approach is taken. Magnitude can be negative (very high, high, moderate, low or negligible) or positive. High magnitude effects could include large-scale permanent and/or high probability changes that affect the receptor's population or extent. Low

magnitude effects would typically be small in scale or possibly temporary in their effect. The criteria used in this assessment for describing the overall magnitude of a potential effect are summarised in Table 9.4.

Table 9.4 Determining the magnitude of effect on valued ecological receptors

Magnitude	Definition
Very High Adverse	Total or almost complete loss of a receptor resulting in a permanent adverse effect on the integrity of the receptor. The conservation status of the receptor would be affected.
High Adverse	Result in large-scale, permanent changes in a receptor, and likely to change its ecological integrity. These effects are therefore likely to result in overall changes in the conservation status of a receptor.
Moderate Adverse	Include moderate-scale long-term changes in a receptor, or larger-scale temporary changes, but the integrity of the receptor is not likely to be affected. This may mean that there are temporary changes in the conservation status of the receptor, but these are reversible and unlikely to be permanent.
Low Adverse	Include effects that are small in magnitude, have small- scale temporary changes, and where integrity is not affected. These effects are unlikely to result in overall changes in the conservation status of a receptor.
Negligible	No perceptible change in the ecological receptor.
Beneficial	The changes in the ecological receptor are considered to be beneficial.

(Source: Natural Power, 2013).

9.2.38 In the case of designated sites, magnitude is assessed in respect of the area within the designated site boundary or the population of species supported by the designated site.

9.2.39 Magnitude is assessed within the appropriate bio-geographic regions as recommended in SNH guidance (2006). These are detailed below:

9.2.40 Potential impacts on breeding bird populations are assessed in a regional context. The appropriate regional bio-geographic unit has been identified by SNH as NHZ. NHZ classifications represent areas with a high level of bio-geographic coherence, and are unrelated to administrative boundaries. However, the Tayside golden eagle population was used as a baseline in this case since the proposed development is near to the boundary of four separate Natural Heritage Zones (NHZs) and it was not considered appropriate to just consider the NHZ within which the proposed development is located. The site is located within NHZ 11: Cairngorms Massif. NHZ13: Lochaber is located immediately to the west of the site. NHZ15: Breadalbane and East Argyll is located approximately 5km to the south of the site and NHZ10: Central Highland is located approximately 5km to the north.

9.2.41 The assessment also takes into account whether the effect is beneficial or adverse, short term (for example only during construction) or long term (throughout the lifetime of the proposed development), reversible or permanent.

9.2.42 Duration is defined as the time for which the impact is expected to last before recovery - i.e. return to preconstruction baseline conditions (Table 9.5).

Table 9.5 Criteria for Describing Duration

Duration	Definition
Permanent	Effects continuing indefinitely beyond the span of one human generation (taken as approximately 25 years), except where there is likely to be substantial improvement after this period (e.g. the replacement of mature trees by young trees which need >25 years to reach maturity, or restoration of ground after removal of a development). Such exceptions can be termed "very long-term effects".
Temporary	Long-term (15-25 years or longer – see above) Medium term (5-15 years) Short term (up to 5 years)

(Source: SNH, 2006).

9.2.43 Knowledge of how rapidly the population or performance of a species is likely to recover following loss or disturbance (e.g. by individuals being recruited from other populations elsewhere) is used to assess duration, where such information is available.

9.2.44 In addition, birds are assessed with consideration to their behavioural sensitivity and ability to recover from temporary adverse conditions. Behavioural sensitivity is determined subjectively based on the species' ecology and behaviour, using broad criteria set out in Table 9.6. The judgement takes account of information available on the responses of birds to various stimuli (e.g. predators, noise and disturbance by humans).

9.2.45 It should be noted that behavioural sensitivity can differ between similar species and between different populations of the same species. Thus the behavioural responses of birds are likely to vary with both the nature and context of the stimulus and the experience of the individual bird. Sensitivity also depends on the activity of the bird, for example, a species is likely to be less tolerant of disturbance while breeding than at other times. In addition, individual birds of the same species will differ in their tolerance depending on the level of human disturbance that they regularly experience in a particular area, and have become habituated to (e.g. individuals that live in an area with high human population and activity levels are likely to have a greater tolerance than those that occupy remote locations with little or no human disturbance). However, tolerance is likely to increase as breeding progresses.

Table 9.6 Behavioural Sensitivity of Birds

Duration	Definition
High	Species or populations occupying habitats remote from human activities, or that exhibit strong and long-lasting reactions to disturbance events. For example golden eagle.
Moderate	Species or populations that appear to be warily tolerant to human activities, or exhibit short-term reactions to disturbance events. For example peregrine falcon.
Low	Species or populations occupying areas subject to frequent human activity and exhibiting mild and brief reaction (including flushing behaviour) to disturbance events. For example red grouse or common passerines.

(Source: Natural Power, 2013).

9.2.46 Magnitude, duration and sensitivity are then considered alongside proposed mitigation, and the nature of the effect determined. The nature of any effect on a VER is assessed using the criteria in Table 9.7, which is based upon IEEM guidelines. The concept of "integrity" in this context refers to sustained coherence of ecological structure and function of a VER, and includes consideration of both temporal and spatial factors. It is to be noted that there may be beneficial effects on VERs as a result of development and mitigation, as well as adverse.

Likelihood of Effect

9.2.47 To ensure consistency of description across the EIA topic areas, the following four-point scale has been used to standardise the degree of confidence in the prediction of impact significance on ecological structure and function. The terms can also be used to make a judgement about the effectiveness of mitigation. The terms given in Table 9.7 allow the assessor to express a qualified prediction.

Table 9.7 Likelihood of Effect

Nature of Effect	Definition
Certain/near certain	Probability estimated at 95% chance or higher
Probable	Probability estimated at 95% chance or higher
Possible	Probability estimated at above 50% but below 95%
Extremely unlikely	Probability estimated at less than 5%

(Source: IEEM, 2013).

Determining significance

9.2.48 Determining whether an effect on an ornithological receptor is significant requires a professional ecologist to take account of all information relating to a given effect including the magnitude of the effect, the value and behavioural ecology of the VER, the duration of the effect and the likelihood of the effect. Effects are more likely to be considered significant where they affect receptors of higher conservation value or where the magnitude of the effect is high. Effects not considered to be significant would be those where the integrity of the receptor is not threatened, effects on receptors of lower conservation value, or where the magnitude of the effect is low. A matrix approach to assigning sensitivity is therefore not used. However, a full narrative is given in order to demonstrate how a decision on significance of effect is reached.

9.2.49 It should be noted that, alongside the criteria provided, professional judgement is applied in determining the significance of potential effect taking account of mitigation. Mitigation measures and detailed design avoid and reduce potentially significant effects, but it is also good practice to propose mitigation measures to reduce adverse effects that are not significant.

9.3 Baseline Conditions

Consultation

9.3.1 A summary of the key points raised by consultees is given in Table 9.8.

Table 9.8 Summary of Consultations and Responses relevant to Ornithology

Consultee	Summary of Response
SEPA offices, Perth 23rd July 2009 Colin Castle (CC) – SNH Katrina Gaul (KG) – SNH Ian Thomas (IT) – SEPA	The following points were raised by SEPA/SNH: • Peat bog management and preservation would need to form part of the Environmental Statement and the sites conservation plan. • SNH confirmed that they were aware that golden eagles bred on the Talladh-a-Bheithe estate on SSSI in 2006 however they were not sure if the eagles had bred on the estate since 2006. CC suggested that the VP survey commence at the beginning of the breeding season. • TR (project team) outlined a pragmatic approach to undertaking the raptor survey at appropriate times during the seasons. TR asked SNH for opinion on

Consultee	Summary of Response
	survey plans and they were agreed with. • It was suggested that Brian Etheridge be contacted since he co-ordinates data recording nationally for Scotland. • The importance of a breeding wader survey was discussed. • Disturbance distance for bird species reported in Ruddock and Whitfield. Typical disturbance distance of 750m for black grouse. CC asked that red-throated diver be considered. ACTION TAKEN: Brian Etheridge was consulted regarding Scottish raptor group published reports. Field surveys were undertaken accordance with methods agreed during meeting with SNH. Scientific paper by Ruddock and Whitfield used to identify bird species disturbance distances.
RSPB 23rd July 2009 Bruce Anderson Preliminary meeting	RSPB made the following comments during the meeting: • BA advised the Tayside Raptor Study Group would be able to confirm the locations of Schedule 1 bird nest sites including golden eagle. • BA identified that an ornithology survey had been conducted by the Forestry Commission for the extension of Craiganour forest some time ago and this may provide some useful local information. • RSPB identified they have long-term red and black-throated diver monitoring records in some areas in the vicinity of the site. 20 years of black-throated diver monitoring data available for 5 most reliable sites but rarely 5 breeding pairs present. RSPB hold the dataset. • BA emphasized the need to establish golden eagle occupancy early in season in case failed breeding attempts are missed. Early and comprehensive survey advised to avoid delays in development later. ACTION TAKEN: TEP consulted Wendy Mattingley of the Tayside Raptor Study Group and the RSPB regarding bird records.
SNH 27th January 2011 Mike Shepherd Pre-scoping meeting in Perth	SNH made the following comments during the meeting: • MS explained that a study of golden eagle habitat usage in relation to forestry plantation management had been undertaken to the south of the west end of Loch Rannoch. • MS also confirmed that he wasn't aware of any other wind farm applications/proposals in the Talladh-a-Bheithe area. • MS suggested that it would be appropriate to assess any impacts on golden eagles in the context of the golden eagle population within the relevant SNH Natural Heritage Zone. • MS suggested that ideally further survey work to confirm the flight lines of the golden eagle pair, in the occurrence of breeding at Talladh-a-Bheithe during a successful breeding season, would be helpful. The RSBP concurred with this view. • MS responded that there is reasonable evidence that the pair of eagles use the area to the west for foraging rather than the wind farm site. • MS asked if it was possible to accommodate the desired number of wind turbines without the north study area that contained the golden plover. • MS agreed that field survey findings indicate that red-throated diver are not of concern for the Talladh-a-Bheithe wind farm. ACTION TAKEN: MS was not able to track down the study of golden eagle habitat usage in relation to forestry plantation management had been undertaken to the south of the west end of Loch Rannoch. It has been impractical to take a Natural Heritage Zone approach to assessing impacts on the golden eagle population since the site is located at the intersection of four separate NHZs which combined cover an extensive part of Scotland. Therefore the assessment has been undertaken using population and nest productivity data for Perthshire.

Consultee	Summary of Response
	The VP survey undertaken during the 2010 breeding period when the resident golden eagle pair did not complete nesting was repeated in 2012 and again in 2013.
Perth and Kinross Biodiversity Officer 28th April 2011 David Williamson - email	DW response: • Where the access track are planned near signs of bird nesting then I would ask for caution, and maybe time the work to avoid the breeding season. Black Grouse, Skylark, Meadow Pipit, Red Grouse, Snipe and Golden Plover are recorded close to the proposed access tracks. • A method statement for the access routes confirming the surveys prior to construction would suffice. • There are 23 different recorded bird species within the areas of the study zones, some of which are priority species, and there will need to be further information on the impact the proposed wind turbines would have on the different species. The Red and Amber status birds recorded within 500m of the wind farm study zones include Black Grouse, Common Sandpiper, Crossbill, Golden Eagle, Golden Plover, Meadow Pipit, Red Grouse, Red Throated Diver, Skylark, Snipe, Song Thrush, Teal, Wheatear, Whinchat and Willow Warbler. ACTION TAKEN: A Construction Environmental Management Plan (CEMP) will be prepared which will include a method statement specifically addressing monitoring and protective measures required to protect nesting birds during the construction phase. The Ornithology technical report has included all red and amber list status species identified by DW.
RSPB Scotland 13th December 2011 Claire Smith Scoping response – email with letter attached	Scoping response: • Satisfied that surveys discussed in meeting on 23/07/09, surveys undertaken to date and data presented in Scoping Report are appropriate for the site. Content survey methods conform with SNH guidance. • Suggest that northern study area has most potential to impact on birds due to its closeness to Coire Bhachdaidh SSSI. • RSPB requests black grouse habitat is created if leks displaced or habitat lost. Welcomes the use of the PAT model to determine golden eagle range use. • RSPB welcome surveys to identify areas of deep peat and would like these areas to be avoided. If blanket bog is unavoidably damaged, suitable areas of modified bog should be identified and restored as compensation. Two amendments to text required relating to golden eagle and Rannoch Lochs. ACTION TAKEN: After further consideration it was decided that the North study area would not be considered further as a potential location for wind turbine construction. Black grouse habitat enhancement will be a component of the Habitat Management Plan (HMP). Detailed peat depth surveys were undertaken to identify areas of deep peat. Amendments were made to the text of the ornithology technical report confirming that the Rannoch Lochs protected site is a SPA
SNH 12th December 2011 Scoping response letter issued via Energy Consents and proposed development Unit	Scoping response: • Key species to consider: golden eagle, hen harrier, osprey, peregrine, merlin, black-throated and red-throated diver, waders and black grouse. • Liaise with RSPB and Raptor Study Group. • Include collision risk analysis and flight line maps. • Provide mitigation with respect to nesting birds and any implications of any change in land

Consultee	Summary of Response
(ECDU)	management to birds. ACTION TAKEN: The Environmental Assessment has focussed on the target species golden eagle, hen harrier, osprey, peregrine, merlin, black- and red-throated diver and black grouse. TEP has regularly ben in contact with the Tayside Raptor Study Group and Highland Raptor Study Groups and the RSPB.
Cairngorms National Park Authority (CNPA) 2011 Scoping response	Scoping response: CNPA can sometimes have concerns with regard to the cumulative impact of wind farms upon the ability of raptors to move between areas outwith and within the Park. ACTION TAKEN: A cumulative assessment has been undertaken which takes careful account of all constructed wind farms within 30km of the site, as well as all wind farm applications currently in the planning process.
SNH 16th August 2012 John Burrows Meeting in Perth	JB requested that PAT modelling of the golden eagles should consider golden eagles that breed on the estate and their nearest neighbours in order to assess whether displacement would occur. If displacement did occur it would be against the SSSI objectives for the conservation of eagles. JB recognised that collision risk was very low although this does need to be proven through modelling. JB also stated that he was uncertain why disturbance effects on birds within the Drumochter Hills SPA were raised as a concern in SNH's scoping response. ACTION TAKEN: PAT modelling has been undertaken to predict range use by golden eagles resident breeding pair. Collision risk modelling has been undertaken for golden eagle. With the exception of feral greylag goose, no other species had more than three flight lines within the site at Potential Collision Height (PCH). TR concurred since there were no plans to position turbines within 6km of the Drumochter Hills SPA and therefore it would be very unlikely that the proposed wind farm would affect the birds therein.
Scottish Natural Heritage 7th May 2013 John Burrows Email	JB made the following response: • Assuming 36 hours of VP survey is completed during the breeding period (and preferably 72 hours to cover both breeding and non-breeding periods); this would provide a good foundation for undertaking collision risk modelling. • The PAT modelling results provide a very useful line of evidence. If the VP observations appear to contradict the PAT model predicted range use it might be worth undertaking a prey study to interpret the contradiction. • It is important that the impact assessment identifies any loss of foraging habitat within the golden eagle breeding pair's home range. JB also made reference to published SNH guidance relating to survey effort and the importance of an impact assessment considering the entire period of consent for the wind farm, typically 25 years. ACTION TAKEN: The PAT modelling prediction of golden eagle breeding pair range use appears to match VP observations. However a prey study was undertaken to provide further supporting evidence to complement the VP observations and PAT model predictions.

