



SPICER HILL WIND FARM

Environmental Statement Volume 3: Technical Appendices

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Prepared by



On behalf of

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1 INTRODUCTION

This appendix provides technical details on ecology surveys undertaken at the Spicer Hill proposed windfarm site. Initially an extended Phase 1 survey and desk study were undertaken to identify the habitats present and any historical records of protected or designated species or habitats. The results of these surveys informed the need to undertake further specific surveys to establish the current baseline conditions on the site.

During this assessment the "survey area" is the red line site boundary of the proposals.

Following the Phase 1 survey and desk study the following additional surveys were undertaken

- Riparian Mammal Survey
- Bat Survey
- Badger Survey (see confidential appendix)
- Breeding Bird Survey
- Winter/Passage Bird Survey
- Preliminary Flight Activity Survey for bird activity.

Details and assessment of the three bird surveys are included in Chapter 6 Ornithology, and associated technical appendices.

2 METHODOLOGY

2.1 Consultation

A range of statutory and non-statutory organisations were contacted in order to gather available information regarding statutorily protected and other designated or notable sites, habitats and species. Data requested during the desk study was for appropriate designated sites and species from within the survey area and surroundings.

In addition the Multi-Agency Geographic Information for the Countryside (MAGIC) website was used to search for the presence of any statutorily protected sites (SAC, SPA and SSSI) or local nature reserves within 5km of the site.

2.2 Field Survey

2.2.1 Extended Phase 1 Survey

This survey followed Phase 1 habitat survey methodology (JNCC, 1993) and was extended to assess faunal potential. This modified approach to the Phase 1 survey is in accordance with the approach recommend by the Guidelines for Baseline Ecological Assessment (IEA, 1995). The survey involved walking the entire site, identifying key habitats and plant species and assessing their inherent value and their potential for holding important populations of faunal species. The habitats were marked on a field plan along with target notes marking the locations of areas of particular interest and/or requiring additional survey. Based on the findings of this survey the following additional surveys were undertaken:

2.2.2 Riparian Mammal Survey

All watercourses running through or adjacent to the site were surveyed for any evidence of Otter or Water Vole.

Evidence searched for included:

- Otter; tracks, feeding remains, spraints, footprints, holts, potential resting places etc.
- Water Vole; droppings/latrines, burrows, feeding remains, "lawns", footprints, runs etc.

All parts of the watercourses within or adjacent to the survey area were easily accessible during the survey. Surveys were undertaken during October 2007 and repeated during March 2008.

2.2.3 Bat Activity Survey

A single preliminary visit was made on 12th to 13th September 2007 to determine the scope of survey that would be necessary at this site, based upon the level of bat activity observed. This survey provides indicative results but does not allow detailed determination of seasonal variation in the level of activity at the site or identification of any regularly used commuting routes.

Two surveyors made an initial visit to the site during daylight to assess any trees and structures as to their suitability as bat roosts, and to plan a transect route, incorporating 12 set listening stops. In addition, listening stops and potential roost sites were also recorded on a handheld GPS. The transect route was designed so as to follow field boundaries and hedgerows, and to bring the surveyors into close proximity to features such as woodlands and watercourses, and open silage or manure stores which may be used by bats. It is to be noted that access was not possible to a portion of a field in the south east part of the survey area due to the stock present in this field.

Trees were assessed based upon features (e.g. cracks, fissures and holes offering access to the interior) that may support bat roosts, and all structures were noted. No trees or structures were assessed in detail for staining or droppings, and surveys were not intrusive.

A dusk transect survey was then undertaken on 12th September 2007, beginning at sunset and completed three hours later. Bat activity was detected using a heterodyne bat detector (Batbox Duet). When activity was detected between listening stops, a digital recording device (EDIROL R-09) was used in conjunction with a frequency division bat detector (Batbox Duet) to record echolocation calls. When the surveyors arrived at a predetermined listening stop, they waited for 3 minutes, and recorded for the duration of the stop using the frequency division bat detector, ensuring any bat activity during that period was recorded.

A dawn transect survey was undertaken the following morning (13th September 2007), beginning two hours before sunrise, and ending thirty minutes after sunrise. The transect route was reversed, and the survey protocol was otherwise identical to that followed during the dusk transect survey.

The two transect surveys were designed with reference to Bat Conservation Trust good practice guidelines.

Recordings were later analysed by a combination of listening and comparing with a reference CD of bat calls and a sample of the recordings were analysed using "Batsound" spectrogram sound analysis software.

2.2.4 Badger Survey

Details of the badger survey are provided in the Confidential Annex.

3 BASELINE CONDITIONS

3.1 Desk Study

A summary of the data received from the consultees is shown below in Table 1

Table 1 Consultation Responses

Consultee	Summary
Natural England	The application should make reference to the latest policy guidance i.e PPS 9. Recommends that the EIA should consider opportunities for increasing biodiversity both within the site and the surrounding countryside, with particular reference to contributing to repairing the fragmentation of heathland in the area.
Environment Agency (EA)	Commented that the scope set out in the scoping document appeared appropriate.
Yorkshire Wildlife Trust (YWT)	No response received.
RSPB	Details in Ornithology chapter.
Barnsley Council	Provided details of local wildlife sites, see below.
West Yorkshire Ecology	A data search was conducted covering the southern part of the site boundary and surrounding area, results of which consisted of: 3 Positive Otter records from Ingbrichworth reservoir (750m + from survey area). Records from 2004/05. Known bat roosts from in and around Penistone (closest record over 2km from survey area); total of 10 records received.
South Yorkshire Bat Group	A total 33 records were received. Of these none were located within 2km of the nearest turbine, 25 of the records related to Pipistrelle or indeterminate species with other species including: whiskered, Brandt's, brown long-eared and natterer's bats.
South Yorkshire Badger Group	See confidential appendix
County Bird Recorder	Records of statutorily protected and designated breeding and wintering/passage birds. Details in Ornithology Chapter.
Local Herpetofauna Recorder	Records limited to "toads at the local reservoir".

3.1.1 Internationally Statutorily Designated Sites

The survey area does not include any or any part of an Internationally designated site i.e. Special Area of Conservation (SAC) or Special Protection Area (SPA).

The nearest such site is the South Pennine Moors SAC/Peak District Moors SPA located over 4km to the south-west of the survey area. This site is designated under both directives and listed for the presence of significant amounts of Annex 1 habitats (EC Habitats Directive 1992) and populations of Annex 1 species (Birds Directive 1979).

SAC designation criteria:

Annex I habitats that are a primary reason for selection of this site:

- European Dry Heaths
- Blanket Bogs
- Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles

Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site:

- North Atlantic wet heaths with *Erica tetralix*
- Transition mires and quaking bogs

The survey area does not include any areas of these habitats, although the dry dwarf shrub heath habitat within the survey area does share similar characteristics as European Dry Heath, it is found in a significantly less diverse and natural form in its current state.

SPA designation criteria:

The Peak District Moors SPA is designated due to its populations of the following species of bird:

- Golden Plover
- Dunlin
- Merlin
- Short-eared Owl
- Peregrine

None of these species were recorded during any of the breeding or wintering bird surveys within the survey area. Details of bird activity within the site are included within the Ornithology chapter.

Due to the distance between the survey area and the nearest internationally designated sites and the lack of significant shared habitats and species and low connectivity of habitats it is considered that there would be no impact on these sites by the proposed wind farm during any of the phases of development.

3.1.2 Nationally Statutorily Designated Sites

The survey area does not include any Site's of Special Scientific Interest (SSSI).

The nearest SSSI is "Spring Meadows, Alderman's Head & Cow Croft Meadows", Site of Special Scientific Interest, which is located c.3.9km south-east of the survey area.

This site consists of a number of separated meadows to the south and west of the survey area. This site is designated due to the presence of nationally important "species-rich unimproved neutral grassland" in the form of "flower-rich hay meadows".

This entire site is currently considered to be in favourable condition according to the latest assessment of the site dated 10th January 2006, (<http://www.english-nature.org.uk/special/sssireportAction.cfm?report=sdrt13&category=S&reference=2000514>).

The site is characterised by crested dog's-tail (*Cynosurus cristatus*) and common knapweed (*Centaurea nigra*) and includes a rich variety of grasses along with a wide variety of forb species including several which are scarce in the South Yorkshire area.

No faunal interest is mentioned within the SSSI citation.

The Dark Peak SSSI, located over 4km from the survey area, covers the same area as the South Pennine Moors SAC and Peak District Moors SPA. It is designated for a combination of its habitats and fauna. In addition to the criteria listed above for the SAC and SPA the following additional habitats and species are mentioned

- Peatlands
- Blanket Mires
- Acid Grassland
- Flushes and Mires
- Curlew
- Red Grouse
- Twite
- Ring Ouzel
- Wheatear
- Whinchat

A small amount of semi-improved and relatively species-poor acid grassland is located within the survey area. No other additional habitats occur within the survey area in significant amounts when compared to the SAC site.

The survey area does not hold any significant areas of habitat or species populations linking it to any of the SSSIs in the wider area. Based on this fact and the distance and lack of connectivity of high value habitats between these sites and the survey area, it is considered that there will be no impact upon the features, habitats and species mentioned within the citations of Spring Meadows or Dark Peak from the proposed windfarm.

3.1.3 Locally Designated Sites

There are four Natural Heritage Sites located within 1km of the site (but no closer than c.500m). These are designated by Barnsley Borough Council and details of the designations are appended to the end of this document in Appendix 1.

Ingbirchworth Nature Reserve is located on the opposite side of Spicer House Lane to the site. No information was received about this site during the desk study, however a sign at the entrance describes it as a Parish Council Nature Reserve. The site consists of dwarf shrub (heather and bilberry) with young trees and bracken. Two small quarry ponds are also present close to the northern boundary.

Figure 5.1 of the Volume 1 of the Spicer Hill Wind Farm Environmental Statement shows the locations of the various designated sites.

3.1.4 *Natural England Natural Area*

The entire survey area falls within the Coal Measures Natural Area as designated by Natural England. The key nature conservation features of local significance within this area are

- Acid grassland
- Fen, marsh and swamp
- Lowland heathland
- Neutral grassland
- Rivers and streams
- Standing open water and canals
- Wet woodland

3.1.5 *Barnsley Biodiversity Action Plan (BBAP)*

In addition to species listed on the UK BAP, BBAP includes the following locally listed species

- Twite
- Little ringed plover
- Bluebell
- Glow worm
- Barn owl
- Lapwing

Locally designated habitats include

- Floodplain Grazing Marsh
- Parkland Ponds & Canals
- Post Industrial Derelict and Degraded Land
- Rush Pasture
- Urban Built-up Areas

The survey area held a small population of lapwing and some areas of species-poor rush pasture. No other listed habitats or species were recorded.

3.2 Field Survey

3.2.1 Extended Phase 1 Survey

3.2.1.1 Overview

The survey area is dominated by stone-walled arable fields and improved grassland used for intensive livestock grazing. To the south-east of the site are fields showing indications of more limited improvement and the acidic nature of the original soil and ground rock is revealed in the species present within the sward. Several areas within grazing fields, particularly north of Whitley Road, have damp areas, usually at the base of slopes which hold high proportions of rush. Within part of the acid grassland and on steep slopes with little soil south of Whitley road, western gorse scrub occurs in limited patches forming a dry dwarf shrub heath/acid grassland mosaic.

Three streams run through or adjacent to the site. None of these streams have significantly diverse associated flora either underwater or emerging. There are no ponds within the site although there are ponds in the surrounding area.

Trees within the site are limited to areas of plantation woodland other than a very few semi-mature trees along boundary walls.

The only buildings within the site are at Spicer House and the front garden holds the only area of dense scrub on the site.

The extended Phase 1 survey identified the following habitats within the survey area

- Arable
- Improved grassland
- Poor semi-improved grassland
- Semi-improved acid grassland
- Dry dwarf shrub heath
- Marshy grassland
- Plantation broad-leaved woodland
- Coniferous plantation woodland
- Dense scrub
- Scattered trees
- Scattered scrub
- Running water
- Fences
- Wall
- Buildings
- Bare ground

Figure 5.2 (ES Volume 1) shows the Phase I Habitat Plan and Target Note Locations. Target Note Descriptions are contained at the end of this document.

3.2.1.2 Arable

All fields included within this category were either ploughed or tilled during the survey and planted with non-cereal crops. The survey area included 4 such fields. These fields lacked any significant features of value to ecological groups such as wide verges or

banks and no evidence of any protected or designated flora or fauna was found. A few other small fields surrounding the survey area also held this habitat.

3.2.1.3 Improved Grassland

This habitat covers the largest land area within the survey area and its immediate surroundings. It consists of grassland which has been subject to extensive fertilization and grazing, resulting in a sward with significantly diminished structure and diversity from that of a more natural state. In many instances synthetic fertilizers and/or manure were seen spread across these fields and evidence of extensive grazing was recorded.

The dominant grass species within this habitat was perennial rye-grass (*Lolium perenne*) with other extremely common species such as Yorkshire fog (*Holcus lanatus*) and crested dog's tail (*Cynosurus cristatus*) often present in lesser amounts. Forbs within the sward were largely restricted to species typical of improved grassland, particularly white clover (*Trifolium repens*), daisy (*Bellis perennis*), dandelion (*Taraxacum agg.*), docks (*Rumex spp.*) and creeping buttercup (*Ranunculus repens*).

In some damper areas tussocks of soft rush (*Juncus effuses*) and tufted hair-grass (*Deschampsia cespitosa*) were also included within the sward. Where significant stands of rush were recorded this habitat was classed as marshy grassland.

This habitat and its constituent floral community is extremely common and widespread throughout the country and is of little ecological value. Although fields of this habitat did hold some displaying ground nesting birds (particularly lapwing and skylark) the high levels of disturbance from farm machinery and livestock greatly reduce the likelihood of significant breeding success.

There is a lack of any significant communities, species or value for faunal groups in this habitat.

3.2.1.4 Poor semi-improved grassland

The areas of this habitat included within the survey area consisted of sections of fields on and adjacent to "Spicer Hill" itself. These areas were subject to high levels of improvement via fertilization and heavy grazing but at the time of survey retained a slightly better diversity of species within the sward than the improved grasslands described above. The sections of fields included within this habitat did not however retain any significant quantities of species indicating higher value habitats such as unimproved grassland or acid grassland.

Features which were used to differentiate between this habitat and improved grassland included

- Higher amounts of grass species other than perennial rye-grass (e.g. common bent (*Agrostis capillaris*), cock's foot (*Dactylis glomerata*), Yorkshire fog, sweet vernal-grass (*Anthoxanthum odoratum*) and tufted hair-grass. Greater amounts of common forb species such as sorrel (*Rumex acetosa*), hawkweed (*Leontodon sp.*), chickweed (*Stellaria media*) and thistles (*Cirsium sp.*)

The majority of the fields designated within this category should be considered to be borderline "improved" and with continued fertilization and grazing or drainage may continue to reduce in their ecological value and become improved within a few years. It

is considered that these fields in their current management are more likely to reduce in ecological value than increase.

The value of this habitat for faunal groups is considered to be largely similar to that of improved grassland. This area is of small size and poor diversity for its habitat type.

3.2.1.5 *Semi-improved Acid Grassland*

This habitat occurred largely within parts of the fields included in the poor semi-improved grassland, generally on slopes where presumably leaching of nutrients had allowed some of the more natural soil and base rock characteristics to show in the species composition. Along the fields around Spicer Hill the sward described in the previous habitat included a higher quantity of common bent and fescue grasses (sheep fescue (*Festuca ovina*), red fescue (*Festuca rubra* agg.)), with small amounts of sheep sorrel (*Rumex acetosella*) and very occasional heath bedstraw (*Galium saxatile*) and harebell (*Campanula rotundifolia*). A similar sward was present in steeper areas south of Whitley Road.

In the field forming the south-east corner of the survey area (see target note 2) the sward became more diverse and showed far greater concentrations of fescues, sheep sorrel and heath bedstraw along with frequent mat-grass (*Nardus stricta*) and tormentil (*Potentilla erecta*). This field was grazed by highland cattle at the time of the survey and did not appear to be as intensively grazed (by sheep) as the remainder of the site. Within the sward of this field were stands of western gorse forming a dry dwarf shrub heath (see below)/acid grassland mosaic. The field also held large amounts of scattered rushes (*Juncus effusus* and *Juncus conglomeratus*). The highest value area with regard to diversity and quantity of acid indicators appeared to be in the southern and eastern sections of this field.

Acid indicators were also noted in the sward of the grass beneath the trees and adjacent to the stream running c. south-west to north-east near Spicer House (target note 3). This sward contained few acid indicator herb species but some notable patches of mat-grass and fescues.

Due to the greater interest of this habitat than all other habitats recorded within the survey area and its listing as a key habitat under the local natural area criteria, and despite its small area and vulnerability to further improvement, it is considered to be of **LOCAL VALUE**, particularly in its association with the dry dwarf shrub heath.

