Statement of Significance

6.197 In conclusion, although there would be some locally significant effects and cumulative effects on landscape character and visual amenity within approximately 8km (but mostly in the vicinity of the proposed development), the overall level of effect resulting from the addition of the proposed development into the baseline of the study area when taken as a whole is not considered to be significant overall.

Chapter seven

ECOLOGY

INTRODUCTION

7.1 This chapter, prepared by Avian Ecology Ltd. on behalf of Airvolution Energy, considers the potential effects of the proposed development on ecological receptors. It includes an assessment of potential effects on flora and fauna, excluding ornithology which is addressed in Chapter 8: Ornithology.

7.2 The proposed development is located approximately 2km to the north-west of Inverarnie and approximately 4.5km to the south of the southern edge of Inverness.

7.3 The proposed development comprises the erection of seven wind turbines with a maximum blade tip height of up to 126.5m metres, together with a substation and control building, associated hard-standings, a new access tracks, a temporary construction compound and turning area, and other related infrastructure including a permanent meteorological mast.

7.4 A grid connection between the proposed wind turbines and the local electricity distribution network would be the subject of a separate application by the Distribution Network Operator (DNO). Initial research indicates that a connection to the local distribution network could be achieved using underground cables to connect at a point to the north of the development site, near Inverness.

7.5 The following terms are used:

- **Application boundary** - the planning application red line boundary as shown on application drawing AEL007 (Rev No. R5).
- **Build footprint and rotor over-sail** – land within the footprint of the proposed development, as shown on Figure 7.1.
- **Development Site** – land encompassing the entire development, including Carr Ban Forest, as shown on Figure 7.1.
- **Study areas** – as defined as relevant with Table 7.8.

7.6 Ecological constraints and considerations have informed both the selection of this site, and the design evolution of the proposed development. The main objectives of this chapter are to assess the potential impacts of the proposed development by:

- Establishing and outlining baseline conditions; Identifying and evaluating key potential impacts,
- Outlining mitigation measures, where required, to ameliorate any potentially significant effects; and
- Outlining enhancement measures, where opportunities arise, to result in net biodiversity gains.

7.7 This chapter describes the assessment methodology, presenting the baseline conditions, together with the identification of the likely significant ecological effects during the construction, operation and decommissioning phases of the proposed development.

7.8 Mitigation measures required to prevent, reduce or offset any significant adverse impacts are described, where appropriate, and the likely remaining (residual) impacts after these measures have been employed are assessed.

CONTEXT FOR ASESSMENT

7.9 This impact assessment has been undertaken in accordance with the Chartered Institute of Ecology and Environmental Management (CIEEM) *Guidelines for Ecological Impact Assessment in the United Kingdom* (IEEM, 2006), and also using experience of 'best practice' in the ecological assessment of wind turbine developments.

7.10 It is important to note that there is no universally recognised definition of what constitutes significance, but following the above guidance a significant impact, in ecological terms (whether negative or positive) is defined as: *an impact on the integrity of a defined site or ecosystem and/or the conservation status of habitats or species within a given geographic area*. Determining whether an impact is deemed significant is therefore often a subjective process based on all relevant and available information, together with professional judgement.

7.11 The chapter addresses the effects associated with the construction, operational and decommissioning phases of the proposed development and considers the potential for cumulative effects arising in combination with other wind developments in the area.

Legislation and Policy

7.12 This assessment has been undertaken with reference to the provisions of relevant legislation and policy guidance. Table 7.1 provides a list of the legislation and policy applicable to this assessment.

Table 7.1: Key legislation and policy

European
• Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (hereafter referred to as The Habitats Directive)
National
• The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in Scotland); • The Wildlife and Countryside Act 1981 (as amended in Scotland) (W&CA) • The Nature Conservation (Scotland) Act 2004 • The Wildlife and Countryside Regulations 1981 (Scotland); • National Parks (Scotland) Act 2000 • Wildlife and Natural Environment (Scotland) Act 2011 • The Protection of Badgers Act 1992 • The Hedgerows Regulations 1997 • UK Post-2010 Biodiversity Framework (2012) • The United Kingdom Biodiversity Action Plan (UK BAP); • Scotland's Biodiversity: It's in Your Hands (2004) • National Planning Framework for Scotland 3 (2014) • Scottish Planning Policy (2014) • Scottish Biodiversity List (2013)

Local
• Highland Biodiversity Action Plan Draft

Consultation

7.13 A number of organisations and groups were contacted in order to obtain their opinions and any relevant ecological records they may have held. These opinions and information supplied both informed the scope of field work undertaken and the current assessment of potential impacts. Table 7.2 provides a list of these consultees, together with a summary of the responses and data received.

Table 7.2: Summary of Consultee Responses

Consultee	Summary of Response
Scottish Natural Heritage (SNH)	
	Scoping response dated 20/11/2014 from Liz McLachlan. SNH identified a series of issues to be addressed within the ES including ecology and ornithology, impacts on statutorily designated sites, landscape and visual and hydrology. Key ecological issues comprise impacts on habitats and peatland habitats and cumulative issues.
Forestry Commission Scotland	
	No response received to date
Highland Biological Recording Group	
	Provided biological records
Inverness Bat Group	
	No response received to date
Scottish Environmental Protection Agency (SEPA)	
Scoping response 10 November 2014	Letter received from Susan Haslam. SEPA identified a series of issues to be addressed in the ES that included carbon balance, disruption to GWDTE's, disturbance and re-use of excavated peat, forest removal and waste, existing ground water abstractions, engineering activities in the water environment, water abstraction, pollution prevention and environmental management and borrow pits.
Highland Council	
Scoping Response 17 November	Specific to the ecology chapter recommended the ES should include: • Account of habitats present on the proposed development site, identifying rare, threatened and protected habitats. • Baseline surveys of birds and animals (mammals, reptiles, amphibians etc.) at the correct time of year. • Consideration of European Protected Species (EPS). • Impacts likely to be more destructive during the construction phase of the development.

ASSESSMENT METHODOLOGY

Ecological Value

7.14 In accordance with CIEEM guidelines, the assessment process firstly requires that ecological features are valued based on their nature conservation interest (IEEM, 2006).

7.15 For the purposes of this assessment ecological value will be determined using the criteria defined in Table 7.3. The criteria defined in Table 7.3 is based upon CIEEM Guidelines, which outlines up to eight different geographic scales by which ecological value can be assigned (IEEM, 2006).

Table 7.3: Geographical scale of biodiversity value in descending order of importance

Geographic Scale of Value	Definition
International	Valuation beyond a UK scale, typically at European level.
National	Scotland
Regional / County	Highlands
District / Borough	Inverness
Local / Parish	Balnafoich
Site	Of value within the context of the Development Site

7.16 It should be noted that whilst the evaluation considers the presence of protected species that receive legal protection at various levels (national, international) and non-statutory protection at a local level (through development plans), the simple presence of the species does not necessarily infer value at the level of protection it receives. Therefore, in this assessment, the value of a site for protected species has been dealt with on a species by species basis, taking into account the level of activity, the level of protection it receives and the overall value of habitat on the site for that species.

7.17 Those sites, habitats and species classified at 'District / Borough' level and above are considered to be significantly valuable for a significant effect upon them to be material in decision making.

Sensitivity

7.18 For the purposes of this assessment, receptor sensitivity is synonymous with value as defined within Table 7.3. Determination of value and therefore sensitivity is also subsequently based on professional judgement and consideration of the rarity, status and distribution of the habitat or species in a geographical context.

7.19 The value given to a receptor does not necessarily relate to the level of legal protection that it receives. Therefore, in this assessment, the value of a receptor has been determined on a contextual basis, taking into account the results of baseline surveys and the value of receptors within the context of the local area.

Impact Magnitude

7.20 The impacts on ecological features are then judged in terms of magnitude and duration. The magnitude of potential impact may be difficult (or in certain cases

impossible) to categorise. The following parameters listed in Table 7.4 are therefore considered.

Table 7.4: Impact parameters

Environmental Parameter	Description
Magnitude	The 'size' or amount of the impacts is referred to as the magnitude and is determined on a quantitative basis where possible.
Extent	The area over which an impact occurs. The magnitude and extent of an impact may be synonymous.
Duration	The time over which an impact is expected to last prior to the recovery or replacement of the resource or feature. This can be considered in terms of life cycles of species or regeneration of habitats. The duration of an impact may be longer than the duration of any activity or impact.
Reversibility	Reversible (or temporary) impacts are those that do not last the duration of the proposal. Either spontaneous recovery or effective mitigation is possible. Irreversible (or permanent) impacts will last the duration of the proposal and recovery is not possible within a reasonable timescale.
Timing and frequency	The timing of impacts in relation to important seasonal and/or life cycle constraints has also been evaluated. Similarly, the frequency with which activities and simultaneous impacts would take place can be an important determinant of the impacts on receptors, and has therefore also been assessed and described.

7.21 The magnitude of an impact is assessed using criteria set out in Table 7.5. Magnitude refers to the size of an impact, and is determined on a quantitative basis where possible (IEEM, 2006). This may relate to the area of habitat lost to the development footprint or predicted loss of population of a particular species.

Table 7.5: Magnitude of Change

Magnitude	Criteria
High	Change affecting the integrity of a site/population, in terms of the coherence of its ecological structure and function across its whole area, which enables it to sustain the habitat, complex of habitats and/or the population levels of species of interest.
Medium	Integrity of a site/species/population would not be adversely or positively affected, but evident change to key characteristics or functioning of a site/species in the long term.
Low	Change affecting a habitat or species on a temporary, small scale or reversible basis or affecting receptors abundant in the local area.

Magnitude	Criteria
Negligible	No observable impact or very small changes over a small area for a temporary period.

Significance Criteria

7.22 The following terms are used to qualify the significance of environmental impacts:

- major beneficial;
- moderate beneficial;
- minor beneficial;
- negligible;
- minor adverse;
- moderate adverse;
- major adverse.

7.23 The significance of an effect on each ecological receptor is based upon the interaction between the sensitivity of the receptor and the magnitude of the change (impact) effected upon it.

Significance of Effect

7.24 As outlined there is no universally accepted definition of significance. However, following the CIEEM guidelines, an ecologically significant impact is that which impacts the integrity of a defined site or ecosystem and/or the conservation status of habitats or species populations within a defined geographical area (IEEM, 2006).

7.25 The overall significance of the impact of an effect is derived by cross-tabulating the magnitude and ecological value. This can be achieved by using the matrix presented in Table 7.6. The result from the impact matrix are however, not considered to be definitive. The overall impact will therefore be a combination of the impact matrix and evidence based approach.

