WILD FRONTIER ECOLOGY

# Park Ings, North Lincolnshire: Wind Turbine Proposal

## Ecological Assessment

May 2012

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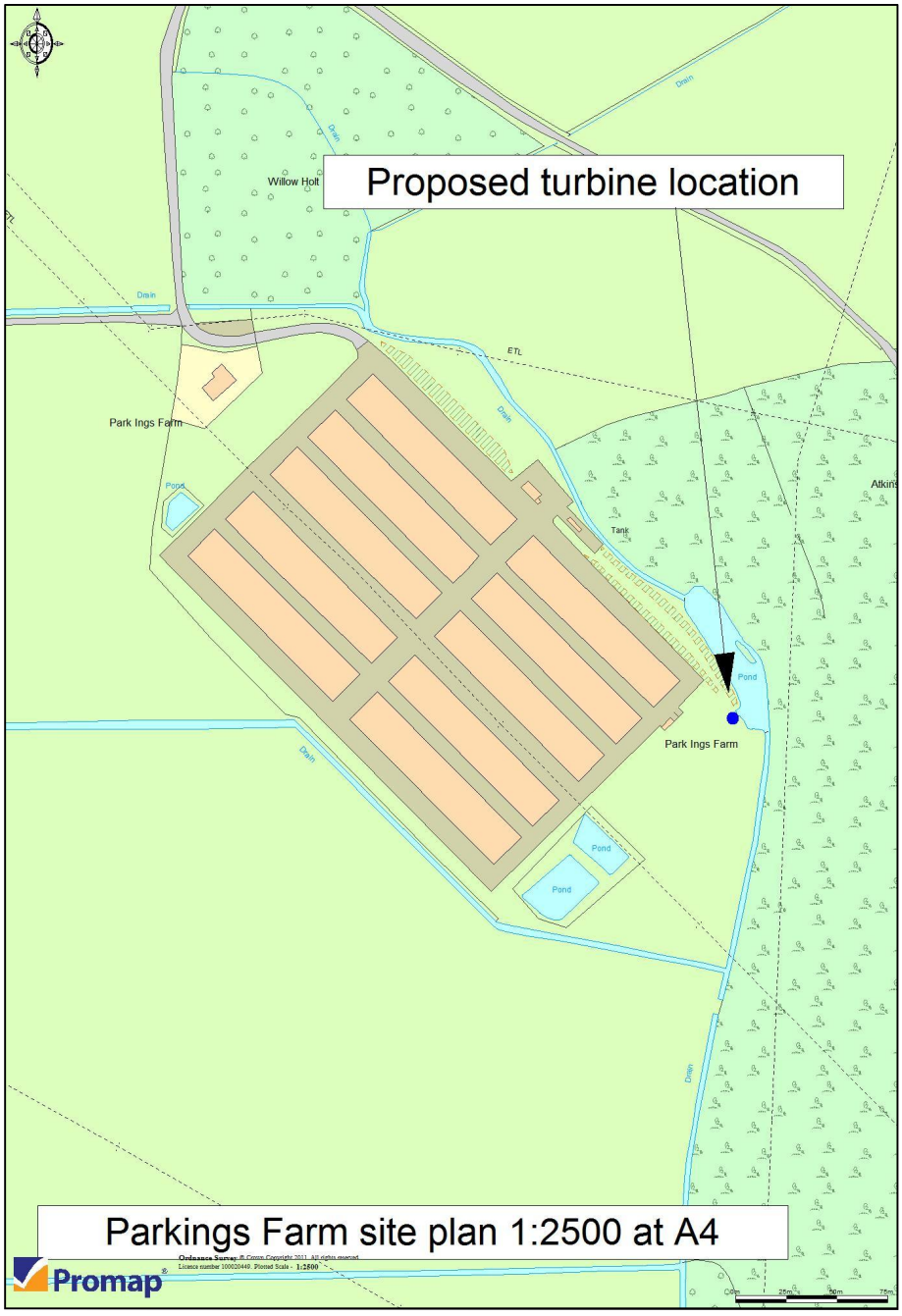
## *Summary*

Ecological surveys were undertaken or have been scheduled at the site of the proposed wind turbine at Park Ings Farm to assess the impact of the proposal on ecological receptors. Surveys include Phase 1 habitat survey, bird, bat and great crested newt surveys. The possible presence of other protected species, including reptiles, water voles, otters and badgers was assessed during the Phase 1 survey and data search provided by the Lincolnshire Biodiversity Partnership (LBP).

**Figure 1: Site Map**



The effects to the various protected species and priority habitats were assessed (1) using the survey data collected; (2) by referring to the available compilation of relevant ecological studies; and (3) by considering the reduction of risk potential afforded by following nature conservation guidelines for wind farm planning. In summary, no significant effects on protected species or priority habitats have been identified at this stage (although it is acknowledged that this assessment is subject to change pending the findings of forthcoming surveys). Best practice measures have been proposed to minimise any effects.

# Introduction

## Consultation and scope of the ecological survey

Consultation was sought from RSPB and Natural England. The RSPB initially stated "I don't have any comments to make about this site at present". This was followed with the following response:

"As you've identified, Marsh Harrier would certainly need consideration at this site. In addition to your cited survey source [Hardy (2006)[1]], I would refer you to NE's advice note TIN008. Any site with suitable habitat within c.10km (as an unofficial estimate) of the estuary and its tributaries could potentially, at times, hold significant numbers of Golden Plover and Lapwing. How much of an issue this is for this site will of course depend on the suitability of the surrounding habitat for roosting and inland foraging.