3.2.1.6 *Dry dwarf shrub heath*

This habitat within the survey area consists almost entirely from a single species; western gorse (*Ulex gallii*). Numerous patches of this low scrub occur within the field of more diverse acid grassland at target note 2, forming a mosaic of habitats. Also within this area a few very small heather (*Calluna vulgaris*) seedlings were seen, suggesting the potential for a succession to more mature and typical heathland habitat would be possible with appropriate management. A few bilberry (*Vaccinium myrtillus*) plants were also scattered along the banks of the stream running along the southern boundary of this field.

Other stands of gorse were located on steep slopes in improved grassland fields south of Whitley Road and immediately east of these fields (adjacent to the survey area). Small Shaw Bank held a mature and extensive block of gorse running for several hundred metres eastwards.

Due to the greater interest of this habitat than all other habitats recorded within the survey area and its listing as a key habitat under the local natural area criteria, and despite its small area and vulnerability to further improvement, it is considered to be of **LOCAL VALUE**, particularly in its association with the more diverse areas of semi-improved acid grassland.

3.2.1.7 Marshy grassland

A few small sections of the semi-improved grassland hold dense populations of rush and tufted hair-grass which are included within this category. This habitat also includes other damp loving species such as marsh thistle (*Cirsium palustre*) and in lower amounts: oval sedge (*Carex ovalis*), glaucous sedge (*Carex flacca*) and rarely sneezewort (*Achillea ptarmica*).

Areas of grassland which held a sward with over 25% *Juncus spp.*, and were not subjected to extensive grazing were included within this category as described within the Phase 1 Handbook (JNCC, 2003).

Due to the small areas of this habitat, exposure to grazing and the lack of species diversity (except the small section which lies within the semi-improved acid grassland/dry dwarf shrub heath mosaic) this habitat is considered to be of **NEGLIGIBLE VALUE** for ecological features.

3.2.1.8 Broad-leaved plantation woodland

The survey area includes trees alongside the stream running south of Spicer House (target note 3) and blocks of trees either side of the site entrance on Whitley Road. All trees are semi-mature or young and somewhat stunted due to exposure to elements. They are in good condition and no trees within this habitat were seen to have potential bat roosting holes or cracks. The dominant species included within this habitat were beech (*Fagus sylvatica*) and sycamore (*Acer pseudoplatanus*). The narrow woodland strip running south to north just outside the survey area from the entrance to the site from Whitley Road, comprises young, native species screen planting including; field maple (*Acer campestre*), birch (*Betula sp.*), ash (*Fraxinus excelsior*), beech, rowan (*Sorbus aucuparia*) and larch (*Larix decidua*).

No significant ground flora was located beneath these trees due to grazing and density of planting (with regard to the woodland strip outside the survey area).

Due to the lack of notable communities of flora or fauna within this habitat within the survey area and the large number of similar woodland blocks in the wider area this habitat is considered to be of **NEGLIGIBLE VALUE** for ecological features.

3.2.1.9 Coniferous plantation woodland

A small block of woodland dominated by spruce (*Picea sp.*) is located immediately west of Spicer House. This area of habitat is densely planted and holds no significant scrub layer or ground flora.

Due to the size and lack of naturalness and diversity of this area of habitat it is considered to be of **NEGLIGIBLE VALUE** for ecological features.

3.2.1.10 Dense scrub

This habitat is restricted to overgrown hedgerows surrounding and spreading in to the front garden of Spicer House, dominated by bramble (*Rubus fruticosus*) and hawthorn (*Crataegus monogyna*) with a few young sapling trees including ash and willow (*Salix* sp.).

The small size of this habitat and the extremely common nature of the species involved make this habitat of **NEGLIGIBLE VALUE** for ecological features.

3.2.1.11 Scattered Trees

This habitat is only represented by four semi-mature sycamore trees along a field boundary near the centre of the site. These trees are in generally good condition and are in an extremely exposed situation. They have extremely limited ecological value and are considered to be of **NEGLIGIBLE VALUE** for ecological features.

3.2.1.12 Scattered Scrub

The site includes a few individual hawthorn shrub/small trees included within this category. They occur along field boundaries in exposed positions and are considered to be of **NEGLIGIBLE VALUE** for ecological features.

3.2.1.13 Running Water

The survey area includes three streams running through or adjacent to boundaries of the site.

A stream running along the southern boundary of the site, south of Whitley Road has no exposed water as it is covered by a dense mat of floating sweet-grass (*Glyceria fluitans*). It was not clear whether there was any flowing water along this stretch of the stream at the time of survey due to the cover of the sweet-grass, and no other significant emergent vegetation was recorded. This area and the banks of this stream were considered to have some limited potential to hold water vole although no evidence was found (see Riparian mammals below).

A stream runs south-west to north-east through the site along a narrow strip of semi-improved grassland (with some acid indicators, see above) with trees either side (target note 3). This stream is shallow and fast flowing with a width generally restricted to c.50cm or lower. Emergent vegetation is limited to occasional clumps or stands of rush and willowherb (*Epilobium* sp.). This area and the banks of this stream were considered to have some limited potential to hold water vole although no evidence was found (see Riparian mammals below). The stream was also considered to potentially be used by commuting otters from Ingbirchworth Reservoir (if present) although again no evidence was found.

The third stream follows part of the boundary of the main acid grassland/dry dwarf shrub heath mosaic field around the south-eastern corner to Spicer House Lane. The majority of this stream was dry during the autumn and summer and had been recently canalized along the stretch closest to the road during the survey, with the banks being scraped clear of vegetation. No emergent vegetation was recorded within the canalized section and floating sweet-grass, rush and willowherb were recorded in small amounts along the remainder. This area and the banks of this stream were considered to have

some limited potential to hold water vole although no evidence was found (see Riparian mammals below).

The streams within the survey area held no evidence of protected species and had limited species-poor associated flora. The water quality or flow of the streams should not be altered during the development, thus potential pollution of surrounding habitats both on or away from the survey area is limited. This habitat is currently considered to be of **NEGLIGIBLE VALUE** for ecological features.

3.2.1.14 Fences

Barbed wire and other wire fences form some field boundaries within the site often adjacent to dry stone walls. This feature within the survey area is considered to be of **NEGLIGIBLE VALUE** for ecological features.

3.2.1.15 Walls

The majority of the field boundaries within the site are dry stone walls. These offer little in the way of habitat for faunal groups other than the occasional nesting bird (e.g. Wren). No notable floristic communities such as mosses, lichens or ferns were found on any of the walls in the survey area.

This feature within the survey area is considered to be of **NEGLIGIBLE VALUE** for ecological features.

3.2.1.16 Buildings

The only buildings located within the survey area are the farmhouse and barns at Spicer House. These buildings have some limited value for common nesting birds, particularly swallow and jackdaw. It is possible that bats may roost within some of these buildings during some periods of the year, although the desk study stated that there were no records of roosts within 2km of the buildings.

The buildings within the site are considered to be of **NEGLIGIBLE VALUE** for ecological features.

3.2.1.17 Bare ground

Areas of bare ground occur as hard standing around Spicer House and tracks and roads throughout the survey area. This habitat within the survey area is considered to be of **NEGLIGIBLE VALUE**.

3.2.2 Faunal Interest

Due to the presence of generally species-poor habitats dominated by open, managed grassland and the exposed location of the survey area it was considered unlikely that the site would hold any significant populations of invertebrates, amphibians or reptiles.

The site held no areas or features of potentially high ecological significance such as mature trees, ponds or high quality hedgerows.

3.2.2.1 Riparian Mammals

No evidence of water vole or otter was found anywhere along any of the streams or anywhere else within the site during the survey.

All of the streams were considered to have some potential to hold water vole populations if they colonized the site in the future. The site did not include any habitats likely to offer valuable foraging or resting habitats for otters. However, due to desk study records from the nearby Ingbirchworth Reservoir it is considered possible that a nearby population could use the watercourses for commuting between higher value areas.

Despite a lack of evidence from the field survey, due to the nearby records of otter, the potential for otter and water vole to occur within the site and their high levels of protection, the survey area is considered to be of **LOCAL VALUE** for these species.

3.2.2.2 Bat Activity Survey

The majority of bat activity recorded related to pipistrelle bats, with both soprano and common pipistrelle featuring in the recordings. Some calls were identified as being of the *Myotis* group of bats, however these calls are very difficult to separate even with analysis software. Brandt's, Daubenton's, Natterer's and Whiskered are all species in this group that are present in the surrounding area according to the records provided by the local bat group. Thus at this stage it is assumed that some foraging activity by all of these species is possible over the proposed development area.

3.2.2.3 Badger Survey

The results of the badger survey are provided as a separate Confidential Annex.

Table 2 Phase 1 Survey Target Notes

Target Note Number	Description of feature
1.	Base of slopes where the improved grassland gives way to a sward with a few acid indicators i.e. heath bedstraw, sheep's fescue and sheep's sorrel. On the steepest slopes are stands of western gorse. The stream running adjacent to this area is dominated by a dense mat of floating sweet-grass and no exposed water is visible. The banks of this stream have some potential to hold water vole due to the presence of potential food and cover although no evidence was found.
2.	Field containing semi-improved sward that includes notable amounts of acid indicators. Sward appears to face lower levels of grazing than the remainder of the survey area, retaining frequent well spaced tussocks of rush throughout. The diversity of acid indicators is greatest on the southern side of the field. The field contains numerous stands of low western gorse scrub and a very few seedling heather plants. The lack of relative improvement in this area increases its potential to be managed to create a higher value habitat more typical of the natural character of the area.
3.	Strip of grassland with planted trees adjacent to a stream which is partially enclosed on both sides by walls. This area is heavily grazed but appears less improved than surrounding fields with acid indicators (especially mat-grass) present in some areas. The stream is narrow and fast-flowing with little emergent vegetation and has some potential for water vole although no evidence was found. The stream runs on in to Ingbirchworth reservoir and upstream joins a field outside the survey area which includes ponds around the quarry. It is therefore considered possible that this strip of habitat could provide a commuting route for otter. This area does not hold any

	large trees with exposed roots, dense scrub or any other habitats likely to provide cover for resting otters.
4.	Ingbirchworth Nature Reserve. A small former quarry apparently designated as a nature reserve by the Parish Council (according to the sign at the site). Dominated by mature heather with frequent bilberry, bramble and bracken. Two ponds were present in the deepest parts of the quarry with limited associated vegetation dominated by rush. Few small sapling trees and hawthorn shrubs along the boundaries and in the eastern half of the site. South Yorkshire Badger Group described the ponds as having been "partially filled a few years ago". The site has some potential to hold reptile and amphibian populations although it is extremely isolated and surrounded by improved grassland making colonization after decommissioning of the quarry and since water was introduced to the ponds potentially unlikely.
5.	A pond shown on maps of the area is now apparently permanently dry holding the same grassland sward as the surrounding field, with some <i>Juncus</i> . The hollow where the pond stood has been largely filled with dumped/stored local stone. No standing water was seen in this area between October 2007 and March 2008 despite regular checks.

References:

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- IEEM. (2002) *Guidelines for Ecological Evaluation and Assessment*. IEEM
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- NCC. (1990) *Handbook for Phase 1 habitat survey*. NCC
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Appendix 1

Details of Local Wildlife Sites provided by Barnsley Borough Council

Site Name: Whitley Edge**Parish:** **Dunford****Grid Reference:** **SE 188048****Area:** **42 ha**

SITE DESCRIPTION

Whitley Edge is located at Crow Edge and extends from the road at 304 m AOD to the plateau above.

Upper Whitley Edge is a mosaic of habitats dominated by a swathe of Ulex gallii (western gorse) heath at its upper limits. Below this belt of heath is acid grassland dominated by mat-grass (Nardus stricta) and red fescue (Festuca rubra) with some patches of bilberry (Vaccinium myrtillus). In the north the land is wetter and an area of valley mire is dominated by water horsetail (Equisetum fluviatile), soft rush (Juncus effusus), lesser spearwort (Ranunculus flammula), common cotton-grass (Eriophorum angustifolium) and some Sphagnum species.

The grassland is taller in the south and dominated by tufted hair-grass (Deschampsia caespitosa) with common sedge (Carex nigra), creeping cinquefoil (Potentilla reptans) and sheep's sorrel (Rumex acetosella). The site extends east and south from Upper Whitley Edge to include fields of semi-improved acid grassland with significant areas of Ulex gallii heath.

The land slopes down to Lower Whitley Edge, which is grazed acid grassland, with flushes of Juncus effusus. The mire areas of Upper Whitley Edge drain into Calf Hey dyke. The species found on the banks of the dyke include cross-leaved heath (Erica tetralix), lady-fern (Athyrium filix-femina), bird's-foot trefoil (Lotus corniculatus) and violets (Viola species). This rough grassland is used as a breeding area by snipe, curlew, lapwing (all Birds of Conservation Concern) and whinchat. The site also attracts wheatear and twite on passage.

SITE EVALUATION

Criteria

Size: Whiteley Edge contains one of the largest areas of western gorse heathland in Barnsley.

Diversity: The site contains a diversity of habitat types, from heath and grassland to mire, rush pasture and running water. It is also of value for breeding wading birds.

Naturalness: All the habitats present are semi-natural. The grassland is modified by grazing, other habitats are unmanaged.

Rarity: Western gorse heathland is at the northern edge of its main range in Great Britain in South Yorkshire and is a scarce habitat of great value in Barnsley. This site is one of nineteen lowland sites in Barnsley, some of which are quite small and isolated and may be of recent origin. Ulex gallii is listed on the UK BAP Long List. Valley mire is a scarce habitat in Barnsley and this is the only example outside the Western Moors area.

Fragility: Grassland and heathland are vulnerable to agricultural improvement or changes in stocking practices, which would also threaten the mire areas. The eastern site boundary adjoins improved grassland.

Typicalness: Whitley Edge comprises a mosaic of typical habitats, with heathland at the top of a slope grading to grassland with areas of impeded drainage downhill.

Evaluation of important features

<u>Site Feature</u>	<u>Importance</u>			
1. <u>Habitat type</u>	<u>District</u>			
Heathland	High			
Acid grassland	Average			
Rush pasture	Average			
Valley mire	Average*			
Running water	Low			
2. <u>Species</u>	<u>National</u>	<u>County</u>	<u>District</u>	
<u>Ulex gallii</u>			Average	
Wading birds			Average*	

* Requires survey to verify current status

Existing site designations: NHS

Site justifications: Whitley Edge has a diversity of habitats including acid grassland and mire areas and in particular western gorse heathland, a rare and vulnerable habitat in Barnsley. The site also has ornithological interest, especially for breeding waders.

Barnsley Biodiversity Action Plan
HAP 10 Lowland Heathland
HAP 12 Rush Pasture
HAP 15 Running Water
SAP 11 Twite

SITE MANAGEMENTManagement objective:

To maintain the mosaic of habitats on the site. Maintain the areas of Ulex gallii heathland, the unimproved grassland for breeding waders and protect the areas of valley mire.

Initial Management:

Ensure that there is adequate fencing to prevent encroachment of improved agricultural land into the heathland.

Ongoing management:

Discourage encroachment into heathland by arable crops, such as Brassica crop present in 1991. Maintain the present grazing regime for the rough grassland areas of Lower Whitley Edge.

Constraints:

Land in private ownership and part of agricultural holding.

Opportunities:

Potential for FWAG liaison with landowner.

SITE CONSTRAINTS AND OPPORTUNITIES

Constraints:

Opportunities

4 DEFRA EIA Regulations may apply.

REVIEW OF BARNSELY NHS SITES – FEBRUARY/MARCH 2003

Whitley Edge**1. Site Boundaries**

The boundaries of the site as shown on the 1990 Survey Map are confirmed as correct, but it is suggested that a sizeable area of gorse scrub near the south-eastern end is included within the site. The boundary has been amended accordingly.

2. Main Habitat Components

The main habitat components have undergone some change since the Survey of 1990. The changes identified during this (2003) survey are listed in (3) below.

3. Habitat Change/Loss

- 1) The western third of the site is now a mosaic of acid grassland and marshy grassland, containing locally frequent Juncus spp, and was not grazed at the time of survey.
- 2) The area of Ulex scrub on Upper Whitley Edge is less extensive than is shown on the 1990 Habitat Map, and a proportion of this former scrub zone is now occupied by semi-improved acidic grassland. It may be that the respective habitat boundaries were not accurately mapped in 1990.
- 3) There was not observed to be any Ulex scrub in the north-eastern field near Whitley Road. All this area was semi-improved acidic grassland.
- 4) Part of the south-central acidic grassland grades into marshland/rush pasture towards the southern boundary of the site.
- 5) It is suggested that a sizeable area of dense Ulex scrub near the south-eastern end of the site is added to the Whitley Edge SSI. This would compensate in some degree for the apparent loss of Ulex scrub elsewhere on site.

4. Notable/Rare Species

One of the principal reasons for notifying this site is the presence of significant populations of western gorse (Ulex gallii), - one of the largest concentrations of the species in Barnsley District. While Ulex gallii is not a rare plant nationally, it is confined to the western half of Britain generally and in Barnsley District is reaching its easternmost limit.

5. Potential Threats

None apparent.