Table 7.6: Effects Matrix

Value/Sensitivity of Receptor	Magnitude of Impact			
	Negligible	Low	Medium	High
International	Negligible	Minor / moderate	Moderate/Major	Major
National	Negligible	Minor	Moderate	Major
Regional / County	Negligible	Minor	Minor	Moderate
District	Negligible	Negligible/Minor	Minor	Minor/ Moderate
Local	Negligible	Negligible	Negligible	Minor
Site	Negligible	Negligible	Negligible	Negligible

7.26 Potential impacts described in later sections assume no specific mitigation measures, which are not already outlined in additional chapters of this ES. Specific mitigation measures are therefore proposed where required to neutralise impacts identified as likely and 'Significant' adverse i.e. those identified as Moderate and/or Major Adverse Significance. A statement of residual impacts is then provided. Impacts of Negligible or Minor Significance are considered to be of limited concern i.e. 'Non-Significant'.

7.27 To define significance further, the terms 'significant' and 'not significant' are used as shown in Table 7.7.

Table 7.7: Definition of ecological significance

Magnitude	Criteria
Significant	The impact is significant if the ecological integrity of a feature is influenced in some way. It may be that the impact is large in scale or amount, irreversible, has a long-term impact, or coincides with a critical period in a species' life-cycle.
Not significant	The impact is not significant if it does not influence the ecological integrity. It may be that the impact is small in amount or reversible within a reasonable timescale and/or does not coincide with critical life stages.

Zone of Influence

7.28 The CIEEM guidelines (IEEM, 2006) require the identification of a 'zone of influence', within which lie ecological areas and resources that may be affected by the development. The initial review of ecological resources, together with a review of the likely activities associated with the proposed development, was used to identify a zone of influence which is extended where appropriate. Within these zones, specific study areas were identified for the more detailed desk study and subsequent field surveys required to inform the valuation of ecological resources and the selection of 'key' ecological resources.

7.29 For the desk based element of the assessment, the following study areas were identified, searches were centred on grid reference E266655, N836282, approximate centre point of the proposed turbines unless otherwise stated.

- Records for all protected and notable species within a 3km radius of the proposed turbines.
- All bat records within a 5km radius, extended to 10km for noctule *Nyctalus noctula,* Leisler's bat *Nyctalus leisleri* records and Nathusius pipistrelle *Pipistrellus nathusius.*
- All designated sites within a 5km radius, extended to 10km for sites with bat interest.

7.30 All non-statutorily designated sites within a 2km radius. For the field survey based element of the assessment, the following study areas were identified as shown in Table 7.8 below:

Table 7.8: Field Study Areas

Field Survey	Study Area
Extended Phase 1 habitat survey	Site, extended to include all habitats within 500m of proposed turbines.
National Vegetation Classification (NVC) survey	250m buffer from all proposed turbines and 100m from all ancillary equipment including access within the Site
Bat activity surveys	Site, extended to include all habitats within 250m of proposed turbine locations. Bat roost assessment was undertaken within 200m of proposed turbine locations and 100m of access tracks within the Site.
Terrestrial mammal surveys	Site, extended to include all habitats within 100m of development footprint

7.31 The zone of influence is therefore varied in accordance with the typical distribution and movements of individual species and the likely mobility of qualifying interests of statutory designated sites.

Cumulative Assessment

7.32 Cumulative impacts are considered broadly following the methodology outlined in SNH guidance (2012)ii *'Assessing the Cumulative Impact of Onshore Wind Energy Developments'*.

7.33 A zone of influence of 10km was considered suitable for assessment purposes for the proposed development.

Table 7.9: Developments within 10km of proposed development

Site	Description
Operational	
Farr Wind Farm	40 wind turbines up to 101m in height approximately 7.5km from the proposal
Proposed (Planning Application or Appeal)	
Glen Kyllachy	20 wind turbines up to 110m in height located approximately 9.2km from the development site.
Hillcroft	2 turbines up to 45.8m in height approximately 3.7km from the development site.

7.34 Key identified receptors likely to be subject to significant effects are habitats and terrestrial mammals. Due to the distance of the cumulative schemes or the comparable small scale of their development (Hillcroft) cumulative effects on these receptors will not occur and are therefore not considered further.

BASELINE METHODOLOGY

Selection of Ecological Receptors

7.35 This section should be read with reference to Appendices 7.1 and 7.2.

7.36 The selection of ecological receptors for detailed assessment has been informed by a desk study and series of field surveys:

Desk study

7.37 The desk study sought to identify the presence of designated sites for ecological interest, or any records of protected or notable species within the identified zones of influence. The following organisations and resources were consulted;

- Highland Biological Recording Group (HBRG).
- Scottish Natural Heritage Information Service (SNHi) was accessed to obtain information on statutory sites.
- Joint Nature Conservation Committee (JNCC) (http://jncc.defra.gov.uk/)

7.38 Additional published and on-line resources were also reviewed to assist in establishing a robust baseline. These are referenced where they are referred to.

Field Surveys

7.39 Baseline ecological surveys were completed between November 2013 and September 2014. All surveys were completed with reference to current guidance and a summary of each field survey methodology is summarised below with full details presented in Appendix 7.1.

7.40 Table 7.10 presents a summary of field survey completed, dates of survey and study area surveyed. The study areas for ecological surveys were based on the Development footprint, and the potential for impacts to extend outwith that boundary.

Table 7.10: Summary of field surveys completed

Field Survey	Date	Technical Appendix	Survey layout Figure
Extended Phase 1 habitat survey	November 2013, updated August and September 2014	7.2	Figure 7.1
National Vegetation Classification (NVC) survey	September 2014	7.2	Figure 7.2
Bat activity surveys	April to September 2014	7.1	Figure 7.3
Terrestrial mammal surveys	November 2013 through to September 2014	7.1	Figure 7.1

7.41 Details of each methodology are summarised below, with full details provided within Technical Appendices 7.1 and 7.2. All field surveyors were suitably qualified and experienced and were fully conversant in all recognised survey methodologies with many years professional ecological field experience.

Extended Phase 1 Survey Methodology

7.42 An Extended Phase 1 habitat survey was carried out within the study area (the extent of the Extended Phase 1 habitat survey is illustrated in Figure 7.1). An initial Extended Phase 1 habitat survey was completed in November 2013; this was subsequently updated in August 2014.

7.43 The survey was undertaken in accordance with the CIEEM (2012)[iii] guidelines, using the UK industry standard JNCC (2010)[iv] guidelines and with reference to the IEEM (2006) and Scotland and Northern Ireland Forum for Environmental Research (SNIFFER, 2009)[v].

7.44 The Extended Phase 1 habitat survey is a multipurpose survey and in addition to recording broad habitat types; also aims to identify the presence or potential presence of key ecological features including flora and fauna protected by law and / or of conservation interest (e.g. protected amphibians, reptiles[vi] and terrestrial mammals[vii, viii, ix, x, xi]).

National Vegetation Classification Survey

7.45 The NVC study areas were selected for survey based on the presence of homogenous stands of vegetation and focusing on UK and/or Local Biodiversity Action Plan habitats of potential nature conservation value, as identified during the initial Phase 1 Habitat Survey, with particular focus on habitats identified as potentially comprising wetlands in accordance with the SNIFFER guidance (2009).

7.46 The NVC survey was undertaken following the guiding principles detailed in the *National Vegetation Classification: Users' handbook* (Rodwell, 2006)[xii]. The NVC is a standard survey technique used to identify and describe plant communities and vegetation types and provides a finer level of detail than the Phase 1 habitat survey. Full details are provided in Appendix 7.2.

7.47 NVC surveys within plantation forestry can be difficult to estimate whole homogenous stands of vegetation, particularly where re-planting has occurred or on deep peat, where forestry planting has failed to take hold due to unsuitable drainage. In these instances vegetation cover has been estimated using field based data and aerial images combined.

7.48 Following the field survey, the NVC sample data was analysed using the Modular Analysis of Vegetation Information System (MAVIS)[xiii] and the published volumes of British Plant Communities (Rodwell, various dates)[xiv] in order to determine a best fit community type for each homogenous stand surveyed.

Bat Survey Methodology

7.49 Baseline information in relation to bats was informed by a habitat appraisal, ground level transect surveys and automated surveys at ground level. Surveys were based upon Natural England (TIN051, 2012, revised 2014[xv]) and Bat Conservation Trust (BCT) guidance (Hundt, 2012)[xvi]. Full details are provided within Appendix 7.1. Survey layout and design is illustrated on Figure 7.3.

7.50 The initial habitat appraisal was informed by the Extended Phase 1 habitat survey and review of aerial images. A risk level was applied for the development site with consideration to habitat quality and species considered likely to be present (informed by desk study information and professional judgement). The risk level is used to determine the minimum standards for survey effort in accordance with BCT guidance (Hundt, 2012).

7.51 Overall, habitats most closely resemble the habitat description, '*small number of potential roost features, of low quality; Habitat could be used extensively by foraging bats. Site is connected to the wider landscape by linear features such as scrub, tree lines and streams*'. (Hundt, 2012). In terms of species likely to be present the Site was assessed as '*low number, several low risk species*' following the definitions set out in Hundt (2012).

7.52 The roost potential of the plantation woodland is considered low as the majority of the coniferous trees lacked features (e.g. cracks / cavities, loose / flaking bark, deadwood and hollow stems) commonly associated with tree roosts and no trees with bat roost potential were identified during the Phase 1 or during subsequent survey methodologies. The importance of any roost is likely to be of Local importance.

7.53 Following the BCT guidance, the development site is of low to medium risk and a precautionary approach was adopted and 'medium' survey effort was applied with monthly surveys (combining of ground level transect surveys and automated surveys at ground level) undertaken between April and September 2014.

7.54 The dominance of plantation forestry within the Site largely dictated the transect routes and automated monitoring locations. Over the course of the survey period, the layout has evolved to accommodate ecological and other environmental constraints and therefore the survey layout does not cover all turbine locations; however, the majority of habitats within the development site were sampled and the surveys are considered to be representative of habitats in the development site and the geographical location of the development site.

Ground Level Transect Surveys

7.55 Ground level transect surveys were undertaken between April and September 2014. Each survey walked a pre-defined transect route that was interspersed with 14 listening points (LPs). Five minutes of static monitoring was undertaken at each LP.

7.56 The transect and LP locations incorporate a range of bat habitat features of both high and low interest to bats (e.g. woodland edge and open moorland).

Automated Activity Surveys

7.57 Automated surveys at ground level were undertaken monthly between April and September 2014. Four monitoring stations were deployed (MS1-MS4); each monitoring station comprised a single Anabat SD2 bat detector positioned at c.1m above the ground. The location of detectors was limited to woodland edge and clear-fell forestry areas, where safe to do so out of the way of forestry machinery. Due to forestry cover no detectors could be placed at proposed turbine locations therefore the monitoring locations were chosen to sample habitats present in the development site, with priority given to woodland edge habitats, which, after construction would be the nearest habitat features to turbine locations and provide a representative account of activity during the operational phase of the development.