Consultee	Summary of Response
Scottish Natural Heritage 1st August 2013 John Burrows Email	JB made the following response: • Vantage point survey data should include the non-breeding period as well as the breeding period for golden eagle since the golden eagle breeding pair occupies the territory all year round. 36 hours of observation during the 2013 breeding period would seem appropriate. • Red-throated diver shows much variation in terms of sensitivity to disturbance. It would seem that a 250m buffer for operational disturbance from the development may be appropriate but this may depend on how disturbed the site currently is. • A three visit Brown and Shepherd survey in 2013 will be sufficient to give an index of activity across the site. The late start of the Brown and Shepherd survey due to cold weather is not a concern and should not have skewed survey results. ACTION TAKEN: The vantage point survey was continued until a minimum of 37.5 hours of survey effort was completed at each vantage point survey location. A minimum buffer of 300m was applied around Loch Mheugaidh to protect occasional use of the waterbody by red-throated diver.

Desk-based Study

9.3.2 Desktop survey records for target bird species are summarised in Table 9.9. Full details of desktop survey records are provided in Technical Appendix 9.1 Ornithological Assessment and Technical Appendix 9.2 Part A Confidential Annex.

Table 9.9 Desktop survey records for target bird species

Species	Source	Record Details
Golden eagle	TRSG	One pair of golden eagle breeds in the Coire Bhachdaidh SSSI (Site EA1), over 3km from the study area. This pair has successfully nested within the SSSI in 2012, 2010, 2009, 2007, 2006 and 2005 as well as 2013. The golden eagle pair is also nesting in 2014 although the outcome is to be confirmed. Nesting in 2011 was suspected but unconfirmed. Nesting records extend back to 1982 although the site was not checked every year. Historic TRSG observations indicate that the golden eagle pair is likely to forage primarily over land to the west of Loch Ericht due to a greater abundance of prey (Steele, pers. comm., 2009). Non-breeding eagles from the east of the Estate are known to forage over the Talladh-a-Bheithe Estate occasionally, though these sub-adults are more often observed around Loch Garry, 7.5km northeast of the study area (Steele, pers. comm., 2010)
Golden eagle	Highland Raptor Study Group	A number of neighbouring golden eagle territories are present, but none with nest sites within 6km of the proposed development (Benn, pers. comm., April 2013). The nesting history of the Coire Bhachdaidh SSSI adult golden eagle pair and details of golden eagle nesting activity in the wider locality is provided in the Confidential Annex (TEP Report Ref.: 3968.005)
Golden eagle	goldeneagletracking.blogspot.co.uk	A satellite-tagged juvenile golden eagle was recorded periodically visiting the Talladh-a-Bheithe Estate between April and September 2012.
Hen harrier	TRSG	Hen harrier nest in the plantations on the southeast and southwest boundaries of the Talladh-a-Bheithe Estate. However the majority of records in the last five years have been located over 3km from the study areas.
Merlin	TRSG Savills 2006	One traditional merlin nesting site west of the Garrocher Plantation has been frequented historically but no breeding has been confirmed in recent years. Another site, inside the Garrocher plantation within the study area was used by merlin in 2006 (ME 1). This merlin pair occasionally uses an alternative nest site

Species	Source	Record Details
		in the Car Mor plantation (Site ME 2). This site is within 1km of the study area though no nesting has been confirmed recently. A merlin nest site was confirmed on the Craiganour Estate approximately 4.5km from the study area (ME 3, 2006)(Savills Ltd, 2006)
Peregrine	TRSG	Anecdotal evidence suggests that peregrine have successfully bred within the Coire Bhachdaidh SSSI during the early 1990s (Robertson, 2010; Steele, 2010)
Golden plover	RSPB TRSG	Breeding golden plover are present approximately 3.5km to the north east of the study area.
Black grouse	RSPB	Three black grouse lek sites have been recorded within 1.5km of the study area during 2007. The closest lek site, comprising four birds, was within the study area. The next nearest lek site was recorded 300m west of the study area and comprised five birds.
Red throated diver	RSPB	No evidence of red-throated diver nesting has ever been recorded on the Talladh-a-Bheithe estate. A red-throated diver site is located approximately 2.5km from the study area (RH2). Individual red-throated diver records exist for Loch Ericht but these are likely to be the same birds at RH2. Nesting was confirmed at a third red-throated diver site in 2007 (RH1) approximately 1.5km from the study area.

Designated Sites

9.3.3 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 ornithological interests within 10 km of the proposed development.

9.3.4 Eight designated sites were identified within 10 km. A summary of their citations is provided in Table 9.10 and their locations shown in Figure 9.2.

9.3.5 The Drumochter Hills SPA/SSSI is the only protected site designated for birds within 5km of Dalwhinnie. The Drumochter Hills SPA/SSSI is located approximately 500m south east of the Dalwhinnie site.

Table 9.10 Protected sites located in the vicinity of the Talladh-a-Bheithe estate

Protected Site	Location	Reason for designation
Coire Bhachdaidh SSSI	Approximately 50m to the west of the site.	The site is nationally important for its assemblage of habitats, rare plants and breeding birds. The site supports a diverse assemblage of breeding birds including golden eagle, merlin, red grouse, twite, wheatear, ring ouzel and golden plover.
Rannoch Lochs SPA	4.8km to the southwest of the *site*.	This site is comprised of a number of small sites on the periphery of Rannoch Moor. The site qualifies under Article 4.1 by supporting populations of European importance of the Annex 1 species black-throated diver. In 1986-1996 the SPA supported 7 pairs of black-throated diver (at least 4.4% of the Great Britain breeding population.
Rannoch Lochs SSSI (Lochan Loin nan Donnlaich)	4.8km to the southwest of the site.	Lochan Loin nan Donnlaich is one of five waterbodies which make up this SSSI which is designated for its breeding population of black-throated divers.
Black Wood of Rannoch SSSI	4.8km 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

Protected Site	Location	Reason for designation
		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 SPA	5.3km to the north west of the site.	The site qualifies under Article 4.1 for its breeding populations of dotterel.
Ben Alder and Aonach Beag SSSI	5.3km to the north west of the site.	This site is designated for its montane plant communities, rare plants and breeding birds including ptarmigan, golden plover and dunlin.
Drumochter Hills Special Protection Area (SPA)	5.6km to the north of the site.	The site qualifies under Article 4.1 for its breeding populations of dotterel and merlin.
Drumochter Hills Site of Special Scientific Interest (SSSI)	5.6km to the north of the site.	Botanical interest including western blanket mire, *Calluna* heath, high mire levels and poor fen. The upland breeding bird assemblage is exceptional.

Field Surveys

9.3.6 A summary of the results of each survey is provided below; full results of all ecology surveys are provided in Technical Appendix 9.1 Ornithological Assessment.

Flight Activity Surveys 2009-2013

9.3.7 A total of 575 flights of 14 target species were recorded during vantage point surveys completed between October 2009 and August 2013. These flights are listed in Table 9.11 and more detail is provided in Appendix 9.1. The total number of flights presented in Table 9.11 is based on the number of flights multiplied by the number of individuals in the flock. Flight lines for selected target species including golden eagle, hen harrier, merlin and red-throated diver are included in Technical Appendix 9.1 Ornithological Assessment – Drawings G3968.012C to G3968.027B.

Table 9.11 Summary of Target Species Flights Recorded During Vantage Point Surveys Completed Between October 2009 and August 2013

Species	Total number of flights			
	Non-breeding 2009-10	Breeding 2010	Breeding 2012	Breeding 2013
Pink-footed goose	0	347	0	0
Greylag goose*	21	41	0	2
Teal	0	0	0	1
Golden Eagle	9	13	4	18
Hen harrier	1	3	1	4
Merlin	1	3	0	4
Peregrine	1	0	1	2
Osprey	0	1	0	0
Golden plover	0	14	2	3
Greenshank	0	0	0	0
Curlew	0	0	0	4

Species	Total number of flights			
	Non-breeding 2009-10	Breeding 2010	Breeding 2012	Breeding 2013
Snipe	0	3	0	0
Black grouse	22	44	0	0
Red-throated diver	0	2	3	2

*The greylag goose population associated with Talladh-a-Bheithe is a resident feral population. Therefore this species will not be considered further in this assessment.

Brown and Shepherd Survey

9.3.8 A total of 28 species were recorded during the Brown and Shepherd survey conducted in 2013 at Talladh-a-Bheithe. 23 species were assessed as having breeding territories (birds displaying breeding behaviour on one or more survey visit) within the ornithology survey area. Survey results were consistent with those of 2010 and 2012. Maps of survey results for 2013 are included in Technical Appendix 9.1 Ornithological Assessment – Drawings G3986.006A to G3968.008B.

9.3.9 Table 9.12 provides details of breeding status species of conservation concern recorded displaying breeding behaviour within the survey area in 2010, 2012 and 2013.

9.3.10 It should be noted that the survey areas in 2010, 2012 and 2013 all vary since the wind farm layout evolved between 2010 and 2013. The survey area in 2010 included a ridge of hills to the north of the current study area which supported a much higher density of golden plover breeding territories compared with the 2013 survey area.

Table 9.12 Breeding status of Species of Conservation Concern recorded with the survey area in 2010, 2012 and 2013

Species	2013 Breeding status (No. of territories in survey area)	2013 Territory Density (territories per km^2)	2012 Territory Density (territories per km^2)	2010 Territory Density (territories per km^2)	Conservation Status
Cuckoo (CK)	Ps	-	-	-	R UK
Common sandpiper (CS)	Pr (1)	0.13	0.58	0.17	A
Curlew (CU)	Ps	-	-	-	UK A
Dunnock (D)	Ps	-	-	-	UK A
Greenshank (GK)	C (1)	0.13	-	0.17	Sch1
Golden plover (GP)	Pr (4)	0.54	-	1.70	A
Hooded crow (HC)	Pr (2)	0.27	-	0.09	SBL
Lesser redpoll (LR)	Pr (2)	0.27	0.29	-	UK R
Mistle thrush (M)	Ps	-	-	0.09	A
Meadow pipit (MP)	C (101)	13.6	17.4	5.85	A
Robin (R)	Pr (2)	0.27	0.58	0.09	SBL

Species	2013 Breeding status (No. of territories in survey area)	2013 Territory Density (territories per km^2)	2012 Territory Density (territories per km^2)	2010 Territory Density (territories per km^2)	Conservation Status
Red grouse (RG)	C (5)	0.67	1.16	2.5	UK A
Skylark (S)	C (17)	2.28	6.37	6.8	UK R SBL
Snipe (SN)	Pr (2)	0.27	0.58	0.60	A
Song thrush (ST)	Ps	-	-	-	UK R
Tree pipit (TP)	Pr (2)	0.27	-	-	UK R
Wheatear (W)	Ps	-	-	0.09	A
Willow warbler (WW)	Pr (2)	0.27	4.35	0.17	A

Sch1 = Schedule 1; UK = UKBAP; R = red-list BoCC; A = amber-list BoCC; SBL = Scottish Biodiversity List; LBAP = LBAP priority species. C = confirmed breeder; Pr = probable breeder; Ps = possible breeder.

Breeding Bird Survey at Dalwhinnie

9.3.11 A total of 34 species were recorded during the breeding bird survey conducted in 2013 at Dalwhinnie. 17 species were assessed as having breeding territories (birds displaying breeding behaviour on one or more survey visit) within the Dalwhinnie survey area.

9.3.12 Table 9.13 provides details of breeding status species of conservation concern recorded displaying breeding behaviour within the survey area.

