

7 ORNITHOLOGY

7.1 INTRODUCTION

This chapter describes the findings of the ornithological assessment of the proposed Spicer Hill Wind Farm ('the Development'). It details the methods used to establish the bird interest within the site and surrounding area and the process used to determine the nature conservation importance of the populations present. It then sets out the potential effects on birds during construction and operation and assesses the significance of potential impacts on populations at an appropriate geographical scale. Measures to mitigate any significant impacts are proposed and a summary of residual impacts is provided. An assessment of impacts on non-avian ecology is considered in Chapter 6: *Ecology* of this ES.

The assessment is structured in the following way:

- Methodology - a description of the methods used, describing the specific survey methods used to describe the baseline conditions and the approach taken to assess potential impacts;
- Baseline Description – a description of the ornithological interest of the site based on the results of surveys, desk information and consultations;
- Information Gaps - a summary of the main uncertainties encountered in the assessment;
- Assessment of Effects - this considers in what ways the Development may result in changes to the baseline, then describes any appropriate mitigation in relation to each effect and presents an assessment of the significance of the effect taking into account the proposed mitigation measures;
- Summary of Effects;
- Monitoring - any monitoring requirements are identified; and
- Statement of Significance - a summary of findings of the assessment with reference to the obligation to identify any significant effects set out in the regulations. Where significant effects are identified, they should be taken into account in the decision making process.

The following key issues were identified at the scoping stage for consideration in the assessment

- Habitat loss: Nesting or feeding areas may be developed for access tracks or turbine bases and associated structures;
- Disturbance: Some species may be displaced from an area they would otherwise use for feeding or nesting because of works during construction or decommissioning and the presence of wind turbines and associated maintenance activities during operation;
- Collision: Birds may fly into and be struck by the turbine blades, with some species, such as raptors and geese considered to be at higher risk than other species, such as passerines;
- Cumulative impacts: The potential for cumulative impacts with other developments in the local area, either granted or pending planning permission; and
- Opportunities for the enhancement of the local bird community.

7.2 CONSULTATION

Account has been taken of the scoping responses set out in Table 7.1.

Table 7.1: Summary of Ornithology Consultee Responses

Consultee	Summary
Natural England (NE)	Asked that cumulative impacts on birds from the Development in addition to the existing Royd Moor Wind Farm be fully assessed.
RSPB	Telephone discussion regarding general bird use of area. No records held.
Royal Society for the Protection of Birds (RSPB)	Stated that they knew of no important bird populations in this area. Mentioned that Golden Plover had historically used the wider area, particularly during spring. Suggested that any management of fields in the area for the benefit of breeding waders could enhance the areas value for this group.
County Bird Recorder	Provided records of Annex 1, Schedule 1, UK and Local BAP, Red List and Amber list species from the site and surrounding 2 miles.

7.3 LEGISLATION AND GUIDANCE – USE DOCUMENTS TO INFORM SCOPE AND ASSESSMENT

The baseline surveys and ornithological assessment have been carried out with reference to the following legislation and guidance:

Council Directive 79/409/EEC on the conservation of wild birds (the Birds Directive): European legislation which aims to maintain or restore favourable conservation status of all wild birds and to instruct the creation of “Special Protection Areas” in member states for the habitats of rare and vulnerable species listed under Annex 1 of the directive as well as for all regularly occurring migratory species.

The Conservation (Natural Habitats &c.) Regulations 1994 (the “Habitats Regulations”): Legislation which implements the Birds Directive in the UK.

The Wildlife and Countryside Act 1981 and Countryside and Rights of Way (CRoW) Act 2000: This Act provides the legislative framework for the protection of British wildlife, including those bird species given extra protection as listed on Schedule 1 of the Wildlife and Countryside Act.

Scottish Natural Heritage guidance on survey methods for onshore wind farm assessments (SNH 2005)¹. This provides detailed guidance and recommendations for survey effort appropriate for the assessment of potential impacts on bird interests at proposed onshore wind farms. The guidance is directed mostly towards upland sites in Scotland, but the principles are generally applicable to lowland sites in England.

The Institute of Ecology and Environmental Management guidelines on ecological impact assessment in the UK (IEEM 2006) have been used as the basis for the assessment of the any potential significance impacts on birds as a result of the Development.

Percival, S.M. (2007). Predicting the effects of wind farms on birds in the UK: the development of an objective assessment method; in *Birds and Wind Power*². Provides suggested guidelines for an approach to valuing receptors and assessing the magnitude and significance of effects of the Development on bird populations.

¹ SNH 2005. *Survey methods for use in assessing the impacts of onshore wind farms on bird communities*. Scottish Natural Heritage, Battleby. These guidelines are applicable for projects throughout the UK.

² de Lucas, M., Janss, G. and Ferrer, M. (eds.) (2007) *Birds and Wind Power*. Lynx Edicions, Barcelona.

Band, W., Madders, M. and Whitfield, D.P. (2007). Developing field and analytical methods to assess avian collision risk at wind farms. In *Birds and Wind Power*². Provides a methodology for estimating the collision risk to birds that is posed by turbines.

RSPB Birds of Conservation Concern³. Assesses the conservation status of 247 species of bird and categorises them into one of three lists: red, amber and green. The listings describe the population status of each species, aiming to help guide conservation action between 2002 and 2007.

7.4 METHODOLOGY

7.4.1 *Baseline Field Survey Methods*

The following field surveys were carried out between May 2007 and April 2008 to inform the ornithological impact assessment:

- Breeding bird survey: four survey visits covering the Development site were undertaken using the British Trust for Ornithology's Common Birds Census methodology between early May and June 2007, in order to inform an assessment of potential displacement effects;
- Winter/Passage walkover Survey: monthly walkovers of the Development site were undertaken between September 2007 and April 2008 to record wintering/passage birds using the site and hinterland area;
- Flight activity survey: twenty-four hours of vantage point watches were undertaken from a vantage point on Spicer Hill which overlooks the majority of the Development site and all turbine locations and the existing Royd Moor during September 2007 and October 2007, in order to provide information to inform a collision risk assessment; and
- Further surveys to record golden plover were undertaken in spring 2008. These included walkover surveys, car-based surveys of the wider area and additional vantage point counts between April 2008 and May 2008.