Site Name: **Royd Moor Reservoir****Parish:** **Gunthwaite and****Ingbirchworth/Penistone TC**

Grid Reference: SE 222048

Area: 32.2 ha

SITE DESCRIPTION

Royd Moor Reservoir is located north of Thurlstone, at an altitude of 268 m AOD. The reservoir area is surrounded by improved grassland and arable farmland. Annat Royd Beck flows into the reservoir at its northern end. There is no aquatic vegetation in the reservoir.

A littoral zone of vegetation noted around the water in 1990/1 includes shoreweed (Littorella uniflora) which is rare in the district, slender tufted sedge (Carex acuta), marsh pennywort (Hydrocotyle vulgaris) and marsh yellow-cress (Rorippa palustris).

There is a diversity of habitats around the reservoir. Much of the land is acid grassland with scrub, dominated by wavy hair-grass (Deschampsia flexuosa) and creeping soft-grass (Holcus mollis). Purple moor-grass (Molinia caerulea), bilberry (Vaccinium myrtillus) and crowberry (Empetrum nigrum) occur occasionally. The western edge of the reservoir is oak woodland with a ground cover of creeping soft-grass. At the northern end of the water body is a small wooded area containing several patches of wood horsetail (Equisetum sylvaticum).

There is an exposure of rock at the south-eastern end of the site, with rough grassland and heather (Calluna vulgaris). An old quarry in the southern arm of the site contains willow (Salix species) scrub and bramble (Rubus fruticosus). Northern marsh-orchid (Dactylorhiza purpurella) which is rare in the district grows in this area. In the old quarry there is a pond surrounded by common sallow (Salix cinerea), at the base of a steep bank.

The site has a variety of faunal interests. It is the location for several scarce beetles and has a diversity of invertebrate interest. A pond in the site contains a good population of great-crested newt, a protected species under the Wildlife and Countryside Act 1981.

Royd Moor reservoir is a ringing site for Barnsley Ringing Group and supports breeding yellow wagtail, grey wagtail (UK BAP Long List), teal and kingfisher (the latter two being Birds of Conservation Concern and listed on the UK BAP Long List). Birds using the site on passage include wheatear, blackcap, garden warbler, willow warbler and whitethroat.

SITE EVALUATION**Criteria**

Size: The reservoir itself is of average size in the context of upland reservoirs in Barnsley.

Diversity: The whole reservoir site has a wide variety of habitats, including woodland, scrub, acid grassland, pools and rock exposures.

Naturalness: The reservoir and quarry are man-made. The surrounding habitats are semi-natural and unmanaged.

Rarity: The great-crested newt is regarded as a vulnerable species in Great Britain and is protected from harm under Schedule 5 of the Wildlife and Countryside Act 1981. Littorella uniflora is a locally frequent species nationally, being widespread and frequent in much of

Scotland, Cumbria, Wales and throughout much of Ireland, In northern England it is of scattered occurrence but may be locally frequent where it is found. This species is found in 972 10 x 10 km squares in Great Britain (New Atlas of the British Flora 2002), but noted as in need of special protection in the Yorkshire Water area (Palmer and Newbold, 1983). *Equisetum sylvaticum* is a northern plant at the southernmost edge of its range in this area. *Dactylorhiza purpurella* is a predominantly northern species which is widespread in Scotland and the northernmost parts of England and is virtually at its southernmost limit in England in South Yorkshire where it is rare and local.

Fragility: The water body itself is secure whilst it is used as a drinking water supply. The new pond may be vulnerable to encroachment by vegetation or drying out. Surrounding habitats are vulnerable to agricultural improvement.

Typicalness: The site contains good, typical examples of unimproved acid grassland and willow carr.

Evaluation of important features:

<u>Site Feature</u>		<u>Importance</u>		
1.	<u>Habitat type</u>	<u>District</u>		
	Standing water	High		
	Running water	Low		
	Inundation	High		
	Woodland	Low		
	Scrub	Average		
	Acid grassland	Average		
2.	<u>Species</u>	<u>National</u>	<u>County</u>	<u>District</u>
	Breeding birds			Average
	Passage birds			Average
	Great-crested newt	Average*	High*	
	<i>Littorella uniflora</i>		High*	
	<i>Dactylorhiza purpurella</i>			High*

* Requires survey to verify current status

Existing site designations: NHS, Grassland Inventory Site (R01 SE 20)

Site justifications: This reservoir site has a particularly good diversity of habitats which have botanical and faunal interest, including scrub, acid grassland and inundation communities. *Dactylorhiza purpurella* is rare in Barnsley and *Littorella uniflora* is of significance in the Yorkshire water area. The site supports a population of great-crested newt, a vulnerable species in Great Britain and a variety of breeding and passage bird species.

Barnsley Biodiversity Action Plan
HAP 1 Upland Oak Woodland
HAP 10 Lowland Heathland
HAP 16 Standing Water
SAP 3 Great Crested Newt

REVIEW OF BARNSLEY NHS SITES – FEBRUARY/MARCH 2003

Royd Moor Reservoir**1. Site Boundaries**

The site boundaries, as shown on the 1990 Survey Map, are confirmed as being correct.

2. Main Habitat Components

The main habitat components, as shown on the 1990 Habitat Map, are broadly correct, but see comments under (3) below.

3. Habitat Change/Loss

1) The area which is shown as acidic grassland on the south-western edge of the site on the 1990 Habitat Map also contains a mosaic of heathland species including bilberry (Vaccinium myrtillus) and heather (Calluna vulgaris) and is interspersed with a scattered scrub cover predominantly of oak (Quercus spp.).

2) There are also small to moderate sized stands of reed canary-grass (Phalaris arundinacea) in shallow water margins around some parts of the reservoir. This species was not mentioned in the 1990 Report.

4. Notable/Rare Species

The site contains shoreweed (Littorella uniflora) and northern marsh-orchid (Dactylorhiza purpurella) which are categorised as rare in Barnsley District. Littorella uniflora is a locally frequent species nationally, being widespread and frequent in much of Scotland, Cumbria, Wales and throughout much of Ireland. In northern England it is of scattered occurrence but may be locally frequent where it is found. Dactylorhiza purpurella is a predominantly northern species which is widespread in Scotland and the northernmost parts of England and is virtually at its southernmost limit in England in South Yorkshire where it is rare and local.

5. Potential Threats

None.

Site Name: Broadstone Reservoir**Parish:** Dunford**Grid Reference:** SE 193063**Area:** 19.3 ha**SITE DESCRIPTION**

Broadstone Reservoir is situated north of Crow Edge and is an upland reservoir surrounded by acid grassland. The water is clear and the bed of the reservoir is stony, grading to gravel at the shallow western end where bulbous rush (Juncus bulbosus) is dominant with soft rush (Juncus effusus). The reservoir has no aquatic vegetation and little marginal vegetation, except for an area at the southern side with Sphagnum species, Polytrichum commune and a variety of species such as lesser spearwort (Ranunculus flammula), celery-leaved crowfoot (R. sceleratus) and marsh violet (Viola palustris).

Within the confines of the reservoir walls rough acid grassland is found with creeping soft-grass (Holcus mollis), tufted hairgrass (Deschampsia caespitosa) and rush (Juncus species). On the north side of the reservoir two dry banks are separated by a ditch, dry except for some water at the western end. The ditch contains broad-leaved pondweed (Potamogeton natans), starwort (Callitriche species) and floating sweet-grass (Glyceria fluitans), with marsh willow-herb (Epilobium palustre) and mountain fern (Oreopteris limbosperma). Creeping soft-grass dominates the bank to the south of the reservoir, with areas of heather (Calluna vulgaris).

The field east of the reservoir is dominated by common bent-grass (Agrostis capillaris) with areas of western gorse (Ulex gallii), heather and bracken (Pteridium aquilinum). Broadstone Dyke runs along the southern boundary of the field and beside it are found heather, western gorse, bilberry (Vaccinium myrtillus), sneezewort (Achillea ptarmica), cat's ear (Hypochaeris radicata), tufted and bush vetch (Vicia cracca, V. sepium) and large bird's-foot trefoil (Lotus uliginosus).

The reservoir and surrounding habitats support breeding birds associated with upland standing water including snipe, curlew (Birds of Conservation Concern), little ringed plover (Barnsley SAP 7), and common sandpiper. Wheatear, twite (Barnsley SAP 11) and whinchat (all UK BAP Long List Species) also breed in the vicinity. The site is used by birds on passage, particularly waders and wildfowl such as dunlin, green sandpiper, greenshank, whimbrel, wigeon, goldeneye and teal. It supports wintering golden plover, lapwing and wildfowl.

SITE EVALUATIONCriteria

Size: The reservoir is of average size for an upland reservoir in Barnsley.

Diversity: There is a diversity of ecological interest on the site. Habitats include both standing and running water, acid grassland and heath/grassland mosaic and a significant diversity of ornithological interest, both breeding and on passage.

Naturalness: The reservoir is man-made and its adjacent habitats semi-natural and unmanaged. The site is surrounded by improved grassland and arable land.

Rarity: There are no scarce habitats on the site. Western gorse is listed on the UK BAP Long List. The site supports a variety of breeding birds including several Birds of Conservation Concern.

Fragility: The reservoir is used as a drinking water supply and as long as this continues its future is secure. The field to the east could be subject to agricultural improvement.

Typicalness: This is a typical upland reservoir site surrounded by a mosaic of typical upland habitats.

Evaluation of important features

<u>Site Feature</u>	<u>Importance</u>		
1. <u>Habitat type</u>	<u>District</u>		
Standing water	Average		
Running water	Low		
Acid grassland	Low		
Calluna heath/grassland mosaic	Average		
2. <u>Species</u>	<u>National</u>	<u>County</u>	<u>District</u>
Breeding birds			Average*
Passage birds			High
<u>Ulex gallii</u>			Average

* Requires survey to verify current status of these species.

Existing site designations: NHS

Site justifications: The site includes a diversity of wet and dry habitats and a typical upland habitat mosaic of Calluna heath and grassland. These habitats support a diversity of breeding birds. The site is particularly notable for birds on passage, especially waders and wildfowl.

Barnsley Biodiversity Action Plan
HAP 11 Upland Heathland
HAP 15 Running Water
HAP 16 Standing Water
SAP 7 Little Ringed Plover
SAP 8 Skylark

SAP 11 Twite

SITE MANAGEMENT

Management objective:

To maintain the present diversity of habitats, for the benefit of the bird interest.

Initial Management:

Ongoing management:

Discourage agricultural improvement or significant alteration to the habitats surrounding the reservoir.

Constraints:

Opportunities:

Conservation management potential through liaison with Yorkshire Water.

SITE CONSTRAINTS AND OPPORTUNITIES

Constraints:

Operational requirements of Yorkshire Water.

Opportunities:

Owned by Yorkshire Water who have an obligation to further nature conservation.

DEFRA EIA regulations may apply.

REVIEW OF BARNSELY NHS SITES – FEBRUARY/MARCH 2003

Broadstone Reservoir**1. Site Boundaries**

The site boundaries, as shown on the 1990 Survey Maps, have been confirmed as correct.

2. Main Habitat Components

The main habitat components, as shown on the 1990 Habitat Map, have been broadly confirmed as correct, but see (3) below.

3. Habitat Change/Loss

In addition to the reservoir being full of water in the winter season, instead of being half full as at the time of the 1990 survey, there are one or two minor habitat changes. These are :

1) the small area of bracken (*Pteridium aquilinum*) near the road on the eastern edge of the site has apparently increased somewhat in area as compared with the delineation on the 1990 Habitat Map.

2) There is a small shelter belt/copse of trees not noted in the 1990 Survey.

4. Notable/Rare Species

None.

5. Potential Threats

None.

Site Name: Ingbirchworth Reservoir**Parish:** **Gunthwaite and
Ingbirchworth****Grid Reference:** **SE 214060****Area:** **31.3 ha****SITE DESCRIPTION**

Ingbirchworth is a mesotrophic reservoir located west of Ingbirchworth village at a height of 256 m AOD. It is a large reservoir surrounded by a stone wall, enclosing a variety of habitats. There is no aquatic vegetation in the reservoir. A littoral zone of vegetation which exists below the highest water mark was noted in the survey undertaken in 1990/1.

There are fringing areas of woodland and trees around much of the reservoir. In the southern area is a mixed woodland of willow (Salix species), birch (Betula species) and sycamore (Acer pseudoplatanus). West of this is a band of new planting of sycamore, rowan (Sorbus aucuparia) and oak (Quercus species). The woodland extends to the western access gate where there is an area of goat willow (Salix caprea) and common osier (S. viminalis) with large stands of amphibious bistort (Polygonum amphibium). Along the northern reservoir boundary are areas of willow scrub with bilberry (Vaccinium myrtillus) and occasional trees of ash (Fraxinus excelsior), sycamore and common osier. In the northern arm of the reservoir is an area of tall ruderal vegetation and willow. Sycamore, ash and goat willow form a dense belt of trees at the top of the north-western bank. Behind the trees is an area of heather (Calluna vulgaris) heath and grassland with ox-eye daisy (Leucanthemum vulgare), tufted vetch (Vicia cracca), meadow vetching (Lathyrus pratensis) common knapweed (Centaurea nigra) and goat's beard (Tragopogon pratensis).

In the 1990/1 survey of the site an extensive littoral zone around the reservoir, was found to be dominated by shoreweed (Littorella uniflora), which is a rare plant in the district, and water mint (Mentha aquatica). In the drier areas silverweed (Potentilla anserina) and marsh pennywort (Hydrocotyle vulgaris) dominated with heath bedstraw (Galium saxatile), red veined dock (Rumex sanguineus), soft rush (Juncus effusus) and bittersweet (Solanum dulcamara). The nationally scarce plant mudwort (Limosella aquatica), was noted in the western arm of the reservoir amongst an area of willow scrub and marsh ragwort (Senecio aquaticus). This littoral zone was submerged during a site visit in March 2003 but reed canary grass (Phalaris arundinacea) was found to be locally frequent as a bankside/shallow emergent species around the reservoir.

An area of mixed scrub and heathland north-west of the reservoir is included. Western gorse (Ulex gallii) and common gorse (Ulex europaeus) are dominant over this area. A more open community of lady fern (Athyrium filix-femina), harebell (Campanula rotundifolia), heath bedstraw and red fescue (Festuca rubra) is found towards Broadstone Dyke in the south of the field.

The reservoir has a diversity of ornithological interest. Breeding birds have included great crested grebe, little grebe and tufted duck. In summer large numbers of house martin, swallow and swift feed over the water. In winter wildfowl such as goldeneye, smew and wigeon use the reservoir. The most significant bird interest is in the passage birds using the site, which include black tern, common tern, common sandpiper, cormorant, whinchat and wheatear.

A population of animals protected under the Wildlife and Countryside Act 1981 was found on the site and these are scarce in the counties of South and West Yorkshire.

SITE EVALUATIONCriteria

Size: This is the largest upland reservoir in Barnsley outside the Western Moors site.

Diversity: There is a large diversity of habitats on the site; woodland, scrub, heathland, grassland, inundation and water. There is also a variety of bird interest present throughout the year.

Naturalness: The reservoir is man-made and the woodland and trees mainly of planted origin. The willow scrub, heathland and grassland habitats are semi-natural and unmanaged.

Rarity: Western gorse heath is a rare habitat in Barnsley and at the northern edge of its main range in Great Britain. *Ulex gallii* is listed on the UK BAP Long List. Neither *Limosella aquatica* nor *Littorella uniflora* was seen during this current 2003 survey, being both presumably dormant/submerged under the higher water levels. *Limosella aquatica* is listed in *Scarce Plants in Britain* (eds. A. Stewart, D.A. Pearman & C.D. Preston, 1994), and 55 – 10 x 10 km. square (hectad) occurrences are noted. In the *New Atlas of the British & Irish Flora* (op. cit.) 77 – 10 x 10 km. square (hectad) occurrences are listed for Great Britain and Ireland. In West and South Yorkshire, however, it remains a very scarce plant. *Littorella uniflora* is a much commoner species nationally, being widespread and frequent in much of Scotland, Cumbria, Wales and throughout much of Ireland. In northern England it is of scattered occurrence but may be locally frequent where it is found. *Littorella uniflora* is found in 972 10 x 10 km squares in Great Britain (*New Atlas of the British Flora* 2002), but is noted as in need of special protection in the Yorkshire Water area (Palmer and Newbold, 1983).

Fragility: The water body is secure whilst it is used as a drinking water supply. The grassland and woodland is confined within the reservoir wall. The heathland is vulnerable to agricultural improvement. The creation of a footpath on the north bank of the reservoir caused much disturbance on the site and may have caused a decline in breeding birds such as great-crested grebe and little grebe.

Typicalness: The fringing habitats of the reservoir are similar to Scout Dyke and Royd Moor reservoirs, although these do not have such a significant littoral zone as Ingbrichworth.

Evaluation of important features

<u>Site Feature</u>	<u>Importance</u>
1. <u>Habitat type</u>	<u>District</u>
Standing water	High
Running water	Low
Inundation	High
Woodland	Low
Scrub Average	
Grassland	Low
Heathland	Average

2.	<u>Species</u>	<u>Importance</u>		
		<u>National</u>	<u>County</u>	<u>District</u>
	Summer feeding birds			Average
	Wintering birds			High
	Passage birds			High
	<u>Limosella aquatica</u>	High*		
	<u>Littorella uniflora</u>		High*	
	<u>Ulex gallii</u>			Average

* Requires survey to verify current status.