Table 9.13 Breeding status of Species of Conservation Concern recorded with the Dalwhinnie survey area in 2013

Species	Breeding status (No. of territories in survey area)	Conservation Status
Common sandpiper (CS)	Pr (3)	A
Scottish crossbill (CY)	Ps	Sch1 UK A SBL
Dunnock (D)	Pr (2)	UK A
Greylag goose (GJ)	Ps	A
Grey wagtail (GL)	Ps	A
Lapwing (L)	Pr (3)	SBL
Mallard (MA)	Pr (1)	A
Meadow pipit (MP)	Pr (9)	A
Oystercatcher (OC)	Pr (2)	A
Robin (R)	Pr (1)	SBL
Red grouse (RG)	Ps	UK A
Ringed plover (RP)	Pr (1)	A

Species	Breeding status (No. of territories in survey area)	Conservation Status
Siskin (SK)	Ps	SBL
Snipe (SN)	Ps	A
Song thrush (ST)	Ps	UK R SBL
Swallow (SL)	Ps	A
Willow warbler (WW)	Pr (5)	A

Sch1 = Schedule 1; UK = UKBAP; R = red-list BoCC; A = amber-list BoCC; SBL = Scottish Biodiversity List; LBAP = LBAP priority species. C = confirmed breeder; Pr = probable breeder; Ps = possible breeder.

Rannoch railway sidings scoping bird survey

9.3.13 On the 13th May, 2013 a single greenshank was heard calling from land approximately 500m southeast of the site on the opposite side of the railway. A pair of common sandpiper was observed on land close to the station approximately 1km south of the proposed works. Eight snipe were recorded flying over land 500m south of the site and three female red grouse were recoded to the east on the opposite side of the railway line. Across both visits up to four pairs of meadow pipit were recorded in land within 1 km of the works site, with a single whinchat territory also identified within this distance.

Nest surveys

9.3.14 Baseline survey information regarding nest sites of target species recorded between 2009 and 2013 are presented in Table 9.14.

Table 9.14 Nest sites for target species recorded between 2009 and 2013

Species	Survey Date	Nest Survey Findings
Golden eagle	2010	Nest abandoned prior to egg laying (EA1) .
	2011	Possible nesting at EA1a.
	2012	Eagle young recorded at nest site EA1a.
	2013	Two eagle young recorded at EA1a. (Steele, *pers. comm*., Jun 2013).
	2014	Two eagle young recorded at EA1a. (Oliver, *pers. comm*., Jun 2014).
Hen harrier	2010	No suitable hen harrier nesting habitat was identified within the site. Two nesting pairs at least 2.5km from site.
	2011	A successful hen harrier nest site was recorded just within 2km of the site in 2011 (HH6).
	2012-2013	No evidence of hen harrier nesting was recorded within the Talladh-a-Bheithe Estate.

Species	Survey Date	Nest Survey Findings
Merlin	2009	Merlin pair fledged at least one young (ML1).
	2010	No merlin nests were recorded within the Talladh-a-Bheithe Estate. A pair of merlin may have nested on the Craiganour Estate to the east.
	2012	Successful merlin nesting was over 3km south of the site in 2012 (ML4). Possible nesting occurred within 2km to west of site but no nesting within the site itself.
	2013	No evidence of nesting merlin within 1km of the site in 2013.
Peregrine	Peregrine nest survey 2010	A peregrine was recorded in suitable habitat 2.2km to the north of the site in 2010 (PE1) but nesting was disproven.
Black grouse	2010	Seven black grouse lek sites located within the Talladh-a-Bheithe estate. Only three lek sites exceeded two males. Overall a total of 19 males and 3 females were recorded. BK6 is located within the site; peak count 3 males. BK5 located 300m to west of site; lek count five males.
	2013	10 males recorded at BK5. Survey findings indicated grouse may be nesting in pre-thicket plantation to north lek site.
Red throated diver	2010	One young recorded at nest site RH1 east of the Talladh-a-Bheithe estate. Incoming flights came from some within passing within site. Adult pair recorded at RH2 at least 2km to west of site.
	2012	RH1 was not visited in 2013. Adult pair recorded at RH2 at least 2km to west of site.
	2013	One young recorded at nest site RH1 east of the Talladh-a-Bheithe estate. RH2 was not checked although anecdotal evidence indicates that nesting took place.
Greenshank	2010	A pair of greenshank was observed feeding at Loch Mheugaidh It is likely that greenshank nested in this location in 2010.
	2013	A pair of greenshank was confirmed breeding within the site (GK1).

Prey study

9.3.15 Overall numbers of red grouse and mountain hare are relatively low (compared to a managed grouse moor) but it can be clearly seen from the distribution of droppings that areas to the north and north-west of the proposed development contain more prey than the wind farm area or area to the south of the wind farm. Findings of the prey study are presented in Confidential Annex 9.2 Part B Eagle Assessment.

Collision Risk Modelling

9.3.16 The number of target species flights and individuals recorded passing through the collision risk zone (i.e. the rotor swept area plus a 200m buffer) at potential collision height (PCH) from all VP survey data (October 2009 – August 2013) are shown in Table 9.15.

Table 9.15 Number of Flights and Individuals Recorded Passing Through the Collision Risk Zone (October 2009 – August 2013)

Species	Total Number of Flights (Individuals) Recorded Flying Through Collision Risk Zone	Flights Through Collision Risk Zone at PCH	CRM carried out
Pink-footed geese	217	0	No
Greylag goose	24	26	No*
Teal	0	0	No
Golden Eagle	8	7	Yes
Hen harrier	4	3	No
Merlin	8	0	No
Peregrine	3	1	No
Osprey	1	1	No
Golden plover	1	0	No
Greenshank	0	0	No
Curlew	2	0	No
Snipe	0	0	No
Black grouse	25	0	No
Red-throated diver	3	1	No

*The greylag goose population associated with Talladh-a-Bheithe is a resident feral population. Therefore this species will not be considered further in this assessment.

9.3.17 Data from all survey years (2009-2013) were used in the CRM for golden eagle. The results are presented in Table 9.16. Details of the calculations used to produce the collision risk estimates are provided in Technical Appendix 9.1 Ornithological Assessment.

9.3.18 No PCH flights within 245 m of a proposed turbine location were recorded during winter 2009/10 and only one flight at PCH during 2012 (and this was beyond the 2km viewshed from the VP) and therefore modelling has not been undertaken for these periods.

Table 9.16 Findings of collision risk modelling for golden eagle (adults and sub adults)

Estimated Mortality Assuming:*									
				Conservative			Non-conservative		
Period	Age	Season	Excludes grallochs	98%	99%	99.8%	98%	99%	99.8%
2009/10	Sub-adult	Breeding	NA	0.133	**0.066**	0.013	0.054	**0.027**	0.005
2013	Adult	Breeding	No	0.101	**0.051**	0.010	0.022	**0.011**	0.002
2013	Adult	Breeding	Yes	0.104	**0.052**	0.010	0.017	**0.008**	0.002
2013	Sub-adult	Breeding	No	1.148	**0.574**	0.115	0.561	**0.280**	0.056
2013	Sub-adult	Breeding	Yes	0.038	**0.019**	0.004	0.031	**0.016**	0.003
*Values in bold represent SNH Recommended Avoidance Rates for species.									

9.4 Assessment of Effects

9.4.1 This section provides an overview of potential effects of wind farm developments on birds, identifies VERs and assesses the likely effects of the proposed development on these VERs. For each VER, the potential effect is assessed for each of the construction, operation and decommissioning phases of the proposed wind farm.

Potential Effects on Ornithological Receptors

9.4.2 The main ways in which a wind farm may affect ornithological receptors are via:

- Habitat loss due to land-take;
- Disturbance or displacement; and
- Collision with turbines.

9.4.3 In addition to effects which are directly related to the proposed development, there may be other effects which arise as a result of the combined effects of multiple wind farms within the local or regional area.

9.4.4 Each of these forms of potential effect is discussed in turn below for each phase of the proposed development (construction, operation and decommissioning).

Effects During Construction

Habitat Loss

9.4.5 Construction of turbine bases, access tracks and other structures will lead to direct habitat loss and could also result in destruction or damage to nests, eggs and/or chicks. The effects of habitat loss will depend upon the extent of land-take and the type of habitat affected. Under the Wildlife and Countryside Act 1981 (as amended) it is an offence to kill or injure any bird, or to damage or destroy nests and eggs; as discussed in Section 9.5, mitigation measures will be put in place to reduce the risk of nest damage or destruction occurring.

Disturbance and Displacement

9.4.6 During the construction phase of the proposed development, the potential effects of associated noise and visual disturbance could lead to the temporary displacement or disruption of breeding and foraging birds. The level of impact depends on the timing of potentially disturbing activities, the extent of displacement (both spatially and temporally) and the availability of suitable habitats in the surrounding area for displaced birds to occupy.

9.4.7 Potential adverse effects are likely to be greatest during the breeding season (mainly between March and August, depending on the species under consideration); behavioural sensitivity to the effects will vary between species (Table 9.6).

9.4.8 Disturbance of birds due to construction activities of this type have not been sufficiently quantified and the available information is often contradictory. However, it is likely that construction impacts will be greater on species that are intolerant of noise and other sources of disturbance. Larger bird species, those higher up the food chain or those that feed in flocks in the open tend to be more vulnerable to disturbance than small birds living in structurally complex or closed habitats such as woodland (Hill*, et al.*, 1997).

9.4.9 The potential effects associated with construction activities are only likely to occur for as long as the construction phase continues, and are thus short-term. These can be readily mitigated by avoiding sensitive areas and by timing construction activities to avoid periods where sensitive species are present, such as the breeding season. The exception to this would be if an adverse effect on the breeding success of a receptor were such that the local population becomes extinct and replacement through recruitment or recolonisation does not occur. For example, a recent study found that snipe and curlew densities declined significantly on wind farms during construction and had not recovered by the first year post-construction (Pearce-Higgins *et al.,* 2012).

Effects During Operation

Disturbance and Displacement

9.4.10 The operation of turbines and associated human activities for maintenance purposes also has the potential to cause disturbance and displace birds from the site. Disturbance effects during the operational phase may be less than during the construction phase, as species may become habituated to turbines and there is less disturbance due to human activities on site.

9.4.11 Studies have shown that, in general, species are not disturbed beyond 500 to 800m from turbines (e.g. Drewitt & Langston 2006 and references therein, Hötker *et al* 2006, Pearce-Higgins *et al* 2009) and, in some cases, birds do not appear to have been disturbed at all (e.g. Devereux *et al* 2008, Fielding & Haworth 2010, Whitfield *et al* 2010, Douglas *et al* 2011).

9.4.12 A study was undertaken of bird abundance data from 19 globally-distributed wind farms using meta-analysis (Stewart *et al*., 2007a). This study demonstrated that following the construction of wind farms Anseriformes (geese) experienced greater declines in abundance than other taxa, followed by Charadriiformes (waders), Falconiformes (falcons) and Accipitriformes (hawks), and Passeriformes (perching birds).

9.4.13 A recent study across 12 large (14 to 42 turbines) upland wind farms in Scotland and northern England concluded that golden plover, curlew, snipe, buzzard, hen harrier, meadow pipit and wheatear all underwent reduced densities of between 15 and 53% within 500 metres of the turbines (Pearce-Higgins *et al.,* 2009). No reduced abundance was observed for several other species including kestrel and lapwing. Some evidence of

reductions in bird abundance was also identified for access tracks although no evidence was found to show that bird abundance was reduced close to overhead lines.

9.4.14 In contrast, studies of golden plover (Fielding & Haworth 2012; Douglas et al 2011) and curlew (Whitfield et al 2010) involving long-term monitoring of these species found no evidence of displacement due to wind farm infrastructure in either species. However, a more recent study found that breeding densities for snipe and curlew which had declined during construction did not recover following the completion of construction (Pearce-Higgins et al 2012).

9.4.15 A detailed review was undertaken by Hotker *et al.,* (2006) of a large number of studies into the displacement effects of wind farms on various bird species. The review showed that avoidance distances during the breeding season were smaller than outside the breeding season. Only a small number of wader species, including black-tailed godwit, avoided wind turbines during the breeding season.

9.4.16 Greater avoidance distances from wind farms were generally observed outside the breeding season, especially in birds which require open habitats such as geese, ducks and waders (Hotker *et al.,* 2006). Geese were particularly sensitive showing avoidance distance of several hundred metres. Some studies also identified wind farm displacement distances of between 50 and 150 metres for lapwing and golden plover during the non-breeding season. Notable exceptions when examining displacement distances included grey heron, birds of prey (especially buzzard and kestrel), oystercatcher, gulls, starling and crows which continued to use land close to wind farms during the non-breeding period.

9.4.17 Hotker *et al*. (2006) also considered the issue of birds habituating to the presence of wind farms over time. They concluded that in 45% of the studies examined good evidence of habituation was observed over time during the breeding season. Species shown to demonstrate habituation in at least one study included wigeon, mallard, eider, common scoter, buzzard, kestrel, oystercatcher, golden plover and lapwing. However the opposite trend, where distances between the birds and the wind farm increased, was identified in white-fronted goose, buzzard, curlew, golden plover, lapwing and oystercatcher, again at least in one study.

9.4.18 Individual turbines, or a wind farm as a whole, may present a barrier to the movement of birds, restricting or displacing birds from much larger areas. The effect this would have on a population is subtle and difficult to predict with any degree of certainty. If birds regularly have to fly over or around obstacles or are forced into suboptimal habitats, this may result in reduced feeding efficiency and greater energy expenditure. By implication, this will reduce the efficiency with which they accumulate reserves, potentially affecting breeding success.

Collision with Turbines

9.4.19 Collision of a bird with turbine rotors is almost certain to result in the death of a bird. In low density populations, such as raptors, this could have a more adverse effect on the local population than in higher density populations (e.g. skylark) because a higher proportion of the local population would be affected in a low density population. The frequency and likelihood of a collision occurring depends on a number of factors. These include aspects of the size and behaviour of the bird (including their use of the site), the nature of the surrounding environment and the structure and layout of the turbines.

