
8.0 ECOLOGY AND NATURE CONSERVATION

8.1 Introduction

8.1.1 This section of the ES assesses the impacts on ecology and nature conservation that may result from the proposed development.

8.1.2 The assessment of ecological impacts follows current guidelines set out by the Institute for Ecology and Environmental Management (IEEM, 2006). It essentially involves:

- determining the scope of the ecological investigation;
- the identification of valued ecological resources and features which may be affected by the development;
- assessing whether ecological interest features would be impacted by any changes arising from the development; and
- proposing ecological enhancement, mitigation or compensation measures to avoid or offset any impacts, where possible providing net ecological benefits.

8.1.3 This section first outlines the methodology used to acquire ecological data, determine the scope of investigation, identify ecological interest features, and assess impacts. The ecological characteristics of the site and its surroundings are then described and evaluated, identifying any valued ecological receptors, and assessing their level of importance. Mitigation, compensation and enhancement measures are then proposed, which are designed to provide a net gain in the value of ecological resources within the development site.

8.1.4 This section makes no division between the construction and operational phase impacts. It is considered that the potential impacts are (a) not significant in either phase and (b) not sufficiently distinct to justify their separation without undue and unnecessary repetition.

8.2 Assessment Methodology

Determination of Scope

8.2.1 The scope of ecological investigation was determined after acquisition of background data and an initial field survey, which identified any potential ecological issues. An ecological scoping report was produced, and submitted for approval to North Kesteven District Council.

8.2.2 The following scope of survey was agreed upon as a result of this process:

- extended Phase 1 habitat survey of site and immediate surrounds, including adjacent woodland;
- breeding bird survey of site and surroundings, comprising 3 visits to the site, and 2 dusk surveys for barn owl / marsh harrier; and
- protected species survey, to include a search of ditches for water vole, search for signs of use by badger, and risk assessment of any trees or other structures which could support a bat roost;
- subsequent bat activity survey on a tree identified as having potential for roosting bats.

Consultation and Data Acquisition

8.2.3 Data was obtained from web-based sources, and by consultation with statutory and voluntary agencies. Details of the nearest statutory nature conservation sites, and the local Natural Area profile were obtained from the government multi-agency geographic information website (www.magic.gov.uk), with linked Natural England data. Species data for the relevant OS grid squares was obtained from the National Biodiversity Network website. A preliminary field assessment of the site was also made on 4th April 2007.

8.2.4 Informal consultations were held with a representative of Natural England to discuss likely key biodiversity issues in the vicinity of the site. Lincolnshire Environmental Records Centre supplied data on protected species and non-statutory nature conservation sites for a 2km search radius around the site.

Field Survey Methods

- 8.2.5 An extended Phase 1 Habitat Survey was carried out on 7th June 2007, in accordance with the standard methodology set out in JNCC (1991), as modified by Institute of Environmental Assessment (IEA, 1995). The geographical scope of the survey included the planning application boundary, together with the adjacent woodland and hedgerow to the east of the site, and a length of ditch to the north. Habitats were mapped, and a series of notes made of the species composition of habitat compartments.
- 8.2.6 The potential of the site to support protected species, such as bats, amphibians, water vole, otter and badger was assessed in terms of available habitats and ecological context (e.g. proximity of suitable habitats). An initial assessment of the suitability of the site for protected species was made following data acquisition, the initial field survey, and interpretation of aerial photographs. Otters and great crested newts were thought unlikely to be on site as there were no sizable watercourses or ponds within close proximity. As there were no ponds on site for breeding there was only small potential for great crested newts to use the area as terrestrial habitat. There are ditches on site along the northern boundary extending north and east from the site. There is a broadleaved woodland to the east and adjoining hedgerow to the north and south. Water voles, badgers and bats were therefore the species considered most likely to be present on site.
- 8.2.7 The ditches were assessed for their quality as habitat for water voles (*Arvicola terrestris*). The ditch along the northern boundary was surveyed and ditches extending to the north and east were surveyed to 50m from the site boundary. The ditches were inspected systematically for signs such as droppings/latrines, tracks, runways and burrow systems/nests with their distinctive grazed 'lawns'. Water voles are diurnal so there was also a chance of sighting adults.
- 8.2.8 Bats of several species are known to roost in trees as such, trees in the woodland and hedgerow were inspected for holes, cracks and crevices that could be used by roosting bats.