7.58 In total: 78 nights of survey were undertaken at each monitoring station across the survey period, totalling approximately 701 hours at each monitoring station.

Tree inspections

7.59 All trees located within 200m of the proposed turbines comprised coniferous plantation forestry, with the exception of a small semi-natural broadleaved woodland copse to the south of proposed Turbine T7.

7.60 The trees on the edge of the semi-natural woodland and all standalone trees within at least 200m of the proposed turbines were visually inspected for potential roost

presence (in line with recommendations in BCT (Hundt, 2012) guidance) from the ground and with the use of binoculars and high powered torches as necessary.

7.61 Trees were assessed for their potential to support a bat roost using BCT (Hundt, 2012) guidance. Trees were then assigned a category between 1* and 3 if applicable.

Other Protected and notable species

7.62 The Phase 1 habitat survey was extended to include searches for evidence of protected species. Additional searches were undertaken in conjunction with Phase 1, NVC, bat and ornithology survey methodologies during site visits between November 2013 and September 2014. The following were considered: badger, otter, water vole, red squirrel, polecat, wildcat, reptiles, amphibians and invertebrates.

Information Gaps

7.63 A full description of survey limitations are provided within Appendix 7.1 and 7.2. overall surveys were conducted within the appropriate windows for relevant species and habitats and no significant limitations to the surveys were encountered. Inevitably with any ecological survey they represent snapshots in time and cannot be guaranteed to detect all species that might be present. No limitations were encountered that would be considered likely to have materially affected the conclusions of this assessment.

BASELINE CONDITIONS

Existing Environment

7.64 The development site is dominated by coniferous plantation, herein referred to as Carr Ban Forest. This was interspersed with areas of blanket bog and heathland.

Designated Sites

7.65 The development site does not form part of any statutory or non-statutory designated site for nature conservation interest. Furthermore, no statutory or non designated sites for nature conservation interest (excluding birds) was identified within 5km of the approximate centre of the development site.

Habitats

Desk Study

7.66 The desk study returned records of several protected and / or notable flora:

- Ling *Calluna vulgaris*: coloniser of lowland heathland and blanket bog.
- Lesser tussock sedge *Carex diandra:* abundant in fen habitats, found near ponds and swampy areas.
- Creeping thistle *Cirsium arvense:* most common species of thistle in the UK, found in lowland grassland habitats.
- Marsh thistle *C. palustre:* common in the south of England, being rare in Scotland. Found in grazed grassland habitats.
- Spear thistle *C.vulgare:* widespread weed species, a coloniser of cultivated and disturbed ground. Most likely found in arable habitats.
- Petty whin: *Genista anglica:* small seasonal shrub found in lowland wet heath and drier areas of bogs.

- Small-white orchid *Pseudorchis albida:* found in heathlands and acid grasslands.

7.67 Species listed above are typically characteristic of heathland and bog habitats found in the local area and within the development site, within the exception of Marsh thistle and Spear thistle.

Habitats within and Adjacent to the Site

7.68 Habitats across the study areas, as defined are shown on Figure 7.1 and 7.2. Full descriptions of habitats and species communities are provided within Appendix 7.2.

7.69 The northern section of the study area was dominated by mature coniferous plantation woodland, on top of deep peat and blanket bog. There are three main open areas of blanket bog within the woodland, the largest comprises plantation woodland which has stunted in growth due to unsuitable wet ground. Due to the small trees present, ground flora has been able to flourish, creating wet modified bog.

7.70 To the north of the study area, outside the development site are large open areas of blanket bog and an area of ancient coniferous woodland.

7.71 The southern section of the study area is coniferous plantation woodland on top of very little or no peat. There are several clear-fell areas in this section which most closely fit heath. The largest of heathland areas surrounds Turbine 7 and has recently been replanted with mixed woodland (1-5 years).

7.72 Priority habitats, as listed on under the UKBAP and are of conservation priority in Scotland, that are present within or bordering the development site include fresh water lochs, ponds, blanket bog, heath and low mixed deciduous and semi natural pine woodland (ancient woodland) to the north of the Site.

7.73 Each of the main habitat types present within the study areas (from Phase 1 and NVC survey information combined) are detailed below and summarised in Table 7. 11. Full details are provided in Appendix 7.2.

Wet modified bog

7.74 On the north-western side of the existing forestry track the majority of forestry is situated on deep peat. Plantation forestry covers the majority of this section, with some open areas and interested by forest rides. Large areas of forestry within the north-western section is stunted by the deep peat present underfoot, creating a low canopy of small coniferous trees. Within these areas wet modified bog is present. Figure 7.2 highlights large areas of wet modified bog identified through NVC survey; however due to gradual stunted tree growth habitat boundaries are approximate. Wet modified bog communities within the study area can be characterised by combinations of *Calluna vulgaris, Eriophorum vaginatum, Narthecium ossifragum* and bryophytes, especially sphagnum species. Overwhelmingly the dominant species was *Eriophorum vaginatum*, with *Calluna vulgaris* and *Erica tetralix* frequent.

7.75 The best match for this community is M18, *Erica tetralix-Sphagnum papillosum* blanket mire, a widespread but local community in Scotland.

7.76 In the extreme south of the survey area, there are two areas of mire which best fit M17 *Scirpus cespitosus-Eriophorum vaginatum* blanket mire.

Heath

7.77 In the southern section of the survey area there are large areas of recently planted mixed woodland (broadleaves and sitka spruce) which are on shallow peat and are drier than the northern section. A further large area of heath was identified adjacent

to the existing forestry track. This section had recently been clear-felled. With the exception of *Sphagnum capillifolium*, sphagnums are notable by their absence, but the bryophytes *Pleurozium schreberi* and *Hypnum jutlandicum* are present, albeit with low cover.

7.78 The best match for this community is H12 *Calluna vulgaris-Vaccinium myrtillus* heath. This is a widespread community in the north of Britain, and particularly in Central Scotland.

Unimproved acid grassland

7.79 Unimproved acid grassland occurs in the south of the survey area, outside the Site. It is dominated by grasses, in particular *Deschampsia flexuosa* and *Festuca rubra,* with *Anthoxanthum odoratum* and *Holcus lanatus* also constant. Several bryophytes are present, in particular *Rhytidiadelphus squarrosus* which is dominant.

7.80 The best match for this community is U2 *Deschampsia flexuosa* grassland, though this is not an exact match, with *Calluna vulgaris* notable by its absence. However the *Deschampsia* grassland is associated with woodland clearances, burning and grazing around areas of heathland and is a temporary transitional community with variable components.

Semi-natural woodland

7.81 A small tract of this habitat occurs in the south of the survey area, outside the development site. This woodland is overwhelmingly dominated by *Betula pubescens*, with some *Pinus sylvstris* and *Picea abies.* Bryophytes are abundant, with the dominant species being *Hylocomium splendens, Polytrichum* commune and *Hypnum jutlandicum.* Sphagnum *palustre* and *Sphagnum girgensohnii* are also present. Grasses feature strongly, especially *Milium effusum, Holcus lanatus, Mollinea carulea* and *Festuca rubra.*

7.82 The best match for this community is *W17 Quercus petraea-Betula pubescens-Dicranum majus* woodland.

Coniferous plantation woodland

7.83 Coniferous plantation woodland dominates most of the development site and is not normally included in NVC surveys due to its limited botanical interest. However large parts of the coniferous woodland grow on deep peat and the understorey contains plants more associated with degraded blanket bog. This woodland is overwhelmingly dominated by *Pinus sylvstris, Pinus contort* and *Picea abies.*

7.84 The *Pinus* contort plantation understorey community best fits degraded M18 *Erica tetralix-Sphagnum papillosum* blanket mire.The *Pinus sylvestris* plantation understorey community best fits H12 - *Calluna vulgaris-Vaccinium* myrtillus heath.

7.85 *Picea abi* plantation occurs in the extreme south of the survey area, outside the development site. This is the least diverse of the coniferous plantation communities with just a handful of bryophytes at low coverage, and as such a NVC community cannot be assigned to the understorey.

7.86 In addition to above, there are small stands of hybrid larch plantation scattered within the forestry. A moderate sized band of hybrid larch is also located on the far eastern boundary. Hybrid larch distribution is presented within Chapter 15 Forestry and Figure 15.3.

Standing and Running Water

7.87 A number of small drainage channels intersected the forestry onsite, feeding into Loch Bunachton or Gask Burn. Drainage channels in the northern section of the Site

bordered areas of deep peat, flowing into small ponds. A channel also broadly followed the forestry track heading south west. All channels were heavily waterlogged and dominated by *Sphagnum spp*. on peat.

7.88 Three ponds were identified within the development site. The most northern pond, located near Dinichean House adjacent to a forestry track was manmade, surrounded with Scots pine trees around 30ft tall. A second pond located centrally within the development site was also manmade and surrounded by plantation and blanket bog. The pond supported a small island at the centre and was very poor in plant species diversity.

7.89 A further third pond located within an area of clearfell and heath was also relatively botanically poor but contained more emergent sedges and rush species.

Buildings and Hard Standing

7.90 One building complex was located within the development site; Dinichean House, a small residential complex located in the far north eastern corner of the development site comprised a large house and large metal shed. The grounds were surrounded by mature pine trees and tall deer fencing. A number of red deer are permanently present within the grounds.

Overall habitats summary

7.91 Habitats recorded within the development site, consisting of plantation woodland, cleared in areas to form pockets of modified blanket bog on areas of deep peat and heathland on shallower areas. Other areas of blanket bog interspersed with stunted conifer growth are present on deep peat, where the ground is too wet for optimal plantation growth. The understorey of dense coniferous plantation indicated a rich seedbank of degraded bog and heathland habitats. Responsible for the immediate recolonization of bog and heathland habitats. See Table 7.11 below.