9.4.20 Collision risk is perceived to be higher for birds that spend much of their time in the air, such as foraging raptors and those that have regular flight paths between feeding and breeding/roosting grounds (e.g. geese). The risk of bird collisions at wind farms is greatest in areas where large concentrations of birds are present (such as on major migration routes), and in poor flying conditions, such as strong winds that affect birds' ability to control flight manoeuvres, or in rain, fog, and on dark nights when visibility is reduced (Langston & Pullan 2003, Drewitt

& Langston 2006 and references therein). Birds may also be more susceptible if the wind farm is located in an area of high prey density. For diurnal foraging raptors, the proximity of structures on which to perch can increase the likelihood of collision with turbines (e.g. Percival 2005 and references therein) although some studies in North America have found that there is no correlation between perching on turbines and collision risk (Smallwood *et al.,* 2009).

9.4.21 Hotker *et al*., (2006) noted that species or species groups which are less wary of wind farms are more likely to be victims of collisions with turbines than species which avoid or fly around wind farms by a wide margin. Some birds of prey tend to fly straight through wind farms whilst geese and waders tend to fly around wind farms. Therefore birds of prey are regular collision victims in comparison with geese and waders which were found less regularly as collision victims.

9.4.22 It should be noted that operational disturbance and collision risk effects are mutually exclusive in a spatial sense, i.e. a bird that avoids the wind farm area due to disturbance cannot be at risk of collision with the turbine rotors at the same time. However, they are not mutually exclusive in a temporal sense; a bird may initially avoid the wind farm but habituate to it and then be at risk of collision.

9.4.23 Passerines nesting within a wind farm site would be expected to be regularly flying between turbines and could therefore be expected to be most at risk of collision. However, passerines tend to fly below PCH and evidence suggests that passerines collide with turbines only infrequently. Moreover, most of the species concerned are of low or negligible nature conservation value. Collision is therefore mainly considered in relation to species of high sensitivity, e.g. target raptor species and species not particularly manoeuvrable in flight, such as geese and swans.

Effects During Decommissioning

9.4.24 Turbine removal may cause disturbance to birds breeding, foraging or roosting within the proposed development. The level of impact will depend on the bird species present at the time of decommissioning and cannot be reliably predicted at this stage. However, as decommissioning activities are of a similar type and intensity to construction activities, the assessment considers that the potential effects of decommissioning will be similar in nature to the potential effects of construction, with the exception that habitat is likely to be restored and displaced birds will be able to return to abandoned territories.

Assessment of Conservation Value of VERs Identified during Baseline Studies

9.4.25 A summary of identified avian Valued Ecological Receptors (VERs) at the site is given in Table 9.17. The value assigned to each of the species is based upon baseline results from all desk study and survey work as opposed to the species conservation/protection status.

Table 9.17 Summary of the identified avian receptors at the proposed development

Protected Sites / Bird Species	Conservation Value	Rationale	Conservation Value within the site	Valued Ecological Receptor (VER)
Coire Bhachdaidh SSSI	High (National)	Approximately 50m to the west of the site. Designated for golden eagle, merlin, red grouse, twite, wheatear, ring ouzel and golden plover.	N/A	Yes
Rannoch Lochs SPA	Very high (International)	4.8km to the southwest of the *site*. Qualifying species black-throated diver not recorded within site or its locality or within proposed Dalwhinnie jetty site. The proposed railway sidings works near Rannoch station are approximately 960m from the Dubh Lochan (the nearest part of the SPA) but there is no direct line of sight between the SPA and the Rannoch railway siding site due to topography.	N/A	No
Rannoch Lochs SSSI (Lochan Loin nan Donnlaich)	High (National)	Refer to Rannoch Lochs SPA	N/A	No
Black Wood of Rannoch SSSI	Very high (International)	4.8km to south of the site. Site designated for its breeding upland and woodland birds. SSSI too distant from development to be effected.	N/A	No
Ben Alder and Aonach Beag SPA	Very high (International)	5.3km to the north west of the site. Qualifying species dotterel. Dotterel was not recorded within site or within the Brown and Shepherd survey area. .	N/A	No
Ben Alder and Aonach Beag SSSI	High (National)	5.3km to the north west of the site. Designated for breeding birds including ptarmigan, golden plover and dunlin.	N/A	Yes
Drumochter Hills SPA	Very high (International)	5.6km to the north of the site. Qualifying species include dotterel and merlin.	N/A	Yes
Drumochter Hills Site of Special Scientific Interest (SSSI)	High (National)	5.6km to the north of the site. Designated for upland breeding bird assemblage.	N/A	Yes
Pink-footed goose	High (National)	Moderate level of flight activity.	Medium (Regional)	Yes
Greylag goose	Low (Local)	Low level of flight activity. Birds are part of a local feral population.	Negligible	No
Teal	Medium (Regional)	Very low level of flight activity. No nesting activity within site.	Negligible	No

Protected Sites / Bird Species	Conservation Value	Rationale	Conservation Value within the site	Valued Ecological Receptor (VER)
Golden Eagle	High (National)	Low level of flight activity. 1 pair regularly nest within Coire Bhachdaidh SSSI.	High (National) Medium (Regional) - sub adults	Yes
Hen harrier	High (National)	Low level of flight activity. 1 pair historically nest within 2km of site.	Low (Local)	Yes
Merlin	High (National)	Low level of flight activity, all at low levels. 1 pair occasionally nest within site.	Medium (Regional)	Yes
Peregrine	High (National)	Low level of flight activity. No nesting within 2km of site.	Low (Local)	Yes
Osprey	High (National)	Very low level of flight activity. No nesting activity with 6km of site.	Low (Local)	Yes
Golden plover	High (National)	Low level of flight activity. Up to four pairs nesting within 500m of site.	Low (Local)	Yes
Greenshank	High (National)	No flight activity recorded within site. 1 pair nesting within site.	Medium	Yes
Curlew	Medium (Regional)	Very low levels of flight activity.	Negligible	No
Snipe	Medium	Very low level of flight activity, all at low levels. 2 pairs nesting within site.	Negligible	No
Black grouse	Medium (Regional)	Low level of flight activity, all at low levels. Small lek within site. Large lek on access track to west.	Low (Local)	Yes
Red-throated diver	High (National)	Low level of flight activity. No nesting within 1km of site. Occasional low levels foraging/roosting at Loch Mheugaidh	Low (Local)	Yes

9.4.26 Receptors of negligible conservation value are not considered further in this assessment; these receptors are generally common and widespread species.

9.4.27 Results from all relevant surveys have been compiled to produce a baseline description for each particular receptor detected or reported. These are then discussed as species groups or individual receptor accounts as appropriate and potential construction and operational effects are considered for each receptor.

9.4.28 Potential decommissioning effects are considered to be of the same nature as construction effects, with the exception that habitat is likely to be restored following reinstatement after construction is complete and displaced birds able to return to abandoned territories.

Predicted Effects

9.4.29 In baseline sections for each species, counts of flights refer to the total number recorded in the relevant season (i.e. breeding or non-breeding) through VP surveys between October 2009 and August 2013 and breeding territory totals refer to the total number of territories recorded in 2013.

Pink-footed Geese

9.4.30 Pink-footed goose is included on the UK BoCC Amber list due to the large numbers that winter in the UK (at least 20% of the NW European flyway) and its restricted distribution (at least 50% of birds in ten or fewer sites). Scotland is a key wintering area for the populations from Iceland and Greenland, with large feeding and roosting flocks in eastern and central areas, especially in autumn and early winter. Numbers peak in October when the population is estimated to be 200,000 birds, falling to 100,000-150-000 birds in winter/spring.

Baseline

9.4.31 347 pink-footed geese were observed migrating across the Talladh-a-Bheithe Estate southwards toward their wintering grounds in September 2010. All of the geese flew above the PCH with the majority flying at heights exceeding 200m. Other pink-footed geese were also observed flying across land outside the Estate indicating that pink-footed geese were migrating on a broad front across the wider area rather than exclusively through the Talladh-a-Bheithe Estate.

Site preparation and construction

9.4.32 Activity was confined to high flights over the site (at least 150m above ground level) and surrounding area and therefore it is highly unlikely that birds will be displaced during construction activities and the construction phase of the development will have no effect on pink-footed geese.

Operation

9.4.33 Moderate levels of pink-footed goose flight activity occurred over the site in September 2010. It is likely that the geese observed flying over the site were migrating. This being the case it is unlikely that the geese would fly at PCH since the geese would need to fly high enough to ensure adequate clearance of the surrounding hills and mountains. Therefore any collision effect on pink-footed geese would be of negligible magnitude and therefore not significant.

9.4.34 For the same reasons discussed concerning disturbance/displacement effects on pink-footed geese during the construction phase, there are also no predicted effects of this nature during the operational phase of the development. Therefore no birds will be displaced during the operational phase of the development will have no effect on pink-footed geese.

Golden eagle

9.4.35 Golden eagle is an amber-listed Bird of Conservation Concern and is an Annex 1 species on the *EU Birds Directive* and a Schedule 1 species under the *Wildlife and Countryside Act 1981, as amended*. Detailed information relating to golden eagle survey findings, impact assessment and mitigation are presented in Confidential Annex 9.2 Part B Eagle Assessment.

Baseline

9.4.36 The Coire Bhachdaidh SSSI within the Talladh-a-Bheithe Estate is designated for its breeding golden eagles. The pair of golden eagles which breed in the SSSI (EA1) represent 1 of 22 pairs of golden eagle in Tayside according to 2011 data (Etheridge *et al*, 2013).

9.4.37 The development is located outside of the 3km core area of foraging habitat within which the golden eagle pair are likely to spend 50% of their time foraging (McGrady, 2010).

9.4.38 Analysis of data within the Scottish Raptor Monitoring Scheme (SRMS) annual reports 2007 to 2011 confirms that at least 77 young golden eagles were fledged in Tayside during this five-year period. The resident pair of golden eagle at Coire Bhachdaidh SSSI fledged two young in this period, therefore contributing approximately 3% of fledged young to the Tayside golden eagle population (2007 to 2011). The Tayside golden eagle population was used as a baseline in this case since the site is close to the border of four separate Natural Heritage Zones (NHZs).

9.4.39 Data provided by TRSG and the Highland Raptor Survey Group indicates that the Coire Bhachdaidh SSSI eagle pair is one of the most consistent breeding pairs within 15km of the Talladh-a-Bheithe Estate.

9.4.40 The 2010 Brown and Shepherd survey confirmed that red grouse, an important prey item for golden eagle, were most abundant on the hills between the Garrocher Plantation and the north boundary of the Talladh-a-Bheithe Estate, outside of the site. This was also backed up by the findings of the prey study (Confidential Annex 9.2 Part B Eagle Assessment.

9.4.41 The VP survey results for the period 2009 to 2013 provide evidence to demonstrate that the site is not on the whole an important foraging area for golden eagle adults or sub adult birds. There is some evidence, however that the slopes to the north of the Garrocher Plantation has some value for foraging golden eagle (resident adult pair and non-resident sub adults). This finding is supported by the PAT model produced by Natural Research and collision risk modelling and the findings of the 2013 prey study.

Site preparation and construction

9.4.42 A study by Watson and Dennis (1992; in Ruddock and Whitfield, 2007) concluded that in Scotland increased human accessibility to golden eagle nest sites was linked to decreased productivity and nest site choice. Furthermore disturbance in the pre-laying period can cause pairs to switch to a different nest site (D. Walker, pers. comm.; in Ruddock and Whitfield, 2007). As in other species, it is also likely that different pairs may react differently according to their prior exposure to disturbance sources.

9.4.43 Ruddock and Whitfield (2007) concluded that their study revealed that active disturbance occurred typically at an upper limit of 750 to 1000 m from a golden eagle nest site but later implied an upper limit of disturbance at 800 m was more realistic, with recommended protective buffers ranging from 300m to 800m.

9.4.44 Both alternate nest sites associated with the Coire Bhachdaidh SSSI are located more than 3km from the nearest proposed wind turbine or access. There is no line of sight between the nest sites and wind turbines and access tracks associated with the proposed development since the nest sites are located on the far west side of a high ridge within the SSSI. Therefore it is highly unlikely that the proposed on-site construction activities would cause disturbance/displacement of the nest site.

Adults

9.4.45 The results of the VP work show that the wind farm area is infrequently used by the resident eagle pair at Talladh a Bheithe. This is backed up by the PAT model which shows a range overlap of only 3.9%. The prey

study suggests that this is likely to be linked to prey availability as prey numbers (at least in terms of red grouse and mountain hare) are considerably lower within the wind farm area compared to further north and west within the estate. It is likely that there will be some displacement from the wind farm area during the construction period however construction activities would be undertaken in a staged approach so disturbance effects would not occur across the entire study area at any one time. It is anticipated that the construction period would be 15 months so under a worse-case scenario it is possible that construction activities would overlap with two breeding periods. However, based on the relative unimportance of this area to the eagle pair this is unlikely to have a significant effect on the productivity or survival of this eagle pair. This is assessed as being a temporary adverse effect which is not significant. Notwithstanding this, mitigation is proposed to offset any residual effect (see section 9.5)

9.4.46 There is a possibility that barge traffic on Loch Ericht to the west of Coire Bhachdaidh SSSI could cause a disturbance of golden eagles at the nest. The nest site used in 2013 is the closer of the two golden eagle nest sites to Loch Ericht, being located approximately 900m from the mid channel of Loch Ericht, however the nest site is on a steep slope approximately 500m above water level.

9.4.47 It is anticipated that the barge traffic would consist of between one and four barges which would be moving between the new jetty locations at Dalwhinnie and the south end of Loch Ericht. Barges would be travelling slowly at a speed of up to 4mph. The distance between each jetty is approximately 17 miles therefore it is envisaged that a single trip would take approximately 4.5 hours to complete excluding loading and unloading time; thus each barge would only make one round trip each day. It is assumed that several barges would pass in view of the golden eagle nest site each day. For further information on transport access to the Talladh-a-Bheithe estate refer to Chapter 14 Access, traffic and Transport.