Full details of the dates, timing and methodology of each survey are provided in the Ornithology Technical Appendix, which can be found in Environmental Statement Volume 2. The surveys were carried out with reference to SNH's guidance: Survey methods for use in assessing the impacts of onshore wind farms on bird communities. Where any deviation from this guidance or from recommendations made by NE or RSPB has been implemented, this has been fully explained in the relevant section of the Technical Appendix.

7.4.2 *Assessment Methodology*

Ecological Impact Assessment (EcIA) is based on a number of factors, primarily the consideration of the value and sensitivity of a site or the feature being assessed, and the anticipated magnitude and likelihood of a potential effect. The Institute of Ecological and Environmental Management (IEEM) has produced guidelines to assist with ecological evaluation and impact assessment (see IEEM, 2006⁴) which have been used as a guide in this assessment. These guidelines have no legal status and are not a substitute for professional judgement and interpretation, particularly where the ecological value of a site and/or impact magnitudes are not clear, or are borderline.

The assessment of the potential impacts of the Development on bird interests is a staged process that involves:

- Determining the nature conservation value of the bird interests present within the zone of influence that may be affected by the Development;

³ RSPB 2006. *The Population Status of Birds in the UK: Birds of Conservation Concern 2002-2007*.

⁴ IEEM. 2006. Guidelines for Ecological Impact Assessment in the United Kingdom. IEEM, available from www.ieem.org.uk

- Identifying the potential effects based on the nature of the construction, operation and decommissioning of the Development;
- Determining the magnitude of the impacts including consideration of the sensitivity of the receptor and the duration and reversibility of the effect;
- Determining the significance of the impacts based on the interaction between the effect magnitude/duration, the nature conservation value and sensitivity of the bird interests affected and the likelihood of the effect occurring;
- Identifying mitigation measures required to address significant adverse effects; and
- Determining the residual impact significance after the effects of mitigation have been considered, including a description of any legal and policy consequences.

7.4.3 Valuation of Ornithological Receptors

The nature conservation value of the bird interests potentially affected by the Development is defined according to Table 7.2.

Table 7.2: Evaluation of Ornithological Receptors (adapted from Percival 2007⁵).

Level of Value	Determining Factor
Very High	Qualifying feature of an SPA or notified interest of a SSSI. Species present in internationally important numbers (>1% of biogeographic/flyway populations)
High	Species that contribute to the integrity of an SPA or SSSI but which are not cited as species for which the site is designated (SPAs) or notified (SSSIs). Ecologically sensitive species such as rare birds (<300 breeding pairs in the UK) and the following birds of prey: golden eagle, white-tailed eagle, red kite, honey buzzard, osprey, marsh harrier and hen harrier. Species present in nationally important numbers (>1% UK population). Species listed on Annex 1 of the EC Birds Directive or Schedule 1 of the Wildlife and Countryside Act. Regularly-occurring relevant migratory species which are either rare or vulnerable, or warrant special consideration on account of the proximity of migration routes, or breeding, moulting, wintering or staging areas in relation to the proposed wind farm.
Medium	Species present in regionally important numbers (>1% regional population). Species occurring within SPAs and SSSIs but not crucial to the integrity of the site. Priority species in the UK Biodiversity Action Plan.
Low	Other species of conservation interest, e.g. species listed in Birds of Conservation Concern: (Gregory et al.; RSPB 2002) not covered above, local Biodiversity Action Plan species.
Negligible	All other species, e.g. those on the "green list" that are not present in locally, regionally or nationally important numbers.

7.4.4 Determining the Magnitude of a Potential Effect

In determining the magnitude of effects, behavioural sensitivity and ability to recover from temporary adverse conditions are considered in respect of each potentially affected population. Behavioural sensitivity is determined subjectively based on the species' ecology and behaviour, using the broad criteria set out in Table 7.3. The judgement takes account of information available on the responses of birds to various stimuli (e.g. predators, noise and disturbance by humans). It should be noted that behavioural sensitivity can differ between

⁵ Percival, S.M., "Predicting the effects of wind farms on birds in the UK: The development of an objective assessment method" in *Birds and Wind Farms: Risk Assessment and Mitigation* (eds de Lucas M., Janss, G.F.E, & Ferrer, M.) Quercus, Madrid

similar species and between different populations of the same species. Thus the behavioural responses of birds are likely to vary with both the nature and context of the stimulus and the experience of the individual bird. Sensitivity also depends on the activity of the bird, for example, a species is likely to be less tolerant of disturbance whilst breeding than at other times, however, tolerance is likely to increase as breeding progresses.

Table 7.3: Sensitivity

Sensitivity	Definition
High	Species or populations occupying habitats remote from human activities, or that exhibit strong and long-lasting (guide: >20 mins) reactions to disturbance events
Moderate	Species or populations that appear to be warily tolerant of human activities, or exhibit short-term reactions (guide: 5-20 minutes) to disturbance events
Low	Species or populations occupying areas subject to frequent human activity and exhibiting mild and brief reaction (including flushing behaviour) to disturbance events

Effects are judged in terms of magnitude in space and time⁶. There are five levels of spatial effect (Table 7.4) and two main levels of temporal effect (Table 7.5).