I'm afraid I can't be any more specific at this stage. The information provided above is not comprehensive and should be taken as general information, as opposed to specific guidance regarding appropriate survey effort. Clearly our position and views might change as and when further information becomes available."

Natural England is yet to respond.

## Legal policy and context

### *International habitat designations*

Habitats of European-wide importance (other than for birds) are listed under Annex I of the Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora[2]. Habitats designated under this Directive are Special Areas of Conservation (SAC). Sites identified as potential SAC (pSAC) and candidate SAC (cSAC) are provided with the same level of protection as SAC.

Habitats of European-wide importance for birds are listed under the EC Wild Birds Directive (1979)[3]. Habitats designated under this Directive are Special Protection Areas (SPA). Any site identified as a potential SPA (pSPA) is provided with the same level of protection as an established SPA.

Wetlands of International Importance are designated under the Ramsar Convention (1971)[4].

### *UK habitat designations*

National ecological designations, such as Sites of Special Scientific Interest (SSSI) and National Nature Reserves (NNR), are also afforded statutory protection. SSSIs are notified and protected under the jurisdiction of the Wildlife and Countryside Act 1981

[1] Hardy, J. et al (2006). Raptors: a field guide to survey and monitoring, SNH, Edinburgh
[2] Council Directive 92/43/EEC *On the conservation of natural habitats and of wild fauna and flora* (EC Habitats Directive). Annex I, 1992.
[3] Council of the European Communities *Council Directive on the Conservation of Wild Birds* (79/409/EEC), 1979.
[4] Ramsar *The Ramsar Convention on Wetlands*, 1971.

(WCA) as amended[5]. SSSIs are notified based on specific criteria, including the general condition and rarity of the site and of the species or habitats supported by it.

Ancient Woodland Sites are woodlands that have existed since at least the Seventeenth Century. They are of biodiversity importance due to their longevity, which often gives rise to high species diversity. Many ancient woodland sites are given national or county designations.

### *Regional habitat designations*

In Lincolnshire and North Lincolnshire, Local Wildlife Sites (LWSs) are non-statutory sites that are of county-wide importance for nature conservation, but are below the standard for selection as SSSIs. Potential Local Wildlife Sites (pLWS) have been recommended as LWSs but the quality of their features has not yet been confirmed.

### *Species protection and designation*

Species in need of special protection in Britain, for reasons of dramatic decline, loss of habitat, rarity or restricted distribution, are listed under the various Schedules of the Wildlife and Countryside Act 1981 (as amended)[6]. Schedule 1 covers birds, while Schedule 5 covers non-avian vertebrates and invertebrates and Schedule 6 details animals which may not be killed or taken by certain methods. Schedule 8 of the Wildlife and Countryside Act 1981 lists species of plants which are afforded special protection.

Schedule 5 of the Wildlife and Countryside Act 1981 covers the non-avian animals that are afforded special protection. Relevant to development plans, this Schedule makes it an offence to damage, destroy, or obstruct access to any structure or place which any Schedule 5 animal inhabits. It is also an offence to disturb any such animal while it is occupying a structure or place which it uses for that purpose. This legislation has been updated by the Countryside and Rights of Way Act 2000[7] which includes design measures to prevent reckless disturbance. For certain species, different levels of protection are afforded.

With the exception of certain quarry and pest species, wild birds are protected under the Wildlife and Countryside Act 1981 (as amended) (the WCA)[8]. The WCA creates a number of offences in relation to wild birds including killing or injuring any bird or damaging or destroying nests and eggs. Certain species are also listed under Schedule 1 of the WCA, which prevents disturbance of the species or its nest and/or eggs at any time with protection by special penalties. There are certain birds excluded from the general stipulations under the WCA. These are quarry species, as well as agricultural pest species such as woodpigeon, magpie and carrion crow.

Certain bird species are listed in Annex 1 of the Council Directive 79/409/EEC on the conservation of wild birds[9]. These are species for which Special Protection Areas (SPAs)

[5] Wildlife and Countryside (Amendment) Act 1981.
[6] Wildlife and Countryside (Amendment) Act 1981.
[7] Countryside and Rights of Way Act 2000 (Commencement No. 7) (Wales) Order 2005
[8] JNCC, *Wildlife and Countryside Act*, 1981.
[9] Council of the European Communities, *Council Directive on the Conservation of Wild Birds*, (79/409/EEC), 1979.

could be designated if the population exceeds 1% of the reference population, as defined in Appendix 4 of the SPA Review[10].

All bat species are listed under Annex IV of Council Directive 92/43/EEC[2], and some rare species are additionally listed under Annex II. UK protected status is conferred by Schedule 2 of the Conservation of Habitats and Species Regulations 2010[11] and Schedule 5 of the WCA 1981 as amended. This protection extends to both the species and roost sites. Likewise, bat roosts are protected at all times of the year, regardless of whether bats are present at the time.

The water vole (*Arvicola amphibius)*is protected under Schedule 5 of the Wildlife and Countryside Act 1981. The protection is now with respect to all parts of Section 9. This section of the Act affords protection to the water vole's shelter and also protects the animal itself. This protection has been provided in recognition of a significant decline in numbers in recent decades and in recognition that this reduction in population has been primarily as a result of habitat loss and predation as opposed to direct persecution. The legal protection makes it an offence to intentionally damage, destroy or obstruct access to any structure or place which water voles use for shelter or protection, or to disturb water voles whilst they are using such a place.