9.4.48 The golden eagle nest sites at Coire Bhachdaidh SSSI are currently subject to some disturbance effects mostly associated with the Tornado military aircraft which fly along Loch Ericht fairly frequently. Small recreational fishing boats occasionally use Loch Ericht as well. The level of disturbance will depend on the timing of the works as well as the behaviour of the eagle pair. It is possible that the eagles will not perceive the barge traffic as a threat and thus not suffer any impact of disturbance. However, it is also possible that given the isolated nature of the nest site that they may be disturbed by this traffic and if this coincided with the nesting season (which is likely given that the works would seek to target the summer months when weather conditions are likely to be more conducive and daylight longer).

9.4.49 The disturbance or displacement of an active golden eagle nest site would be a temporary moderate adverse effect on a receptor of National value.

Sub adults

9.4.50 The behaviour of sub adult eagles during the period between fledging and settling on a territory to breed is poorly understood. Several studies are currently undertaking satellite tracking of young birds to help to understand this period of the eagles life history. It is clear that birds are wide ranging and some example satellite data show birds fledged from nests in Forsinard Flows and the Cairngorms have visited the general area of Talladh a Bheithe (www.roydennis.org). It seems unlikely that displacement from such a small area as the study area during a temporary construction period would have any significant effect on sub adult eagle population, especially at a national level. Short term displacement from the wind farm area during construction is a temporary low magnitude adverse effect which is not significant.

Operation

Adults

9.4.51 Based on the evidence from existing wind farms presented in the eagle assessment (Confidential Annex 9.2b) it is likely that there will be some displacement from the proposed development, at least in the short term. However as noted above the results of the VP work, PAT modelling and prey study indicate that this will not result in substantial loss of foraging resource and it is assessed to be a low magnitude adverse effect and therefore not significant. Notwithstanding this, mitigation is proposed (see section 9.5).

9.4.52 The collision risk modelling predicts a low rate of collision for adult birds. In 2009/10 there were no flights at collision risk height within the turbine area. In 2012 there was only one flight and this was greater than 2km from the VP when recorded so modelling has not been undertaken. In 2013 a maximum of one bird every 18.5 years is predicted to collide using the conservative model or, more realistically one bird every 83.3 years using the non-conservative model. This is assessed as being a low magnitude adverse effect which is not significant.

Sub adults

9.4.53 Given the wide ranging nature of sub-adult eagles it seems very unlikely that displacement from a relatively small area of habitat will have any measurable effect. The relatively high level of flight activity recorded in late summer 2013 coincided with a recent deer shoot which resulted in gralloch being left in the turbine area. There are several deer stalking estates (as opposed to grouse shooting) surrounding Talladh a Bheithe and eagles have learned to associate the sound of a rifle shot with food (Logan Steele *pers comm*). It is likely that this is what has drawn in the eagles in higher numbers than previously recorded. Gralloch will not be left in this area during the operational period and therefore the impact of displacement is assessed to be of low magnitude adverse effect and not significant.

9.4.54 The collision model predicts a relatively high rate for sub adult birds even if golden eagles are displaced to some extent from the site post-construction (refer to Technical Appendix 9.2 Part B Eagle Assessment. This is considered to be a high magnitude adverse effect and likely to result in a significant effect at the regional level.

9.4.55 As noted above most of this is being driven by the high level of activity in late summer 2013 when deer gralloch was present in the turbine area. For this reason the model was re-run excluding the two survey days when gralloch was present (27 August and 3 September). This has a big effect, reducing the collision rate from 1 bird every 3.6 years (or about seven birds during the lifetime of the wind farm) to 1 bird every 62.5 years (or about 0.4 birds during the lifetime of the wind farm) using the more realistic model (c.14 and 0.5 birds respectively using the conservative model). Collision rates at this level are considered to be low magnitude and not significant, and therefore appropriate mitigation has been suggested in order to ensure as far as possible that collision rates are reduced to this more acceptable level.

Hen harrier

9.4.56 Hen harrier is a red-listed Bird of Conservation Concern and is an Annex 1 species on the *EU Birds Directive* and a Schedule 1 species under the *Wildlife and Countryside Act 1981, as amended*. The current Scottish hen harrier population is estimated at 633 pairs (Hardey *et al*., 2006).

9.4.57 Early spring checks in 2007 at 56 home ranges in Perthshire revealed 31 pairs. Twenty four of these pairs successfully fledged at least 48 young between them (Etheridge *et al.,* 2011).

Baseline

9.4.58 A hen harrier nest site was recorded just within 2km west of the site in 2011. No other hen harrier nest sites have been recorded within 2km of the site since 2008.

9.4.59 The pre-thicket forestry located between Car Mor Plantation and the *site* has the potential to develop into hen harrier nesting habitat in the next 5 to 10 years. The majority of the pre-thicket plantation is located over 500m from the site making any risk of post-construction displacement unlikely.

9.4.60 Only nine hen harrier flight lines have been recorded within the study area during VP surveys since 2009; only three of these flights were at PCH.

9.4.61 The low number of hen harrier sightings over the proposed wind farm site may be partly explained by the low number of meadow pipits recorded within the wind farm. The meadow pipit is an important prey item for hen harrier and merlin (Trobe, 1990).

Site preparation and construction

9.4.62 The study of disturbance distances by Ruddock and Whitfield (2007) suggested a maximum buffer of 500 to 750m would be sufficient to protect hen harrier breeding sites from human disturbance. During wind farm construction, displacement has been suggested to occur up to 500 m around construction sites with some disruption up to 1 km, depending on line of visibility (Madders 2004; in Bright *et al.* 2006).

9.4.63 The lack of hen harrier sightings during the VP surveys undertaken in 2009-2010, 2012 and 2013 provides strong evidence to confirm the low importance of the site as foraging areas for hen harrier.

9.4.64 No birds would be displaced from nest sites during construction activities. The disturbance/displacement effects of the construction phase of the development on foraging hen harrier would be of a negligible magnitude and not significant.

Operation

9.4.65 Operational wind farms typically do not appear to displace foraging harriers through disturbance and hen harriers will nest at 200 to 300m from an operational wind turbine (Madders & Whitfield 2006; in Ruddock and Whitfield, 2007). Examination of previous studies of hen harrier mortality at operational wind farms indicates that turbine collision is also rare (Whitfield and Madders, 2006).

9.4.66 Taking into account the low vulnerability of hen harrier to turbine collision and the small amount of time that birds would be potentially at risk from the proposed development, it is considered that collisions would have long term adverse effects of negligible magnitude and not significant.

9.4.67 The disturbance/displacement effects of the operational phase of the development on foraging birds would be of a negligible magnitude and not significant.

Merlin

9.4.68 Merlin is an amber-listed Bird of Conservation Concern and a Schedule 1 species under the *Wildlife and Countryside Act 1981, as amended*. The Drumochter Hills SAC/SPA/SSSI, located 5.6km to the north of the development, is also designated for merlin, as is the Coire Bhachdaidh SSSI within the Talladh-a-Bheithe Estate.

9.4.69 The current Scottish merlin population is estimated at 800 pairs (Hardey *et al*., 2006). Early spring checks in 2011 at 36 home ranges in Perthshire revealed 26 pairs. Twenty one of these pairs laid eggs and all pairs successfully fledged at least 32 young between them (Etheridge *et al.,* 2011). The TRSG confirm that there has been a general decline in the west Perthshire merlin population in recent years (Steele, *pers comm.,* 2010).

Baseline

9.4.70 Merlin have bred in the Garrocher Plantation (ME1) within the site in 2006 and again in 2009. The same pair of merlin is believed to use an alternative nest site associated with the Car Mor Plantation immediately north of the dam at the south end of loch Ericht (Steele, *pers comm*. 2010) but this is not known to have been used since 2005. Overall merlin nesting has only been confirmed twice within the Talladh-a-Bheithe Estate in the last nine years.

Site preparation and construction

9.4.71 Ground nesting merlin may have a reduced detection capability for sources of disturbance, with tree nesting birds likely to detect disturbance at greater distance. C. Wiklund (pers. comm.; in Ruddock and Whitfield, 2007) suggests merlin are particularly prone to desertion immediately prior to egg laying and the risk declines thereafter, although individuals were occasionally found breeding at a different site if disturbance occurred prior to or at the laying of the first egg.

9.4.72 The study undertaken by Ruddock and Whitfield (2007) revealed a very wide range of opinions on the typical distance from which nesting merlin may be disturbed by an approaching human. For example, static disturbance during incubation may range from less than 10 m to between 300 and 500m.

9.4.73 The development will result in the likely loss of a merlin nest site in the Garrocher plantation last used in 2009, as this plantation will be felled. It is not envisaged that this impact will affect merlin nesting productivity in the locality since there are a number of potential alternative nest sites available, particularly in plantation around the shores of Loch Ericht. This is assessed as being a low magnitude effect which is not significant.

9.4.74 There are no displacement/disturbance effects predicted on the merlin nest site associated with the Car Mor Plantation since the Car Mor Plantation is over 500m from the site.

Operation

9.4.75 The tendency for merlin to fly close to the ground means that this species is less exposed to collision risk with the large wind turbines than some other species. No merlin were recorded flying above 20m during the 2010 or 2013 VP surveys. No merlin flight lines were recorded during the VP survey in 2012.

9.4.76 Therefore any collision effect on merlin would be of negligible magnitude and therefore not significant.

9.4.77 Under the development proposals, one wind turbine is within the Garrocher Plantation and a further four wind turbines are located within 200m of the Garrocher Plantation. It is considered likely that the proposed development would permanently displace merlin from nesting within the Garrocher Plantation. However the alternative nest site associated with this merlin breeding pair within the Car Mor Plantation is located move than 500m from the nearest wind turbine. Therefore it is unlikely that the proposed development would result in reduced merlin breeding productivity within the Talladh-a-Bheithe Estate. Therefore this is assessed as being a low magnitude effect which is not significant. Notwithstanding this, measures proposed as part of the Outline Habitat Management Plan should provide improved nesting and foraging opportunities within the estate away from the turbine area.

Osprey

9.4.78 Osprey is an amber-listed Bird of Conservation Concern, an Annex 1 species on the *EU Birds Directive* and a Schedule 1 species under the *Wildlife and Countryside Act 1981, as amended*. The current Scottish osprey population is estimated at 179 pairs (Hardey *et al*., 2006). Early spring checks in 2011 recorded 44 pairs in Perthshire which fledged at least 34 young (Etheridge *et al.,* 2011).

Baseline

9.4.79 No osprey were recorded during the 2013 VP survey although three incidental observations were recorded of osprey, one of which flew across the site at PCH for 100 seconds. There are no osprey nest sites within 6km of the site.

9.4.80 Sightings of osprey within the Talladh-a-Bheithe estate indicate that osprey occasionally fly between Loch Rannoch in the south and Loch Ericht. The birds tend to follow the slope of the hills adjacent to the plantation edge to the west of the estate, usually avoiding flying within the site.

Site preparation and construction

9.4.81 There is a possibility that the proposed construction activities, particularly at the south end of Loch Ericht may occasionally disturb or displace foraging osprey. However barge traffic on Loch Ericht would only be using Loch Ericht for a relatively short period of time.

9.4.82 The disturbance/displacement effects of the construction phase of the development on foraging hen harrier would be of a negligible magnitude and not significant.

Operation

9.4.83 Vantage point survey data confirms that osprey do not tend to fly within the site when foraging or commuting to foraging sites. Therefore any collision effect on osprey would be of **negligible magnitude** and therefore **not significant**.

Peregrine

9.4.84 Peregrine is an amber-listed Bird of Conservation Concern and is an Annex 1 species on the *EU Birds Directive* and a Schedule 1 species under the *Wildlife and Countryside Act 1981, as amended*.

9.4.85 The Scottish peregrine population during the current decade is estimated at 544 pairs (Hardey *et al.,* 2006). Early spring checks in 2010 at 104 home ranges in Tayside and Fife (31 west of the A9) revealed 61 pairs (19 pairs west of the A9)(Etheridge *et al*., 2010).

Baseline

9.4.86 The last evidence of peregrine nesting on the Talladh-a-Bheithe Estate was recorded in the early 1990s (Steele, *pers. comm*., 2013).

9.4.87 Only four peregrine flight lines have been recorded within the site during VP surveys since October 2009. One of these birds flew at PCH.

Site preparation and construction

9.4.88 The study undertaken by Ruddock and Whitfield (2007) revealed an upper limit of static or passive disturbance distance of 500 to 750m. Peregrine can tolerate at least some human disturbance, as witnessed by its occupation of disturbed nest sites such as working quarries and urban centres.

9.4.89 There are no predicted displacement/disturbance effects predicted on peregrine nest site or foraging areas during the construction phase.

Operation

9.4.90 Vantage point survey data confirms that peregrine do not tend to fly within the site when foraging or commuting to foraging sites. Therefore any collision effect on peregrine would be of **negligible magnitude** and therefore **not significant**.

9.4.91 There are no predicted displacement/disturbance effects predicted on peregrine nest site or foraging areas during the operational phase.

Golden plover

Baseline

9.4.92 Golden plover is an Annex 1 species on the *EU Birds Directive*. The Drumochter Hills SAC/SPA/SSSI, located 5.6km to the north of the site, is also designated for golden plover as is the Coire Bhachdaidh SSSI within the Talladh-a-Bheithe Estate.

9.4.93 Forrester et al. (2007) estimated the number of breeding golden plover pairs in the UK to be 15,000 breeding pairs in the 'early 1990s' in Scotland and 19,900 in the UK. The number of golden plover pairs in the Scottish Highlands was estimated to be 8,700 south of Great Glen and 6,800 north of Great Glen (Sharrock, 1976).The great majority of golden plover nesting pairs are located within the northeast part of the Talladh-a-Bheithe Estate, outside the site. This distribution of golden plover is likely to be a regular occurrence since golden plover tend to nest in the same place in successive years (Ratcliffe, 1976).