Table 7.4: Criteria for Describing Spatial Magnitude (adapted from Percival 2007)

Impact magnitude	Description
Very high	Total loss or very major alteration to key elements/features of the baseline (pre-development) conditions such that the post development character/composition/attributes would be fundamentally changed and may be lost from the site altogether. Guide: <20% of population/habitat remains
High	Major loss or major alteration to key elements/features of the baseline conditions such that the post development character/composition/attributes would be fundamentally changed. Guide: 20-80% of population/habitat lost
Medium	Loss or alteration to one or more key elements/features of the baseline conditions such that post development character/composition/attributes would be partially changed. Guide: 5-20% of population/habitat lost
Low	Minor shift away from baseline conditions. Change arising from the loss/alteration would be discernible but the underlying character/composition/attributes would be similar to pre-development circumstances/patterns. Guide: 1-5% of population/habitat lost

⁶ Regini, K. (2000). Guidelines for ecological evaluation and impact assessment. Ecology and Environmental Management. *In Practice*, 29 (September), pp. 1, 3-7. Winchester, Institute of Ecology and Environmental Management.

Impact magnitude	Description
Negligible	Very slight change from baseline condition. Change barely distinguishable, approximating to the "no change" situation. Guide: < 1% population/habitat lost

In the case of SPAs / SSSIs magnitude is assessed in respect of the area within the designated site boundary. For non-designated sites, magnitude is assessed in respect of an appropriate scale depending on the value of the receptor e.g. County/Local.

Table 7.5: Criteria for Describing Temporal Magnitude

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

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

7.4.5 Determining the Significance of Potential Impacts

The 2006 IEEM guidelines use only two categories: "significant" or "not significant". In assessing whether an impact is significant, the concept of "ecological integrity" is a guiding principle. This concept can be applied both to designated sites (for example a SSSI) and to defined populations (for example a local red squirrel population). This concept underpins much of the European legislation in relation to nature conservation.

In determining the significance of a potential impact, all of the above factors are considered: the nature conservation value of the receptor, the sensitivity of the receptor and the magnitude and duration of the potential effect. Professional judgement is applied in determining the likelihood of the effect occurring.

In accordance with standard approaches to EIA and in terms of the EIA Regulations, impacts of proposed developments which are assessed as significant would require some form of mitigation or compensation in order to reduce the potential impact. With respect to sites that support protected species, there may also be a legal obligation to provide such mitigation.

7.5 BASELINE DESCRIPTION

The following sections describe the location of the Development site with respect to surrounding areas designated for their nature conservation interests. The baseline conditions at the Development site are described in terms of the breeding bird community, the wintering bird community and the flight activity of target species at the Development site. Full details of the results of the surveys are provided in the Technical Appendix.

7.5.1 Statutory Designated Sites

A number of statutory and non-statutory designated sites identified during the desk study are mapped in Figure 6.1 (Chapter 6: *Ecology* of this ES) and detailed below.

There are no areas designated as Special Protection Areas (SPA) or Ramsar sites within 4 km of the application boundary of the Development. The nearest SPA is the South Pennine Moors located approximately 4.2 km south-west of the Development site. This area is designated for its upland breeding raptor and wader populations, specifically; peregrine, merlin, short-eared owl, golden plover and dunlin. None of these species were recorded on the site during surveys, however, records of all species were received from the county bird recorder within approximately three kilometres of the site boundary, with the exception of short-eared owl. The Development site does not hold any habitat suitable for any of these species to breed and desk study records referred to passage/wintering birds.

There are no Sites of Special Scientific Interest designated for bird interests within 4 km of the Development. The nearest site designated for bird populations is the South Pennine Moors SSSI which lies entirely within the boundary of the South Pennine Moors SPA.

7.5.2 Non-Statutory Designated Sites

There are four local wildlife sites in the area – Whitley Edge, Broadstone Reservoir, Ingbirchworth Reservoir and Royd Moor Reservoir. The main bird interest at these sites are breeding waders and passage birds at the reservoirs.

There are no areas designated as National Nature Reserves within 4 km of the application boundary.

7.5.3 Desk Study

7.5.3.1 Very High

Qualifying SPA/SSSI species present in internationally important numbers

Desk study records show that peregrine and merlin are both seen regularly as winter/passage visitors to the wider area. The site does not currently hold any habitat likely to offer significant breeding potential for either of these species and no significant numbers of prey species were recorded on the site during any of the surveys. Neither species was recorded during any of the surveys.

Golden plover are recorded as using the Whitley Common/ Blackstone Edge area as an important local staging post between late March and early May. Discussions with RSPB suggested that golden plover were less frequent in this area than in the past and were not known to occur in sizeable numbers on the site itself. The Development site and surrounding area do not hold habitats likely to hold breeding golden plover with the nearest high value breeding habitats being found in the SPA/SSSI over 4 km to the south-west. No golden plover were recorded from the survey area or surrounding fields during any of the surveys, including some specifically targeted survey visits in Spring 2008.

Dunlin is recorded as a regular winter/passage visitor to the nearby reservoirs in the area. No dunlin were recorded from the survey area or surrounding fields during any of the surveys.

No other records were received of species included as qualifying features of any of the nearest internationally or nationally designated sites were recorded as breeding within the site or recorded at any time during the survey.

7.5.3.2 *High*

Ecologically sensitive and rare species; species present in nationally important numbers; species listed on Annex 1 / Schedule 1; regularly occurring migratory species

Dotterel was recorded virtually annually as a passage visitor in low numbers until 1995, after which records became more infrequent and they have not been recorded in the area since 2001.

A single record of barn owl from the Ingbirchworth area was provided dating from 2007. No barn owl was recorded during any surveys.

Little ringed plover is described as being recorded on many dates throughout the summer from all three nearby reservoirs, with breeding confirmed only in 2001. The site does not hold any breeding habitat for this species and it was not recorded during any surveys.

Common quail is described as historically known to breed in the area but with single singing bird from near Broadstones Reservoir in 2006 being the only recent record. No quail were recorded during any of the surveys.

Kingfisher was recorded on several dates in 2001/2 at Ingbirchworth reservoir, but not since.

No other Annex 1 or Schedule 1 species were recorded as breeding within the search area. Although several other species were recorded in low numbers as winter/passage visitors, during which period they are common visitors to this country e.g. brambling, fieldfare and common tern.