Otters (*Lutra lutra*) are protected under Schedule 5 of the Wildlife and Countryside Act 1981. The Otter is also a protected species included in Schedule 2 of the Conservation (Natural Habitats etc.) Regulations 1994, and is protected under Annex II of 92/43/EEC. It is an offence to intentionally kill, injure or take an otter from the wild, or to intentionally or recklessly damage, destroy or obstruct access to any habitat used by otters or to disturb the otters which make use of those habitats.

All native reptiles are listed on Schedule 5 of the Wildlife and Countryside Act 1981, though they are afforded different levels of protection. For the four most commonly occurring species, adder (*Vipera berus*), grass snake (*Natrix natrix*), slow-worm (*Anguis fragilis*) and common lizard (*Zootoca vivipara*), the protection extends to prohibit killing and injury although does not include habitat protection. In practice, when the presence of reptiles is confirmed the legislative protection requires that a mitigation programme is undertaken to make 'reasonable effort' to remove animals prior to the commencement of any site preparation or development. In certain parts of the country, the presence of one or all of the four more common species of reptile could be regarded as a conservation issue as opposed to what is essentially an animal welfare issue.

The great crested newt (*Triturus cristatus*) is fully protected under both national and international legislation. Specifically, the species is listed on Schedule 5 of the Wildlife and Countryside Act 1981, making it an offence to knowingly kill, injure, disturb, handle or sell the animal. The protection is afforded to all life stages and includes both the terrestrial and aquatic components of its habitat. The species is also listed under Annexes II and IV(a) of European Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora.

The other native amphibians, including common frog (*Rana temporaria*), common toad (*Bufo bufo*), palmate newt (*Triturus helveticus*), and smooth newt (*Triturus vulgaris*),

[10] Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. and Whitehead, S. (eds), *The UK SPA network: its scope and content*, JNCC, Peterborough, 2001.
[11] *Conservation of Habitats and Species Regulations,* 2010.

are protected by Section 9(5) of the Wildlife and Countryside Act 1981. Section 9(5) only prohibits the sale, possession or transport for the purpose of sale, and advertising the buying or selling of listed animals.

Badgers (*Meles meles*) and their setts are protected under the Protection of Badgers Act 1992[12]. This means that it is unlawful to knowingly kill, capture, disturb or injure an individual or intentionally damage, destroy or obstruct an area used for breeding, resting or sheltering by Badgers.

Schedule 8 of the WCA 1981 lists species of plants which are afforded special protection. It is an offence to pick, uproot or destroy any species listed on Schedule 8 without prior authorisation from the relevant statutory organisation, and all plants are protected from unauthorised uprooting (i.e. without the landowner's permission) under Schedule 13 of the WCA 1981. Schedule 4 of the Conservation of Habitats and Species Regulations[11] also protects certain plants in that it is an offence to deliberately pick, collect, uproot or destroy a wild plant of a European Protected Species.

The Red Data Book (RDB) system applies standard criteria to define the national conservation status of animal and plant species according to the following categories: Extinct (EX), critically endangered (CR), endangered (EN), vulnerable (VU), near-threatened (NT) and lower concern (LC).

Biodiversity Action Plans (BAPs) stem from the Convention on Biological Diversity, also known as the 'Earth Summit' (1992), which called for the creation and enforcement of national strategies and action plans to conserve, protect and enhance biological diversity. The BAP system in the UK comprises both Habitat Action Plans (HAPs) for Priority Habitats and Species Action Plans (SAPs) for Priority Species. Priority species and habitats are chosen according to a number of criteria, including threatened status, decline in range/area and endemism. Biodiversity action planning has been applied at both a national and local (LBAP) level, in North Lincolnshire this is conferred by the Lincolnshire BAP (LBAP), which has been adopted by North Lincolnshire Council. That a BAP has been prepared should simply reflect the fact that the habitat or species concerned is in a sub-optimal state (and hence that action is required). It does not imply, and was never intended to imply, any specific level of importance for the habitat or species.

### *Birds of Conservation Concern*

The British Trust for Ornithology (BTO) (2009) lists Birds of Conservation Concern (BoCC)[13], which fall into three categories:

- red list (species of high concern);
- amber list (species of medium concern); and,
- green list (species of lower concern).

Species are placed on these lists based, among other criteria, on the percentage decline of breeding or wintering populations in the recent past. In this assessment, those species of lower concern are not considered in detail, except where it is considered there is a particular risk to that species posed by the development proposal. These lists

[12] *Protection of Badgers Act*, 1992.
[13] British Trust for Ornithology, *Birds of Conservation Concern*, 2009.

do not imply rarity for the species concerned and many listed species are common and widespread.

# Methods

## Desk study

*Data search*

The desk study accumulated designated site data from on-line resources and via records requests from Lincolnshire Biodiversity Partnership.

Natural England's and the Joint Nature Conservation Committee's websites were used to identify designated sites and their qualifying features. LBP searched within 2km of the study site for non-statutory designated sites and for species records.

## Flora/habitats

The Phase 1 survey was undertaken on 28th September 2011 by Susannah Dickinson. The landholding on which the turbine is proposed was surveyed. This comprised the area immediately surrounding the poultry sheds. Outside of the landholding, surveys extended to at least 250 metres of the proposed turbine locations by viewing from the landholding, public footpaths, roads, and by using aerial photographs. Habitats and features were classified according to JNCC guidelines[14]. The Phase 1 survey was supported by detailed target notes and photographic evidence.

The Phase 1 habitat survey extended to include an evaluation of the site in terms of potential to support rare or protected species, and the compilation of a plant species list. Particular attention was paid to hedgerows; species composition and structure of each hedgerow was recorded.