Table 7.11: Habitat Summary

Broad Habitat Type	Associated NVC community types	Corresponding Annex 1 habitats	UKBAP Priority Habitat	GWDTE
Bogs	M17 & M18	Blanket bog (only if active)*	UK BAP – Blanket Bog (only if active)* L BAP – Blanket bog	No
Dry Dwarf Shrub Heath	H12	European dry heath	UK BAP – Upland Heathland L BAP – Upland Heathland	No
Acid	U2	None applicable	UK BAP - Lowland dry	No

Broad Habitat Type	Associated NVC community types	Corresponding Annex 1 habitats	UKBAP Priority Habitat	GWDTE
Grassland			acid grassland	
Coniferous plantation woodland	n/a, understorey of degraded modified H12 and M18	None applicable	None applicable	No
Semi-natural coniferous woodland	W18, W17, W19	Caledonian forest	UK BAP - Native pine woodland	No
Ditches	N/A	Small drainage ditches	N/A	N/A
Pond	N/A	Two manmade ponds and a single pond within clear-fell heathland.	UK BAP	N/A

*active bog – refers to the bog 'peat forming. The habitat supports a significant area of peat forming species such as *Sphagnum spp.*

7.92 Blanket bog habitats such as M17 and M18 identified are listed under Annex 1 of the Habitats Directive and under UK and L BAP's. Due to historic land use of forestry plantation, these habitats were found in their degraded form and their ecological value is therefore considered to be reduced from more species-rich, unmodified examples. In the context of the wider area, these habitats are prevalent, particularly in their modified form as is the case with Carr Ban. They are also one of the most extensive semi-natural habitats across the UK. The bog habitats are modified, supporting low coverage of Sphagnum spp, recorded within quadrats examples suggesting the bogs are not 'active', this reduces their value further. The lack of Sphagnum spp is also likely due to the prevalence of either recently planted or stunted coniferous growth. Drainage channels may also be responsible for the drier areas of blanket bog and the transition into heathland.

7.93 Areas of heathland (H12) were found under recently clear-felled forestry and were also modified or degraded. The communities recorded within the quadrat samples represented degraded forms of heath, with reduced species than what would be expected of unmodified examples. These areas rested on shallow peat compared to blanket bog and dominated by *Calluna vulgaris* there was no evidence including cutting or management for the encouragement heath.

7.94 Based on the above, both heath and bog habitats are in their degraded forms. However, they are considered to be of moderate ecological value as they appear to be in current regeneration and are representative of the original blanket bog / heath habitats present before commercial forestry was planted. Blanket bog and heath habitats are therefore considered to be of up to **County** value in-line with IEEM guidelines.

7.95 The remaining habitats within the development site are considered to be limited value due to the dominance of plantation woodland. In addition, ponds are listed under the UKBAP and are of potentially moderate to high importance; however, they are manmade, supporting very little aquatic vegetation and in the early stages of generation. They are therefore considered to be of lower value. The plantation woodland and ponds are of low interest and considered to be of **Local** value in-line with IEEM guidelines.

7.96 Areas of semi-natural woodland and unimproved grassland are located outside the Site and will not be affected by the development, although they would be considered to be of **County** value in-line with IEEM guidelines.

Bats

Desk Study

7.97 The UK is known to support 18 species of bats, with Scotland supporting at least nine species and the Highlands four species; brown long-eared bat *Plecotus auritus*, soprano *Pipistrellus pygmaeus* and common pipistrelle *Pipistrellus pipistrellus* bats and Daubenton's bat *Myotis daubentonii*.

7.98 Bat records obtained through consultation were typical of the region and tended to reflect the dominant habitats within the wider landscape and the geographical location of the proposed development.

Transect Survey Results

7.99 Transect surveys recorded common pipistrelle and soprano pipistrelle. No medium or high risk species were recorded during the surveys. In total 3 bat passes were recorded during the April survey, 13 during May, 9 during June, 17 during July, 5 during August survey and 3 during September 2014. Common pipistrelle was the most frequently recorded species (32 passes in total), followed by soprano pipistrelle (17 passes).

7.100 Common pipistrelle activity was found to be concentrated near LP's 9 and 12, within forestry plantation and is most likely attributed to the small water body present within the blanket bog clear-fell area. Further increased activity was recorded along the public highway near LP14. No activity was recorded between LP13 and LP14 within the large heathland strip at the eastern end of the Site; however this location offers moderate foraging opportunities and sheltered either side from plantation woodland.

7.101 Soprano pipistrelle activity was lower than common pipistrelle, with activity focused between LP9 and LP10, near the small waterbody. Lower levels were recorded at LP11-LP12 near a further water body and then at LP14 on the public highway.

Automated Survey Results

7.102 Analysis of data recorded from automated activity surveys identified calls with the characteristics of common and soprano pipistrelle, species considered to be at low risk at population level (Natural England, 2014).

7.103 A total of 1,948 bat passes were recorded over at least 701.03 hours of automated survey. No bat passes were recorded at MS1, the detector located within clear-fell forestry from 78 nights worth of monitoring. MS2, MS3 and MS4 recorded both

common and soprano pipistrelle, with the highest levels of activity recorded at MS2. No medium or high risk species were recorded during the surveys.

7.104 The highest activity was recorded in July 2014 were up to 7.14 bat passes per hour were recorded (both species combined). Of the activity recorded this month 61% related to soprano pipistrelle.

Common pipistrelle

7.105 A total of 780 common pipistrelle passes were recorded over the survey period. Overall, this equates to approximately 1.1 passes per hour or 10 passes per night. The species was recorded at three of the four monitoring stations. The results indicate that clear-fell areas are used by but unimportant for foraging common pipistrelle bats.

7.106 MS2 recorded the highest levels of activity with up to 0.98 passes per hour recorded. This detector was located within bog habitat within plantation woodland. For the most part, activity was recorded in July 2014 (81%), with low levels recorded during remaining months.

7.107 MS3 only recorded a single pass of common pipistrelle, which was located on the same forest edge as MS2 and MS4 within similar habitats. MS4 recorded low levels of activity (0.14 passes per hour) and was restricted to June and July 2014.

7.108 The usage within the study area appears to be predominantly by foraging bats, with some occasional commuting.

7.109 For example, at MS2 the most activity was recorded on the 16th July 2014. During this period 512 of the 780 bat passes were recorded. This increase in activity peaked at midnight, but remaining relatively constant throughout the rest of the nightly period. July can be a peak month for bat activity, when weather is conducive to bat activity (warm, dry and low wind speeds) and with the detector being placed in bog habitat. This habitat at this geographical location reaches it 'peak' flowering period in July / August. So the bat activity increase in most likely attributed to this, offering increased foraging opportunities (invertebrate prey).

7.110 Chart 7.1 below shows the overall bat activity per hour and per night for common pipistrelle across the survey period.

Chart 7.1: Overall Bat Activity per hour and per night

Soprano pipistrelle

7.111 A total of 1,168 soprano pipistrelle passes were recorded over the survey period. Overall, this equates to approximately 1.67 passes per hour or 14.97 passes per night. The species was recorded at three of the four monitoring stations. The results indicate that clear-fell areas are unimportant for foraging soprano pipistrelle bats.

7.112 MS2 recorded the highest levels of activity with up to 1.5 passes per hour recorded. This detector was located within bog habitat within plantation woodland. For the most part, activity was recorded in July 2014 (94%), with low levels recorded during remaining months.

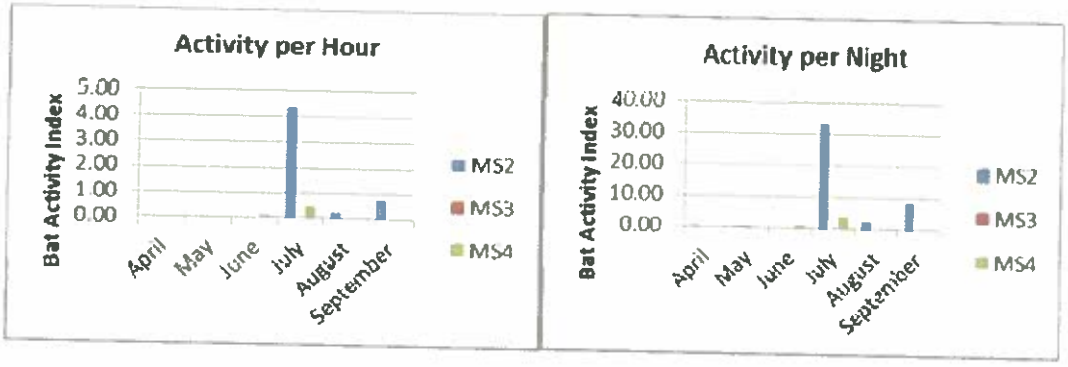
7.113 MS3 recorded only three soprano pipistrelle passes, which was located on the same forest edge as MS2 and MS4 within similar habitats. MS4 recorded low levels of activity (0.16 passes per hour) and was restricted to June and July 2014.

7.114 The usage within the study area appears to be predominantly by foraging bats, with some occasional commuting. From activity levels recorded it is difficult to estimate commuting activity.

7.115 Activity patterns recorded were very similar to common pipistrelle with the majority of activity recorded at MS2 on 16th July 2014. During this period 738 bat passes were recorded representing 63% of all activity. Unlike common pipistrelle, soprano pipistrelle activity peaked between 04:00 and 05:00 in the morning. July can be a peak month for bat activity, when weather is conducive to bat activity and with the detector being placed in bog habitat. This habitat is considered to offer increased foraging opportunities (invertebrate prey) (7.108).

7.116 Chart 7.2 below shows the overall bat activity per hour and per night for common pipistrelle across the survey period.

Chart 7.2: Overall Bat Activity per hour and per night



Bat Tree Roost Potential

7.117 A visual roost assessment of all trees within 200m of the proposed turbine locations was undertaken in August 2014 in accordance with BCT guidance (Hundt, 2012). The assessment aimed to note any evidence of roosting bats and to assess each tree for its value to bats.

7.118 The study area was dominated by coniferous forest and due to its dense nature not all trees could be assessed for bat roost potential. The forestry onsite was Scots pine and Lodgepole pine, with the latter comprising the majority. Norway spruce was also present on area of shallow peat outside the development site. These species of confer offer very low potential for roosting bats, supporting a lack of rot holes and cracks in branches and trunks.

7.119 The only potential for bat roosts was identified in a small area of broadleaved woodland to the far extent of the study area, c.480m from the proposed turbines. The woodland comprised NVC community W17 (see TA 7.2.), which on inspection was dominated by birch woodland which was found to be of low value to roosting bats; no signs of decay were identified, no cracks in the bark or rotting holes visible; however

there did appear to be mature broadleaves further afield which could not be accessed that could potentially offer roosting opportunities.

7.120 Within the far northern extents of the development site is Dinichean House complex. The main residential building and associated shed type structures were externally inspected for their potential to support a bat roost. The buildings were all in a highly maintained state, showing no obvious signs for roosting bats. It was considered unlikely that the buildings had the potential for support a bat roost. The building complex is located approximately 600m from the nearest proposed turbines.

7.121 In summary, all trees within 200m of the proposed turbines were considered unsuitable to support a bat roost and classed as Category 3 trees. There are also limited potential roosting opportunities within 500m of the proposed turbines within W17 woodland.

7.122 Within the wider landscape there is a high likelihood of roost opportunities in residential dwellings near Balnafoich and associated mature broadleaved woodland (c.1.5km south east) and residential dwellings to the south west of the proposed turbines (c.1.5km).