7.5.3.3 *Medium*

Species present in regionally important numbers or listed as priority species in the UKBAP

Eight UKBAP priority species are recorded as breeding in the area. All of these species are small passerines except grey partridge and lapwing which are recorded as being resident breeders in the area. Of these species only lapwing, skylark and linnet were recorded during surveys.

7.5.3.4 *Low*

Other species of conservation interest, such as those listed on the red and amber lists of the RSPB's Birds of Conservation Concern and local Biodiversity Action Plan.

Up to four swallows were recorded at Spicer House and three meadow pipits were recorded throughout fields in the survey area. Single oystercatcher, stonechat and willow warbler territories were located around the periphery of the survey area and a single goldcrest was recorded singing in the conifer plantation behind Spicer House.

7.5.3.5 *Other species*

A further six red-listed passerine species and a further forty-two amber list species have been recorded in the wider area.

7.5.4 **Breeding Birds Survey**

Twenty-one species were recorded holding territory or displaying signs of breeding within the Development site. Territories are shown on Figures 7.1a-7.1c. More detailed information of the birds recorded during breeding bird surveys is provided in the Technical Appendix. These are grouped according to their nature conservation value defined in Table 7.2.

7.5.4.1 *Very High*

Qualifying SPA/SSSI species present in internationally important numbers

No species included as qualifying features of any of the nearest internationally or nationally designated sites were recorded as breeding within the site or recorded at any time during the survey. No species were present within the survey area in internationally important numbers.

7.5.4.2 *High*

Ecologically sensitive and rare species; species present in nationally important numbers; species listed on Annex 1 / Schedule 1; regularly occurring migratory species

No Annex 1 or Schedule 1 species were recorded within the survey area during the survey.

7.5.4.3 *Medium*

Species present in regionally important numbers or listed as priority species in the UKBAP

A single displaying lapwing was recorded within the south-east corner of the survey area. Two further displaying birds were recorded in fields to the north-east of the survey area c. 150m from the site. Up to eight birds were recorded feeding in fields immediately north of Spicer Hill during the survey but these were never recorded undertaking breeding behaviour and were considered to be non-breeders or failed breeders. No juvenile birds were recorded from any of the displaying birds during the survey.

A single curlew was recorded undertaking breeding behaviour in fields immediately west of the survey area and a single bird (presumed to be from this pair) was seen in a field in the north-west of the site. This pair is located over 500 m from the nearest turbine location.

A total of seven skylarks were widely distributed throughout the survey area and in immediately adjacent fields. No juveniles were recorded and due to the location of the majority of the territories in fields with high grazing or arable management it is considered that breeding success would have been generally poor. One territory was located within 100 m of the existing wind farm.

A single dunnock territory was located in plantation woodland c.400 m north of proposed turbine 3.

Up to three starling nests were considered to be present within the Spicer House buildings, c.500m from the nearest proposed turbine.

A total of five linnet territories was recorded with four of these being located outside of the site. The only territory within the site was c380 m NE of turbine 1. One territory was located within the Ingbirchworth Nature Reserve and the remaining three were located in close proximity to each other on Small Shaw Bank, c.500 m from the nearest turbine location (but within 200 m of existing turbines).

A single yellowhammer territory was recorded on the southern boundary of the survey area, over 500 m from the nearest proposed turbine location and c.250 m from the nearest existing turbine.

Low: other species of conservation interest, such as those listed on the red and amber lists of the RSPB's Birds of Conservation Concern and local Biodiversity Action Plan

Up to four swallows were recorded at Spicer House and three meadow pipits were recorded throughout fields in the survey area. Single oystercatcher, stonechat and willow warbler

territories were located around the periphery of the survey area and a single goldcrest was recorded singing in the conifer plantation behind Spicer House.

7.5.4.4 Other species

Other species breeding at or near the Development site included small numbers of common and widespread birds such as: jackdaw, pied wagtail, wren, robin, blackbird, blue tit, carrion crow, and chaffinch.

7.5.5 Wintering Birds

A total of twenty-seven species of bird were recorded during the winter/passage walkover survey visits between September 2007 and March 2008. There were few species of conservation interest recorded at the Development site. Those records of species of conservation interest (wildfowl, waders and Annex 1/ Schedule 1 raptors and flocks of other passerine species) are summarised below.

Up to 32 lapwing were recorded in fields between the Development site and Ingbirchworth Reservoir on all visits. Lapwing was only recorded on the site when two birds were seen in arable fields during the March visit. No other waders were recorded within or in close proximity to the Development site during the survey.

A flock of up to five hundred Canada geese was recorded distantly west and south-west of the site on occasions throughout the survey. These geese were seen to be commuting between Ingbirchworth, Royd Moor and Scout Dyke Reservoirs and surrounding fields. The geese were never recorded within 800 m of the site boundary.

A single kestrel was regularly seen hunting along Spicer House Lane, usually close to the Ingbirchworth Nature Reserve.

Up to 21 redwing and 35 fieldfare were recorded around Spicer House during the November and December visits.

Up to one hundred and twenty starlings were recorded in recently ploughed arable fields within the site boundary on site visits in February and March.

Low numbers of common and black-headed gulls were recorded in fields between the Development site and Ingbirchworth Reservoir throughout the winter. Once the arable fields within the site had been ploughed up to 200 black-headed and 30 common gulls were seen in the area. Single herring and lesser black-backed gulls were also occasionally seen.

Groups of up to 50 crows, jackdaws and less commonly rooks were regularly seen flying around the site and in fields south of Whitley Road.

7.5.6 Flight Activity

Full details of the flight activity of target species are provided in Technical Appendix A7.

Focal species records were limited to single sightings of two teal flying into ponds at the adjacent clay quarry during one evening survey. The only other wildfowl recorded were a pair of mallard following the same route as the teal. No other wildfowl were recorded within 800 m of the vantage point.

No raptors other than the occasional kestrel hunting within the site were recorded. No information has been gathered regarding nocturnal flight activity by birds such as owls, although no owls were recorded during early morning and evening breeding bird and flight activity surveys. No droppings or pellets were found within the survey area and there are no

records of barn owl from the only building within the survey area, Spicer House. Consequently, no nocturnal survey was considered necessary.