The full habitat map is shown in figure 2, and target notes are described in table 1.

## Bats

The study site has been (or at the appropriate time of year is due to be) assessed for bats using the following methods:

- Overall evaluation of the study site and surrounding area as a habitat for bats (e.g. foraging areas, potential roosting sites, potential hibernacula, and probable flyways) from a site walkover, the Phase 1 habitat survey results, and aerial imagery.
- The study site is to be sampled using manual transects and automated static monitoring stations. Batbox Duet (coupled with Creative Zen V MP3 recording devices) and SM2 BAT384 frequency division bat detectors will be used in combination to identify bat activity. Surveys are scheduled for May/June 2012.

[14] JNCC (2010), Handbook for Phase 1 Habitat Survey – A Technique for Environmental Audit. JNCC.

Bat activity declines markedly after the first two hours following sunset; transect surveys therefore will begin at 15 minutes before sunset and continue for two hours after sunset to comply with Bat Conservation Trust (2011[15]).

Each bat echolocation registered on a bat detector will be recorded for:

- Time of occurrence;
- Estimated map location;
- The habitat in the area;
- Estimated number of bats present;
- Estimation of the bat activity exhibited based on the number passes, the distance away, and any special call features (e.g. social calls, feeding buzzes).

Air temperature will be measured at the beginning and end of each survey. Wind speed will be estimated to a Beaufort Scale value.

Sound recordings will be reviewed to confirm the full range of species encountered using BatScan 9 and AnalookW software. If necessary, audio analysis of frequency division data will be achieved by comparing sound characteristics and sonogram shapes and measurements (peak call frequency, call frequency range, and mode pulse interval) to reference measurements and/or recordings provided by Russ (1999)[16], Parsons & Jones (2000)[17], Bat Conservation Trust (2008)[18], Sowler (2010)[19] and an in-house library.

Two manual transect surveys and five consecutive nights of static monitoring are planned for May/June 2012.

## Birds

The study site was (or at the appropriate time of year, is to be) assessed for birds using the following methods:

- Overall evaluation of the study site and surrounding area as a habitat for birds (e.g. foraging areas, potential roosting sites, and probable flyways) from a site walkover, the Phase I habitat survey results, Ordnance Survey maps and aerial imagery.

[15] Bat Conservation Trust (2011) Bat Surveys – Good Practice Guidelines (2nd edition): Surveying for onshore wind farms.

[16] Russ J. (1999) The Bats of Britain and Ireland. Alana Books, UK.

[17] Parsons S. and Jones G. (2000) Acoustic Identification of Twelve Species of Echolocating Bat by Discriminate Function Analysis and Artificial Neural Networks. The Journal of Experimental Biology 203: 2641-2656.

[18] Bat Conservation Trust. (2008) Bat Sound Library. Online at: http://www.bats.org.uk/pages/bat_sound_library_introduction.html?handle=bat_sound_library_introduction.html

[19] Sowler S. (2010) Difficult Sonograms and Social Calls – Advanced AnaBat Analysis. Alana Ecology Workshop. Bury St. Edmunds, Suffolk.

- Desk study of bird records provided by Lincolnshire Biodiversity Partnership in a search radius of 2km from the proposed turbine.

- Three breeding marsh harrier surveys, to be conducted between May and July 2012.

The proposal site is located approximately directly adjacent a reedbed with some scattered scrub; habitat which is capable of supporting nesting marsh harrier *Circus aeruginosus,* a species known to be present in this region. Surveys for breeding marsh harrier are therefore proposed between May and July 2012, to be conducted in accordance with methods in Hardy et al (2006)[20].

The site is located approximately 1.2km from the River Trent (to its west) and 10km from the Humber Estuary SPA (to the north), both of which are areas of ornithological importance. The RSPB outlined the potential, at this range, for lapwing *Vanellus vanellus* and golden plover *Pluvialis apricaria* to occur on or around the site. However, habitats and landuses surrounding the site include industrial and depot centres, disused gravel pits, the suburban extent of northern Scunthorpe, and arable fields relatively small compared to those across much of the wider region. While both species are expected to be present in this region, the habitats on and immediately surrounding the proposal site are not considered to be of sufficient suitability to suggest a particular concentration of activity here.

### Great crested newts

The study site was (or at the appropriate time of year, is to be) assessed for great crested newts using the following methods:

- Overall evaluation of the study site and surrounding area as a habitat for great crested newts (e.g. breeding ponds, foraging habitat, potential hibernacula, connectivity between areas of potentially suitable habitat) from a site walkover, the Phase I habitat survey results, Ordnance Survey maps and aerial imagery.

- Desk study of bird records provided by Lincolnshire Biodiversity Partnership in a search radius of 2km from the proposed turbine.

- Presence/absence surveys for great crested newts are proposed between May and June 2012 in three ponds on site and in the pond to the immediate east of the proposed turbine position.

The survey technique to be used for the presence/absence survey of all four ponds will comply with "Great Crested Newt Mitigation Guidelines" (2001)[21]. The Guidelines recommend that, in order to determine whether great crested newts are present or absent from a pond, four survey visits should be carried out between mid-March and mid-June, with two of the visits between mid-April to mid-May. Each survey visit should consist of three of four of the following recommended techniques; torching; bottle trapping; egg searching; or netting (methodology for each given below). The habitat and characteristics of each pond will be assessed to identify the preferred survey technique for each pond surveyed.