Existing site designations: NHS

Site justifications: This is a large reservoir with a diversity of wet and dry habitats including the locality for a nationally scarce plant, Limosella aquatica and locally rare plant, Littorella uniflora. There is a variety of bird interest throughout the year and this is a significant site for wintering and passage birds.

Barnsley Biodiversity Action plan
HAP 1 Upland Oak Woodland
HAP 10 Lowland Heath
HAP 16 Standing Water

SITE MANAGEMENT

Management objective:

To maintain the diversity of habitats present within the site. To diversify and supplement the woodland areas. To protect the habitat and location of mudwort (Limosella species).

Initial Management:

Underplant sparse woodland with native broadleaved trees. Supplement single rows of trees to give a wider band of woodland in some areas.

Ongoing management:

Discourage agricultural improvement of the scrub and heathland area.
Ensure that the habitat for mudwort is preserved, that mud areas where the plant grows are safeguarded, both from drying out and encroachment by willow scrub.
Consider designation of a conservation area between the western and southern access gates to prevent disturbance to birds, so they have a haven area within the reservoir site.

Constraints:

The timing and methods employed in management must taken account of the bird interest and be carried out in such a way as to minimise disturbance to the birds.

Opportunities:

Possibility of conservation management. A scheme has already constructed the new path and young trees are being planted. Trees could be planted to screen the water from the footpath and maintain undisturbed areas of water for birds. The construction of hides at the western end of the reservoir would provide a constructive recreational element to the site.

SITE CONSTRAINTS AND OPPORTUNITIES

Constraints:

Potential conflict between bird interest and public wishing to see birds and use site.
Operational requirements of Yorkshire Water.

Opportunities:

Owned by Yorkshire Water who have an obligation to further nature conservation.

DEFRA EIA Regulations may apply.

REVIEW OF BARNSLEY NHS SITES – FEBRUARY/MARCH 2003

Ingbirchworth Reservoir**1. Site Boundaries**

The site boundaries, as shown on the 1990 Survey Map, were identified as being correct.

2. Main Habitat Components

The main habitat compartments, as shown on the 1990 Survey Map, were identified as being correct, except that the area of open water in this winter period covered the whole of the reservoir, and the zone of inundation vegetation shown on the 1990 Habitat Map (presumably Littorella uniflora) was not apparent on the present survey.

3. Habitat Change/Loss

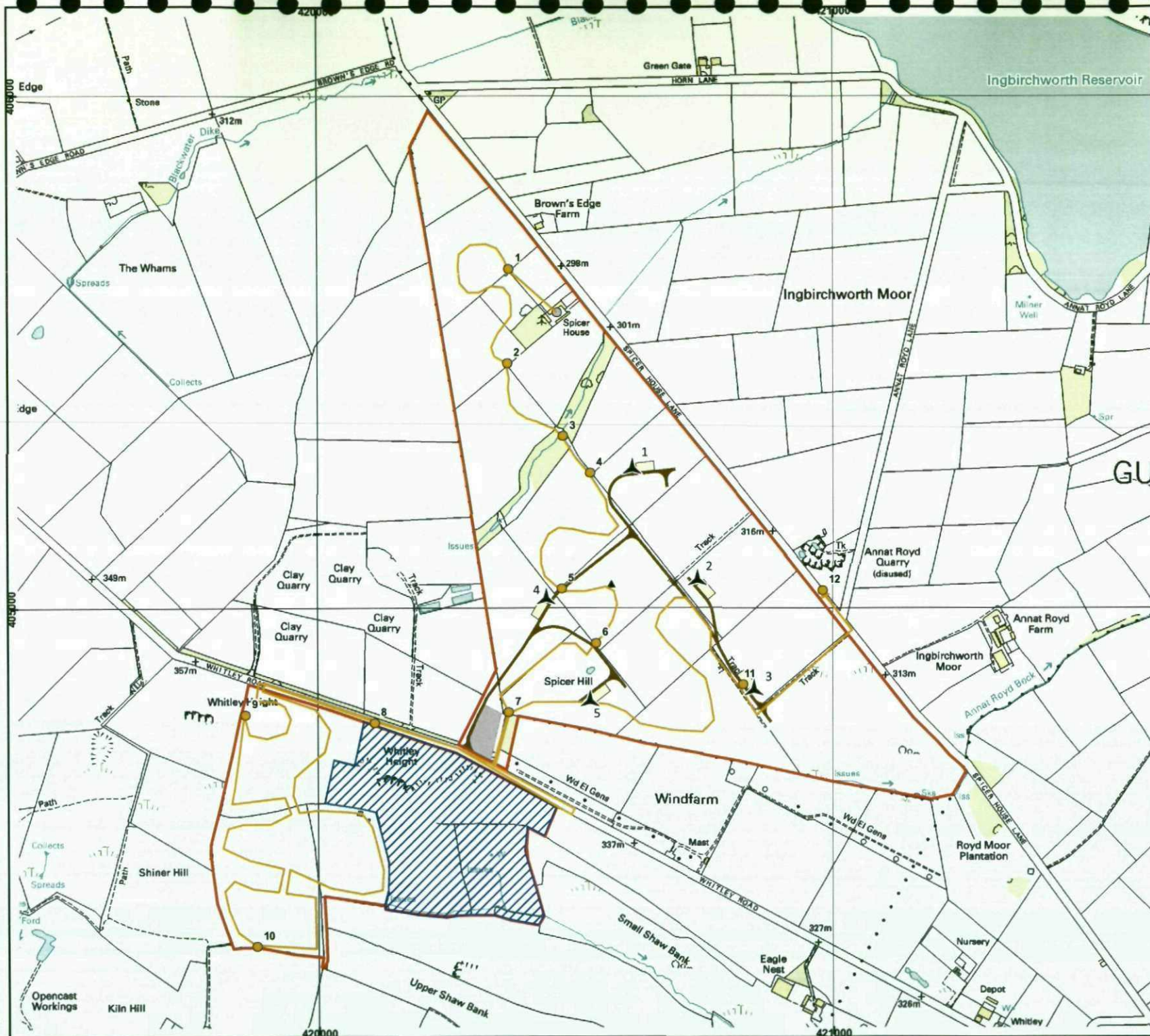
No habitat change or loss noted.

4. Notable/Rare Species

Neither Limosella aquatica nor Littorella uniflora was seen during this current survey, being both presumably dormant/submerged under the higher water levels. Limosella aquatica is listed in *Scarce Plants in Britain* (eds. A. Stewart, D.A. Pearman & C.D. Preston, 1994), and 55 – 10 x 10 km. square (hectad) occurrences are noted. In the *New Atlas of the British & Irish Flora* (op. cit.) 77 – 10 x 10 km. square (hectad) occurrences are listed for Great Britain and Ireland. In West and South Yorkshire, however, it remains a very scarce plant. Littorella uniflora is a much commoner species nationally, being widespread and frequent in much of Scotland, Cumbria, Wales and throughout much of Ireland. In northern England it is of scattered occurrence but may be locally frequent where it is found.

5. Potential Threats

None.



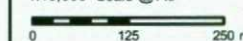
J G Pears Ltd



Key

- ▲ Proposed Wind Turbines
- ▲ Meteorological Mast
- Access Tracks
- Study Area
- Construction Compound and Storage Area
- Temporary Hardstanding
- Listening stop
- Potential bat roost
- Transect route
- No access

1:10,000 Scale @ A3



**Preliminary Bat Survey
Figure 1**

**Spicer Hill Wind Farm
Environmental Statement**

ORNITHOLOGY TECHNICAL APPENDIX

ORNITHOLOGY TECHNICAL APPENDIX

1 INTRODUCTION

This Appendix provides technical details on ornithology surveys undertaken at the Spicer Hill proposed wind farm site. A Phase 1 survey and desk study was undertaken to assess the potential for the site to hold significant bird populations and to gather existing and historical records of designated species for the site and surrounding area. The desk study also involved locating any nearby sites designated for bird populations.

During this assessment the "survey area" is the red line boundary of the proposals.

Following the Phase 1 survey and desk study the following additional surveys were undertaken:

- Breeding Bird Survey
- Winter/Passage Bird Survey
- Preliminary Vantage Point Counts for bird activity.

2 METHODOLOGY

2.1 Consultation

A range of statutory and non-statutory organisations were contacted in order to gather available information regarding statutorily protected and other designated or notable sites, habitats and species. Data requested during the desk study was for appropriate designated sites and species from within c.3km (2 miles) of the survey area.

In addition the Multi-Agency Geographic Information for the Countryside (MAGIC) website was used to search for the presence of any statutorily protected sites (SAC, SPA and SSSI) or local nature reserves within 5km of the site, designated for their ornithological interest.

2.2 Field Survey

2.2.1 Breeding Bird Survey

The breeding bird survey undertaken on the site involved the identification and mapping of all birds within the survey area over four visits. On each visit a different route was followed to prevent bias. Each bird and any relevant behaviour (e.g. territorial singing or display, nest sites, fledglings, carrying food etc.) were recorded using BTO standard species and activity codes. Following the final visit the data collected on the survey visits was collated to indicate the locations of occupied breeding bird territories. This methodology is based on the RSPB/BTO Breeding Bird Survey/ Common Bird Census.

The data from all four visits was then collated to produce an indicative map showing approximate locations of these territories. (see ES Volume 1, Figure 6.1)

All survey visits were undertaken during the first four hours of daylight, when breeding behaviour is generally at its peak. Visits were carried out in suitable weather conditions i.e. no heavy rain or high winds on: 7th, 18th and 29th May and the 9th June 2007.

2.2.2 Winter/Passage Bird Survey

The site was subject to monthly visits between September 2007 and April 2008 in order to search for any significant wintering bird populations (particularly raptors, waders or wildfowl). The survey was restricted to open field habitats within the survey area as any species likely to be impacted upon by the proposals are most likely to be restricted to these habitats e.g. golden plover, lapwing or wildfowl. Three walkover surveys were undertaken during April 2008 to specifically look for any golden plover within the site and surrounding c.2km. Two further walkover surveys for golden plover will be undertaken before mid-May.

All open field habitats within the site were surveyed on each visit using binoculars and where necessary a telescope. All birds seen during the survey were recorded along with their locations.

2.2.3 Flight Activity Survey

All flight activity surveys were undertaken from the top of Spicer Hill at SE 205 049. Whilst this location is within the site it was the best location in the area to oversee all of the potential turbine locations and the existing Royd Moor windfarm.

Following consultations with the RSPB it was known that this site and the wider area did not hold sizeable raptor populations or significant wildfowl populations and therefore the survey was designed to act as a preliminary assessment of flight activity to determine whether more extensive surveys would be necessary.

A total of 24 hours of surveys were undertaken in two-hour periods over seven days in September and October 2007. Surveys were timed so that equal amounts were undertaken in morning, evening and middle day periods to reduce bias.

Specific golden plover flight activity surveys were also undertaken during April 2008 and will continue until mid-May 2008.

Details of survey timings and weather conditions are shown below in Table 1.

Table 1 Flight Activity Survey; Visit details

Survey date	Survey time	Weather at start	Weather at end
September 17 th	06:30-08:30	Visibility: Good Rain: 0 Wind: 2SW Cloud Height:>500m	Visibility: Good Rain: 0 Wind: 1SW Cloud Height:>500m
	12:00-14:00	Visibility: Good Rain: 0 Wind: 3W Cloud Height:>500m	Visibility: Good Rain: 0 Wind: 3SW Cloud Height:>500m
September 26 th	12:15-14:15	Visibility: Good Rain: 0 Wind: 3N Cloud Height:>500m	Visibility: Good Rain: 0 Wind: 4N Cloud Height:>500m
	17:00-19:00	Visibility: Good Rain: 0 Wind: 5N Cloud Height:>500m	Visibility: Good Rain: 0 Wind: 5N Cloud Height:>500m
October 6 th	07:00-09:00	Visibility: Good	Visibility: Good

Survey date	Survey time	Weather at start	Weather at end
		Rain: 0 Wind: 0 Cloud Height: 150-500m	Rain: 0 Wind: 0 Cloud Height: 150-500m
	16:40-18:40	Visibility: Good Rain: 0 Wind: 2S-E Cloud Height: >500m	Visibility: Good Rain: 0 Wind: 2S Cloud Height: >500m
October 10 th	12:10-14:10	Visibility: Moderate Rain: 0 Wind: 3NW Cloud Height: 150-500m	Visibility: Moderate Rain: Light Showers Wind: 4NW Cloud Height: 150-500m
October 11 th	16:25-18:25	Visibility: Moderate Rain: 0 Wind: 2W Cloud Height: 150-500m	Visibility: Moderate Rain: 0 Wind: 2W Cloud Height: 150-500m
October 18 th	07:15-09:15	Visibility: Good Rain: 0 Wind: 0 Cloud Height: 150-500m	Visibility: Good Rain: 0 Wind: 0 Cloud Height: >500m
	16:10-18:10	Visibility: Good Rain: 0 Wind: 3NW Cloud Height: 150-500m	Visibility: Good Rain: 0 Wind: 3WNW Cloud Height: 150-500m
October 25 th	07:25-09:25	Visibility: Moderate Rain: Light showers Wind: 4SE Cloud Height: 150-500m	Visibility: Good Rain: 0 Wind: 4SE Cloud Height: 150-500m
	12:10-14:10	Visibility: Moderate Rain: Light showers Wind: 3E Cloud Height: 150-500m	Visibility: Good Rain: 0 Wind: 3E Cloud Height: 150-500m
April 2 nd	12:00-14:00	Visibility: Excellent Rain: 0 Wind: 5SW Cloud height: 150-500m	Visibility: Excellent Rain: Light showers Wind: 5/6 SW Cloud height: 150-500m
	18:00-20:00	Visibility: Good Rain: 0 Wind: 5SW Cloud height: 150-500m	Visibility: Good Rain: Light showers Wind: 5SW Cloud height: 150-500m
April 15 th	06:10-08:10	Visibility: Excellent Rain: 0 Wind: 1SW Cloud height: 150-500m	Visibility: Excellent Rain: 0 Wind: 1SW Cloud height: 150-500m
	13:00-15:00	Visibility: Excellent Rain: 0 Wind: 2S Cloud height: >500m	Visibility: Excellent Rain: 0 Wind: 2SW Cloud height: >500m
April 29 th	12:00-14:00	Visibility: Excellent Rain: 0 Wind: 2E Cloud height: 150-500m	Visibility: Excellent Rain: 0 Wind: 2E Cloud height: 150-500m
	18:45-20:45	Visibility: Excellent Rain: 1 Heavy shower c.18:55-19:100 Wind: 3E Cloud height: 150-500m	Visibility: Excellent Rain: 0 Wind: 3E Cloud height: 150-500m

3 BASELINE CONDITIONS

3.1 Desk Study

A summary of the data received from the consultees is shown below in Table 2

Table 2 Consultation Responses

Consultee	Summary
RSPB	Telephone discussion regarding general bird use of area. No records held. Said that the wider area historically held <i>passage populations of golden plover and dotterel but not in significant numbers over recent years</i> . Suggested that some waders, especially lapwing and curlew nest in the area. Was not aware of any significant populations of vulnerable species i.e. raptors and wildfowl likely to be at risk from the proposals.
County Bird Recorder	Records of statutorily protected and designated breeding and wintering/passage birds. Species or records referring to vagrant and casual observations of species outside of the breeding period and known not to breed in the area have been omitted. Full details are appended at the end of this document.

3.1.1 *Internationally Statutorily Designated Sites*

The survey area does not include any part of an Internationally designated site i.e. Special Area of Conservation (SAC) or Special Protection Area (SPA).

The nearest such site is the South Pennine Moors SAC/Peak District Moors (south Pennine Moors Phase 1) SPA located c.4.2km to the south of the survey area. This site is designated under both directives and listed for the presence of significant amounts of Annex 1 habitats (EC Habitats Directive 1992) and populations of Annex 1 species (Birds Directive 1979).

SPA designation criteria:

The Peak District Moors SPA is designated due to its populations of the following species of bird:

- Golden Plover
- Dunlin
- Merlin
- Short-eared Owl
- Peregrine

None of these species were recorded during any of the breeding or wintering bird surveys within the survey area.

Due to the distance between the survey area and the nearest internationally designated sites and the lack of shared habitats and species and low connectivity of habitats it is

considered that there would be no impact on these sites by the proposed wind farm during any of the phases of development.

3.1.2 *Nationally Statutorily Designated Sites*

There are no Sites of Special Scientific Interest designated for bird interests within 4km of the proposed 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, approximately 4.2km away at it's nearest point.

3.1.3 *Locally Designated Sites*

Barnsley Metropolitan Borough Council provided details of four Natural Heritage Sites from within 2km of the survey area. Details of these sites are provided within Appendix 1 of the Ecology Technical Appendix, also within this Volume.

3.1.4 *Birds*

Records were received from SK58 Bird Group of 159 species having been recorded from within the site or the adjacent 1km. Of these, 41 species were recorded as being scarce or vagrant species. There were no records of Schedule 1 (Wildlife and Countryside Act 1981) species breeding within the survey area.