No golden plover were recorded during any survey visit, including specifically targeted surveys during spring 2008.

No waders were seen flying over the site during the survey with small numbers of lapwing and a single curlew (twice) outside the site boundary being the only records.

Recorded movements were greatly dominated by crows and gulls crossing the site (all in single figure flocks) and low numbers of passerines moving within the site.

During a few visits several swallows and house martins were recorded crossing the site at low heights i.e. less than ten metres, and probably migrating along the line of Whitley Road (past the existing turbines).

A single heron was recorded flying over the site at well over 100 m height.

7.6 INFORMATION GAPS

All data needed for the assessment were available.

The flight activity was designed to act as a scoping tool for the need to undertake more extensive surveys. Based on the findings of this survey and desk study responses from the county bird recorder and RSPB it was considered that the area did not hold any significant populations of species likely to be vulnerable to collision or other disturbance and further activity surveys were deemed unnecessary.

7.7 ASSESSMENT OF EFFECTS

7.7.1 *Evaluating Nature Conservation Importance*

The nature conservation importance of species potentially affected by the Development was determined using criteria defined in Table 7.2. These are set out in Table 7.6.

Table 7.6 Nature conservation value of ornithological receptors at Spicer Hill.

Value	Species
Very high	Breeding raptors and waders from South Pennine Moors SPA/ SSSI i.e. Peregrine, Merlin, Golden Plover and Dunlin (desk study records only).
High	Dotterel, Barn Owl, Little Ringed Plover, Common Quail and Kingfisher (desk study records only).
Medium	Grey Partridge, Bullfinch, Spotted Flycatcher, Song Thrush, Reed Bunting, Tree Sparrow, Twite (desk study only) Lapwing, Curlew, Skylark, Dunnock, Starling, Linnets, Yellowhammer
Low	Swallow, Meadow Pipit, Oystercatcher, Stonechat, Willow Warbler, Goldcrest

7.7.2 Behavioural Sensitivity

The behavioural sensitivity of the above listed bird species potentially affected by the Development was determined using criteria set out in Table 7.3. These are set out in Table 7.7.

Table 7.7 Behavioural sensitivity of species of high and moderate Nature Conservation Importance recorded at Spicer Hill

Sensitivity	Species	Reason
High/Moderate	None	No species likely to fall within this category were recorded from the site during the surveys or as desk study records.
Moderate	Curlew	Birds sensitive to visual disturbance and sudden noise events over relatively large distances (e.g. up to c. 500 m)
Moderate/Low	Non-breeding: Peregrine, Golden Plover, Merlin, Breeding: Lapwing	Breeding birds sensitive to visual disturbance and sudden noise events over relatively large distances (e.g. up to c.500 m). However, individuals tolerate quite high levels of disturbance in some situations. Non-breeding birds less sensitive to disturbance.
Low	Skylark, Swallow, Stonechat, Starling, Dunnock, Linnets, Yellowhammer	Birds sensitive to visual disturbance and sudden noise events, but effects likely to extend only a short distance (e.g. up to c.100 m). Individuals appear capable of a high degree of habituation

The breeding raptors and waders using the South Pennine Moors SPA/SSSI are sufficiently distant from the Development that they are highly unlikely to be disturbed by any phase of the Development. Given this, it is considered that there is no requirement to consider impacts on these receptors further in this assessment.

Whilst no peregrine, merlin or golden plover were recorded from the survey area the desk study history of these birds ensures that they are taken in to account during this assessment.

Small numbers of curlew and lapwing breed in the survey area and immediate surroundings.

The survey area supports a small breeding skylark population.

The numbers of other species of passerine of low or medium importance using the survey area were relatively low. Of those species, none would be within 100 m of a proposed turbine location. For this reason, these species are considered to be highly unlikely to be negatively affected by the presence of the adjacent Development. There may be additional disturbance impacts during the construction phase, but the short, temporary nature of the construction phase and the low number of birds breeding within the footprint of the Development means that significant effects on their local, regional or national populations would not occur.

Taking the above information into account, the ornithological receptors to be considered further in the assessment are

- Winter/passage peregrine, merlin and golden plover;
- Breeding waders (curlew and lapwing) in the survey area; and

- Skylark breeding within the survey area.

7.7.3 Nature and Magnitude of Potential Effects

The potential effects of each of the three main phases of the Development are described below. Different species vary in their behavioural sensitivity to the disturbance effects of the construction, operation and decommissioning phases of the wind farm. There is little published information on the distances at which birds may be adversely affected, therefore the sensitivities defined in Table 7.3 are considered in assessing the potential effect.

7.7.3.1 Construction effects

Direct land-take by the Development structures (turbine bases, control building, access tracks etc.) would result in the loss of a very small proportion of the available habitat within the site (see Chapter 6: Ecology). This is highly unlikely to affect 1 % of any species population at a regional or local scale, therefore the potential effect of land take on all bird species is considered to be negligible.

During the construction phase of the Development, the potential impacts of associated noise and visual disturbance could lead to the temporary displacement or disruption of breeding and foraging birds. Potential effects are likely to be greatest during the breeding season (mainly between March and September depending on species) and behavioural sensitivity to the effects will vary between species. Disturbance of birds due to construction activities of this type has not been sufficiently quantified and the available information is often contradictory. However, larger bird species, those higher up the food chain, or those that feed in flocks in the open tend to be more vulnerable to disturbance than small birds living in structurally complex or closed habitats such as woodland⁷. The potential effects associated with construction activities are only likely to occur for as long as the construction phase continues. The exception to this would be if an adverse impact on the breeding success of a receptor were such that the local population becomes extinct and replacement does not occur.