[20] Hardy, J. et al (2006). Raptors: a field guide to survey and monitoring, SNH, Edinburgh
[21] English Nature (2001). Great crested newt mitigation guidelines. English Nature

A standard survey form will be completed for each pond for each survey visit, to record:

- Visit number;
- Pond reference number;
- Photograph reference;
- Surveyor;
- Date and time;
- Methods used;
- Air temperature for day and night;
- Water turbidity;
- Water temperature for day and night;
- Precipitation;
- Wind disturbing water;
- Vegetation cover, and;
- Sex and life-stage of any great crested newt or any other amphibians recorded

Ponds where great crested newt adults are present can then be attributed a population size class (according to guidelines in English Nature, 2001[22]), where:

- Small population size = maximum count per visit is up to 10 adults
- Medium population size = maximum count per visit is between 11 and 100 adults
- Large population size = maximum count per visit is over 100 adults

*Survey Techniques*

Bottle trapping – this method involves setting bottle traps (normally made from 2-litre plastic bottles) around the pond margin, and leaving the traps set overnight. A density of one trap per two metres of shoreline is recommended for general survey purposes. Some studies indicate that bottle trapping is the most reliable method for detecoting the present of great crested newts, and it is especially useful for surveying turbid or weedy ponds. The main disadvantages are susceptibility to damage by vandals and possible harm to newts; certainly there is a need for careful training to minimise such risks. Bottle trapping can be used to catch adults during breeding season and larvae during summer. It should only be used when night-time air temperature is >5ºC, but note that very high temperatures can increase the likelihood of harm to trapped newts, especially larvae.

Torching – This method involves searching for great crested newts at night by shining a torch in the pond. In clear ponds this can be a simple and very effective way of detecting newts, but in heavily weeded or turbid ponds this method is limited. Bright

[22] English Nature (2001). Great crested newt mitigation guidelines. English Nature

light may cause great crested newts to seek the cover of vegetation, possibly affecting survey results and disrupting their breeding activity. Nonetheless, it is often indicated as a useful method. Powerful torches should be used, with 50,000 candlepower as a recommended minimum. Surveys employing 1,000,000 candlepower torches are planned, which may increase the chance of detecting newts and may reveal a higher proportion of the newts present, though increased disturbance also occurs. The margins of the pond are often the best areas to search for newts. It is recommended that the entire margin of the pond be walked once, slowly checking for great crested newts (though some areas of the margin may need to be omitted if access is difficult). Torch survey results are subject to high variation due to weather conditions, and so should only be carried out in suitable conditions, with night-time air temperature >5°C, no or little wind, and no rain.

Egg Searching – This method involves searching both live and dead submerged vegetation for great crested newt eggs (or, strictly speaking, embryos). This is often a very effective method for detecting great crested newt presence, but eggs can prove difficult to find in heavily vegetated ponds with small newt populations, or those with no accessible vegetation. The search should be conducted with care not to damage the eggs or the aquatic and marginal vegetation. Normally, it is necessary to 'unwrap' eggs to confirm identification, and there is some evidence that exposed eggs may be more prone to predation and UV radiation impacts. It is therefore recommended that large areas of vegetation are not systematically unwrapped (to conduct egg counts); once great crested newt eggs have been reliably identified, the search can be terminated. This is not a problem as the method does not give any meaningful quantitative information on population size. In large ponds, it may be useful to conduct egg searching in different sections of the pond margin to establish favoured breeding areas. Artificial 'egg strips' may be successful at detecting newt presence, and are especially valuable in sparsely vegetated ponds (though even in well-vegetated ponds, newts sometimes prefer them). Egg-strips may be constructed from plastic bin-liners cut into 1-2cm wide strips, attached to a stake or rock and submerged near the pond margin. The risk of interference should be considered (do not use them if there is a high risk), and egg-strips should be removed after hatching. When egg searching it can be instructive to make a note of the developmental stage of newt eggs and the presence of previously used leaves (folds without eggs are often evident in late season)

Netting – Using a long-handled dip-net, great crested newts can be captured by sampling the area around the pond edge. Netting can be conducted by day or night, but better results may be obtained at night when adult newts are more likely to be in open water. A perimeter walk, as with torch surveys, is recommended, and there should be at least 15 minutes of netting per 50m of shoreline. Studies indicate that netting is much less effective at detecting adult great crested newt presence than bottle trapping, torch survey or egg search, but it is nonetheless useful in supplementing these techniques. In addition, netting is often useful for finding larvae during late summer (though care is needed to avoid damage to gills). Results from netting are normally only useful for indicating presence/absence; using netting to give an indication of population size is not usually recommended.

Refuge Search – Great crested newts may rest under refuges such as logs, bark, rocks, and debris (discarded furniture etc). Placing further refuges such as carpet tiles and plywood boards on a site for the purpose of survey may be advised to increase the chances of newts finding a refuge. However, lifting and searching underneath such refuges appears to be a very ineffective method, and is best used as an additional technique. It should certainly not be relied upon as the sole survey method. There is

some evidence that placing refuges along drift fences can be somewhat more effective, but they should be used together with, not instead of, pitfall traps.

# Results

## Desk study

### *Data search*

The data search with LBP returned 170 records of 40 species within 2km of the site. Key records of note include 16 records of bats, of which three confirm the species. Species given are common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus* and brown long-eared bat *Plecotus auritus*.

There are also five records of reptile species; four of grass snake *Natrix natrix* and one of common lizard *Zootoca vivipara*. However, as with many of the records supplied, these are over 40 years old (in this case dating from 1977). There are also 11 records of brown hare *Lepus europaeus* and three of harvest mouse *Micromys minutus*. Full results are appended.