9.4.94 In 2013 up to four pairs of golden plover nested within the site 500m buffer; however two of these pairs were on the periphery of the survey area.

9.4.95 A total of 20 golden plover pairs were recorded within the Talladh-a-Bheithe Estate including suitable nest habitat immediately to the north east of the Estate, in 2010. The 2010 survey covered the majority of potential golden plover nesting habitat within the Estate although the survey excluded the majority of the Coire Bhachdaidh SSSI.

9.4.96 No golden plover flight lines were recorded at PCH within the site during vantage point surveys since they commenced in October 2009.

Site preparation and construction

9.4.97 There is a high probability that up to two pairs of golden plover would be affected by displacement effects during the construction phase of the proposed development. There is a possibility that these displaced golden plover could find alternative nest sites beyond the disturbance influence of the wind turbines. However the worst case is that one or two pairs of golden plover have reduced or no productivity for up to two breeding seasons. This is assessed as being a temporary low magnitude adverse effect which is not significant.

Operation

9.4.98 The literature review provided earlier in this chapter indicates that golden plover displacement effects associated with wind farms are quite localised and unlikely to affect birds nesting more than 250m from wind turbines. In some cases no change in numbers of golden plover were recorded following wind farm construction.

9.4.99 It is predicted that up to two pairs of golden plover would be displaced from the wind farm site during the operational phase of the development. This represents 10% of the known golden plover nesting pairs associated with the Talladh-a-Bheithe Estate excluding the majority of the SSSI, based on 2010 survey data.

9.4.100 The potential displacement of golden plover nests is assessed as being a low magnitude adverse effect which is not significant.

9.4.101 Golden plover rarely fly within the site at PCH. Therefore any collision effect on golden plover would be of **negligible magnitude** and therefore **not significant**.

Greenshank

9.4.102 Greenshank is a Schedule 1 species under the *Wildlife and Countryside Act 1981, as amended*. In 1997 the greenshank breeding population in the UK was estimated to be 1,440 pairs (Hancock *et al*. 1997). The entire UK greenshank breeding population is located in Scotland.

Baseline

9.4.103 A pair of greenshank was observed feeding on the north edge of Loch Mheugaidh in May 2010, on the south boundary of the study area. It is likely these birds were displaying courtship behaviour, and went on to nest nearby on the Talladh-a-Bheithe Estate. One greenshank pair successfully nested 500m to the north of Loch Mheugaidh in 2013.

9.4.104 No greenshank flight lines were recorded at PCH within the site during vantage point surveys since they commenced in October 2009.

Site preparation and construction

9.4.105 Without mitigation there is a possibility that one pair of greenshank would be affected by displacement during the construction phase of the proposed development. This is assessed as being a temporary **moderate adverse effect** which is **significant** at the regional level (however see mitigation section).

Operation

9.4.106 There is limited information available regarding the sensitivity of greenshank to wind turbines however Pearce-Higgins *et al*., (2009) states that many breeding wader species are displaced 200m or more from wind turbines although there is contradictory evidence for some species including golden plover and curlew. However it is typical for greenshank to move their nest site within the same territory each year (Nethersole-Thompson and Nethersole-Thompson, 1986).

9.4.107 It is predicted that up to one pair of greenshank would be displaced from the wind farm site during the operational phase of the development. However there is a distinct possibility that the greenshank would re-locate to favourable nesting habitat around Loch Mheugaidh, just over 200m to the south of the site.

9.4.108 Greenshank has been recorded successfully breeding with a 300m exclusion zone around the Rosehall wind farm in Sutherland (Natural Power internal data); this would indicate that a 300m around the Loch Mheugaidh would be sufficient during the operation phase. Pearce-Higgins *et al*., (2009) also indicate that displacement effects are lower during operation compared to the construction phase. Greenshank has also been recorded nesting at similar distances from the operational Causeymire wind farm in Caithness (Cox, *pers comm*., 2013).

9.4.109 The site design in the vicinity of Loch Mheugaidh, is considered sufficient to allow greenshank to continue breeding in the area during operation. It is therefore considered unlikely that greenshank displacement would occur during the operational phase. This potential displacement effect on greenshank is assessed as being an effect of **negligible magnitude** which is **not significant**. In order to improve the habitat for greenshank and

help to provide more certainty to this conclusion, measures have been included in Technical Appendix 9.3 Outline Habitat Management Plan (OHMP).

9.4.110 Greenshank rarely fly within the site at PCH. Therefore any collision effect on greenshank would be of negligible magnitude and therefore not significant.

Black grouse

9.4.111 Black grouse is a red-listed Bird of Conservation Concern. In Britain black grouse have been in long term decline. Between 1995-96 and 2005 there has been a 29% decrease in displaying male black grouse in Scotland. Overall however, only a 9% decrease in displaying males was recorded in northeast Scotland (Sim *et al.,* 2008). However, numbers of males in Perthshire declined by an estimated 70% between 1990 and 2002 (Pearce-Higgins *at al.*, 2007, in Sim *et al.,* 2008).

9.4.112 Sim *et al.*, (2005) estimated that there were 3,344 black grouse males in Scotland in 2005, with 45% of these birds found in northeast Scotland.

Baseline

9.4.113 A historic black grouse lek is located approximately 500m to the west of the site, however the same lek appeared to have moved westwards in 2010 placing it 625m away from site. A peak count of ten black grouse was recorded at this lek site in 2013 (BK5).

9.4.114 Another black grouse lek was recorded in the east part of the Garrocher Plantation within the study area in 2010 (BK6). Only one male was recorded at BK6 in 2013 indicating that the importance of the lek site has decreased since 2010.

9.4.115 Black grouse are also occasionally recorded in the early morning on the main track on the west side of the site as single birds or as a group of two.

9.4.116 All black grouse flight lines recorded during the 2009 to 2010 VP surveys were below a height of 20m. No black grouse flight lines were recorded during the 2012 or 2013 VP surveys.

Site preparation and construction

9.4.117 Ruddock and Whitfield (2007) report that breeding female black grouse would not be passively disturbed by a human at distances greater than 100 to 150m and leks would not be passively disturbed at over 500 to 750m.

9.4.118 Lek site BK5 located between the site and the south end of Loch Ericht would be displaced during the construction phase of the proposed development while the jetty is being used to transport wind turbine blades onto the site. BK5 is the largest lek site in the Talladh-a-Bheithe Estate. The displacement of lek site BK5 is a temporary low magnitude adverse effect (but see mitigation section).

9.4.119 Construction activities would result in the temporary displacement of lek site BK6 associated with the Garrocher Plantation located within the site. This is because the Garrocher Plantation is to be felled and restored to blanket bog. However lek site BK6 appears to have decreased in size since 2010 and its possible these birds have re-located to BK5 which has increased in size since 2010. The temporary loss of lek site BK6 is a **low magnitude adverse effect** which is **not significant**.

9.4.120 Small numbers of black grouse males associated with the main track on the west side of the site could also be subject to disturbance effects during the construction phase. This disturbance effect is assessed as being a **low magnitude adverse effect** which is **not significant**. (see also mitigation section for OHMP measures for black grouse).

Operation

9.4.121 Recent work by Newcastle University has found that black grouse abundance in areas surrounding wind farms remain unchanged following construction. There was some local movement of leks within 500m of turbines but leks further away remain unaffected (Zwart *et al* 2013)

9.4.122 There is a possibility that the large lek site BK5 would be occasionally disturbed by site traffic associated with the operational phase of the development. This effect is assessed as being a **negligible magnitude adverse effect** which is **not significant**.

9.4.123 Under the development proposals, one wind turbine is within the Garrocher Plantation and a further four wind turbines are located within 200m of the Garrocher Plantation where BK6 is located. It is possible the functionality of this lek site would be reduced during the operational phase due to the presence of the wind turbines. This is assessed as being a **low magnitude adverse effect** which is **not significant**.

9.4.124 Black grouse rarely fly within the site at PCH. Therefore any collision effect on black grouse would be of **negligible magnitude** and therefore **not significant**.

Red-throated diver

9.4.125 Red-throated diver is an amber-listed Bird of Conservation Concern and is an Annex 1 species on the *EU Birds Directive* and a Schedule 1 species under the *Wildlife and Countryside Act 1981, as amended*.

9.4.126 A national survey of breeding red-throated diver in 1994 estimated that there were 3,010 red-throated divers in Scotland during summer 1994, including approximately 935 breeding pairs (Gibbons *et al.,* 1997).

Baseline

9.4.127 Two red-throated diver nest sites were confirmed during 2010; located 1.4km (RH1) to the east and 2.4km (RH2) to the west of the site. Historically there is no evidence to indicate that red-throated diver have ever bred within the site or within any of the pools or lochans within the Talladh-a-Bheithe Estate.

9.4.128 Flight line surveys undertaken at the RH1 nest site (2010) and VP surveys (2009-2010, 2012 and 2013) provide clear evidence that these divers only feed on Loch Rannoch. These findings are consistent with those of a similar study of diver feeding flight lines at RH1 nest site in 2006 (Savills Limited, 2006).

9.4.129 Single red-throated diver have been recorded loafing on Loch Mheugaidh within the Talladh-a-Bheithe Estate, on two occasions in 2010 and one occasion in 2012 and 2013.

9.4.130 None of the flight lines recorded at the nearest red-throated diver nest site in 2010 entered the study area. One incoming flight line and one outgoing flight line passed within approximately 900m of the site.

9.4.131 Three red-throated diver flight lines were recorded within the site in 2012. One of these flight lines was recorded at PCH within the site.

Site preparation and construction

9.4.132 Ruddock and Whitfield (2007) report that there is no information on disturbance available for this species in the published literature. Their own studies concluded that on a precautionary basis, birds would apparently not show indications of disturbance by human activity on foot at 500 to 750m from the diver nest site and the large majority are probably not disturbed when an observer is 500m away.

9.4.133 There are no predicted disturbance or displacement effects on the red-throated diver nest site located 1.4km to the east of the site (RH1) since the nest site is far enough from the development for these effects to be of a negligible magnitude and not significant.

9.4.134 There are also no direct effects on red-throated diver nest site RH2 located 2.4km west of the development and 1.4km from the likely route of barge traffic on Loch Ericht. There is a low possibility that the adult birds associated with nest site RH2 could be affected by intermittent temporary disturbance from barge traffic whilst feeding on Loch Ericht. This disturbance effect is assessed as being a low magnitude adverse effect which is not significant.

9.4.135 There is a possibility that construction activities could displace or disturb occasional red-throated diver feeding and loafing activity associated with Loch Mheugaidh. The Environmental Statement for the Viking Wind Farm on Shetland is of some value when determining whether the proposed development will result in disturbance/displacement effects on divers using Loch Mheugaidh due to the abundant red-throated diver breeding population close to the Viking Wind Farm site. The Viking Environmental Statement assumed that red-throated divers would be displaced from non-breeding lochs within 500m of construction work sites. There will be two wind turbines located within 500m of Loch Mheugaidh therefore it is assumed that red-throated divers would be temporarily displaced from using Loch Mheugaidh for between one and two seasons. This disturbance effect is assessed as being a low magnitude adverse effect which is not significant.

Operation

9.4.136 The red-throated diver is a strong, fast flyer, however the bird has a high wing loading making it less agile and unable to change direction or height quickly (Okill, 1994, in Jackson and Beasley, 2006). However, studies at Burgar Hill wind farm on Orkney demonstrated that red-throated divers can exhibit a high level of avoidance (98% or more) of collision with turbines located between breeding and feeding sites (Jackson *et al*., submitted).

9.4.137 Red-throated diver rarely fly within the site at PCH. Therefore any collision effect on red-throated would be of negligible magnitude and therefore not significant.

9.4.138 There is a possibility that feeding and roosting activity infrequently recorded on Loch Mheugaidh, to the south of the site, could be effected during the operational phase

9.4.139 At Burgar Hill wind farm on Orkney, red-throated divers regularly breed within 300m of two wind turbines without exhibiting behavioural abnormalities although it is acknowledged that this particular site was already affected by visiting public.

9.4.140 The Viking Wind Farm Environmental statement considered the potential effects of the proposal on non-breeding lochs in some detail and concluded that disturbance effects would be unlikely if a 250m turbine free area was maintained around non-breeding lochs during the operational phase.

9.4.141 .It is unlikely that diver access to the loch would be reduced since no turbines are to be located to the east, west or south of the loch and a 300m buffer has been maintained between the loch and nearest turbine to the north. It is therefore concluded that the potential disturbance/displacement of occasional red-throated diver activity on Loch Mheugaidh would be of a negligible magnitude and not significant.

Decommissioning effects

9.4.142 Decommissioning effects would be of similar or of lower magnitude to the preparation and construction phase effects with an overall beneficial effect resulting from restoration.

9.5 Mitigation

Construction

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

9.5.2 It is recommended that production and implementation of a Construction Environmental Management Plan (CEMP) be a condition of planning permission. This should, be prepared in accordance with British Standard 42020:2013 Biodiversity – Code of practice for planning and development and Scottish Renewables *et al* (2013) Best Practice During Wind Farm Construction (or any relevant updated/superseding documents available at the time of construction) and should detail construction mitigation measures and how these will be implemented. This should be incorporated into Balance of Plant contractors contracts prior to works commencing to ensure that the mitigation is implemented and factored in to construction costs from the outset. It is recommended that this includes provision for an Ecological Clerk of Works to be employed during the construction phase to ensure high quality ecological and environmental advice is available.