3.2 *Field Survey*

3.2.1 *Breeding Bird Survey*

A total of twenty-eight species of bird were identified during the survey with twenty-one of these considered to be breeding within the survey area. No qualifying species for the South Pennine Moors SPA/SSSI or any other Annex 1 or Schedule 1 species were identified as breeding on the site or recorded at any time during the breeding bird survey.

Of the species recorded, seven were listed as UK BAP priority species i.e. lapwing, curlew, skylark, dunnoek, linnet, starling and yellowhammer.

A further six species listed on the Amber list of species of conservation concern were recorded as breeding i.e. swallow, meadow pipit, oystercatcher, willow warbler, goldcrest and stonechat. All species recorded during the survey were considered to be generally common and widespread across the UK and typical of the habitats found within the site.

Other species recorded as breeding within the site (in low numbers) not currently designated as those species above were: chaffinch, blackbird, wren, jackdaw, robin, blue tit, whitethroat and pied wagtail.

The seven species recorded within, or flying over the survey area but not undertaking breeding behaviour were: carrion crow, rook, wood pigeon, black-headed gull, lesser black-backed gull, kestrel and heron.

3.2.1.1 *Schedule 1 Species*

No Schedule 1 species were recorded exhibiting breeding behaviour during the survey.

3.2.1.2 UK BAP species

Lapwing: a single territory was recorded from within the site boundary in the easternmost field of the site. Two further territories were recorded in fields between the site boundary and Ingbirchworth Reservoir c. 100-150 m from the site boundary. Up to nine birds were recorded feeding and roosting in fields immediately north of Spicer Hill during the survey. These birds were considered to be non-breeders or failed breeders and were not seen undertaking any breeding behaviour.

Curlew: A single territory was recorded in fields outside of the site boundary to the north-west. The bird was frequently heard calling and occasionally seen flying over the clay quarry area.

Skylark: Seven territories were recorded within the site boundary and adjacent fields. Most territories were located in improved grassland and arable fields within the survey area.

Duncock: A single territory was recorded within the site boundary.

Linnet: five territories were recorded. Three of these were outside the site boundary on Small Shaw Bank, another was located close in Ingbirchworth Nature Reserve and the final one was located within the survey area between the proposed locations of turbines 2 and 3.

Starling: three nesting pairs were suspected within buildings at Spicer House. Flocks of between ten and fifty birds were seen flying around and feeding in arable fields within the site on every visit.

Yellowhammer: A single territory was recorded on the southern site boundary, close to Small Shaw Bank.

3.2.1.3 Red List and Local BAP Species (included within Barnsley BAP).

No Red List species or species specifically listed on the Barnsley BAP and not already covered by the UK BAP species above, were recorded during the survey.

3.2.1.4 Amber list species

Swallow: Up to four pairs of swallow were recorded from buildings at Spicer House.

Meadow Pipit: Four territories were recorded from fields within or adjacent to the site boundary.

Oystercatcher: A single territorial bird was recorded from fields around the clay quarry, outside the site boundary.

Willow Warbler: A single territory was recorded from the Ingbirchworth Nature Reserve.

Goldcrest: A singing bird was recorded from the conifer plantation adjacent to Spicer House.

Stonechat: A single pair (with young on the June visit) was recorded on the eastern boundary of the site, to the north of the existing Royd Moor windfarm.

3.2.1.5 Winter/Passage Bird Survey

No important wintering or passage bird populations were recorded anywhere within the survey area during the winter/passage bird survey, including the specific golden plover surveys in April 2008. Below are summaries of each month's survey visits highlighting all records of waders, wildfowl and raptors and significant movements of passerines (i.e. groups of over ten individuals).

September 18th: A flock of sixteen lapwings were present in fields north of the site boundary and a single curlew was recorded in fields south of Whitley Road. No other wildfowl or waders were recorded. Maxima of fourteen black-headed gulls, twelve common gulls and a single lesser black-backed gull were recorded flying over the site along with single figure counts of jackdaw and carrion crow. A flock of fifteen rook, eight carrion crows and twenty jackdaws was recorded feeding in fields south of Whitley Road. The only other passerines recorded in significant numbers was a flock of twenty-three starlings flying between fields along the southern boundary of the site and a group of eight house martins and twelve swallows feeding in fields around Spicer House.

October 23rd: Eleven lapwings were recorded in fields north of the site boundary. No other waders or wildfowl were recorded. A kestrel was seen hunting along the verges of Spicer House Lane, near Ingbirchworth Nature Reserve. Twelve jackdaw were present in trees around Spicer House along with ten carrion crow. Twenty starlings were feeding in arable fields along the northern boundary of the site. A total of six common gulls and four black-headed gulls were recorded flying over the site.

November 27th: No waders or wildfowl were recorded during the visit other than a single grey heron flying high (over 100m) over the site from east to west. Ten jackdaws and thirteen crows were recorded scattered through the site. A flock of twenty-four fieldfares, eight redwing and twelve blackbirds were present in the front garden of Spicer House and nearby trees. Eighteen common gulls and six black-headed gulls were feeding fields north of the site boundary and a further six common gulls were recorded flying over the site in groups of one and two. A kestrel was again hunting along Spicer House Lane.

December 16th: One flock of eleven and another of twenty-one lapwings were recorded in fields between the site boundary and Ingbirchworth Reservoir. The flocks were seen moving between fields during the survey but were not seen within the site boundary at any time. Ten jackdaws and six carrion crows were recorded at Spicer House and fourteen common gulls were recorded in the fields north of the site. Thirty-five fieldfare and twenty-one redwing were recorded around Spicer House along with ten blackbirds. A total of fifteen starlings were seen in small groups flying over the site.

January 14th: Eight lapwings were present in fields north of the site boundary. A flock of c.500 Canada geese were seen distantly toward Royd Moor Reservoir c.1.2km south-east of the site boundary. This flock was then seen flying between fields around Royd Moor reservoir and fields north of Ingbirchworth Reservoir. The flock never approached within c.1km of the site boundary. Ten jackdaws and eight carrion crow were recorded within the site boundary. No fieldfare or redwing were recorded (presumably as food around Spicer House had become exhausted). Twelve common and four black-headed gulls were recorded flying over the site and in fields north of the site boundary.

February 14th: Twenty-six lapwings were recorded in fields c.800m west of the northernmost point of the site boundary at Brown's Edge. No other waders were

recorded from the site or surrounding area. The flock of Canada geese was again seen over fields north of Ingbirchworth Reservoir but no closer to the site boundary. Sixty black-headed, twelve common and a single herring gull were recorded in arable fields in the site boundary, along with c.100 starlings.

March 5th: Two lapwings along with c.200 black-headed, thirty common, two lesser black-backed and a single herring gull, plus c.120 starlings were all present in arable fields adjacent to Spicer House Lane within the site boundary, feeding on the ploughed surface. No other notable records were made within the survey area.

April 2nd: twenty lesser black-backed, ten common and eight black-headed gulls in arable fields within site boundary. Up to twenty five carrion crow, fifteen jackdaws and fifty starlings moving around site. No golden plover recorded within the site boundary or surrounding 2km.

April 15th: a single oystercatcher and six lapwing were feeding in ploughed fields adjacent to Spicer House lane, within the site boundary. Eighteen lesser black-backed gulls, forty crows and six jackdaws in arable fields and around other fields within the site boundary. Single pied wagtail and meadow pipits in arable fields. No golden plover recorded within the site boundary or surrounding 2km.

April 29th : up to fifty lesser black backed gulls around site, c. twenty carrion crow and twenty jackdaw around site, especially on and adjacent to Spicer House. Six swallows over the site, ten goldfinches near Spicer House and a single swift also recorded. No golden plover recorded within the site boundary or surrounding 2km.

3.2.1.6 Flight Activity Survey

The focal species for this survey were Annex 1 and Schedule 1 raptor species, ducks (excluding mallard), geese (excluding feral populations) and waders (excluding lapwing and curlew).

The only focal species recorded during the entire survey were two teal on the evening of 26th September.

The only raptor recorded during the survey was a single kestrel hunting within the site and the only additional wildfowl were two mallard seen on 26th September. Wader records were limited to a maximum of sixteen lapwing moving around fields beyond the site boundary on three visits. The vast majority of records related to carrion crows and jackdaw with frequent gulls and starlings although no notable movements were recorded. Crows were regularly seen flying just over and between the towers of the existing Royd Moor windfarm.

3.2.1.7 Survey summaries:

September 17th; No raptors, waders or wildfowl recorded. The morning included thirty carrion crow and twelve jackdaw movements throughout the site along with four black-headed and a single lesser black-backed gull. All of these records, except twenty crows (between 20 and 100m height), were recorded below 20 metres. Six swallows, two meadow pipits and twelve starlings were also recorded moving around the site at low heights. The mid-day visit totaled a further twenty-two records of carrion crow, fourteen jackdaw, four black-headed gull, c.forty-five starlings (in a single group), two meadow pipits and a pied wagtail.

September 26th; The mid-day survey produced twelve lapwing briefly seen moving between fields c.200m north of the site boundary. A single kestrel was present along Spicer House Lane and occasionally hunting just within the site boundary. Forty-one crows and eight jackdaws were recorded flying through the site (usually to or from Spicer House). One common gull flew over the site. Ten swallows and ten house martins were feeding low over fields around Spicer House and six swallows were recorded flying c. E to W along Whitley Road at c.5-10m height. The evening visit revealed twenty-six crow and eleven jackdaw movements and at dusk two mallard and two teal were recorded flying into ponds at the clay quarry from the direction of Ingbirchworth Reservoir at <50m height. Two meadow pipits and six swallows were recorded feeding and commuting within fields in the area.

October 6th; During the morning visit ten lapwing were seen flying in fields c.100m east of the site boundary. A single heron was recorded flying well over 100m over the site from east to west. Forty carrion crow and fourteen jackdaws were recorded flying around and through the site, all between 20 and 100m except when landing near Spicer House. Two common gull and two black-headed gulls were recorded. Thirty starlings were recorded in groups of less than ten moving around the site. Four goldfinches and three meadow pipits were also recorded at heights of less than 20m. The evening visits produced records of a single kestrel hunting in the easternmost fields within the site boundary and then flying between existing turbines beyond the site. Also, twenty-six carrion crows, sixteen rooks and thirty-two jackdaws over the site (all between 20 and 100m). Sixteen black-headed gulls were recorded flying over the site toward Ingbirchworth Reservoir in groups of less than five (all between 20 and 100m).

October 10th; Mid-day visit produces two lapwings flying along the site boundary north-west to south-east. Twelve carrion crow and twelve jackdaws moving around Spicer House and generally heading north-west. Two groups of four black-headed gulls and three single common gulls also pass through. Eighteen starlings in small groups throughout the two hours at heights less than 20m. Heavy evening rain postpones next count to tomorrow.

October 11th; Evening survey. Sixteen lapwings in two groups of eight recorded flying from fields north-east of the site boundary toward Royd Moor reservoir at c.30m height. Hunting kestrel recorded along Spicer House Lane and then briefly flew low to few trees east of Spicer Hill before leaving low to the south. Ten black-headed gulls, sixteen carrion crows and twenty jackdaws recorded flying around the site. One meadow pipit and two goldfinches flying around fields near vantage point.

October 18th; Morning visit! Kestrel hunting along Spicer House Lane. Eight carrion crows and twenty-four jackdaws around the site at heights between 20-100m. Four common gulls over at similar heights and twelve starlings moving between arable fields in the site. Four wood pigeons over the site from south to north. One meadow pipit in fields near vantage point. Evening visit produced one lapwing c.100m north of the site boundary and a curlew flying west from the clay quarry outside the site boundary, four carrion crows, twelve jackdaws and two wood pigeons along with a flock of twelve starlings were also recorded.

October 25th; Morning survey recorded twelve lapwings in fields between the site boundary and Ingbirchworth Reservoir flying north at lower than 20m. A single curlew was seen flying north from the Clay Quarry area at c.20-100m height. Thirty carrion crow and sixteen jackdaw movements were recorded along with twenty starling and two meadow pipit. The mid-day survey produced a further thirty-eight carrion crow and eight

jackdaw movements along with twelve rooks flying south from fields west of Whitley Road at less than 20m height. Eight goldfinches and one meadow pipit were also recorded moving around the site.

April 2nd; No golden plover or other high risk species recorded during surveys.

April 15th; No golden plover or other high risk species recorded during surveys.

April 29th; No golden plover or other high risk species recorded during surveys.

The lack of focal species or other notable species (with regard to vulnerability of collision) over the proposal site and the low numbers of other common and widespread species using the area meant that no significant collision risks are anticipated based on this survey along with the results of the breeding and wintering/passage surveys.

4 REFERENCES

- Gilbert G; Gibbons D, Evans J. (1998) Bird Monitoring Methods. RSPB
- IEA. (1995). Guidelines for Baseline Ecological Assessment. Chapman & Hall
- IEEM. (2002) Guidelines for Ecological Evaluation and Assessment. IEEM
- IEEM. (2006) Guidelines for Ecological Impact Assessment. IEEM (www.ieem.co.uk).

Appendix 1

County Bird Recorder Desk Study Results: Spicer Hill Wind Farm

The following bird list is of species listed as Schedule 1, Annex 1, UK and Local BAP, Red Listed and Amber Listed that have been recorded since 2001 within a 2 mile radius of Spicer Hill, Penistone. The list is first in order of importance, and then in alphabetical order.

The status, (this information is the line directly under the species name) ie, Resident breeder/passage migrant, refers to the status in the Barnsley recording area (nb; Not within the desk study area itself).

Systematic List

Schedule 1 species present through the breeding season in the Spicer Hill area:

Barn Owl (*Tyto alba*) (Schedule 1, Barnsley BAP, Amber Listed)

Resident breeder

A single Barn Owl has recently been seen in the Ingbirchworth area (2007). This is the only record.

Little Ringed Plover (*Charadrius dubius*) (Schedule 1, Barnsley BAP)

Summer visitor

This species has been present on many dates throughout the summer month's at all three reservoirs: breeding was proven in 2001/2. Although present every year since then breeding was not proven for these years.

Common Quail (*Coturnix coturnix*) (Schedule 1, Red Listed)

Summer visitor

Historically they have always bred in the area; the only recent record however is from near Broadstones Res where one was heard singing on the 30th and 31st May 2006.

Schedule 1 species that do not breed in the area but are recorded as winter visitors, migrants or vagrants.

Brambling (*Fringilla montifringilla*) (Schedule 1)

Winter visitor

Recorded most years at a number of locations in the area, the largest counts were 300 during January in 2003 at Ingbirchworth Reservoir, with 120 also there on the 3rd Dec 2006.

Black-tailed Godwit (*Limosa limosa*) (Schedule 1, Red Listed)

Passage visitor

A single was at Ingbirchworth Reservoir on the 7th August 2001 and one was also present in fields near Scout Dyke Res from the 26th to 28th March 2005.

Dotterel (*Charadrius morinellus*) (Schedule 1, Annex 1, Amber listed)

Infrequent passage visitor

Two birds were seen on Whitley Common on the 11th May 2001. Between 1979 and 1985 Dotterel were recorded annually on the fields in this area, and virtually annually to 1995.

Fieldfare (*Turdus pilaris*) (Schedule 1, Amber Listed)

Common winter/passage visitor

Many records of this common winter/passage visitor, flocks in excess of 800 birds recorded in the area.

Green Sandpiper (*Tringa ochropus*) (Schedule 1, Amber listed)
Common passage/winter visitor
Singles seen on many dates' at all three reservoirs during the last 5/6 years.

Greenshank (*Tringa nebularia*) (Schedule 1)
Passage visitor
One/two at Ingbirchworth Reservoir on a number of dates in 2001, one a Broadstones Res on the 2/3rd August 2002 and singles at Scout Dyke Res on the 10th and 15th Aug 2003. In 2006 birds were seen on several dates at all three reservoirs during Sept and October.

Hobby (*Falco subbeteo*) (Schedule 1)
Uncommon passage/winter visitor
Singles at Ingbirchworth Res on the 8th of July 2001 and at Broadstones and Ingbirchworth Reservoirs on the 10th and 11th August 2003.

Kingfisher (*Alcedo atthis*) (Schedule 1, Annex 1, Amber Listed)
Resident breeder
Seen on several dates at Ingbirchworth Res in 2001/2, but no records since.

Little Gull (*Larus minutus*) (Schedule 1)
Uncommon passage visitor
One at Ingbirchworth Reservoir on the 25th March 2005

Mediterranean Gull (*Larus melanocephalus*) (Schedule 1, Amber Listed)
Uncommon passage/winter visitor
One in fields near Royd Moor Res on the 13th January 2001 and one at Ingbirchworth Res on the 1st April 2001. In 2006 singles were at Ingbirchworth Res on the 12th August and Royd Moor Res on the 26th August.

Merlin (*Falco columbarius*) (Schedule 1, Annex 1, Amber Listed)
Winter/passage visitor
Breeds nearby on the moorlands and therefore seen regularly in the area during the last 5/6 years.

Osprey (*Pandion hiaetus*) (Schedule 1, Annex 1, Amber Listed)
Scarce passage migrant
One was seen flying south over Scout Dyke Res on the 21st September 2003.