The data search also highlighted six local wildlife sites (LWS), one ancient woodland, two local geological sites, and two regionally important geological sites. The nearest local wildlife site is Slag banks LWS which lies within 500m of the proposed turbine location.

The Humber Estuary is the only Special Protection Area (SPA) within 10km of the site, which at its closest lies 7km north of the proposal. Thorne and Hatfield Moors SPA is 11km to the west of the proposed turbine.

The Humber Estuary is also the only Special Area of Conservation (SAC) and Ramsar site within 10km. The extents of the SAC and Ramsar sites include the River Trent tributary, meaning it comes to within approximately 1.2km of the proposed turbine location, to the west. This is also the nearest Site of Special Scientific Interest (SSSI) to the site.

In total there are nine SSSIs within 10km of the proposal. There are no National Nature Reserves within 10km of the proposal.

Citations for all sites are appended.

## Flora/habitats

The site is situated south of the village of Flixborough in North Lincolnshire, set between large industrial estates and intensively farmed arable fields.

The landholding is a poultry farm, comprising ten wooden sheds with corrugated metal roofs. A mixture of gravel, hard-standing and improved grassland habitats occupy the areas between and around the poultry sheds. The proposed turbine location (Plate 1) is an area of amenity grassland to the southeast of the poultry sheds. There are three holding ponds on site, which appear to be associated with the poultry farm, and a pond bordering the site immediately to the east.

To the north of the site is an area of plantation woodland with ash *Fraxinus excelsior*, beech *Fagus sylvatica*, pedunculate oak *Quercus robur,* and willow *Salix* spp. The south of the wood is clearly plantation whilst the north and especially north-eastern sections appear more semi-natural with less ash *Fraxinus excelsior* and more crack willow *Salix fragilis* and white willow *Salix alba*.

To the east of the site is a large unmanaged area of reedbed (dominated by common reed *Phragmites australis*), with areas of scrub (predominantly willow *Salix* spp., elder *Sambucus nigra*, and hawthorn *Crataegus monogyna*) and areas of common bracken *Pteridium aquilinum* and nettle *Urtica dioica*. Beyond this reedbed the land is higher, becoming drier with further areas of scrub supporting bramble *Rubus fruticosus agg.* bracken and ruderal vegetation including nettle, and rosebay willowherb *Chamaerion angustifolium*. There are also some more open, grassy areas and areas of recent scrub clearance, and a further small area of young broad-leaved woodland and scrub, comprised of ash, willow and hawthorn.

**Table 1: Target notes**

| | Description | Photo ref. |
|---|---|---|
| TN01 | Grassy bank. Rough un-managed grassland with a variety of ruderal species including perennial rye-grass *Lolium perenne*, Yorkshire-fog *Holcus lanatus*, cock's-foot *Dactylis glomerata*, common nettle *Urtica dioica*, cow parsley *Anthriscus sylvestris*, broad-leaved dock *Rumex obtusifolius*, spear thistle *Cirsium vulgare*, creeping buttercup *Ranunculus repens*, cleavers *Galium aparine*, common chickweed *Stellaria media*, and Shepherd's-purse *Capsella bursa-pastoris*. | Plate 1 & 2 |
| TN02 | Two small ornamental cherry trees ~5m tall. Large Leyland cypress *Cupressocyparis leylandii* hedge enclosing the garden. | Plate 3 |
| TN03 | Large dense hedge/scrub. Predominantly hawthorn *Crataegus monogyna* ~4.5m tall. | - |
| TN04 | Large dense hedge/ scrub extending to pond. Including small ash ~8m tall | Plate 4 |
| TN05 | Several small trees and poplars ~12m tall, to the south of the pond. | Plate 4 |
| TN06 | Wide, dense hedge. | - |

**Figure 2: Phase 1 Habitat Map**

## Mammals

### *Badgers*

No evidence of badgers was identified during the Phase 1 habitat survey.

### *Bats*

Survey results are forthcoming.

The area surveyed during the Phase 1 habitat survey holds potential for foraging and commuting bats. The majority of trees within 500m are relatively young and without any crevices, but larger trees within the woodland areas may provide suitable roosting opportunities bats.

### *Riparian Mammals (otters and water voles)*

No evidence of riparian mammals was identified during the Phase 1 habitat survey, and the habitats on and immediately surrounding the site are not considered capable of supporting such species.

## Birds

Survey results are forthcoming.

Bird species observed during the Phase 1 habitat survey include linnet *Carduelis cannabina*, chaffinch *Fringilla coelebs*, wren *Troglodytes troglodytes*, blackbird *Turdus merula*, great spotted woodpecker *Dendrocopos major*, rook *Corvus frugilegus*, jackdaw *Corvus monedula*, magpie *Pica pica*, lesser black-backed gull *Larus fuscus*, buzzard *Buteo buteo*, wood pigeon *Columba palumbus*, and pheasant *Phasianus colchicus*.

## Amphibians

### *Great Crested Newt*

There are three ponds on the landholding and a further pond directly bordering it, which provide potential habitat for great crested newts. Ponds were visited during the Phase 1 habitat survey and scored using the Habitat Suitability Index (HSI)[23], an indicative tool used to categorise the suitability of a water body for great crested newt occupation. Ponds are rated from 0 to 1, where 0 represents a suboptimal pond and 1 indicates an optimal pond for the species.

Results are summarised below.