Bat Survey Summary

7.123 During manual activity surveys, highest levels of activity were recorded along plantation tracks near ponds. Low levels of activity were recorded along edges of woodland wedge and bog habitats and activity was recorded outside the development site commuting along the road.

7.124 During automated surveys bat activity levels were highest at MS2 (overall BAI of 1.50m common pipistrelle passes per hour). This station was positioned adjacent to plantation woodland edge and open modified blanket bog. The same habitats were located at MS3 and MS2.

7.125 No medium or high risk species (at population level) were recorded (Natural England, 2014).

7.126 Common pipistrelle is relatively common in the UK, with a population estimate of 2,430,000 individual bats (Battersby *et al.*, 2005)[xvii]. This estimate should however, be treated with caution given population declines in recent years. Soprano pipistrelle is relatively common in the UK, with an estimate population of 1,300,000 in the UK (Battersby *et al.*, 2005).

7.127 In consideration of the habitats present, overall low bat activity levels (<2 passes per hour maximum), the absence of high risk species recorded and the limited potential for roosts within the immediate vicinity of the study area, the overall value of bats within the study area is considered to be of **Local** value when referring to CIEEM guidelines.

Badger

7.128 No badger setts or other evidence (e.g. foraging signs or latrines) of badger activity was found within the development site during the Extended Phase 1 habitat surveys. No records relating to observation of badgers or sett locations were returned during desk study.

7.129 The habitats within the site are largely unsuitable for the species, being dominated by dense plantation forestry intersected by drainage channels and the ground is generally quite wet. On this basis the habitats within the site are of less than **Site** value.

Otter

7.130 No signs of otter were recorded within the development site during the Extended Phase 1 habitat surveys or incidentally during other field surveys. A number of water logged ditches were present but were overgrown with sphagnum with limited grassland, forb and shrub vegetation present and no ditch banks present. An overall assessment of the ditches considers them to be largely unsuitable for supporting dens. The structure of the ditches and vegetation present decrease the potential presence of prey species (fish) along the ditches so they are unlikely to form part of a favoured foraging network although may be occasionally present and the site is considered to be of **Site** value in line with CIEEM guidance overall.

Water vole

7.131 Due to habitat losses in lowland areas, water vole populations in Scotland are restricted to small upland areas. The species had limited range within Scotland although SNH are currently working towards more appropriate bankside vegetation management to encourage the species back into lowland areas.

7.132 No evidence of water vole was found during the Extended Phase 1 habitat surveys or incidentally during other field surveys. Watercourses within the site were shallow and overgrown with sphagnum spp., offering no bank material for burrow creation or grasses for foraging. Based on the overall poor habitat suitability and lack of evidence during the Extended Phase1 habitat survey the species is unlikely to be present. On this basis the habitats within the site are of less than **Site** value.

Red Squirrel

7.133 Red squirrels *Sciurus vulgaris* are still widespread in northern and eastern Scotland, where the range of the invasive grey squirrel is limited. A number of records received from HBRC related to Tomfat Woods over 1km north and Farr, c.2.5km south of the site.

7.134 Red squirrels are found in most woodland habitats within Scotland but generally found within woodlands of suitable age to produce seeds. The plantation forestry dominating the development site is likely to offer suitable foraging and nesting habitat for the species as it is composed of a variety of mature, young and pioneering plantation with ancient woodland nearby.

7.135 No sightings of red squirrel or their dreys were observed during the Extended Phase 1 habitat surveys or incidentally during other field surveys; however it is considered likely that red squirrel will be present in the locality and may use mature woodland habitats on the boundary of the development site.

7.136 A precautionary approach is adopted and the species is assumed to be present within or within close proximity to the development site. The habitats within the Site are deemed to be of **County** value in line with CIEEM guidelines.

Pine marten

7.137 Pine marten *Martes martes* has a restricted distribution in the UK. Found in upland areas, with strongholds in the Scottish highlands where it is widespread. A single record of this species was received through desk study near Balnafoich in 2008 but they are likely to be under recorded in the area.

7.138 Pine marten are a habitat specialist, dependant on areas of extensive woodland with food and breeding opportunities. It is possible that the woodland habitats within the

development site combined with the nearby broadleaved woodland and bog / heath habitats provide opportunities for this species.

7.139 The forestry within the development site offers moderate foraging opportunities year round and is connected to the wider landscape by open water and broadleaved woodland to the south, semi-natural woodland to the north and further plantation to the north-east; however, the trees within the site are of insufficient age to support dens or elevated tree cavities needed for shelter and breeding.

7.140 No sightings of pine marten, their tracks, hair or latrines were identified during field surveys. Based on recent nearby records and habitats present within and bordering the development site, the species is likely to be present in the locality and use the habitats within the development site for foraging as part of a wider territory. The habitats within the development site are deemed to be of **District** value in line with CIEEM guidelines.

Wildcat

7.141 The Scottish wildcat *Felis silvestris*, once widespread has suffered major declines across the UK and it is now thought less than 100 individuals remain in the wild[1]. The species has become highly hybridised with domestic cats and 'pure' wildcats are restricted to remote areas of northern and western Scotland.

7.142 The species prefers woodland edge habitats on the margins of mountains and moorlands with rough grazing with some crops also available. It is possible that habitats within the Site offer some potential for wildcat although the chances of the species being present are low.

7.143 No records of this species were returned and most recent data from Kilshaw (2011)[xviii] 'Scottish Wildcats, Naturally Scottish' surveys did not record the species within at least 10km of the proposed development. On this basis the habitats within the development site are of less than **Site** value.

Hedgehog

7.144 Hedgehogs are found in a variety of habitats including woodland but rarely found within plantation forestry habitats. No sightings of hedgehog were observed during the Extended Phase 1 habitat surveys or incidentally during other field surveys. On this basis the habitats within the development site are of less than **Site** value.

Brown hare

7.145 Largely restricted to arable and lowland habitats this species is unlikely to be found within plantation forestry habitats within the development site. No evidence or sightings of brown hares were observed during the Extended Phase 1 habitat surveys or incidentally during other field surveys. On this basis the habitats within the development site are of less than **Site** value.

Amphibians

7.146 Three shallow ponds were identified within the development site during the phase 1 survey. All ponds were surrounded by plantation woodland and / or forestry tracks. Ditches present within the survey area were considered to offer poor quality habitat for most amphibians as they overgrown with sphagnum and contained insufficient water

[1] http://www.scottishwildcats.co.uk/

depth and either lacked aquatic vegetation or were heavily shaded by ruderal and scrub vegetation. Ditches were not therefore subject to detailed survey.

7.147 The development site is located within Zone C, as described in Oldham *et al* (2000), an area which is unsuitable for great crested newt *Triturus cristatus*. On this basis the development site is extremely unlikely to support the species. The ditches and other minor waterbodies may support more common amphibian species smooth newt *Lissotriton vulgaris*, palmate newt *Lissotriton helveticus*, common frog *Rana temporaria* and common toad *Bufo bufo*. Records of common toad were returned during the desk study.

7.148 The habitats within the development site are considered to be of **Local** value in line with CIEEM guidelines.

Reptiles

7.149 The plantation woodland habitats are of limited value to reptile species, although the woodland edge, clear-fell and open habitats offer some foraging and basking opportunities. There is potential for the plantation woodland to offer hibernation opportunities in the winter months.

7.150 The common lizard is frequently found in habitat with an open aspect with good locations for basking, being commonly recorded in habitats such as heathland, bog and moorland which offer high invertebrate interest. Adder and slow worm are typical of heathland habitats, remaining close to suitable vegetative cover such as scrub and woodland edge.

7.151 No records of reptiles were returned from Highland Biological Recording Group; however all three species are known to be present in the region and habitats within the Site offer moderate opportunities and the development site is considered to be of **District / Borough** value in line with CIEEM guidelines.

Invertebrates

7.152 A number of protected and notable invertebrate species records were received from desk study. A full list of species are provided in Technical Appendix 7.1. No species listed under Schedule 5 of the Wildlife and Countryside Act (1981, as amended in Scotland).

7.153 On this basis the habitats within the site are of **Site** value for invertebrates in line with CIEEM guidelines

Other Protected and Notable Species

7.154 No signs of additional protected or notable species were recorded during baseline surveys.

Future Baseline

7.155 The development site comprises in the main Carr Ban Forest, a privately owned and privately managed forest. Full details on the forestry current baseline and future proposals are presented in Chapter 15 Forestry.

7.156 Parts of the Carr Ban Forest has been identified as Potential Native Woodland Network Expansion Areas, by the Forestry Commission Scotland. Within these areas the Forestry Commission plan to restructure woodlands with a range of tree species to produce a strategic reserve of timber. These changes would be undertaken over the next 30 years within the Carr Ban Forest irrespective of the proposed development.

7.157 There is currently no future felling plan available for Carr Ban Forest and no proposed re-stocking plan for felled areas.

SUMMARY VALUATION OF KEY ECOLOGICAL RESOURCES

7.158 The results of the desk study and field surveys were used to inform both the initial valuation of receptors and the detailed impact assessment as discussed in the preceding section.

7.159 The evaluation identifies those resources classed as 'key' ecological resources (and thus have been 'scoped in' for the detailed impact assessment).

7.160 Only those ecological resources that it was considered could experience significant effects (i.e. impacts that could adversely affect the integrity of the habitat or the favourable conservation status of a species' local population), and which were identified as being of sufficient value to be material to decision making, have been classified as being 'Key' ecological resources.

7.161 Bats have been included to reflect their legal protection and potential effects as a result of operation making them a material consideration to any wind turbine development.

7.162 Table 7.12 presents the evaluation of 'Key' ecological resources and provides the rational as to why individual receptors have been 'scoped in' or 'scoped out' of detailed impact assessment.

Table 7.12: Summary Valuation of Key Ecological Resources

Ecological receptor	Value	Potential Effect Pathways and Rationale for selection of Key Ecological Resources
Statutory designated site for nature conservation	National	None located within the search radius. Direct impacts are unlikely to occur and lack of connectivity mean that indirect impacts are also not anticipated. **Scoped out of assessment**
Non-statutory designated sites for nature conservation	County	None located within the search radius. Direct impacts are unlikely to occur and indirect impacts are also not anticipated. **Scoped out of assessment**

Ecological receptor	Value	Potential Effect Pathways and Rationale for selection of Key Ecological Resources
Habitats	Wet modified bog and dry dwarf shrub heath – County Semi-natural woodland and unimproved grassland – County Plantation woodland and other habitats - Local	Habitat interest within the development footprint and the wider development site comprised plantation forestry of low ecological value and wet modified bog and heathland of moderate ecological value. Direct land-take resulting in loss of habitat. Potential for indirect impacts on adjoining / nearby habitats for example through pollution and sedimentation effects resulting from construction activity. Highly unlikely to affect semi-natural woodland and unimproved grassland as not located within the development site or immediately adjacent. **Scoped in to the assessment** under Construction and Decommissioning only due to potential loss of UKBAP habitats and for effects on protected or notable species that may utilise such habitats.