Peregrine (*Falco peregrinus*) (Schedule 1, Annex 1, Amber Listed)
Regular winter/passage visitor
Breeds nearby on the moorlands; seen regularly throughout the area during the last 5/6 years.

Red Throated Diver (*Gavia stellata*) (Schedule 1, Annex 1, Amber Listed)
Rare winter visitor
A juvenile was at Scout Dyke Reservoir on the 26th December 2004.

Ruff (*Philomachus pugnax*) (Schedule 1, Annex 1, Amber Listed)
Passage visitor
Two were seen leaving north at Royd Moor Res on the 3rd September 2003.

Annex 1 species (in addition to those that are also schedule 1 species)**Arctic Tern** (*Sterna paradisaea*) (Annex 1, Amber Listed)

Passage migrant

Two were seen at Scout Dyke Res on the 24th June 2001.**Bewick's Swan** (*Cygnus columbianus*) (Annex 1, Amber listed)

Scarce passage/winter visitor

Two adults were at Ingbirchworth Reservoir on the 4 and 5th January 2002.**Common Tern** (*Sterna hirundo*) (Annex 1)

Passage migrant and migrant breeder

Recorded annually on passage at both Scout Dyke and Broadstones Reservoirs.

Golden Plover (*Pluvialis apricaria*) (Annex 1)

Passage/winter visitor and migrant breeder

The Blackstone Edge – Whitley Common area has traditionally been an important local staging area for the northern race of Golden Plover *Pluvialis apricaria altifrons* between late March and early May. Post breeding flocks of Golden Plover build up in the area during early autumn prior to movement to lowland and coastal wintering areas. Numbers in recent years have included up to 600 in 2003. They breed nearby on the blanket bog of the moorlands.

Whooper Swan (*Cygnus Cygnus*) (Annex 1, Amber Listed)

Passage/winter visitor

Three flew west over Ingbirchworth on the 23rd November 2001. Five were at Scout Dyke Res on the 2nd January 2002 with two there on the 27th March 2003.

UK and local BAP species (in addition to those that are also Schedule 1, Annex 1)**Common Scoter** (*Melanitta nigra*) (UK BAP, Red Listed)

Uncommon passage visitor

In 2002 seven were at Broadstones Res on the 8th July and an adult drake was at Ingbirchworth Res from the 2nd to 5th November. In 2006 a female was at Ingbirchworth Res on the 17th September and three were at Royd Moor Res on the 26th August.

Bullfinch (*Pyrrhula pyrrhula*) (UK BAP, Red Listed)

Resident breeder

Breeds locally, 12 were seen at Royd Moor Res on the 17th December 2005.**Grey Partridge** (*Perdix perdix*) (UK BAP, Local BAP, Red Listed)

Resident breeder

Breeds locally, with confirmed breeding pairs at Broadstones, Ingbirchworth and Crow Edge since 2001.

Lapwing (*Vanellus vanellus*) (Local BAP, Amber Listed)

Resident breeder and partial migrant

Breeds in area with at least four pairs each at Broadstones and Royd Moor.

Linnet (*Carduelis cannabina*) (UK BAP, Local BAP, Red Listed)

Partial migrant breeder

Breeds in area with post breeding flocks of up to 100 birds regularly recorded. In 2006 400 were noted at Royd Moor during September.

Reed Bunting (*Emberiza schoeniclus*) (UK BAP, Red Listed)

Resident breeder and partial migrant
Common breeding bird in the area.

Skylark (*Alauda arvensis*) (UK BAP, Local BAP, Red Listed)

Partial migrant breeder
Common breeding bird in the area.

Spotted Flycatcher (*Muscicapa striata*) (UK BAP, Red Listed)

Migrant breeder
No records recently but formally bred in the area.

Song Thrush (*Turdus philomelos*) (UK BAP, Local BAP, Red Listed)

Resident breeder and winter visitor
Breeds locally in small numbers.

Tree Sparrow (*Passer montanus*) (UK BAP, Local BAP, Red Listed)

Resident breeder
Breeding colonies exist near Scout Dyke Res and Royd Moor Res.

Twite (*Carduelis flavirostris*) (Local BAP, Red Listed)

Scarce passage/winter visitor
Only recent record in the area is of four birds at Ingbirchworth from the 10th to 19th January 2003.

Red Listed Species (in addition to those that are also Schedule 1, Annex 1, UK and local BAP)**House Sparrow** (*Passer domesticus*)

Common resident
Breeds locally.

Grasshopper Warbler (*Locustalla naevia*)

Migrant breeder
Occasionally breeds in the area.

Ring Ouzel (*Turdus torquata*)

Migrant breeder
Seen occasionally in the area on passage.

Starling (*Sturnus vulgaris*)

Resident breeder and winter visitor
Breeds locally with significant post breeding flocks sometimes present in the area in excess of 500 birds.

Willow Tit (*Poecile montanus*)

Resident breeder
Breeds locally, three singing males were noted at Broadstones Res in 2006.

Yellowhammer (*Emberiza citronella*)

Resident breeder
Fairly common breeding bird in the area, winter flocks often in excess of 60 birds.

Amber Listed Species (in addition to those that are also Schedule 1, Annex 1, UK and Local BAP.)

Black headed Gull (*Larus ridibundus*)

Common winter visitor and migrant breeder
A common visitor to the area.

Common Gull (*Larus canus*)

Common passage and winter visitor
A common visitor to the area.

Cormorant (*Phalacrocorax aristollis*)

Common resident and passage visitor
Regular passage visitor in the area.

Cuckoo (*Cuculus canorus*)

Migrant breeder
Occassional visitor/breeder in the area.

Curlew (*Numenius arquata*)

Migrant breeder and passage visitor
A fairly common breeder in the area. .

Dunlin (*Calidris alpina*)

Common passage/winter visitor and scarce migrant breeder.
A regular passage visitor to the three reservoirs in the area.

Dunnoch (*Prunella modularis*)

Resident breeder
Breeds in the area.

Gadwall (*Anas strepera*)

Resident and winter visitor
Regular visitor to the reservoirs in the area.

Goldcrest (*Regulus regulus*)

Resident breeder and winter visitor
Possibly breeds in the area.

Goldeneye (*Bucephala clangula*)

Winter visitor
Regular winter visitor to the reservoirs in the area.

Green Woodpecker (*Picus viridis*)

Resident breeder
Breeding resident with at least one pair present on the spoil heap area of the clay works at Crow Edge.

Grey Wagtail (*Motacilla cinerea*)

Resident breeder and passage/winter visitor
Breeds in the area, also a regular passage/winter visitor.

Herring Gull (*Larus argentatus*)

Common passage/winter visitor
A common visitor to the area.

House Martin (*Delichon urbicum*)
Migrant breeder
A regular passage visitor; breeds locally.

Kestrel (*Falco tinnunculus*)
Common resident
A regular visitor to the area and breeds locally.

Lesser black backed Gull (*Larus fuscus*)
Common passage and scarce winter visitor
A regular visitor to the area during times of passage.

Lesser Redpoll (*Carduelis cabaret*)
Partial migrant breeder and winter visitor
A regular passage visitor to the area.

Meadow Pipit (*Anthus pratensis*)
Partial migrant breeder
A common breeding bird and passage/winter visitor to the area.

Mistle Thrush (*Turdus pilaris*)
Resident breeder
A fairly common breeding bird in suitable habitat.

Mute Swan (*Cygnus olor*)
Resident breeder (lowlands)
An occasional visitor to the areas reservoirs.

Oystercatcher (*Haematopus ostralegus*)
Passage migrant, breeds
Single pairs regularly seen in the vicinity of the three reservoirs; possibly breeds in the area.

Pink-footed Goose (*Anser brachyrhynchus*)
Regular winter/passage visitor
A regular passage visitor in winter, skeins always flying SE or NW (the area is twix Norfolk and Martinmere).

Pintail (*Anas acuta*)
Fairly common passage/winter visitor
2/3 birds seen on many dates at all three reservoirs.

Pochard (*Aythya ferina*)
Winter/passage visitor
A regular visitor to the areas reservoirs.

Redshank (*Tringa totanus*)
Migrant breeder and passage visitor
A regular visitor to the areas reservoirs, but no evidence of breeding in the last five years.

Redwing (*Turdus iliacus*)

Common winter/passage visitor
A regular passage/winter visitor to the area.

Ringed plover (*Charadrius hiaticula*)
Passage migrant and summer visitor
A common passage/summer visitor to the area but no evidence of breeding.

Sand Martin (*Riparia riparia*)
Passage visitor and migrant breeder
A regular passage visitor to the area.

Sandwich Tern (*Sterna sandvicensis*)
Infrequent passage visitor
A scarce passage visitor to the area; several records in the last five years.

Scaup (*Aythya marila*)
Scarce passage visitor
In 2003 one was seen at Broadstones Res on the 18th March, and in July a juvenile was seen briefly at Carlecotes pond on the 15th. (This pond is within the clayworks boundary)

Shelduck (*Tadorna tadorna*)
Resident breeder/passage visitor
A regular passage visitor to the areas reservoirs.

Shoveler (*Anas clypeata*)
Resident and winter visitor
An occasional visitor to the areas reservoirs.

Snipe (*Gallinago gallinago*)
Common winter visitor and migrant breeder
Breeds locally, may well be the commonest breeding wader of the area.

Stock Dove (*Columba oenas*)
Resident breeder
Breeds in the area, flocks of up to 120 birds seen near Ingbirchworth.

Stonechat (*Saxicola torquata*)
Uncommon passage/winter visitor and partial migrant breeder
Regular visitor; also breeds in the area.

Swallow (*Hirundo rustica*)
Migrant breeder
A common passage migrant, also breeds in the area.

Teal (*Anas crecca*)
Common winter visitor and rare breeder
A regular visitor to the area, flocks of up to 74 birds recorded at Ingbirchworth Reservoir.

Tree Pipit (*Anthus trivialis*)
Migrant breeder
Has bred in the last five years in the area; two singing males were present near the spoil heap at the clay works in 2004.

Whimbrel (*Numenius phaeopus*)

Fairly common passage visitor

A regular passage visitor to the area.

Wigeon (*Anas Penelope*)

Common winter visitor

A regular passage visitor to the area.

Willow Warbler (*Phylloscopus trochilus*)

Migrant breeder

A common breeding bird in the area in suitable habitat.

Yellow Wagtail (*Motacilla flava*)

Migrant breeder

A regular passage visitor to the area.

Compiled by Peter Middleton

References

Barnsley Area Bird Reports 2001/6

NOISE TECHNICAL APPENDIX

NOISE TECHNICAL APPENDIX

1.1 INTRODUCTION

This appendix contains information relating to the noise assessment of a technical nature that has not been included within Chapter 10 of the Environmental Statement. It contains the following:

- Consultation Correspondence
- Baseline Noise Survey Documentation – survey notes, rainfall record and equipment calibration certificates
- Manufacturer's Noise Data for WinWind 1MW Wind Turbine
- Noise Model outputs

1.2 CONSULTATION CORRESPONDENCE

The following pages contain copies of correspondence between Arcus Renewable Energy Consulting Ltd and Barnsley Metropolitan Borough Council Environmental health Department.



Sarah Newman
Environmental Health Officer
Barnsley MBC
By email: sarahnewman@barnsley.gov.uk

27 Woodside Place
Glasgow
G3 7QL

T 0141 332 9949
W arcusrenewables.co.uk
E michael@arcusrenewables.co.uk

21 January 2008

Our Ref 064/MR-SN-20080121

Dear Ms Newman

RE: Proposed Windfarm at Spicer Hill

Arcus Renewable Energy Consulting is engaged by J.G. Pears Ltd to carry out an Environmental Impact Assessment for a proposed windfarm at Spicer Hill, near Penistone in South Yorkshire. A scoping report was issued in September 2007, to which a response has been received from Regulatory Services, stating that the baseline noise monitoring locations proposed were acceptable.

The proposed monitoring locations (Annat Royd, Brown's Edge, Eagle's Nest and Middle Cliff) were based on a preliminary turbine layout, which included turbines to the south of Whitley Road, which bisects the site. The layout has since been modified, and now comprises five 1.0MW turbines situated on the land to the north of the road.

A noise contour plot for the proposed five turbine layout has been produced, and is enclosed. This takes account of noise emissions from the proposed Spicer Hill turbines, together with theoretical emissions from the existing Royd Moor turbines.

ETSU-R-97 *The Assessment and Rating of Noise from Wind Turbines* specifies limits on wind turbine noise, the lowest of which is 35 dB(A), $L_{A90,10min}$. Higher limits may also be acceptable, depending on background noise levels. Therefore, it is intended to focus the assessment on properties which may receive noise levels at or above this minimum limit.

A baseline noise survey will be carried out in accordance with the methodology described in ETSU-R-97 for such measurements.

As can be seen from the enclosed noise contour plot, one of the initially proposed monitoring locations now lies outwith the 35 dB(A) contour, and would therefore not receive noise levels higher than 35 dB(A). It is therefore proposed to utilise an alternative location (Whitley House) rather than Middle Cliff. Please could you confirm that this will be acceptable.

During our telephone conversation today, you mentioned that you would be taking the view that the existing wind farm at Royd Moor should be considered a part of the prevailing background noise in the area. We would welcome this approach, and feel that it would be justified in this case. The planning consent for Royd Moor did not include any conditions relating to noise, and therefore to include the noise from this source in the limits imposed on Spicer Hill would be unreasonable on the new scheme. Royd Moor has also been in operation for a number of years now, and it may be assumed that the local residents have become accustomed to its presence. Therefore, it is likely that it would be the change to the current situation that would be of interest to them. In this regard, I would be interested in your thoughts regarding suitable criteria to be applied in the assessment.

My colleague has lodged an informal inquiry with the Council enquiring whether you have records of any noise complaints relating to Royd Moor. I would be grateful if you could advise whether there have been any such complaints and the outcome of any subsequent investigations.

Yours Sincerely,

Michael Reid AMIOA
For Arcus Renewable Energy Consulting Ltd



J. G. Pears Ltd



Key

- Proposed Turbine Locations
- Proposed Monitoring Locations

Predicted Noise Level

LA90, 10min

- 30 dB(A)
- 35 dB(A)
- 40 dB(A)
- 45 dB(A)
- 50 dB(A)
- 55 dB(A)

Noise contours calculated according to ISO-9613, assuming soft ground and omitting barrier attenuations. Calculation height 2.0m AGL, based on OS Landform Panorama contours.

Contributions from existing Royd Moor and proposed Spicer Hill turbines included.

Royd Moor turbines assumed to have sound power level of 98 dB(A), and typical wind turbine spectrum.

Spicer Hill turbines assumed to be WinWind 1.0MW turbines with maximum sound power level of 104 dB(A).

1:10,000 Scale @ A3



Noise Contour Plot
Figure 1

Spicer Hill Wind Farm
Noise Assessment

Michael Reid

From: Newman , Sarah [SarahNewman@barnsley.gov.uk]
Sent: 04 February 2008 17:21
To: Michael Reid
Subject: RE: proposed spicer hill wind farm

Dear Micheal,

- Whitely House is acceptable as an alternative monitoring location to Middle Cliff.
- Unfortunately I was not with the authority when Royd Moor was commissioned therefore I am not sure how far back to go in the records. We received complaints regarding noise and flashing from the turbines in 1994, however the computerized records only started in 1990 so I am not sure that they are complete. This service has received an Environmental Information query regarding this and will respond in due course.
- Not sure why you would consider the noise from a long-established land use as 'unreasonable' as part of the background noise or why this is difficult to include in the assessment criteria?.

Yours sincerely,

Sarah Newman

Senior Environmental Health Officer

Barnsley Metropolitan Borough Council
 Regulatory Services

Tel - 01226 77(2454)
 Mob - 07786 525 914
 Fax - 01226 775699

From: Michael Reid [mailto:MichaelR@arcusrenewables.co.uk]
Sent: 21 January 2008 14:41
To: Newman , Sarah
Cc: Victoria Ridyard
Subject: proposed spicer hill wind farm

Hi Sarah,

Further to our earlier conversation, please find attached a consultation letter regarding the noise assessment for the proposed Spicer Hill wind farm.

I look forward to hearing from you.