7.7.3.2 Operational effects – Disturbance and Barrier to Movement

The operation of turbines and associated human activities for maintenance purposes has the potential to cause disturbance and displace birds from the wind farm area. It is considered likely that disturbance effects during the operational phase will be less than during the construction phase. Studies have shown that in general, species are not disturbed beyond 600-800 m from turbines and in some cases, birds have not been disturbed at all⁸. However, individual turbines, or the Development as a whole, may present a barrier to the movement of birds, restricting or displacing birds from much larger areas. The effect this would have on a population is subtle, and difficult to predict with any great certainty. If birds regularly have to fly over or around obstacles or are forced into suboptimal habitats, this may result in reduced feeding efficiency and greater energy expenditure. By implication, this will reduce the efficiency with which they accumulate reserves, potentially affecting breeding success. During the lifetime of the wind farm, however, birds may habituate to the presence of turbines, thus the effect is likely to be greatest in the short-term.

7.7.3.3 Operational effects - Collision

Collision of a bird with the turbine rotors is almost certain to result in the death of the bird. In low-density populations, such as raptors, this could have a more adverse impact on the local population than in higher density populations (*e.g.* skylark). The frequency and

7 Hill, D.A., D. Hockin, D. Price, G. Tucker, R. Morris, and J. Treweek. 1997. Bird disturbance: improving the quality of disturbance research. *Journal of Applied Ecology* 34:275-288.

8 Quoted in guidance notes supplied by SNH/BWEA "Methodology for assessing the effects of wind farms on ornithological interests".

likelihood of a collision occurring is dependent on a number of factors. These include aspects of the structure and behaviour of the bird, the nature of the surrounding environment and the structure and layout of the turbines.

Collision risk is perceived to be higher in birds that spend much of the time in the air, such as foraging raptors, and those that have regular flight paths between feeding and breeding/roosting grounds (*e.g.* divers and geese). The majority of bird fatalities at wind farms have occurred on major migration flyways, in reduced visibility or at night^{9,10}. Birds are also more susceptible if the wind farm is located in an area of unusually high prey density. A close array of turbines across a natural wind funnel (a "wind wall") has also been known to cause increased bird mortality. For diurnal foraging raptors, the proximity of structures on which to perch can increase the likelihood of collision with turbines¹¹. The proposed site at Spicer Hill presents none of these factors that are likely to increase the risk of bird collision.

It should be noted that operational disturbance and collision risk effects are mutually exclusive in a spatial sense *i.e.* a bird that avoids the wind farm area cannot be at risk of collision with the turbine rotors at the same time. However, they are not mutually exclusive in a temporal sense; a bird may initially avoid the wind farm, but habituate to it, and would then be at risk of collision. In this case there has not been sufficient bird activity for a collision risk model to provide meaningful results.¹²

7.7.3.4 Decommissioning effects

Potential disturbance effects associated with decommissioning are assumed to be the same as those identified for construction. This assumes that there is no permanent displacement of birds from the wind farm due to disturbance effects. Decommissioning effects are not considered separately for each receptor.

7.7.4 Potential Construction Effects

7.7.4.1 Peregrine and Merlin

Due to the low densities of these species in the area, the low numbers of potential prey species within the survey area and the lack of records during the surveys it is considered unlikely that disturbance during the construction phase of the Development would have a significant impact on these species and therefore the magnitude of potential effects on these species is considered to be negligible.

7.7.4.2 Golden Plover

This species does not breed within the survey area and therefore any disturbance would be to passage populations. The wider area holds considerable amounts of alternative habitat for feeding passage birds and it is difficult to establish the threshold distances at which golden plover might be disturbed by construction activities at the wind farm. In this case, a precautionary approach¹³ is taken in assuming that birds would be displaced from areas within 500 m of the turbine bases and access tracks. No golden plover during specific surveys

9 Crockford, N.J. (1992) A review of the possible impacts of wind farms on birds and other wildlife. JNCC Report No. 27. JNCC, Peterborough.

10 Gill, J.P., Townsley, M. & Mudge, G.P. (1996) Review of the impacts of wind farms and other aerial structures upon birds. SNH Review 21 68

11 Orloff, S. & Flannery, A. (1996) Avian mortality in Altamont Pass WRA – final report. California Energy Commission, Sacramento.

¹² Band W., Madders M. & Whitfield D.P. (2007) Developing field and analytical methods to assess avian collision risk at wind farms. In de Lucas M., Janss G. & Ferrer M. (eds.) *Birds and Wind Power*. Lynx Edicions, Barcelona.

¹³ Pearce-Higgins, J.W., Stephen, L., Langston, R.H.W. & Bright, J.A 2008 "Assessing the cumulative impact of windfarms on peatland birds: a case study of golden plover *Pluvialis apricaria* in Scotland" *Mires and Peat* 4 p1-13, provides evidence of displacement of breeding golden plover at distances of at least 200m. Thus using a figure of 500m can be considered precautionary.

for this species in spring 2008 and therefore the magnitude of potential effects on any passage populations are considered most likely to be negligible. Further surveys are ongoing to cover the spring period in more detail, however to date there has been no recorded activity by this species in or near the site.

7.7.4.3 *Breeding curlew and lapwing*

It is difficult to establish the threshold distances at which curlew and lapwing might be disturbed by construction activities at the wind farm. In this case, it is assumed that birds would be displaced from areas within 500 m¹⁴ of the turbine bases and access tracks (note however, that an existing lapwing territory is located within c.400 m of the existing Royd Moor turbines).

Both curlew and lapwing breed at low density within the survey area, but neither species breeds or has been recorded within the application boundary. The distance between the breeding site and the nearest part of the Development was over 500 m for curlew and c.430 m for lapwing. Under the assumption that breeding curlew and lapwing would be disrupted by construction activities within 500 m, a single pair of lapwing would be disrupted or displaced. (Note however that this is a precautionary interpretation given the presence of breeding lapwing within similar distances of the Royd Moor turbines). Therefore the magnitude of potential effects of construction disturbance on breeding waders in the absence of any mitigation is considered to be low in the short-term and negligible in the long-term. Given that this potential effect is predicted to affect only a single pair of lapwing, and the presence of greater populations in the wider area this disturbance is considered to be negligible on local populations of these species.