Ecological receptor	Value	Potential Effect Pathways and Rationale for selection of Key Ecological Resources
Bats	Local	Species assemblage recorded using the development site are all common and widespread species. Only low risk species were recorded and activity was very low (<2 bat passes per hour maximum). All UK bats and their roosts are protected under the W&CA and the Habitat Regulations, deeming them European Protected Species (EPS). Potential impacts upon bats are therefore scoped in. Harm to individual animals; operational impacts due to interaction between foraging bats and wind turbines. Potential for disturbance, effects of lighting and habitat loss during construction. **Scoped in to the assessment** during all phases of the development. Impacts considered: • Harm to individuals; • Potential for disturbance, effects of lighting and habitat loss during construction. Operational impacts due to interaction between foraging bats and wind turbines.
Badgers	Site	No setts found with the development site and impacts are considered unlikely. Potential for damage or disturbance to newly constructed setts in the interim period. **Considered in the mitigation section only.**
Otter	Site	No evidence of otter found within the development site and impacts are considered unlikely. Indirect pollution impacts. **Considered in the mitigation section only.**

Ecological receptor	Value	Potential Effect Pathways and Rationale for selection of Key Ecological Resources
Water vole	Site	No evidence of water vole found within the development site and impacts are considered unlikely. Indirect pollution impacts. **Considered in the mitigation section only.**
Red squirrel	County	No evidence of red squirrel observed within the development site. Habitats of moderate ecological value for red squirrel and the species is assumed to be present. Red squirrel are a UKBAP species and also protected under Schedule 5 of the W&CA. The Act makes it an offence to recklessly kill, injure or take any red squirrel or to intentionally or recklessly damage or destroy or obstruct access to a shelter. Potential for construction related disturbance: habitat loss, killing or injuring or obstruction to shelter. **Scoped into assessment** during the construction phase only.
Pine Marten	District	No evidence of pine marten observed within the development site. Habitats of moderate ecological value for pine marten and the species is assumed to be present. Pine marten are a UKBAP species and also protected under Schedule 5 and 6 of the W&CA. The Act makes it an offence to recklessly kill, injure or take any red squirrel or to intentionally or recklessly damage or destroy or obstruct access to a shelter. Potential for construction related disturbance: habitat loss, killing or injuring or obstruction to shelter. **Scoped into assessment** during the construction phase only.

Ecological receptor	Value	Potential Effect Pathways and Rationale for selection of Key Ecological Resources
Wildcat	Site	No evidence of wildcat observed within the development site. Habitats are largely unsuitable for this rare species and highly unlikely for an impact to occur. **Scoped out of assessment.**
Hedgehog	Site	No evidence of hedgehog found within the development site and impacts are considered unlikely. **Scoped out of assessment.**
Brown hare	Site	No evidence of brown hare found within the development site and impacts are considered unlikely. **Scoped out of assessment.**
Amphibians	Local	Aquatic habitats within at least 500m of the development site are generally considered unsuitable for great crested newts but may support more common species. Impacts are considered unlikely. **Considered in the mitigation section only.**
Reptiles	District / Borough	Habitats within the development site are considered to be of moderate value for reptile species. Adder, common lizard, grass snake and slow worm are fully protected under Schedule 5 of The W&CA. Sand lizard and smooth snake are also fully protected under Schedule 5 of The W&CA and Schedule 2 of The Habitats Regulations making them EPSs. Potential for construction related disturbance: habitat loss, killing or injuring. **Considered in the mitigation section only.**
Invertebrates	Site	No evidence of protected and notable invertebrates found within the development site and impacts are considered unlikely. **Scoped out of assessment.**

MODIFICATIONS TO PROJECT DESIGN

7.163 The potential for impacts upon habitats and species of conservation value was a key consideration in the development through the design process and a series of embedded mitigation features were included, where these were achievable along with the consideration of other design constraints. Similarly, decommissioning measures will follow those employed during the construction phase.

7.164 The final wind farm layout was derived through a series of design iterations, which sought to minimise the potential impacts upon a range of receptors, including those of an ecological nature.

7.165 The following ecological buffers were subsequently applied to inform turbine layouts:

- Habitats - existing forestry tracks and forest clear-fell rides have been incorporated into the design of the development where feasible, to avoid unnecessary impact on habitats, particularly blanket bog which is of high conservation interest.
- Bat habitat features – a minimum 50m buffer (from blade tip) was applied to watercourses, woodland edges, hedgerows and mature trees to protect bat flight lines and feeding areas associated with these habitats. This was based on the guidance and formula provided in Natural England Interim guidance on *Bats and Wind Farm Developments*.

7.166 The final wind farm layout has subsequently resulted in the offset of the original bat study area however, the dataset derived from bat surveys is considered to provide a fully representative sample of bat activity of key bat habitat features within the site and within 250m of the proposed turbine locations.

POTENTIAL IMPACTS IN THE ABSENCE OF MITIGATION

7.167 The proposed development has been assessed for an operational life of 25 years. This section identifies the potential impacts of the construction, operational and decommissioning phases of the development on the key ecological resources in the absence of mitigation.

Construction and decommissioning

7.168 The construction of the wind turbines will require the creation of access tracks and construction areas for the wind turbines and operational features, along with a temporary construction compound. In addition, there will be a temporary increase of disturbance through vehicular traffic, site staff and larger vehicles used to transport the turbine sections onto the site.

7.169 Impacts associated with the decommissioning of the wind turbines are considered to be broadly the same as construction impacts, requiring the temporary creation of compounds to house equipment and a temporary increase of disturbance through vehicular traffic, site staff and probably large vehicles. Consequently, decommissioning effects are considered to be the same as, or less than, construction effects.

Habitats

7.170 Existing forestry tracks and forest clear-fell rides have been incorporated into the design of the development where feasible, to avoid unnecessary impact on habitats.

However, some habitat removal will be required at turbine locations and for some access track extensions. Permanent habitats loss will comprise approximately 26.93ha of plantation forestry and 0.4ha of heathland (which has been recently re-planted as mixed woodland). No watercourses will be subject to direct impacts, but it is possible that temporary pollution and/or sedimentation may occur from construction activities.

7.171 The loss of plantation forestry is considered to be of negligible magnitude in respect of availability of similar habitats in the local area and low ecological value. This would result in a **negligible** effect on a receptor of **local value** which is **not significant**.

7.172 The loss of 0.4ha of dry dwarf shrub heath, a UKBAP habitat and a receptor of county value is required to access Turbines T5, T6 and T7. The loss of heath required comprises an area of recently felled forestry which has yet to be replanted and a separate area of recently planted conifers on heath. These areas of heath are degraded, most likely due to the forestry operations on site and therefore the minor loss of 0.4ha is of low magnitude in the context of the wider site which supports 10ha of heath.

7.173 Construction will involve the clear-felling of approximately 26.93ha of coniferous plantation and would be required during the construction phase only. The majority of the felled areas would be restocked during the operational phase with the exception of the 100m turbine buffer which will be maintained as open ground. Full details provided within Chapter 15 Forestry. The loss of this additional forestry clearance should be viewed in the context of felling that would occur within the development site irrespective of the wind farm development or not, as part of forestry operations.

7.174 Benefits resulting from woodland felling are also anticipated. The plantation at Carr Ban forest is located within Caledonian Pinewood Zone and within a Potential Native Woodland Network Expansion Areas. The current structure of the woodland within these areas comprises Scots pine, not native pinewood. By removing trees within these areas and preventing the re-growth of trees, light will be able to reach the woodland floor and seeds associated with the woodland seed bank will be able to regenerate, encouraging heathland or bog creation depending on soil type. This effect is anticipated to be minor – moderate beneficial for woodland ground flora (potentially from an ancient seed source).

7.175 A peat assessment has been undertaken for the proposed development (Chapter 14: Hydrology and Ground Conditions). Peat within the site is concentrated on the western slopes synonymous with Longpole pine sections of the plantation and blanket mire habitats. Drier areas on top of shallow peat supported areas of heathland and Scott's pine plantation.

7.176 The temporary and permanent loss of dry dwarf shrub heath are considered to be **Low** magnitude on this receptor of **County** value, which is consequently of **minor adverse** effect and **Not Significant.** In addition, the clear-fell of plantation forestry up to 100m from turbine locations allows the regeneration of heathland and wet modified bog up to 26ha. This is considered to outweigh the loss associated with construction of the proposed development and result in an effect that is **minor beneficial**; however indirect pollution and/or habitat degradation through sedimentation during the construction phase along with direct compaction and habitat loss has the potential to affect local hydrology and therefore local habitat complex. If this were to occur it would be of **Medium** magnitude, resulting in a **Minor Adverse** impact which is **Not Significant**.

7.177 The loss of other habitats including coniferous forestry plantation and clear-fell areas are of **Low** magnitude, which is **Not Significant** on receptors of **Local** value.

Bats

7.178 The habitats within and bordering the development site offer low value to roosting bats and it is considered highly unlikely that habitats within 200m of proposed turbines support roosting bats. The nearest potential roosting features identified where within the Dinichean House complex (approximately 600m north of the nearest turbine) and an area of mature broadleaved woodland (260m south of nearest turbine).

7.179 There will be no loss of mature broadleaved trees to facilitate development however 26.93ha of coniferous plantation woodland will require clearance prior to construction.

7.180 Construction impacts on bats are anticipated to comprise the following;

- Permanent loss or fragmentation of foraging habitats due to land take;
- Disturbance and displacement of foraging activity.

7.181 The habitats within the site under the current baseline restrict bat activity within the site due to the dominance of forestry. Opportunities for foraging are present within area of clear-fell forestry and forest tracks and rides; however activity surveys have demonstrated little use of these habitats by bat species.

7.182 Construction will require the small loss of bog and heathland habitats, of increased foraging value to bat species. The activity surveys have demonstrated low use of these areas by bats and this habitat loss is considered to be **Negligible** in context with the wide availability in the local area, which is subsequently **Not Significant**.

7.183 The construction will require the clearance of 26.93ha of pine plantation forestry which of has not been demonstrated to support a favoured foraging or commuting network. On this basis, the coniferous woodland removal is considered to be **Low Magnitude** and therefore of **Negligible** significance on these receptors of **Local** sensitivity, which is subsequently **Not Significant**.

7.184 Noise and dust generation during the construction period will be limited in extent and duration, but could potentially result in reduced foraging opportunities for bats if night-time work is undertaken. This impact is considered to be impact of **Low** magnitude on a receptor of **Local** value leading to an impact of **Negligible** significance, which is subsequently **Not Significant**.