[23] Oldham R, Keeble J, Swan M, Jeffcote M (2000) Evaluating the suitability of Habitat for Great Crested Newt (*Triturus cristatus*). Herpetological Journal **10**: 143-155

**Table 2: Pond HSI Summary**

| Pond no. | Habitat Suitability Index Classification | Description | Photo ref. |
|---|---|---|---|
| P01 | 0.68 - Average | Pond fenced. Open water with, marginal vegetation on banks; abundant common reed, with nettle and rosebay willowherb. | Plate 10 |
| P02 | 0.76 - Good | Pond fenced. Open water with, marginal vegetation on banks. Abundant nettle occasional willow scrub. | Plate 11 |
| P03 | 0.57 – Below average | Pond fenced with P02. Near dry at time of survey. Abundant nettle and rosebay willowherb on banks. | Plate 12 |
| P04 | 0.75 - Good | Heavily shaded pond abundant willows, with bramble. | Plate 13 |

The ponds are considered capable of also supporting other amphibian species, namely common frog, common toad and smooth newt.

# Impact Assessment Methods

## Potential impacts on ecological receptors

A number of impacts on ecological receptors may result from the construction and operation of the proposed wind turbine.

### *Physical land take*

An area of land will be appropriated to accommodate the wind turbine base, and a short section of access tracks estimated at around 25m will be required for this development.

The duration of impacts is estimated at 25 years (the industry standard lifespan for a wind turbine development). The proposed development could be removed after decommissioning, and so potential impacts are ultimately reversible.

### *Construction activities*

The activity, noise, and fumes from assembling the turbine, and burying electricity transport cabling, could disturb species using the site. The duration of construction impacts would be temporary.

### *Avoidance during operation*

These effects are defined as the abandonment of areas of wildlife significance following wind turbine construction, due to the presence of the turbines or related operational activities. This is mostly relevant to volant (i.e. flying) species.

Effects may be either temporary and will disappear with habituation or lasting as long as the development is in place. Potential impacts are judged to be reversible upon decommissioning of the turbine.

### *Collision*

The key factors determining the level of collision risk at wind developments are the frequency of animals flying across the turbine site at a height equivalent to a spinning turbine rotor, the proficiency of different animal species in detecting and avoiding moving turbine blades, and any potential behavioural attraction to outputs generated by the turbine (e.g., heat, noise, visuals).

The duration of impacts is estimated at 25 years (the industry standard lifespan for a wind turbine development). Potential impacts would cease with the decommissioning of the turbine, but may or may not be reversible.

### *Impacts on surrounding areas of biodiversity value*

A wind turbine could potentially indirectly impact nearby wildlife refuges (e.g., SPAs, SSSIs or LWSs) by affecting species which reside for some length of time within the refuge but at other times forage or migrate into the surrounding landscape within range of the turbine.

Potential impacts would cease with the decommissioning of the turbine.

### Impact magnitude

As described by Byron (2000[24]), when necessary to define potential impacts in qualified terms, the impact magnitude categories and criteria can be described as:

- Major negative effect – that which has a harmful impact on the integrity of a site or the conservation status of a population of a species within a defined geographical area (e.g. fundamentally reduces the capacity to support wildlife for the entirety of a conservation site, or compromises the persistence of a species' population).
- Intermediate negative effect – that which has no adverse impact on the integrity of a conservation site or the conservation status of a species' population, but does have an important adverse impact in terms of achieving certain ecological objectives (e.g. sustaining target habitat conditions and levels of wildlife for a conservation site or maintaining population growth for a species).
- Minor negative effect – some minor detrimental effect is evident, but not to the extent that it has an adverse impact in terms of achieving ecological objectives.
- Neutral effect – that which has no predictable impact.
- Positive effect – that which has a net positive impact on a wildlife species.

### Impact probability

The likelihood that an impact will occur to a specified receptor is categorized following definitions given by the IEEM (2006[25]):

- Certain/near-certain – probability of occurrence estimated at 95% chance or higher;
- Probable – probability of occurrence estimated above 50% but below 95%;
- Unlikely – probability of occurrence estimated above 5% but less than 50%;
- Extremely unlikely – probability of occurrence estimated at less than 5%.

### Geographical scale of importance

The value of a given receptor is categorized following the terminology given by the IEEM (2006[25]).

- International;
- National;
- Regional;
- County;

[24] Byron, H. (2000) *Biodiversity Impact - Biodiversity and environmental impact assessment: a good practice guide for road schemes*. The RSPB, WWF-UK, English Nature and the Wildlife Trusts, Sandy.
[25] Institute of Ecology & Environmental Management *Guidelines for Ecological Assessment*. IEEM, Winchester, 2006.

- District;
- Local/parish;
- Within site only.

### Impact significance

For the purposes of this study, and following IEEM (2006[25]) guidelines, an ecologically significant impact is that which impacts the integrity of a defined site or ecosystem and/or the conservation status of habitats or species populations within a defined geographical area. 'Integrity' in this technical sense is defined within the Guidelines as "The coherence of [a site's] ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified."

# Species and Habitats Impact Assessments

## Statutory protected sites and non-statutory sites

The Humber Estuary and the River Trent are the dominant geographical features west and north of the site. The Humber Estuary SPA is an extensive estuarine ecosystem, supporting populations and habitats of European importance, predominantly birds. At 7km distant, the habitats of the Humber Estuary are not considered susceptible to impacts as a result of the construction or operation of this turbine. As Park Ings Farm is a single poultry farm site, dominated by buildings and hard-standing, surrounded by industrial landuses and intensively farmed arable fields, it is considered unlikely to attract bird species for which the Humber Estuary is designated. However, the proximity of the River Trent (1.2km), which is of importance to migrating species using the SPA, may bring birds of conservation concern, or those designated as qualifying features of the SPA, into the area of the proposed turbine. It is possible that such species could use (flock over, land in, or feed on) some of the fields surrounding the site. However, within 7km of the Humber Estuary SPA there are extensive areas of habitat capable of supporting such species, and across much of the wider region this habitat is closer to the SPA and of superior attractiveness to birds (i.e. larger, more open fields, better separated from industrial activity). There is therefore no reason to expect particular concentrations of birds listed under the SPA designation on or around this site.