7.7.4.4 *Skylark*

For the purposes of this assessment it is assumed that skylark would only be displaced from areas immediately adjacent to construction activities (*e.g.* within 100 m). Based on the recorded distribution of skylark territories none of the pairs recorded are predicted to be displaced. Therefore the magnitude of potential construction disturbance effects on skylark is considered to be negligible in both the short and long terms.

7.7.5 *Potential Operational Effects - Disturbance*

7.7.5.1 *Peregrine and Merlin*

Due to the low densities of these species in the area, the low numbers of potential prey species within the survey area and the lack of records during the surveys it is considered unlikely that disturbance during the operational phase of the Development would have a significant impact on these species and therefore the magnitude of potential effects on these species is considered to be negligible.

7.7.5.2 *Golden Plover*

This species does not breed within the survey area and therefore any disturbance would be to passage populations. The wider area holds considerable amounts of alternative habitat for feeding passage birds. It is difficult to establish the threshold distances at which golden plover might be disturbed by operation of a wind farm, especially for non-breeding birds which can be regularly seen flying in close proximity to turbines at existing windfarms in the UK in the author's personal experience. In this case, a precautionary approach is taken in assuming that birds would be displaced from feeding in areas within 500m of the turbine bases and access tracks. No golden plover have been recorded from within 500m of any

¹⁴ Langston, R.W.H. & Pullan, J.D. 2004 "The effects of wind farms on birds" *Nature and Environment No 139*, Council of Europe Publishing – this review study found effects of up to 500m for curlew and for lesser distances for lapwing.

turbine locations during the survey and therefore the magnitude of potential effects on any passage populations are considered most likely to be negligible.

7.7.5.3 Breeding curlew and lapwing

Operation of the turbines may result in disturbance or displacement of breeding birds. It is difficult to establish the threshold distances at which curlew and lapwing might be disturbed by the operation of the wind farm and associated maintenance activities with certainty, and a figure of 500m is assumed as a displacement distance in this assessment. In relation to the Development, the nearest curlew territory would be over 500 m away from the nearest proposed turbine. It is assumed for the purposes of assessment that the single curlew territory would not be affected by disturbance during the operational phase of the Development.

In relation to the Development, the nearest lapwing territory would be c.430 m away. However for the purposes of this assessment it is assumed that a single pair of lapwing will be affected by disturbance during the operational phase of the Development.

Therefore it is considered that any operational disturbance would have a potential effect of low magnitude on the breeding waders.

7.7.5.4 Skylark

Skylarks nest at the site and in the surrounding area. Recent guidance (SNH, 2005¹) indicates that this species and other red listed passerines are unlikely to be negatively affected by upland wind farm developments. In addition, no territory locations are within 100 m of proposed turbine positions, and one existing territory is within 100m of the existing turbines at Royd Moor Wind Farm. Therefore it is considered that any operational disturbance would have a potential effect of low magnitude on breeding skylarks.

7.7.6 Potential Operational Effects - Collision

7.7.6.1 Peregrine and Merlin

Peregrine and Merlin were not observed within the Development area. The collision risk to these species is predicted to be negligible.

7.7.6.2 Golden Plover

Golden Plover were not observed within the Development area during survey work. Based on this the collision risk to these species is predicted to be negligible.

7.7.6.3 Breeding curlew and lapwing

Breeding curlew and lapwing were recorded in low numbers within the Development area along with a maximum of nine non-breeding birds. The collision risk to these species is predicted to be low.

7.7.6.4 Skylark and other species

Recent guidance (SNH, 2005¹) indicates that this species is unlikely to be negatively affected by upland wind farm developments. Low numbers of breeding skylark were present within the survey area in the context of local and national populations of this common species. The flight patterns of this species make it a limited collision risk (i.e. relatively slow and manoeuvrable). Therefore it is considered any potential adverse effects as a result of collision would be of negligible.

Collision risks to most other species recorded during surveys is considered to be very low due to limited populations or records in the wind farm area. The highest risk species groups, based on surveys, would be corvids and gulls passing over the site or feeding in arable fields around the turbines. These groups consist of extremely common and widespread species with breeding birds limited to a few jackdaws and a single crow at or near Spicer House and as a result, the potential adverse effects on other species due to collision are predicted to be of negligible.

7.7.7 Potential Decommissioning Effects

These are likely to be the same as for the construction phase, hence the potential disturbance effects as a result of decommissioning activities are considered to be the same as for the construction phase.

7.8 MITIGATION

Construction (and decommissioning) would be timed where possible to commence outside the breeding season and to only affect a single breeding season. This is to minimise disturbance to breeding birds during the construction phase. By commencing construction activities outside the breeding season, birds returning to the area to breed would have the opportunity to select breeding sites further away from potentially disturbing activities, if suitable available habitat exists.

An Ecological Clerk of Works (ECoW) would be appointed to oversee the construction and decommissioning phases of the Development. In addition to responsibility for ensuring that protected species are not disturbed and that pollution prevention measures are implemented, the ECoW would be responsible for ensuring that breeding birds are not recklessly disturbed by construction or decommissioning activities.

Potential effects on breeding waders could be off-set by management of grazing in parts of the site distant from proposed turbines. A Habitat Management Plan will be prepared in respect of the improved and semi-improved grassland on site. Where practicable, measures will be incorporated to facilitate management of the current grazing regime.

7.9 RESIDUAL EFFECTS

7.9.1 Construction Effects

Short-term disturbance effects on breeding and passage waders are assessed as being of low/negligible magnitude. This potential effect is assessed as *not significant*. All other potential construction effects are assessed to be of negligible or low magnitude and are considered to be *not significant*.

7.9.2 Operational Effects

All potential operational effects are assessed to be of negligible or low magnitude. Due to the low numbers of breeding waders on the site and the large amount of alternative breeding habitat in the wider area these impacts are considered to be *not significant* on local population levels of these species.