Regards,
 Michael Reid
Arcus Renewable Energy Consulting Ltd
 27 Woodside Place
 Glasgow G3 7QL
 0141 332 9949
 07878 530174
 michael@arcusrenewables.co.uk
 www.arcusrenewables.co.uk

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15/04/2008

1.3 BASELINE NOISE SURVEY

The following pages contain:

- Survey Notes
- Equipment Calibration Certificates

Wind Farm Noise Survey Record Sheet



Project No:	064	Project Name:	Spicer Hill
Client:	JG Pears	Survey By:	MR/MB
Location No (x/y):	1/4	Location Name:	Annat Royd
Monitoring Location (GPS Grid Reference):			SE 21349,04973
Monitoring Location Description:	Edge of field NE of house. Yard area is reflective, so free-field location nearby selected.		
Distance From Façade:	5m from low wall, 7m from outbuilding, >10m from house		
Noise Sources Present:	Distant traffic, farm activities, partially screened from Royd Moor. Dairy.		
Notes:	Machinery active in dairy approx 0630-0830, 1630-1930		
Start Date & Time	12/2/08 17.40	End date & Time	5/3/08 16.50
Equipment			
Item	Make	Model	Serial No.
Microphone	Rion	NH-21	20328
Sound Level Meter	Rion	NL-31	1062690
Calibrator	Rion	NC-74	34372738
Source of Equipment:		Arcus	
Calibration			
	Date & Time	Calibration Level	Level before calibration
Initial	12/2/08 17.30	93.9	n/a
Mid-Survey Check 1	21/2/08 AM	93.9	94.0
Final Check	5/3/08 1700	n/a	94.0

Photo of Monitoring Location:



Wind Farm Noise Survey Record Sheet



Project No:	064	Project Name:	Spicer Hill
Client:	JG Pears	Survey By:	MR/MB
Location No (x/y):	2/4	Location Name:	Brown's Edge
Monitoring Location (GPS Grid Reference):		SE 20465,05769	
Monitoring Location Description:	Corner of garden, NE of house.		
Distance From Façade:	> 10m		
Noise Sources Present:	Distant traffic, farm activities, Royd Moor.		
Notes:			
Start Date & Time	13/2/08 10.40	End date & Time	5/3/08 16.45
Equipment			
Item	Make	Model	Serial No.
Microphone	Rion	NH-21	310534/20327
Sound Level Meter	Rion	NL-31	1062689
Calibrator	Rion	NC-74	34372738
Source of Equipment:		Arcus	
Calibration			
	Date & Time	Calibration Level	Level before calibration
Initial	12/2/08 10.40	93.9	n/a
Mid-Survey Check 1	21/2/08 AM	93.9	94.0
Final Check	5/3/08 16.45	n/a	93.9

Photo of Monitoring Location:



Wind Farm Noise Survey Record Sheet



Project No:	064	Project Name:	Spicer Hill
Client:	JG Pears	Survey By:	MR/MB
Location No (x/y):	3/4	Location Name:	Whitley House
Monitoring Location (GPS Grid Reference):		SE 21351,04169	
Monitoring Location Description:	Garden east of house, narrow strip between low wall and fence.		
Distance From Façade:	> 10m, approx 5m to 1m high wall		
Noise Sources Present:	Dogs, traffic, wind, farm machinery, royd moor.		
Notes:			
Start Date & Time	13/2/08 11.10	End date & Time	5/3/08 16.30
Equipment			
Item	Make	Model	Serial No.
Microphone	Rion	NH-21	309605/20329
Sound Level Meter	Rion	NL-31	1062691
Calibrator	Rion	NC-74	34372738
Source of Equipment:		Arcus	
Calibration			
	Date & Time	Calibration Level	Level before calibration
Initial	13/2/08 10.40	93.9	n/a
Mid-Survey Check 1	21/2/08	93.9	94.0
Final Check	5/3/08 16.45	n/a	94.0

Photo of Monitoring Location:



Wind Farm Noise Survey Record Sheet



Project No:	064	Project Name:	Spicer Hill
Client:	JG Pears	Survey By:	MR/MB
Location No (x/y):	4/4	Location Name:	Eagle Nest
Monitoring Location (GPS Grid Reference):		SE 20979,04214	
Monitoring Location Description:	Corner of garden, east of house, above wall off yard.		
Distance From Façade:	> 10m		
Noise Sources Present:	Farm traffic, wind, dogs.		
Notes:			
Start Date & Time	21/2/08 0800	End date & Time	5/3/08 1700
Equipment			
Item	Make	Model	Serial No.
Microphone	Rion	NH-21	20326
Sound Level Meter	Rion	NL-31	1062688
Calibrator	Rion	NC-74	34372738
Source of Equipment:		Arcus	
Calibration			
	Date & Time	Calibration Level	Level before calibration
Initial	21/2/08	93.9	n/a
Mid-Survey Check 1	n/a	n/a	n/a
Final Check	5/3/08 16.45	n/a	94.0

Photo of Monitoring Location:





CERTIFICATE OF CONFORMANCE

Date of Issue 26th April 2007
Customer Bolsterstone PLC
Certificate Number CONF040712

	Manufacturer	Type	Serial Number
Acoustic Calibrator	Rion	NC-74	34372738

This is to certify that the instrument was tested and calibrated at the Manufacturer's factory according to their specification and that the product satisfied all the relevant requirements of the following Standard:

IEC 60942 2003 Class 1 (Electroacoustics – Sound Calibrators)

The instrument also received a functional check by ANV Measurement Systems prior to despatch in the UK, in accordance with our standard procedures.

ANV Measurement Systems recommend that the instrument is calibrated at an interval of 12 months.

Signe

Position... DIRECTOR ...

Date... 26/4/07 ...

BEAUFORT COURT, 17 ROEBUCK WAY, MILTON KEYNES, MK5 8HL

☎ 01908 642846 ☎ 01908 642814

✉ info@noise-and-vibration.co.uk 🌐 www.noise-and-vibration.co.uk

ACOUSTICS NOISE AND VIBRATION LIMITED. REGISTERED IN ENGLAND NO. 3549028. REGISTERED OFFICE AS ABOVE.



CERTIFICATE OF CONFORMANCE

Date of Issue 26th April 2007
Customer Bolsterstone PLC
Certificate Number CONF040708

	Manufacturer	Type	Serial Number
Sound Level Meter	Rion	NL-31	01062688
Preamplifier	Rion	NH-21	20326
Microphone	Rion	UC-53A	310533

This is to certify that the instrument was tested and calibrated at the Manufacturer's factory according to their specification and that the product satisfied all the relevant requirements of the following Standards:

IEC 60651:1979 Type 1;
IEC 60804:1985 Type 1; and
IEC 61672-1:2002 Class 1.

The instrument also received a functional check by ANV Measurement Systems prior to despatch in the UK, in accordance with our standard procedures.

ANV Measurement Systems recommend that the instrument is calibrated at an interval of 12 months.

Signed 

Position DIRECTOR

Date 26/4/07

BEAUFORT COURT, 17 ROEBUCK WAY, MILTON KEYNES, MK5 8HL

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CERTIFICATE OF CONFORMANCE

Date of Issue 26th April 2007
Customer Bolsterstone PLC
Certificate Number CONF040709

	Manufacturer	Type	Serial Number
Sound Level Meter	Rion	NL-31	01062689
Preamplifier	Rion	NH-21	20327
Microphone	Rion	UC-53A	310534

This is to certify that the instrument was tested and calibrated at the Manufacturer's factory according to their specification and that the product satisfied all the relevant requirements of the following Standards:

IEC 60651:1979 Type 1;
IEC 60804:1985 Type 1; and
IEC 61672-1:2002 Class 1.

The instrument also received a functional check by ANV Measurement Systems prior to despatch in the UK, in accordance with our standard procedures.

ANV Measurement Systems recommend that the instrument is calibrated at an interval of 12 months.

Signe



Position DIRECTOR

Date 26/4/07

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CERTIFICATE OF CONFORMANCE

Date of Issue 26th April 2007
Customer Bolsterstone PLC
Certificate Number CONF040711

	Manufacturer	Type	Serial Number
Sound Level Meter	Rion	NL-31	01062691
Preamplifier	Rion	NH-21	20329
Microphone	Rion	UC-53A	309605

This is to certify that the instrument was tested and calibrated at the Manufacturer's factory according to their specification and that the product satisfied all the relevant requirements of the following Standards:

IEC 60651:1979 Type 1;
IEC 60804:1985 Type 1; and
IEC 61672-1:2002 Class 1.

The instrument also received a functional check by ANV Measurement Systems prior to despatch in the UK, in accordance with our standard procedures.

ANV Measurement Systems recommend that the instrument is calibrated at an interval of 12 months.

Signed



Position... DIRECTOR

Date... 26/4/07

BEAUFORT COURT, 17 ROEBUCK WAY, MILTON KEYNES, MK5 8HL

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CERTIFICATE OF CONFORMANCE

Date of Issue 26th April 2007
Customer Bolsterstone PLC
Certificate Number CONF040710

	Manufacturer	Type	Serial Number
Sound Level Meter	Rion	NL-31	01062690
Preamplifier	Rion	NH-21	20328
Microphone	Rion	UC-53A	311678

This is to certify that the instrument was tested and calibrated at the Manufacturer's factory according to their specification and that the product satisfied all the relevant requirements of the following Standards:

IEC 60651:1979 Type 1;
IEC 60804:1985 Type 1; and
IEC 61672-1:2002 Class 1.

The instrument also received a functional check by ANV Measurement Systems prior to despatch in the UK, in accordance with our standard procedures.

ANV Measurement Systems recommend that the instrument is calibrated at an interval of 12 months.

Signed



Position DIRECTOR

Date 26/4/07

BEAUFORT COURT, 17 ROEBUCK WAY, MILTON KEYNES, MK5 8HL

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1.4 MANUFACTURER'S NOISE DATA

The following pages contain extracts of manufacturer's noise data for the WinWind 1.0MW wind turbine. Note that the assessment has been based on documentation for the 60m rotor diameter variant of this turbine. Suitable data for the 56m rotor diameter turbine was unavailable. The manufacturers have stated that the 60m data is also applicable to the 56m turbines.



5 Summary

As ordered by the customer WinWinD Oy, WINDTEST Grevenbroich GmbH has measured the noise emission of a WEC type WWD-1 with a hub height of 68 m (including the base) according to IEC 61400-11 [1].

The measurement has been performed on 22.05.2006 in Vara / Sweden, in normal operation mode.

No distinct directional characteristic could be noticed for this turbine. Single noise events, exceeding the average noise of the turbine more than 10 dB, could not be noticed.

Some tonality noise can be noticed subjectively at some wind speeds, but not leading to any tonality according to [1]. Any other special noise characteristics like impulsivity could not be stated. Generally speaking, the operating noise of the wind turbine WWD-1 can be stated to be inconspicuously.

For the given sound power levels a measurement uncertainty of typical 0,6 dB has been found.

The data analysis gives the following noise values for the single wind speed bins:

Tab. 8: Measurement results for the WWD-1

Wind speed in 10 m height (v_{10m})	BIN 5 4,5–5,5 m/s	BIN 6 5,5–6,5 m/s	BIN 7 6,5–7,5 m/s	BIN 8 ¹⁾ 7,5–8,5 m/s	BIN 9, 10 ²⁾ ≥ 8,5 m/s
Sound power level (L_{WA} / dB)	93,1	97,9	101,9	104,0	103,4
Tonal audibility ($\Delta L_{a,k}$ / dB)	-2,01	< -3,0	< -3,0	-3,0	-1,09
Electr. power (P / kW)	225	403	643	938	1014

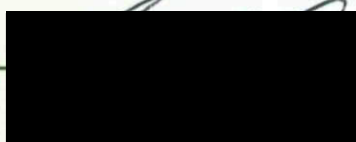
1) 95 % rated power at 8,04 m/s

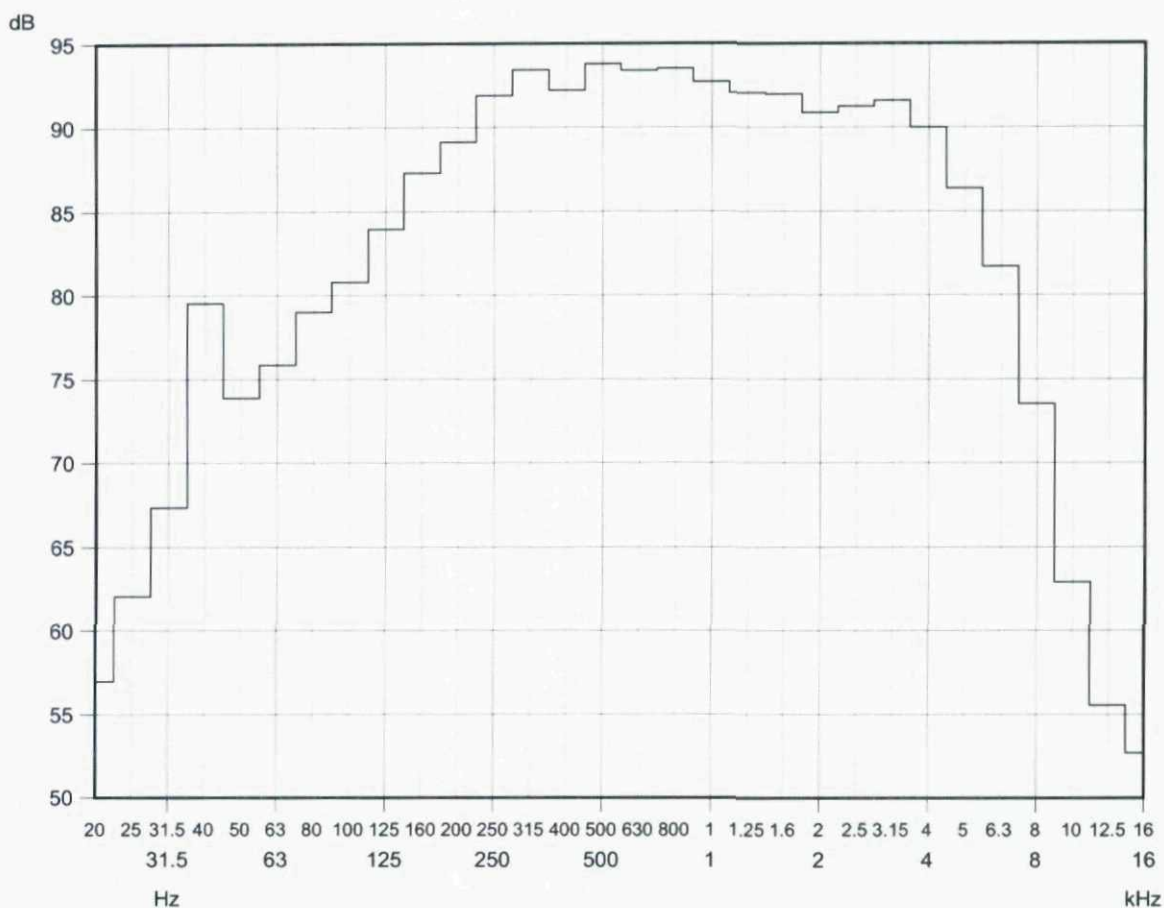
2) contains values above 95 % of rated power with larger uncertainty of wind speed determination

It is assured that the testing of the sound performance of the WEC WWD-1 was performed according to the state of technology, independently and impartially and to the best of our knowledge and conscience.

The results presented in this report only refer to and apply on this WEC.

Grevenbroich, 27.07.06





Third octave sound power level at 8 m/s, sum level = 104,0 dB			
Middle frequency [Hz]	Sound power level [dB]	Middle frequency [Hz]	Sound power level [dB]
20	57	630	93.4
25	62	800	93.5
31.5	67.3	1000	92.8
40	79.6	1250	92.1
50	73.9	1600	92
63	75.9	2000	90.9
80	79	2500	91.3
100	80.8	3150	91.6
125	84	4000	90.1
160	87.3	5000	86.4
200	89.2	6300	81.7
250	92	8000	73.5
315	93.5	10000	62.9
400	92.3	12500	55.5
500	93.8	16000	52.7

1.5 NOISE MODEL OUTPUTS

The following pages contain noise model outputs, detailing the following for the proposed Spicer Hill wind turbines.

- Modelling parameters
- Predicted noise levels for each receptor for reference wind speed of 9 m/s at 10m AGL
- Source details
- Propagation Summary for each receptor

Individual receptor noise levels are also provided for Royd Moor, Hazelhead and Blackstone Edge.

Note that the following assumptions have been made throughout:

- Acoustically absorbent ground
- Air pressure, temperature and humidity setting were chosen to provide the minimum level of atmospheric absorption
- Receiver height of 2.0m
- $L_{A90,10min}$ 2 dB(A) lower than $L_{Aeq,10min}$ which is assumed to be equal to the model output
- Receiver levels were calculated for a single reference wind speed, then adjusted to provide predictions for other wind speeds according to the variation in sound power level with wind speed for the assessment envelope.
- Relative contributions of each 1/3-octave band to broadband sound power level assumed to be consistent throughout wind speed range.