7.185 The use of temporary lighting during the construction phase may have short-term effects on the distribution and activity of bat species. The use of lighting during construction will be temporary, and minimal (with respect to hours of operation and duration of works) and restricted to specific areas such as site compounds. On consideration of the above, the effects of lighting on bats during the construction phase are considered to be **Low** magnitude on a receptor of **Local** value leading to an impact of **Negligible** significance, which is subsequently **Not Significant**.

7.186 The construction of the proposed development is not anticipated to adversely affect the Favourable Conservation Status of any bat species.

7.187 Construction impacts on bats are considered to be of **Low** magnitude on a receptor of **Local** value and hence effects would likely be **Negligible** and considered **Not Significant.**

Red Squirrel

7.188 No sightings of red squirrel were recorded during baseline surveys however the geographical location of the proposed development and consideration of habitats and nearby biological records indicate this species is assumed to be present for the purposes

of the EcIA. The primary impacts of the proposed development would occur during the removal of plantation forestry.

7.189 The primary impacts of the proposed development would be destruction, damage and / or disturbance to squirrel dreys during clear-fell operations during construction, permanent habitat loss of cone bearing trees and disturbance from noise during construction and decommissioning.

7.190 Guidance on the SNH website[xix] states that '*50m is the buffer zone within which there should be no disturbance to a breeding drey*'. In order to achieve a suitable offset from bat habitat features, woodland habitats within 100m of each turbine will require felling. Should any breeding dreys be located within the identified area for clear-fell impacts are considered to be of **Medium** magnitude on this receptor of **County** value and consequently **Minor Adverse** and **Not Significant**. Any works likely to require removal of a red squirrel drey or disturbance to a red squirrel occupying such a place can only occur under an appropriate derogation licence issued by SNH.

7.191 Impacts associated with loss of foraging habitat are likely to be low based on the extent of this resource available locally and in the context of planned felling that would occur regardless of the proposed development. Such effects are anticipated to be negligible/minor adverse overall.

7.192 Impacts relating to noise and dust generation will be temporary and are not expected to be any greater than that associated with felling of woodland tracts that is occasionally required as part of forestry operations within Carr Ban Forest. The populations of squirrels that remain here must therefore be relatively tolerant to such impacts. Impacts resulting from lighting will also be temporary and targeted within areas where people are more likely to be present. As such, any impacts will be localised. This acknowledged, should works coincide with a sensitive period of the year for red squirrel e.g. when young are present within dreys, it is possible that impacts could be greater and of low impact, leading to **Negligible/ Minor Adverse** impacts overall.

7.193 Without mitigation the proposed coniferous woodland removal has the potential to result in a **Medium** magnitude impact, on a receptor of **County** value which is potentially **Minor Adverse** effect and **Not Significant** in accordance with the methodology provided above.

Pine Marten

7.194 No sightings of pine marten were recorded during baseline surveys; however the geographical location of the proposed development and consideration of habitats and nearby biological records indicate this species is assumed to be present for the purposes of the EcIA. The primary impacts of the proposed development would occur during the removal of plantation forestry.

7.195 Pine marten require extensive forestry as part of a territory; up to 166ha of woodland[xx]. The species is not limited to woodland however and will also hunt in open montane habitats. Extensive mature coniferous woodland provides suitable cover and sufficient foraging opportunities. The Carr Ban Forest is approximately 30-40 years old and is near the end of the ticket stage/ early forest stage. The structure of the woodland offers limited opportunities for den creation, with very few mature conifers available with hollows for den creation.

7.196 In order to achieve a suitable offset from bat habitat features, woodland habitats within 100m of each turbine will require felling. In the unlikely event a breeding den is located within the identified area for clear-fell impacts are considered to be of **Medium** magnitude on this receptor of **District value** and consequently **Minor adverse** and **Not**

Significant in EIA terms. Any works likely to require removal of a pine marten den or disturbance to a pine marten occupying such a place can only occur under an appropriate derogation licence issued by SNH.

7.197 Impacts associated with loss of foraging habitat are likely to be low based on the extent of this resource available locally and in the context of planned felling that would occur regardless of the proposed development. Such effects are anticipated to be negligible/minor adverse overall.

7.198 The removal of coniferous forestry is unlikely to result in damage or destruction of den sites. The loss of foraging heath and bog habitat is also minimal. Overall the construction phase is considered to be of low magnitude on this receptor of District value which is **Minor Adverse** and **Not Significant**.

Operation

7.199 Operational impacts of the wind turbines would comprise the operation of the wind turbines themselves, and the maintenance of the turbines and all associated infrastructure. Maintenance works would require intermittent site visits from staff during daytime working hours. It is envisaged such visits would cause no more disturbance than the current use of the site, but would increase the amount of time people and vehicles are present.

Bats

7.200 Generic guidance on assessing the impact of operational wind turbines on bats has been developed at the European level under the EUROBATS Agreement (Bonn Convention), to which the UK is a signatory.

7.201 Betts (2006)[xxi] includes an assessment of collision risk based on the foraging strategy of different UK bat species and this was refined in Natural England (2009, updated 2014) guidance (TIN051). The NE guidance highlights the current lack of information and goes on to make basic recommendations for avoidance of important bat areas and landscape features typically used by bats.

7.202 More recently the Bat Conservation Trust (Hundt, 2012) issued guidance on surveying for bats in relation to wind farm developments; *'Bat Surveys Good Practice Guidelines'* describes survey methods which were followed to inform the baseline used in this assessment.

7.203 According to the BCT guidance (Hundt, 2012), operational wind turbines may impact on bats through interaction with the turbines, either by:

- direct collision with turbine blades; or,
- mortality due to damage to bat's lungs caused by a sudden change in air Pressure (barotrauma).

7.204 Other possible impacts include:

- Loss of foraging habitat; and,
- Fragmentation of habitat.

7.205 Loss of foraging habitat is discussed in the construction impacts section. No additional removal or fragmentation of habitat is anticipated to occur as a result of the operation of the wind farm and this potential impact is not considered further.

7.206 There has not yet been any published substantial monitoring of existing wind farms to determine the collision rate of British bats and little is known about the risk to individuals through interaction with the turbine blades.

7.207 Research from Europe, which has focused on a number of bat species also present within the UK, has provided information on mortalities associated with turbine blade interactions in relation to feeding, roosting and migration behaviour. The results of these studies enable a degree of prediction of which UK species are likely to be more susceptible to collision.

7.208 The European research forms the basis of the NE 2012 guidance (TIN051) recently updated in 2014, along with a broad understanding of how different bat species use the landscape. The guidance publishes two lists of species considered vulnerable to wind turbines, classifying species as low, medium or high risk based on ecology and flight characteristics. The first list classifies risks to individual bats, and the second classifies risks at species population level. These are reproduced as Table 7.13 and Table 7.14.

Table 7.13: Bat species potentially at risk from wind turbines. Species recorded during bat surveys are highlighted

Low	Medium	High
Long-eared bats	Serotine	Nathusius' Pipistrelle
Myotis species	Barbastelle	Leisler's
Horseshoe Bats	Soprano Pipistrelle	Noctule
	Common Pipistrelle	

Table 7.147: Bat populations likely to be at risk from wind turbines. Species recorded during bat surveys are highlighted

Low	Medium	High
Long-eared bats	Serotine	Nathusius' Pipistrelle
Myotis species	Barbastelle	Leisler's
Horseshoe Bats		Noctule
Soprano Pipistrelle		
Common Pipistrelle		

7.209 Analysis identified bat species included in medium risk groups at an individual level; however, it is the second table (Table 7.15) which is considered most pertinent in relation to any site assessment, as population level threats represent a more serious potential risk to the integrity of bat communities both within the development site and in the wider area. In this context, species recorded generally fell into the low risk category at population level.

7.210 The only two species recorded over the course of the surveys was soprano pipistrelle and common pipistrelle; these are both considered low risk at population level and both species were recorded with a low activity index.

7.211 Potential impacts have been assessed in relation to activity levels, noted use of habitat features and species vulnerability as classified in TIN051. The survey results showed that bat activity was low overall with transect data showing bat activity restricted to woodland edge and open clear-fell with standing water within the northern extents of the development site.

7.212 Guidance set out in TIN051 states that '*evidence in Britain is that most bat activity is in close proximity to habitat features. Activity was shown to decline when measured at fixed intervals up to 50m away from treelines and at varying intervals up to 35 m from treelines. This decline occurred both when bats were commuting and when foraging, although the decline is greater when animals were commuting. Monitoring in Scotland showed that bats in mixed farmland preferred to remain close to habitat features when commuting. Occurrence declined the further pipistrelles and serotines went from linear features*'.

7.213 To minimise risk to bat populations, Natural England guidance TIN051 recommends that a 50m buffer is maintained between any part of a wind turbine and habitat features which may be used by bats (such as hedgerows, woodland). The guidance provides a formula for calculating this 'stand-off' distance. In order to minimise potential impacts on bats, the proposed woodland removal will clearfell existing plantation woodland within 100m of each turbine and will be maintained to this buffer for the lifetime of the proposed development.

7.214 Whilst the occasional mortality of individuals is possible (as with any wind turbine development), it is considered highly unlikely that the turbines would represent a significant threat to any bat species at a population level. Small scale indirect impacts such as minor levels of disturbance to foraging bats are considered to be of **Negligible** magnitude and no population level effects are predicted

7.215 As with all wind energy developments, the risk to individual bats is difficult to ascertain and it is possible that some level of impact will occur. However due to the relatively poor quality habitat for bats near to the proposed turbine locations, presence of predominantly low risk species and low activity levels for all species, impacts are assessed as no more than **Low** magnitude on individual bats. At a population level, impacts are considered to be **Negligible** and impacts on these **Local** value receptors are at worst considered to be **Negligible** for individuals and for populations.

7.216 The operational phase of the development is therefore highly unlikely to adversely affect the Favourable Conservation Status of bat species at a population level.

Table 7.15: Summary of predicted impacts.

Receptor	Ecological Value	Potential Impact	Impact Magnitude	Phase	Impact Significance	Pre-mitigation effects	Mitigation Proposed
Habitats	Local	Plantation woodland clearance	Low	Construction	Negligible	Not significant	No
	County	Dry dwarf shrub heath habitat loss	Medium	Construction	Minor adverse	Not significant	Yes
	County	Blanket bog habitat loss	Negligible	Construction	Negligible	Not significant	Yes
Bats	Local	Habitat Loss/fragmentation	Negligible	Construction	Negligible	Not significant	No
	Local	Displacement of foraging activity	Low	Construction	Negligible	Not significant	No
	Local	Death through interaction with turbine blades	Low	Operation	Negligible	Not significant	No
Red squirrel	County	Habitat loss/ injury or killing	Medium	Construction	Minor adverse	Not significant	Yes
Pine marten	District	Habitat loss/ injury or killing	Medium	Construction	Minor adverse	Not significant	Yes

MITIGATION

7.217 The following section outlines the mitigation measures proposed to minimise potential effects as assessed in the preceding section. It also proposes mitigation to ensure that potential adverse impacts on other receptors that were scoped out of the assessment do not occur as a result of the development.