7.9.3 Decommissioning Effects

These would be the same as for construction effects, therefore short-term disturbance effects on breeding waders would be reduced to a low/negligible magnitude.

All other potential decommissioning effects are assessed to be of negligible or low magnitude and are considered to be *not significant*.

7.10 CUMULATIVE IMPACTS AND EFFECTS

The potential effects of the Development have been considered in combination with the existing Royd Moor Wind Farm.

The only species at Spicer Hill that may be prone to cumulative impacts are golden plover and other breeding waders, as a result of potential cumulative collision risk. The cumulative collision risk to golden plover is likely to remain low in the context of background mortality and the size of the national population, and is considered to be *not significant*.

7.11 SUMMARY OF EFFECTS

Table 7.8 Summary of Effects Table

Potential Effect	Description of Effect and any Mitigation	Significance & Comments
Construction Effects – Disturbance		
Peregrine, Merlin and Golden Plover	Short term effect of negligible spatial magnitude on a very high value receptor with moderate-low behavioural sensitivity (non-breeding)	Not Significant – no evidence that any of these species make regular use of the site.
Curlew	Short term effect of negligible spatial magnitude on a medium value receptor with moderate behavioural sensitivity. Breeding in 2007 was close to the threshold distance at which disturbance is suggested to occur.	Not Significant – unlikely possibility of displacement or disruption to one breeding attempt in one year.
Lapwing	Short term effect (1 year approx) on a medium value receptor with moderate-low behavioural sensitivity. Spatial magnitude very high in the context of the population within the area surveyed, but negligible within the context of the regional population. Timing of the start of construction may reduce the spatial magnitude.	Not Significant – displacement or disruption of one breeding attempt in one year.
Skylark	No disturbance predicted as all territories are more than 100m from nearest turbine/infrastructure.	Not Significant
Operational Effects – Disturbance		
Peregrine/Merlin	An effect of negligible spatial magnitude on a very high value receptor of moderate-low behavioural sensitivity over 25 years.	Not Significant – these species are likely to make only trivial use of the site if at all, no use was recorded in any of the surveys
Golden Plover	An effect of negligible spatial magnitude on a very high value receptor of moderate-low behavioural sensitivity over 25 years.	Not Significant- this species has not been recorded on the site
Curlew	An effect of negligible or low magnitude on a medium value receptor of moderate behavioural sensitivity over the long term (25 years). There is an unlikely possibility of displacement or disruption to the breeding activity of one pair. This would not lead to a detectable effect at the population level.	Not Significant
Lapwing	An effect of low spatial magnitude on a medium value receptor with moderate to low behavioural sensitivity over the long term (25 years). At the local level, displacement or disruption to the breeding activity of one pairs will not be detectable at the population level.	Not Significant
Skylark	No disturbance predicted as all territories are	Not Significant

Potential Effect	Description of Effect and any Mitigation	Significance & Comments
	more than 100 m from nearest turbine/infrastructure.	
Operational Effects – Collision		
Peregrine, Merlin and Golden Plover	An effect of negligible spatial magnitude on a very high value receptor over 25 years.	Not Significant- these species have not been observed within the site and this is interpreted to mean that any collision risk will be trivial
Curlew	An effect of low spatial magnitude on a medium value receptor over 25 years	Not Significant
Lapwing	An effect of low spatial magnitude on a medium value receptor over 25 years	Not Significant
Skylark	An effect of negligible spatial magnitude on a medium value receptor over 25 years	Not Significant

7.12 STATEMENT OF SIGNIFICANCE

The Development site has been identified as being not sensitive with regard to bird populations. Three receptors (peregrine, merlin and golden plover) were not recorded at all during fieldwork. This highlights that any displacement, disturbance or collision risk is likely to be of very low magnitude for these receptors. No disturbance or displacement is predicted for any of the skylark territories recorded, and collision risk is assessed as not significant for this species. Based on recorded activity levels, collision risk to waders is also assessed as being *not significant*.

The possibility of potential disturbance and displacement of waders (curlew and lapwing) during the construction and operational phases of the Development has been assessed. Using published data (significant effects have been reported at 500 m) the possibility of disturbance/displacement exists for one pair of lapwing and is close to the threshold for one pair of curlew. The presence of breeding lapwing within 370 m of the existing Royd Moor windfarm highlights that such disturbance/displacement effects are not certain to occur. Furthermore, the disturbance/displacement effects of this scale (one or two individual pairs of waders) are not predicted to be detectable at the population level and are therefore assessed as being *not significant*.

On this basis none of the predicted ornithological effects are assessed as being significant.

It should also be noted that climate change is widely accepted as the cause of some adverse ecological events and predictions indicate that declines will occur in many ecological taxa, including bird populations¹⁵. There is consensus that relying on renewable energy as an alternative to fossil fuels may alleviate the severity of such climate change impacts.

¹⁵ Parmesan, C & Yohe, G 2003. A globally coherent fingerprint of climate change impacts across natural systems. *Nature*, 421, pp 37-42; Berry, P, Dawson, T, Harrison, P, Pearson, R & Butt, N 2003 The sensitivity and vulnerability of terrestrial habitats and species in Britain and Ireland to climate change. *Journal for Nature Conservation*, 11, pp 15-23; Root, T.L., Price, J.T., Hall, K.R., Schneider, S.H., Rosenzweig, C. & Pounds, J.A. 2003. Fingerprints of global warming on wild animals and plants. *Nature*, 421: 57-60; Thomas, C.D., Cameron, A., Green, R.E., Bakkenes, M., Beaumont, L.J., Collingham, Y.C., Erasmus, B.F.N., Ferreira de Siqueira, M., Grainger, A., Hannah, L., Hughes, L., Huntley, B., van Jaarsveld, A.S., Midgley, G.F., Miles, L., Ortega-Huerta, M.A., Peterson, A.T., Phillips, O.L. & Williams, S.E. 2004. Extinction risk from climate change. *Nature* 427: 145 – 148.