Project description

Project title: Spicer Hill Wind Farm
Engineer: Michael Reid
Customer: JG Pears Ltd

Description:

Run description

Calculation: Single Point Sound
Title: point layout 20071122 105 dB(A) 20080306
Run file: calcs.run
Result number: 7
Calculation start: 14/04/2008 13:32:22
Calculation end: 14/04/2008 13:32:52
Calculation time [ms]: 1531
No. of points: 13
No. of calculated points: 13
Kernel version: 26/03/2008

Run parameters

Angle increment: 1.00 deg
Reflection depth: 0
Number of reflections: 3
Maximal search radius: 5000
Weighting: dB(A)
Source side reflection precalculation enabled

Standards:

Industry: ISO 9613-2 : 1996
Air absorption: ISO 9613
Using alternative method according to chapter 7.3.2
Limitation of screening loss:

single/multiple 0 dB /0 dB

Environment:

Air pressure 1013.25 mbar
rel. Humidity 70 %
Temperature 10 °C
Meteo. Corr. C0(7-19h)[dB]=0.0; C0(19-23h)[dB]=0.0; C0(23-7h)[dB]=0.0;

VDI-Parameters for diffraction

C1=3 C2=20

Dissection parameters:

Distance to diameter factor 2
Minimal Distance [m] 1 m
Max. Difference GND+Diffraction 1 dB

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Max. No. of Iterations 4

Assessment: ESTU-R-97

Geometry data

RDGM9999.dgm	26/11/2007 13:58:02	
layout 20071122 WW1-60 20080306.geo		06/03/2008 14:32:08
receivers.geo	14/04/2008 13:31:16	

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	Source Details - Spicer Hill Turbines																										
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Source	X	Y	Lw	KI	KT	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1 kHz	1,25 kHz	1,6 kHz	2 kHz	2,5 kHz	3,15 kHz	4 kHz	5 kHz	6,3 kHz	8 kHz	10 kHz	
1	420610.00	405273.00	105.0	0	0	74.9	76.9	80.0	81.8	85.0	88.3	90.2	93.0	94.5	93.3	94.8	94.4	94.5	93.8	93.1	93.0	91.9	92.3	92.6	91.1	87.4	82.7	74.5	63.9	
2	420737.00	405055.00	105.0	0	0	74.9	76.9	80.0	81.8	85.0	88.3	90.2	93.0	94.5	93.3	94.8	94.4	94.5	93.8	93.1	93.0	91.9	92.3	92.6	91.1	87.4	82.7	74.5	63.9	
3	420846.00	404841.00	105.0	0	0	74.9	76.9	80.0	81.8	85.0	88.3	90.2	93.0	94.5	93.3	94.8	94.4	94.5	93.8	93.1	93.0	91.9	92.3	92.6	91.1	87.4	82.7	74.5	63.9	
4	420444.00	405019.00	105.0	0	0	74.9	76.9	80.0	81.8	85.0	88.3	90.2	93.0	94.5	93.3	94.8	94.4	94.5	93.8	93.1	93.0	91.9	92.3	92.6	91.1	87.4	82.7	74.5	63.9	
5	420529.00	404819.00	105.0	0	0	74.9	76.9	80.0	81.8	85.0	88.3	90.2	93.0	94.5	93.3	94.8	94.4	94.5	93.8	93.1	93.0	91.9	92.3	92.6	91.1	87.4	82.7	74.5	63.9	

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Source Details - Spicer Hill Turbines

Legend

Source		Source name
X	m	X-Coordinate
Y	m	Y-Coordinate
Lw	dB(A)	Sound power per unit
KI	dB	Correction for impulsiveness
KT	dB	Correction for tonality
50 Hz	dB(A)	Sound power level 50 Hz
63 Hz	dB(A)	Sound power level 63 Hz
80 Hz	dB(A)	Sound power level 80 Hz
100 Hz	dB(A)	Sound power level 100 Hz
125 Hz	dB(A)	Sound power level 125 Hz
160 Hz	dB(A)	Sound power level 160 Hz
200 Hz	dB(A)	Sound power level 200 Hz
250 Hz	dB(A)	Sound power level 250 Hz
315 Hz	dB(A)	Sound power level 315 Hz
400 Hz	dB(A)	Sound power level 400 Hz
500 Hz	dB(A)	Sound power level 500 Hz
630 Hz	dB(A)	Sound power level 630 Hz
800 Hz	dB(A)	Sound power level 800 Hz
1 kHz	dB(A)	Sound power level 1000 Hz
1,25 kHz	dB(A)	Sound power level 1250 Hz
1,6 kHz	dB(A)	Sound power level 1600 Hz
2 kHz	dB(A)	Sound power level 2000 Hz
2,5 kHz	dB(A)	Sound power level 2500 Hz
3,15 kHz	dB(A)	Sound power level 3150 Hz
4 kHz	dB(A)	Sound power level 4000 Hz
5 kHz	dB(A)	Sound power level 5000 Hz
6,3 kHz	dB(A)	Sound power level 6300 Hz
8 kHz	dB(A)	Sound power level 8000 Hz
10 kHz	dB(A)	Sound power level 10000 Hz

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Sourc	Lw dB(A)	I or S m,m ²	KI dB	KT dB	Ko dB	s m	Adiv dB	Agr dB	Amisc dB	Abar dB	Aatm dB	DI dB	Re dB(A)	LAeq dB(A)	LA90 dB(A)
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Name	Annat Royd		LAeq 41.9 dB(A)		LA90 39.9 dB(A)										
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1	105.0		0	0	3.0	780.7	68.8	3.7		0.0	2.8	0.0		32.7	30.7
2	105.0		0	0	3.0	596.5	66.5	3.2		0.0	2.4	0.0		36.0	34.0
3	105.0		0	0	3.0	494.2	64.9	2.8		0.0	2.1	0.0		38.3	36.3
4	105.0		0	0	3.0	882.4	69.9	3.8		0.0	3.1	0.0		31.2	29.2
5	105.0		0	0	3.0	807.5	69.1	3.7		0.0	2.9	0.0		32.3	30.3

Name	Brown's Edge		LAeq 41.2 dB(A)		LA90 39.2 dB(A)										
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1	105.0		0	0	3.0	511.1	65.2	2.6		0.0	2.1	0.0		38.1	36.1
2	105.0		0	0	3.0	760.2	68.6	3.4		0.0	2.8	0.0		33.2	31.2
3	105.0		0	0	3.0	999.2	71.0	3.8		0.0	3.3	0.0		29.9	27.9
4	105.0		0	0	3.0	733.0	68.3	3.2		0.0	2.7	0.0		33.8	31.8
5	105.0		0	0	3.0	937.0	70.4	3.7		0.0	3.2	0.0		30.7	28.7

Name	Carr House		LAeq 34.4 dB(A)		LA90 32.4 dB(A)										
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1	105.0		0	0	3.0	1469.	74.3	4.6		0.0	4.3	0.0		24.8	22.8
2	105.0		0	0	3.0	1218.	72.7	4.4		0.0	3.8	0.0		27.1	25.1
3	105.0		0	0	3.0	979.9	70.8	4.3		0.0	3.3	0.0		29.6	27.6
4	105.0		0	0	3.0	1355.	73.6	4.4		0.0	4.1	0.0		25.9	23.9
5	105.0		0	0	3.0	1151.	72.2	4.3		0.0	3.7	0.0		27.9	25.9

Name	Eagle Nest		LAeq 39.8 dB(A)		LA90 37.8 dB(A)										
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1	105.0		0	0	3.0	1089.	71.7	4.2		0.0	3.5	0.0		28.6	26.6
2	105.0		0	0	3.0	845.5	69.5	3.8		0.0	3.0	0.0		31.7	29.7
3	105.0		0	0	3.0	614.4	66.8	3.1		0.0	2.4	0.0		35.7	33.7
4	105.0		0	0	3.0	931.9	70.4	3.8		0.0	3.2	0.0		30.6	28.6
5	105.0		0	0	3.0	719.9	68.1	3.4		0.0	2.7	0.0		33.8	31.8

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Sourc	Lw dB(A)	I or S m,m ²	KI dB	KT dB	Ko dB	s m	Adiv dB	Agr dB	Amisc dB	Abar dB	Aatm dB	DI dB	Re dB(A)	LAeq dB(A)	LA90 dB(A)	
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Name Far Royd Moor		LAeq 35.1 dB(A)		LA90 33.1 dB(A)												
1	105.0		0	0	3.0	1278.	73.1	4.1		0.0	3.9	0.0		26.8	24.8	
2	105.0		0	0	3.0	1089.	71.7	3.9		0.0	3.5	0.0		28.8	26.8	
3	105.0		0	0	3.0	948.4	70.5	3.8		0.0	3.2	0.0		30.5	28.5	
4	105.0		0	0	3.0	1367.	73.7	4.2		0.0	4.1	0.0		26.0	24.0	
5	105.0		0	0	3.0	1263.	73.0	4.2		0.0	3.9	0.0		26.9	24.9	

Name Flash House Farm 1		LAeq 35.2 dB(A)		LA90 33.2 dB(A)												
1	105.0		0	0	3.0	1424.	74.1	4.6		0.0	4.2	0.0		25.2	23.2	
2	105.0		0	0	3.0	1224.	72.8	4.3		0.0	3.8	0.0		27.2	25.2	
3	105.0		0	0	3.0	1045.	71.4	4.0		0.0	3.4	0.0		29.2	27.2	
4	105.0		0	0	3.0	1172.	72.4	4.2		0.0	3.7	0.0		27.7	25.7	
5	105.0		0	0	3.0	971.4	70.7	3.8		0.0	3.3	0.0		30.2	28.2	

Name Flash House Farm 2		LAeq 34.9 dB(A)		LA90 32.9 dB(A)												
1	105.0		0	0	3.0	1449.	74.2	4.5		0.0	4.2	0.0		25.0	23.0	
2	105.0		0	0	3.0	1267.	73.1	4.2		0.0	3.9	0.0		26.8	24.8	
3	105.0		0	0	3.0	1108.	71.9	4.0		0.0	3.6	0.0		28.6	26.6	
4	105.0		0	0	3.0	1179.	72.4	4.1		0.0	3.7	0.0		27.7	25.7	
5	105.0		0	0	3.0	991.8	70.9	3.8		0.0	3.3	0.0		30.0	28.0	

Name Green Gate		LAeq 36.9 dB(A)		LA90 34.9 dB(A)												
1	105.0		0	0	3.0	786.8	68.9	3.3		0.0	2.8	0.0		32.9	30.9	
2	105.0		0	0	3.0	993.3	70.9	3.6		0.0	3.3	0.0		30.1	28.1	
3	105.0		0	0	3.0	1211.	72.7	3.9		0.0	3.8	0.0		27.7	25.7	
4	105.0		0	0	3.0	1072.	71.6	3.7		0.0	3.5	0.0		29.2	27.2	
5	105.0		0	0	3.0	1247.	72.9	4.0		0.0	3.9	0.0		27.3	25.3	

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Source	Lw dB(A)	I or S m,m ²	KI dB	KT dB	Ko dB	s m	Adiv dB	Ag dB	Amisc dB	Abar dB	Aatm dB	DI dB	Re dB(A)	LAeq dB(A)	LA90 dB(A)	
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Name Illian's Cottage		LAeq 35.0 dB(A)		LA90 33.0 dB(A)											
1	105.0		0	0	3.0	1425.	74.1	4.5		0.0	4.2	0.0		25.2	23.2
2	105.0		0	0	3.0	1271.	73.1	4.3		0.0	3.9	0.0		26.8	24.8
3	105.0		0	0	3.0	1146.	72.2	4.0		0.0	3.6	0.0		28.2	26.2
4	105.0		0	0	3.0	1137.	72.1	4.1		0.0	3.6	0.0		28.2	26.2
5	105.0		0	0	3.0	973.5	70.8	3.8		0.0	3.3	0.0		30.2	28.2

Name Small Shaw		LAeq 38.0 dB(A)		LA90 36.0 dB(A)											
1	105.0		0	0	3.0	1203.	72.6	4.5		0.0	3.8	0.0		27.2	25.2
2	105.0		0	0	3.0	986.9	70.9	4.2		0.0	3.3	0.0		29.7	27.7
3	105.0		0	0	3.0	790.4	68.9	3.7		0.0	2.8	0.0		32.5	30.5
4	105.0		0	0	3.0	979.0	70.8	4.0		0.0	3.3	0.0		29.9	27.9
5	105.0		0	0	3.0	767.0	68.7	3.5		0.0	2.8	0.0		33.1	31.1

Name Spicer House		LAeq 45.0 dB(A)		LA90 43.0 dB(A)											
1	105.0		0	0	3.0	346.7	61.8	1.7		0.0	1.6	0.0		42.9	40.9
2	105.0		0	0	3.0	595.7	66.5	3.1		0.0	2.4	0.0		36.0	34.0
3	105.0		0	0	3.0	834.5	69.4	3.7		0.0	3.0	0.0		31.9	29.9
4	105.0		0	0	3.0	576.2	66.2	2.8		0.0	2.3	0.0		36.7	34.7
5	105.0		0	0	3.0	775.0	68.8	3.6		0.0	2.8	0.0		32.8	30.8

Name The Lanes		LAeq 35.2 dB(A)		LA90 33.2 dB(A)											
1	105.0		0	0	3.0	1378.	73.8	4.5		0.0	4.1	0.0		25.6	23.6
2	105.0		0	0	3.0	1261.	73.0	4.3		0.0	3.9	0.0		26.8	24.8
3	105.0		0	0	3.0	1176.	72.4	4.1		0.0	3.7	0.0		27.8	25.8
4	105.0		0	0	3.0	1079.	71.7	4.1		0.0	3.5	0.0		28.7	26.7
5	105.0		0	0	3.0	950.3	70.5	3.8		0.0	3.2	0.0		30.4	28.4

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Sourc	Lw dB(A)	l or S m,m ²	Kl dB	KT dB	Ko dB	s m	Adiv dB	Agr dB	Amisc dB	Abar dB	Aatm dB	DI dB	Re dB(A)	LAeq dB(A)	LA90 dB(A)
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Name	Whitley House	LAeq 36.5 dB(A)	LA90 34.5 dB(A)												
1	105.0	0	0	3.0	1317.	73.4	4.1		0.0	4.0	0.0		26.5	24.5	
2	105.0	0	0	3.0	1066.	71.6	3.8		0.0	3.5	0.0		29.2	27.2	
3	105.0	0	0	3.0	829.3	69.4	3.4		0.0	2.9	0.0		32.3	30.3	
4	105.0	0	0	3.0	1229.	72.8	3.9		0.0	3.8	0.0		27.5	25.5	
5	105.0	0	0	3.0	1033.	71.3	3.7		0.0	3.4	0.0		29.7	27.7	

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Legend

Source		Source name
Lw	dB(A)	Sound power per unit
l or S	m, m ²	Size of source (length or area)
KI	dB	Correction for impulsiveness
KT	dB	Correction for tonality
Ko	dB	Correction for non spherical emission
s	m	Distance source - receiver
Adiv	dB	Mean spreading loss
Agr	dB	Mean ground effect
Amisc	dB	Miscellaneous losses (mitigation, ...)
Abar	dB	Mean barrier loss
Aatm	dB	Mean air absorption loss
DI	dB	Directivity correction
Re	dB(A)	Reflection part
LAeq	dB(A)	LAeq
LA90	dB(A)	LA90

Spicer Hill Wind Farm
Existing Royd Moor Noise Levels

Name	Lr dB(A)	LA90 dB(A)
Annat Royd	39.3	37.3
Brown's Edge	31.2	29.2
Carr House	36.4	34.4
Eagle Nest	43.9	41.9
Far Royd Moor	34.2	32.2
Flash House Farm 1	36.1	34.1
Flash House Farm 2	35.4	33.4
Green Gate	29.0	27.0
Illian's Cottage	34.9	32.9
Small Shaw	40.1	38.1
Spicer House	32.9	30.9
The Lanes	34.5	32.5
Whitley House	40.3	38.3

	Predicted Noise Levels for Blackstone Edge for reference sound power level of 106.2 dB(A)	
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Name	LA90 dB(A)	
Annat Royd	29.7	
Brown's Edge	36.9	
Carr House	26.9	
Eagle Nest	29.9	
Far Royd Moor	26.6	
Flash House Farm 1	29.5	
Flash House Farm 2	30.0	
Green Gate	32.6	
Illian's Cottage	31.0	
Small Shaw	30.3	
Spicer House	37.3	
The Lanes	32.5	
Whitley House	27.8	

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	Predicted Noise Levels, Hazelhead for reference sound power level of 105.3 dB(A)	
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Name	LA90				
	dB(A)				
Annat Royd	17.8				
Brown's Edge	20.0				
Carr House	18.3				
Eagle Nest	20.1				
Far Royd Moor	16.1				
Flash House Farm 1	22.0				
Flash House Farm 2	22.8				
Green Gate	18.1				
Illian's Cottage	24.0				
Small Shaw	21.3				
Spicer House	20.2				
The Lanes	25.4				
Whitley House	18.4				

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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	Predicted Noise Levels, Spicer Hill for reference sound power level of 105 dB(A)	
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Name	X	Y	LAeq	LA90	
	m	m	dB(A)	dB(A)	
Annat Royd	421319.000	404955.000	41.9	39.9	
Brown's Edge	420431.000	405746.000	41.2	39.2	
Carr House	421318.000	403988.000	34.4	32.4	
Eagle Nest	420948.000	404239.000	39.8	37.8	
Far Royd Moor	421786.000	404783.000	35.1	33.1	
Flash House Farm 1	420517.000	403855.000	35.2	33.2	
Flash House Farm 2	420366.000	403847.000	34.9	32.9	
Green Gate	420742.000	406043.000	36.9	34.9	
Illian's Cottage	420170.000	403920.000	35.0	33.0	
Small Shaw	420679.000	404074.000	38.0	36.0	
Spicer House	420481.000	405587.000	45.0	43.0	
The Lanes	419980.000	404049.000	35.2	33.2	
Whitley House	421332.000	404172.000	36.5	34.5	