The proposal is not expected to directly affect any SSSIs, Local Wildlife Sites or ancient woodlands. The small scale and footprint of the development, and the separating distance from these designated sites, precludes the possibility of any indirect negative effects on these sites.

## Habitats

The land-take is restricted to a small area of amenity grassland which will be required for the turbine base and associated access track. This habitat is not considered species-rich and is therefore not a UK or Lincolnshire Biodiversity Action Plan habitat. Given the high frequency of this habitat type in the region, its occurrence onsite is considered of *local* value at most and the loss of a very small area is considered a *minor negative* effect that is *certain* but *not significant*.

## Mammals

### *Bats*

The position of the turbine has not maintained a separation distance (from the blade tip) of a minimum of 50m away from linear features including ditches and hedgerows, being as it is within 3m of the pond edge, so would over-sweep the line of scrub surrounding the pond and reedbed to the east. A separation distance of 50m from linear features is recommended by the Natural England Technical Information Note TIN051 (Mitchell-Jones & Carlin 2009[26]). This guidance states:

"…in many cases, risk could be minimised by locating turbines at least 50m from hedgerows, tree-lines or woodland, as bat activity beyond this declines significantly. While bats are still active further away from linear features, the level of bat activity is likely to be so low that there is a very low risk of impact."

[26] Mitchell-Jones T. & Carlin C. (2009) *Bats and onshore wind turbines*. Natural England Technical Information Note TIN051.

Assessment of the potential impacts of the development on bats is reserved until the surveys have been completed and data analysed.

### *Other mammals*

There is some potential for water vole to use the ponds on site, although this was disconnected from any other watercourses or bodies at the time of the Phase 1 habitat survey. Badger and other BAP mammals including hedgehog and brown hare may use the site. However, the footprint of the development will be very small so, providing best practice measures are implemented during construction (described below), *neutral effects* on these species as a result of the development during both construction and operation are considered *near-certain* and *not significant*. Otter are considered to be so unlikely to occur on site (due to the lack of suitable habitat) for *neutral impacts* to be considered *certain*.

### *Amphibians and reptiles*

The four ponds are considered to offer good quality habitat for great crested newts, according to the HSI categorisation, above. Assessment of the potential impacts of the development on great crested newts and other amphibian species is reserved until the surveys have been completed and data analysed.

## Birds

### *Collision*

Collision impacts (bird strikes) may arise from the presence of wind turbines. Three main factors determine the level of collision risk at windfarms: the frequency of birds flying over the wind turbine site, the time spent in the risk zone and the ability of birds to detect and avoid turbine blades.

The turbine proposed for the development is expected to have a hub height of 50m and a rotor diameter of 40m. The hazard exposure of a particular species should consider the number of individuals observed and the amount of flight activity exhibited at an altitude equivalent to the hazard zone. The consequence of collisions with turbine blades is presumed to be 100% mortality.

The effects are assumed to persist for the duration of the operative life of the development. Potential collision effects are judged to be reversible upon decommissioning of the turbines.

Percival (2000)[27] lists a number of studies showing that such collisions are generally rare. Although in an international context some wind developments have caused relatively high bird mortality via collision, these have generally been situated along high-risk bird migration routes (such as Tarifa in southern Spain, or at Altamont Pass in California, USA) and consist of hundreds or even thousands of turbines.

Assessment of the potential impacts of the development on birds is reserved until the surveys have been completed and the data analysed.

[27] Percival, S.M., *Birds and wind turbines in Britain*, British Wildlife 12(1):8-15, 2000.

## Precautionary Measures

Precautionary measures are recommended to prevent entrapment of terrestrial species during construction. These measures will involve briefing construction personnel on the possible presence of badgers, hedgehogs, brown hares and reptiles, and providing material to enable them to recognise them should they be encountered during the works. If any of these species is discovered during works, construction should cease and a suitably qualified ecologist should be consulted.

Storage of materials and construction waste on site should be kept in areas where reptiles and newts are less likely or able to gain access and use them as refuge; site waste should be placed in skips.

Trenches and other excavations should be filled by the end of the day and not left overnight, in order to prevent animals falling in. Should it not be possible to fill excavations by the end of each day, they should be covered and a ramp left so any animals which fall in can escape.

## Conclusion

A Phase 1 survey and data search identified potential ecological receptors that are present (or may occur) on the site. As a result, the site is due to be surveyed for bats, birds and great crested newts. Potential impacts upon these groups of species are due to be assessed following relevant surveys at the appropriate times of year. The proposal is to have a very small footprint as no access tracks are required; therefore impacts on species (with the exception of bats, birds and great crested newts) and habitats are expected to be very low and not significant. However, best practice measures have been prescribed to prevent entrapment of terrestrial species during construction.

In summary, due in part to the small scale of the proposal and the minor land-take associated with it, no significant effects are predicted (at this stage) on ecological receptors that may use the site. This assessment does not at this stage relate to potential impacts on bats, birds and great crested newts, for which assessment is reserved until relevant surveys have been conducted.