7.218 No significant effects have been identified and as a result no specific mitigation is proposed. However, general good practice measures are described below; protection and mitigation in relation to the proposed development will largely be delivered through a Construction Environmental Management Plan (CEMP).

7.219 Embedded design mitigation measures described previously have also avoided or reduced potential adverse effects through, for example, avoiding mature trees, and minimising loss of bog and heath habitats.

During construction

7.220 A CEMP will be agreed in advance of construction with relevant regulators and consultees. The objective of the CEMP will be to minimise the potential for effects on protected and notable species and habitats and to provide habitat enhancement measures.

7.221 An Ecological Clerk of Works (ECoW) will also be made available for the duration of the construction period to resolve any uncertainties regarding ecological issues. The site workforce will be briefed about the ecological issues on the site by the ECoW prior to the commencement of construction works.

7.222 Construction activity will be limited to clearly defined working areas and standard best practice working methods will be employed.

7.223 Suitable environmental safeguards will be implemented to ensure that no construction-related pollution will enter watercourses. This will minimise the potential for impacts upon downstream designated sites for nature conservation, they're qualifying interest features and general flora and fauna (including water vole and otters).

7.224 Full details are presented in Chapter 12, but the measures are anticipated to include the following:

- All construction activities shall adhere to good practice as set out in BS 5228-1:2009 *Code of practice for noise and vibration control on construction and open sites - Noise* and BS5228-2:2009 *Code of practice for noise and vibration control on construction and open sites - Vibration.*
- A bunded construction compound to be created, designed to ensure all hydrocarbons and other pollutants are stored in a covered area, with a low permeability base to prevent infiltration;
- Documented emergency procedures to be in place to deal with any accidental spillages of pollutants; and / or,
- All equipment will be maintained in good working order and any associated noise attenuation, such as engine casing and exhaust silencers, shall remain fitted at all times.
- Silt traps, where appropriate, to stop siltation of watercourses;
- Stripped soils will be stored and sealed to prevent erosion.

7.225 Some of the proposed infrastructure will be located on deep peat. In order to mitigate any impacts upon habitats, the following measures will be implemented:

- Sensitive construction measures, such as the use of floating road technology using a geo-textile membrane and topped with locally sourced graded aggregate;
- Use of low ground pressure vehicles to minimise impacts on sensitive habitats as far as possible.
- Hydrological management will be implemented to ensure that road construction does not lead to loss of cross-track drainage (and therefore hydrological function) within the underlying peat, or substantial increases in runoff.
- An ecological clerk of works will oversee the installation of the access track and will be on hand to offer advice on micrositing of the track and associated turbine infrastructure, away from the higher quality habitat features, within permitted micrositing allowances.

7.226 A pre-construction survey will be undertaken for red squirrels within 50m of proposed working areas, in order to identify any dreys and potential for disturbance to red squirrels occupying these features. Should dreys be located within this survey area, further survey will be undertaken to identify which species is using them e.g. through camera trapping. If the drey(s) are found to be in use by red squirrel, a Reasonable Avoidance Measures method statement will be produced in consultation with the LPA and SNH. This will consider measures to avoid impact based on the sensitivity of the feature identified (e.g. maternal drey or otherwise) by adapting felling buffers, use of low noise equipment, micrositing turbines or access tracks within permitted distances, altering timing of works or as a last resort, licensing. It is considered that with implementation of these measures, impacts can be reduced or avoided so that significant effects do not occur.

7.227 Additional mitigation will include phase forestry felling so individuals have time to vacate the area. A felling regime starting in northern sections, moving south will be explored to allow displaced red squirrel into broadleaved and further coniferous plantation to the south rather than over public roads to the north. Feeding stations will be set out along the southern and westerns boundaries of the site to encourage the species outside of the centre of the site were works are proposed. Felling will be undertaken in a continuous manner, whereby whole sections are removed avoiding the creation of group of standalone or small collections of trees.

7.228 A pre-construction survey of the development site for other receptors will be undertaken to ensure that baseline conditions remain unchanged. The survey will include checks for badgers, amphibians, reptiles, (red squirrel is considered separately above) pine marten, water vole and otter. The preconstruction survey will comprise all land within 100m of construction areas and all woodland that requires removal.

7.229 Should any new activity of protected species be identified, the potential for harm or disturbance will be assessed and appropriate avoidance and protection measures set in place. If necessary, works would only proceed after a development licence has been obtained from Scottish Natural Heritage.

7.230 Reasonable Avoidance Measures (RAMs) will be implemented to protect any reptiles and amphibians potentially present during the construction phase. This will negate the possibility of an offence under relevant legislation. RAMs will include measures such as hand searching of vegetation within working areas by an ecologist to

ensure that no amphibians or reptiles are present and appropriate timing of works to avoid critical periods. Full details of RAMS will be provided within the CEMP.

7.231 A wildlife sensitive lighting scheme designed in consultation with the appointed EcOW will be adopted throughout the duration of construction works. This will be served largely by limiting the requirement for artificial lighting to a minimum e.g. restricting construction to daylight working hours. Where lighting columns are required, these should be downward-directional to prevent lighting spill beyond construction areas.

7.232 If employed, these measures will substantially mitigate construction impacts on habitats.

During Operation

7.233 Areas of woodland or trees that will be felled within 100m of the proposed turbines as part of the construction phase, will not be allowed to regenerate within the lifetime of the development. This is to ensure that foraging bats are not drawn closer to the turbines and into increased risk of collision with the turbine blades.

7.234 No other specific operational phase mitigation is proposed.

During Decommissioning

7.235 Mitigation during decommissioning works will broadly follow those undertaken during the construction period and will follow a Decommissioning Management Plan (DMP). The objective of the DMP will be to minimise the potential for effects on protected species throughout the decommissioning period.

7.236 Decommissioning areas will be surveyed prior to decommissioning works to identify any changes to the predicted future baseline conditions.

Enhancement Measures

7.237 In line with local and national planning policy, ecological enhancement measures will be detailed within a Biodiversity Management Plan (BMP) which will be produced for the proposed development.

7.238 All measures will be included within the BMP and will be agreed with the LPA and other relevant stakeholders. Measures are likely to include:

- Sensitive woodland management for red squirrels.
- Planting of broadleaved trees within re-forested areas.
- Provision of bat boxes within the site
- Onsite pond management for wildlife. This could include fencing off areas to prevent access and allow a greater variety of vegetation to establish.
- Heathland creation and appropriate management in areas of clear-fell on the southern portion of the Site on shallow peat.
- Bog creation and appropriate management in areas of clear-fell on deep peat.

7.239 Enhancement measures will likely increase the foraging opportunities for all species and increase the overall value of the site for wildlife.

RESIDUAL EFFECTS

7.240 With the implementation of appropriate pollution prevention and control measures and proposed construction phase mitigation, the proposed development is not anticipated to have any significant residual impacts upon habitats or populations of protected species, including bats.

7.241 A summary of residual effects is included within **Table 7.16**.

SUMMARY OF IMPACTS

7.242 A summary of impacts before and after proposed mitigation measures is provided in Table 7.16.

Table 7.16: Summary of Impacts

Potential Impacts	Valuation	Magnitude of impact	Proposed Mitigation / Enhancement	Residual Effect
Construction and Decommissioning				
Dry dwarf shrub heath	County	Medium	CEMP to include pollution prevention, habitat protection, hydrology protection and habitat creation and management	Not Significant
Wet modified bog	County	Negligible	CEMP to include pollution prevention, habitat protection, hydrology protection and habitat creation and management	Not Significant
Other habitats	Local	Low	CEMP to include pollution prevention, habitat protection, hydrology protection and habitat creation and management	Not Significant
Bats	Local	Negligible / Low	100m buffer between turbines and woodland edge to reduced potential impacts on bats.	Not Significant
Red Squirrel	County	Medium	CEMP to include preconstruction surveys, EcOW onsite and construction during the winter months. Habitat enhancement.	Not Significant
Pine marten	District	Medium	CEMP to include preconstruction surveys, EcOW onsite and construction during the winter months. Habitat enhancement.	Not Significant
Operation				
Bats	Local	Low	Maintain 100m buffer between turbines and woodland edge throughout lifespan of wind farm	Not Significant

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Chapter eight
ORNITHOLOGY

INTRODUCTION

8.1 This Chapter, prepared by Avian Ecology Ltd., provides an assessment of the potential impacts of the proposed development on ornithological receptors.

8.2 The assessment of impacts has been based on one year of field based survey between November 2013 and September 2014. In accordance with Scottish Natural Heritage Guidance (2014) at least two years of field survey are normally required to fully assess potential impacts of the proposed wind farm development on ornithological interests. As such, this Chapter in its current form provides a preliminary assessment based on the data gathered up until the time of submission. It should be noted that further survey work is ongoing, and baseline data and the subsequent assessment of impacts will be updated on completion of the full survey schedule. As part of this, relevant information to inform a Habitats Assessment will also be supplied.

8.3 A full project description is provided in **Chapter 3.** The proposed development comprises the erection of seven wind turbines with a maximum blade tip height of up to 126.5m metres, together with a substation and control building, associated hard-standings, a new access tracks, a temporary construction compound and turning area, and other related infrastructure including a permanent meteorological mast.

8.4 A grid connection between the proposed wind turbines and the local electricity distribution network would be the subject of a separate application by the Distribution Network Operator (DNO). Initial research indicates that a connection to the local distribution network could be achieved using underground cables to connect at a point to the north of the development site, near Inverness.

8.5 The following terms are used:

- **Application boundary** - the planning application red line boundary as shown on application drawing AEL007 (Rev No. R5).
- **Build footprint and rotor over-sail** – land within the footprint of the proposed development, as shown on Figure 7.1.
- **Development Site** – land encompassing the entire development including Carr Ban Forest, as shown on Figure 7.1.
- **Study areas** – as defined as relevant with Table 8.8.

8.6 The objectives of this Chapter are to assess the potential impacts of the proposed wind turbine development on ornithological interests by:

- Establishing and outlining baseline conditions;
- Identifying and evaluating key potential impacts,
- Outlining mitigation measures, where required, to ameliorate any potentially significant effects; and
- Outlining enhancement measures, where opportunities arise, to result in net biodiversity gains.

8.7 This chapter describes the assessment methodology, presenting the baseline conditions, together with the identification of the likely significant ecological effects during the construction, operation and decommissioning phases of the proposed development.