Protection of Breeding Birds and their nests

9.5.3 Under the Wildlife and Countryside Act (1981) as amended by the Nature Conservation (Scotland) Act (2004), it is an offence, with only limited exceptions, to:

- intentionally or recklessly kill, injure or take any wild bird;
- intentionally or recklessly take, damage, destroy or otherwise interfere with the nest of any wild bird whilst that nest is in use or being built;
- intentionally or recklessly at any other time take, damage, destroy or otherwise interfere with any nest habitually used by any wild bird included in Schedule A1;
- intentionally or recklessly obstruct or prevent any wild bird from using its nest;
- intentionally or recklessly take, or destroy the egg of any wild bird;

- intentionally or recklessly disturb any wild bird included in Schedule 1 while it is building a nest or is in, or near nest containing eggs or young, or disturb the dependent young of such a bird;
- intentionally or recklessly disturb any wild bird included in Schedule 1 which leks while it is doing so;
- intentionally or recklessly harass any wild bird included in Schedule 1A; and
- knowingly cause or permit any of these acts to occur.

9.5.4 Good practice will be necessary to reduce the possibility of illegal damage, destruction or disturbance to occupied bird nests during the construction phase. Three good practice measures will be adopted: timing, pre-construction surveys, and the use of an Ecological Clerk of Works (ECoW).

9.5.5 Where site clearance and construction activities are required to take place during the main breeding bird season (mid-March to mid-August, inclusive) pre-commencement survey work will be required in order to guide mitigation measures to ensure that nest destruction/damage (all species) and disturbance (Sch 1 species) to breeding birds are avoided. Where applicable construction will not take place within disturbance buffer zones agreed with SNH for certain sensitive species during the breeding season.

9.5.6 Compliance with the law will also be achieved by the appointment of a suitably experienced ECoW throughout the construction period (including enabling works). Among other tasks, this will involve locating any active nests close to construction works shortly before these commence. Any active nests found will be cordoned off to a suitable distance for the species concerned and construction operations delayed within the cordon until the young have fledged and/or the nest becomes vacant. There will be a clear line for responsibility for ensuring these measures are adhered to.

9.5.7 Additional protection may be necessary for certain Schedule 1 species associated with the Talladh-a-Bheithe estate. Schedule 1 bird species which could be potentially affected by disturbance from construction activity could include golden eagle, greenshank, merlin and possibly hen harrier. It would therefore be a priority to establish the locations of active nests for these species prior to potentially disturbing construction phase activities. It should be noted that the sensitive nesting period for golden eagle could potentially begin in January rather than mid-March since golden eagle can commence nest building in January and lay eggs in early March.

9.5.8 It would be necessary to undertaken intensive monitoring of the golden eagle nest site within Coire Bhachdaidh SSSI while barge traffic is present on Loch Ericht to ensure that any behavioural abnormalities are identified at an early stage to avoid any risk of disturbance. In the event that behavioural abnormalities are observed barge traffic on Loch Ericht would be stopped immediately.

9.5.9 In addition to this, barge operators would be required to follow a fixed route along Loch Ericht to ensure that distance is maximised between the barge and the nest site (no barges within at least 800m horizontal of the golden eagle nest site; the upper disturbance limited identified by Whitfield and Ruddock [2007]). Speed limits would be imposed when travelling on Loch Ericht and barges would not be permitted to stop moving when within view of the golden eagle nest site, except under emergency circumstances.

9.5.10 It is envisaged that wind turbine construction works would need to be phased to avoid possible disturbance effects on greenshank and merlin. In the event that an active greenshank nest is identified within or close to the development, a protective buffer of at least 300m would be established. Greenshank were recorded breeding successfully when a similar approach was taken at the Rosehall Wind Farm site.

9.5.11 Where development priorities permit it, the felling of the Garrocher Plantation would be undertaken outside the bird breeding season to minimise the possibility of illegal destruction of active bird nests and avoid possible disturbance effects on nesting merlin, in the event that nesting occurs during the construction phase. However

pre-construction surveys would be undertaken in the event that some forestry felling was likely to be required during the breeding bird season. A phased approach to forestry felling would also be implemented if felling became necessary during the breeding bird season. This would ensure the protection of all active nest sites and avoid the disturbance of nesting merlin should they be using the plantation.

9.5.12 To minimise the disturbance of black grouse lek sites construction activity within the vicinity of active black grouse leks would not be permitted in the hour after sunrise and hour before sunset during the peak black grouse lekking period of late March to mid May (specific timings and exclusion zones to be agreed with SNH and included in the CEMP).

9.5.13 An Outline Habitat Management Plan (OHMP) has been prepared for the Talladh-a-Bheithe estate which identifies management proposals to benefit VERs within the estate. The HMP is included at Technical Appendix 9.3. A number of measures described in the HMP can be implemented either pre-construction or at the commencement of construction activities. Firstly, gralloch will be deposited on the hills within the north part of the Talladh-a-Bheithe estate, well to the north of the study area. Implementing this measure will influence how adult and sub adult golden eagle utilise the Estate resulting in a reduced flight activity within the study area. Secondly fence markers would be added to lengths of deer fencing associated with young forestry plantations on the Estate.

Operation

9.5.14 The OHMP will identify management objectives required to enhance and maintain habitat for those VERs, which will include the bird species golden eagle, merlin, greenshank and black grouse.

The aims of the HMP are as follows:

- Restore blanket bog;
- Maintain and enhance golden eagle prey resource outwith the turbine area whilst maintaining a low resource within the envelope;
- Maintain and enhance foraging and nesting habitat for merlin, black grouse and greenshank outwith the turbine envelope;
- Monitoring and review.

9.5.15 These will be achieved through the following prescriptions:

- Grip blocking – throughout the site but also in particular around Loch M where there is extensive gripping and where benefits to greenshank would be likely to be greatest;
- Forestry clearance – felling of Garrocher plantation and restoration to peatland habitats;
- Deer management – slight increase in cull numbers and reduction in supplementary feeding to reduce grazing pressure across the site. Depositing of gralloch in the north of the estate well away from the turbine envelope and within the golden eagle core range;
- Woodland management/tree planting – appropriate extension of native tree planting. Management of existing native tree planting and Car Mor plantation;
- Fence marking – marking of the deer fence around the existing native tree planting to reduce risk of black grouse collision;

- Monitoring – this includes ornithological monitoring of breeding success of golden eagle, merlin and greenshank and lek surveys of black grouse in years 1,2,3,5,10,15,20,25 following construction with a mechanism for review of the HMP measures should monitoring suggest it is required.

9.5.16 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. However to minimise the disturbance of black grouse lek sites vehicular movements by wind farm maintenance personnel would not be permitted within 2 hours of sunrise and sunset during the peak black grouse lekking period.

Decommissioning

9.5.17 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.

9.6 Potential Cumulative Impacts

9.6.1 The following section assesses the predicted cumulative effects of wind farm developments within the vicinity of the proposed development and follows recently published SNH guidance (2012).

9.6.2 The context in which cumulative effects are considered depends upon the ecology of the species in question. The main target species recorded at the proposed development for which cumulative impacts may occur is golden eagle. The impacts of the proposed development alone on these species were not significant. However as a precautionary measure cumulative effects have also been considered for merlin, hen harrier, greenshank and black grouse.

9.6.3 Cumulative impact assessments may be complicated by availability of Environmental Statements and Appraisals for consented sites and, where this information is available, survey periods and methodologies may differ between sites; furthermore, some schemes may have been in existence for many years, and thus contemporary data may not be available.

9.6.4 This cumulative assessment considered all current wind farm planning applications within 30km of the site located within the Local Authorities of Highland Council and Perth and Kinross. It was necessary to consider a wide area for the cumulative assessment since golden eagles are a mobile species with large home ranges.

9.6.5 The following wind farms have been identified within 30km of the site:

- Calliacher Wind Farm, Amulree. Located 30km south east of the site. Proposals for 14 wind turbines with a maximum blade tip height of 109.8m and a hub height of 63.3m.
- Land 2000 metres north of Calliacher Wind Farm, Amulree (North Calliacher). Located 30km south east of the site. Proposals for seven 3MW wind turbines, three of which with a maximum blade tip height of 127m and four with a max blade tip height of 110m.
- Crossburns. Located 28km south east of the site. Proposals for 40 wind turbines. Specifications to be confirmed, however majority will have a max blade tip height of 115m.

9.6.6 Details of these wind farm sites are provided in Table 9.18.

Table 9.18 Details of proposed wind farms within 30km of the Talladh-a-Bheithe site.

	Calliacher Wind Farm (Operational)	North Calliacher (refused planning permission)	Crossburns (Scoping)
Golden eagle	Recorded on site but showed no indication of breeding within 1km of site. No flight lines were recorded within the site during VP survey. No impact identified	Golden eagle not mentioned in Environmental Statement.	Recorded within vicinity of wind farm. No golden eagle have been found to breed within the site. Ben Chonzie SSSI 6km to south designated for golden eagle.
Merlin	Merlin recorded breeding on site. No impact identified.	Merlin not recorded within site. No impacts identified	Recorded within the turbine search area. No merlin have been found to breed within the site.
Hen harrier	Hen harrier recorded breeding on site. 0.57 flight lines per hour were recorded of which 12% were at PCH. Collision risk modelling carried out and identified a 0.8% increase in baseline mortality. This was considered to be a negligible impact. Mitigation to be carried out to manage habitat for hen harrier away from wind farm.	Only 1 individual was recorded to fly through the site during the breeding season giving a flight rate of 0.03 flights/hour. Ten individuals flew through the site during the non-breeding season giving a flight rate of 0.24 flights/hour (27% at PCH). Collision risk modelling carried out and identified a 0.01% increase in baseline mortality, with a predicted 0.01 collisions per year. No significant impact identified.	Recorded within the turbine search area. No hen harrier have been found to breed within the site.
Greenshank	No impact identified.	Greenshank not recorded within site. No impact identified.	No information available.
Black grouse	No impact identified. Mitigation scheme will enhance habitats for black grouse.	Black grouse present in regionally important numbers. Lek identified within site with estimated eight breeding pairs present. Mitigation measure includes no construction undertaken within 500m of main lek site. This impact is not significant. No flights observed within collision risk zone at rotor height. Collision risk assessed as of negligible magnitude and not significant.	No information available.

Summary

9.6.7 No significant residual impacts to golden eagle or any other bird species were predicted for any project included in this cumulative assessment. It is therefore concluded that the cumulative impacts on golden eagle, merlin, hen harrier, greenshank and black grouse would not be significant.

9.6.8 Very low levels of hen harrier collision mortality were predicted for Calliacher Wind Farm and the proposed North Calliacher wind farm. TEP are aware of two recent hen harrier deaths at the nearby Griffin wind farm and it is likely that the collision modelling for that scheme did not predict this. It is possible therefore that the collision mortality at the Calliachar schemes has been under-estimated, however until further work is done at Griffin to establish the specific circumstances there (currently being undertaken by RSPB/BTO) this cannot be determined.

9.7 Summary and Conclusions

9.7.1 The level of significance of potential effects on each VER during the construction and operational phases of the proposed development are summarised in Table 9.19.

Table 9.19 Summary of the level of significance of potential effects on Valued Ecological Receptors (VERs) and residual effects following mitigation.

VER	Value of the site to the VER	Potential effect	Mitigation	Magnitude	Duration	Nature	Significance	Level of certainty/comments
Construction and decommissioning impacts								
Pink-footed goose	High (National) Medium within site	No construction effects identified	-	-	-	-	-	-
Golden eagle (adults)	High (National) High within site	Displacement from foraging habitat	Monitoring and control measures in OHMP and CEMP.	Negligible	Short term	Adverse	Not significant	A measureable effect on the national population is considered to be highly unlikely.
		Displacement from nest site	Monitoring and control measures in OHMP and CEMP.	Moderate	Short term	Adverse	Not significant	The source of disturbance is located more than 800m from the nest site; threshold identified by Whitfield and Ruddock (2007). A measureable effect on the national population is unlikely.
Golden eagle (sub-adults)	Medium within site	Displacement during period between fledging and settling	Monitoring and control measures in OHMP and CEMP.	Low	Short-term	Adverse	Not significant	Short-term effect of construction activity, coupled with wide-ranging behaviour means significant effect unlikely.

VER	Value of the site to the VER	Potential effect	Mitigation	Magnitude	Duration	Nature	Significance	Level of certainty/comments
Hen harrier	High (National) Low within site	Displacement from nest site	Monitoring and control measures in OHMP and CEMP.	Negligible	Short term	Adverse	Not significant	A measureable effect on the regional population is considered to be highly unlikely.
Merlin	High (National) Medium within site	Displacement – loss of a nest site	Monitoring and control measures in OHMP and CEMP.	Low	Long term	Adverse	Not significant	A measureable effect on the regional population is considered to be highly unlikely. Nest site not actively used
Peregrine	Low within site	No construction effects identified	-	-	-	-	-	-
Osprey	Low within site	Displacement from foraging habitat	None required	Negligible	Short term	Adverse	Not significant	A measureable effect on the local population is considered to be highly unlikely.
Golden plover	Low within site	Displacement from nest site	Monitoring and control measures in OHMP and CEMP.	Low	Short term	Adverse	Not significant	A measureable effect on the local population is considered to be highly unlikely.
Greenshank	Medium within site	Displacement from nest site	Monitoring and control measures in OHMP and CEMP.	Low	Short term	Adverse	Not significant	Prior to mitigation, a possible moderate magnitude effect of significance was predicted, but design and mitigation measures should

VER	Value of the site to the VER	Potential effect	Mitigation	Magnitude	Duration	Nature	Significance	Level of certainty/comments
								be effective
Black grouse	Low within site	Displacement from lek sites	Monitoring and control measures in OHMP and CEMP.	Low	Short term	Adverse	Not significant	A measureable effect on the local population is considered to be unlikely.
Red-throated diver	Low within site	Displacement from nest site	Control measures in CEMP.	Negligible	Short term	Adverse	Not significant	A measureable effect on the local population is considered to be highly unlikely.
		Displacement from foraging habitat	Control measures in CEMP.	Low	Short term	Adverse	Not significant	A measureable effect on the local population is considered to be highly unlikely.
Operational impacts								
Pink-footed goose	Medium within site	Collision	None required	Negligible	Long term	Adverse	Not significant	A measureable effect on the regional population is considered to be highly unlikely.
Golden eagle	High (National) within site – adult birds	Collision	None required	Low	Long term	Adverse	Not significant	A measureable effect on the national population is considered to be highly unlikely.

VER	Value of the site to the VER	Potential effect	Mitigation	Magnitude	Duration	Nature	Significance	Level of certainty/comments
	High (National) within site – adult birds	Loss of foraging	Habitat Management	Low	Short-term before habituation	Adverse	Not significant	Habituation to adjusted foraging areas is likely
	Medium (Regional) within site – sub adult birds	Collision	Habitat enhancement outside site in OHMP.	Low	Long term	Adverse	Not significant	A measureable effect on the regional population is considered to be unlikely.
	Medium (Regional) within site – sub adult birds	Displacement	Habitat and Gralloch management	Low	Long-term	Adverse	Not significant	Habituation is likely
Hen harrier	Low within site	Collision	None required	Negligible	Long term	Adverse	Not significant	A measureable effect on the regional population is considered to be highly unlikely.
		Displacement from foraging habitat	None required	Negligible	Long term	Adverse	Not significant	A measureable effect on the regional population is considered to be highly unlikely.
Merlin	Medium within site	Collision	None required	Negligible	Long term	Adverse	Not significant	A measureable effect on the regional population is considered to be highly unlikely.

VER	Value of the site to the VER	Potential effect	Mitigation	Magnitude	Duration	Nature	Significance	Level of certainty/comments
	Medium within site	Displacement from nesting habitat	Habitat enhancement outside site.	Low	Long term	Adverse	Not significant	A measureable effect on the regional population is considered to be unlikely.
Peregrine	Low within site	Collision	None required	Negligible	Long term	Adverse	Not significant	A measureable effect on the local population is considered to be highly unlikely.
Osprey	Low within site	Collision	None required	Negligible	Long term	Adverse	Not significant	A measureable effect on the local population is considered to be highly unlikely.
Golden plover	Low within site	Displacement from the nest site	Monitoring	Low	Long term	Adverse	Not significant	A measureable effect on the local population is considered to be unlikely.
		Collision	None required	Negligible	Long term	Adverse	Not significant	A measureable effect on the local population is considered to be highly unlikely.
Greenshank	Medium (Regional) within site	Displacement from the nest site	Monitoring and control measures in HMP.	Negligible	Long term	Adverse	Not significant	A measureable effect on the local population is considered to be unlikely.
		Collision	None required	Negligible	Long term	Negative	Not significant	A measureable effect on the local population is considered to be highly

VER	Value of the site to the VER	Potential effect	Mitigation	Magnitude	Duration	Nature	Significance	Level of certainty/comments
								unlikely.
Black grouse	Low within site	Displacement from lek sites	Operational procedures and OHMP	Low/Negligible (2 sites)	Long term	Negative	Not significant	A measureable effect on the local population is considered to be highly unlikely.
		Collision	None required	Negligible	Long term	Negative	Not significant	A measureable effect on the local population is considered to be highly unlikely.
Red-throated diver	Low within site	Displacement from foraging habitat	None required	Negligible	Long term	Negative	Not significant	A measureable effect on the local population is considered to be highly unlikely.
		Collision	None required	Negligible	Long term	Negative	Not significant	A measureable effect on the local population is considered to be highly unlikely.

9.8 Statement of Significance

9.8.1 An assessment has been undertaken of the likely significant of effects of the proposed development on avian species within the study areas. The effects of the proposed development have been assessed as all being of low to negligible magnitude and therefore are not significant in EIA terms.

9.9 Impacts on designated sites

9.9.1 As detailed in Table 9.14, the following protected sites designated for birds have been identified as VERs:

- Coire Brachdaidh SSSI;
- Ben Alder and Aonach Beag SSSI; and
- Drumochter Hills SPA/SSSI.

9.9.2 As well as assessing potential effects on SSSIs section 9.9 also presents the information required to demonstrate that no likely significant effects are predicted for the Drumochter Hills SPA.

9.9.3 Under the Habitats Regulations any development unconnected with the nature conservation management of a Natura 2000 site which risks adversely affecting the integrity of the site, either alone or in combination with other projects, requires an Appropriate Assessment to be carried out by the relevant competent authority, to assess the implications for the conservation interests for which the area has been designated. The requirement for an Appropriate Assessment is triggered if it is identified that a development will have a 'likely significant effect' on the notified features of the SPA.

9.9.4 The Drumochter Hills SPA has the following conservation objectives:

- To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and
- To ensure for the qualifying species that the following are maintained in the long term:
    - Population of the species as a viable component of the site;
    - Distribution of the species within site;
    - Distribution and extent of habitats supporting the species;
    - Structure, function and supporting processes of habitats supporting the species; and
    - No significant disturbance of the species.

9.9.5 As with the assessment of the predicted cumulative effects of wind farm developments within the vicinity of the proposed development on valued ornithological receptors an assessment of the predicted cumulative effects of wind farm developments within the vicinity of the SPA was conducted.

Coire Brachdaidh SSSI

9.9.6 Coire Brachdaidh SSSI breeding birds. The site supports a diverse assemblage of breeding birds including golden eagle, merlin, red grouse, twite, wheatear, ring ouzel and golden plover. Predicted effects on golden eagle have already been considered in sufficient detail. Collision effects and disturbance effects on merlin and golden plover have also been considered in detail.

9.9.7 No ring ouzel or twite breeding activity was recorded within parts of the SSSI located within 500m of the study area during field surveys. Therefore is considered unlikely that breeding twite and rind ouzel would be affected either directly or indirectly by disturbance. Wheatear breeding activity was recorded near to the existing track at the south end of the SSSI. It is likely that wheatear nesting in this location will be affected by disturbance from vehicles during the construction phase, however this disturbance will be very localised in the context of the overall SSSI. This is assessed as being an effect of negligible magnitude which is not significant.

Ben Alder and Aonach Beag SSSI

9.9.8 Ben Alder and Aonach Beag SSSI site is designated for its breeding birds including dotterel, ptarmigan, golden plover and dunlin. Ben Alder and Aonach Beag SSSI is located 5.5km from site. The breeding populations associated with the SSSI are sufficiently distant from the study area for the breeding populations of golden plover and dunlin to be considered separate populations.

9.9.9 The proposed barge traffic on the Loch Ericht will pass within 1.2km of the although the nearest part of the SSSI to Loch Ericht is at an altitude of over 500m above the waterline of Loch Ericht. It is considered extremely unlikely that barge traffic associated with transport of materials on Loch Ericht would lead to disturbance on nesting golden plover, dunlin or ptarmigan. This affect is assessed as being an effect of negligible magnitude which is not significant.

9.9.10 No dotterel have been recorded flying over the Talladh-a-Bheithe Estate at any stage during the vantage point surveys conducted between July 2009 and August 2013. However a single dotterel was recorded at the top of the ridge within Coire Bhachdaidh SSSI in August 2012; this was likely to be a migrating bird. The desktop survey did not reveal any evidence of dotterel on the Talladh-a-Bheithe Estate. Therefore there are no adverse effects predicted for dotterel.

9.9.11 It was not appropriate to undertake collision risk modelling for dotterel for the proposed development since no dotterel flight lines were recorded.

9.9.12 The likelihood of additional mortality from collisions resulting in an increase in population decline for dotterel is very small. Consequently there will be no likely significant effect on the SPA dotterel population at Ben Alder and Aonach Beag SPA.

Drumochter Hills SPA/SSSI

9.9.13 Drumochter Hills SPA is designated for its internationally important numbers of breeding dotterel and merlin. The SPA supports 70 pairs of breeding dotterel (1987 to 1994), equivalent to 8% of the breeding population in Great Britain. The current status of this qualifying feature is favourable maintained. The SPA also supports seven pairs of breeding merlin. The current status of this qualifying feature is unfavourable unchanged.

9.9.14 Drumochter Hills SPA is a large upland site on either side of the Drumochter Pass that contains a series of rounded summits divided by steep-sided stream gullies. The SPA is located 5.6km to the north of the site.

9.9.15 Due to the distance of the proposed development from the SPA (>4.8 km) there will be no impact on the SPA habitats supporting the qualifying species, no significant disturbance of the species within the SPA or impact on the distribution of the species within the SPA. The only remaining conservation objective that may be affected is the population of the species as a viable component of the site.

9.9.16 Dotterel has only been recorded within the Talladh-a-Bheithe site on one occasion since July 2009 when a single migrant bird was observed on the top of the ridge of the Coire Bhachdaidh SSSI.

9.9.17 One merlin pair has been recorded nesting within the Talladh-a-Bheithe estate in 2009 and 2012. Merlin nesting within the estate would not be associated with the Drumochter Hills SPA since breeding merlin tend to forage within 2km of the nest site. The SPA is considered to be too distant from the Talladh-a-Bheithe merlin to be considered a part of the same population.

Disturbance to nest sites

9.9.18 The proposed development is too distant from the Drumochter Hills SPA for breeding dotterel and merlin to be effected by disturbance.

9.9.19 The proposed barge traffic on the Loch Ericht will pass within 1.1km of the SPA but the nesting habitat is located at an altitude of over 400m above the waterline of Loch Ericht. It is considered that neither dotterel nor merlin nest sites associated with the Drumochter Hills SPA would be affected by disturbance from barge traffic.

9.9.20 It is considered unlikely that foraging merlin would be displaced from foraging habitat associated with habitat adjacent to Loch Ericht. This is assessed as being an effect of negligible magnitude which is not significant.

Collision

9.9.21 It was not required to undertake collision risk modelling for dotterel for the proposed development since no dotterel flight lines were recorded. There are no collision effects predicted for the merlin SPA/SSSI population since the site is too distant for merlin to use for foraging.

9.9.22 The likelihood of additional mortality from collisions resulting in an increase in population decline for dotterel or merlin is very small. Consequently there will be no likely significant effect on the SPA dotterel or merlin populations at Ben Alder and Aonach Beag SPA.

Impacts specific to SSSI species

9.9.23 Drumochter Hills Beag SSSI site is designated for it exceptional breeding bird assemblage although no specific species are mentioned in the citation. The SSSI is located 5.6km to the north of the site. The breeding populations associated with the SSSI are sufficiently distant from the study area for the populations to be considered separate populations to those associated with the study area.

9.9.24 The proposed barge traffic on the Loch Ericht will pass within 1.1km of the SSSI and any nest sites would be located at an altitude of over 400m above the waterline of Loch Ericht. Therefore there are no predicted disturbance effects on SSSI species.

Cumulative Assessment

9.9.25 Table 9.20 provides a summary of the residual effects of operational, submitted and consented wind farms within 30km of SPAs potentially affected by the proposed development.

Table 9.20 Summary of residual effects of operational, consented and submitted wind farms within 30km of SPAs potentially impacted by the development on cited species

SPA/SSSI and cited species	Calliacher Wind Farm (Operational)	North Calliacher (refused planning permission)	Crossburns (scoping)
Coire Brachdaidh SSSI - golden eagle, merlin, red grouse, twite, wheatear, ring ouzel and golden plover.	Merlin and golden plover were identified as a high sensitivity species. However no residual effects were identified for merlin or golden plover. Red grouse breed within the site in regionally important numbers but no displacement was predicted. Detailed habitat enhancement measures were described for merlin, golden plover and red grouse among other species. Twite, ring ouzel and wheatear were not mentioned as being a part of the impact assessment.	No impacts were predicted for golden eagle, merlin, twite, wheatear, golden plover. 19 pairs of red grouse were recorded in the survey area. Overall no residual effects identified.	Golden eagle and merlin recorded within turbine search area. Impact assessment yet to be completed.
Ben Alder and Aonach Beag	Dotterel, dunlin and ptarmigan were not mentioned as being a	Dotterel, ptarmigan and dunlin were not mentioned as being a	Dotterel were not mentioned as being a part of the impact

SPA/SSSI and cited species	Calliacher Wind Farm (Operational)	North Calliacher (refused planning permission)	Crossburns (scoping)
SSSI – dotterel, ptarmigan, golden plover and dunlin	part of the impact assessment. Golden plover was identified as a high sensitivity species. However no residual effects were identified for golden plover.	part of the impact assessment. No impacts were predicted for golden plover. Overall no residual effects identified.	assessment. Impact assessment yet to be completed.
Drumochter Hills SPA – dotterel and merlin Drumochter Hills SSSI – exceptional breeding bird assemblage	Merlin nesting within site. No impacts predicted on merlin. Dotterel were not mentioned as being a part of the impact assessment.	No impacts were predicted for dotterel and merlin. Overall no residual effects identified.	Recorded within vicinity of wind farm. No merlin have been found to breed within the site. Dotterel were not mentioned as being a part of the impact assessment. Impact assessment yet to be completed.

Overall Conclusions

9.9.26 There is a degree of uncertainty regarding residual effects for the Crossburns wind farm project which is only at scoping stage. However it is known that no raptor species breed within the site itself and dotterel are described as being a target species. It is important to take account of the fact that the proposed development at Talladh-a-Bheithe has identified no significant impacts on merlin or dotterel.

9.9.27 Therefore this assessment concludes that the proposed development will not have a likely significant effect on the Drumochter Hills SPA, alone or in combination with other developments within 30km of the SPA.

9.9.28 On the basis of currently available information it is also concluded that the proposed development will not have any significant effects on the Coire Bhachdaidh SSSI, Ben Alder and Aonach Beag SSSI and Drumochter Hills SSSI, alone or in combination with other developments within 30km.