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- 8.2.9 Following the initial risk assessment, a mature ash tree (*Fraxinus excelsior*) was identified as having potential to support roosting bats; as a result, a bat activity survey was carried out. Bats are active during the hours of darkness and are most readily identified using ultrasonic bat detectors that make the bat's sonar audible to humans. An evening activity survey was carried out to assess the level of bat activity on site and to identify active bat roosts. From dusk, surveyors, equipped with bat detectors, watched the tree so that any emerging bats could be detected. The time and location of detected bats were noted, as was their direction of flight. One surveyor used a Stag electronics 'Batbox 3' and the other a Pettersson Elektronik time expansion detector which was used to record the calls of bats on site, these recordings were subsequently transferred to BatSounds v3.31 for analysis of species composition. Trees often require a dawn survey, but as this tree is a single mature tree in a hedgeline a dusk survey was sufficient, as bats coming from the tree would be easily visible.
- 8.2.10 The woods were searched for signs of badger (*Meles meles*). Efforts were made to identify any setts, latrines, tracks and/ or snuffle holes which would positively identify the presence of badger on, or close to, the site.
- 8.2.11 The data search and consultation had not identified any great crested newt (*Triturus cristatus*) records in the vicinity of the site, and no ponds were identified within 500m of the site boundaries which could provide potentially suitable breeding habitat. Nevertheless, the site was assessed in terms of its quality and potential to provide terrestrial habitat for newts.
- 8.2.12 The Common Bird Census (CBC) methodology was employed to monitor the populations of common breeding birds on site (Bibby et al., 2000; Gilbert et al., 1998; Marchant, 1983). This involves the production of bird species maps that can be used to indicate the density and distribution of territorial breeding birds. It is based on a British Trust for Ornithology (BTO) survey method known as 'territory mapping', which identifies the number and distribution of breeding territories (for individual bird species) in a specified census area. Indications of breeding include adult males singing (proclaiming a territory), adult males fighting (defending a territory), adult birds carrying food or nesting material, juveniles calling for food or being fed, or adult birds displaying alarm calls.

Additional activities of territorial significance, such as displaying and mating were noted, when appropriate.

- 8.2.13 Visits were made roughly one hour after sunrise until mid-morning (1000-1100h), as birds are generally most active at this time of day and most inactive in the early afternoon. The survey area was walked at a slow walking pace with frequent pauses, so that all birds detected could be identified. Days of inclement weather (persistent rain, high winds, poor visibility) were avoided. Survey routes were varied between visits so that there was no tendency for any part of the survey area to be visited later or earlier in the survey period. The route was organised such that any point within 50m of the survey route was visited; the open vistas on most of this site made comprehensive coverage relatively simple.
- 8.2.14 Observations of bird species' (by sight or sound) were noted on the survey map using BTO standard species and activity recording codes. This information was then transferred to a summary map. The bird survey season lies between late March and the end of June; visits are undertaken during this period, firstly to coincide with the peak singing periods for most resident and migratory species and secondly to reduce the number of unidentified juveniles recorded (Raven et al., 2004). Three visits were undertaken, on 4th April, 16th May, and 28th June 2007; the geographical scope of survey included an area of 250-300m around the planning application boundary.
- 8.2.15 Evening surveys were also carried out on 3rd April and 28th June to determine whether the site was used by foraging barn owl (*Tyto alba*).

8.3 Site Evaluation

Ecological Context

- 8.3.1 The site is located in the Lincolnshire and Rutland Limestone Natural Area. This is divided into three sub-sections: the Lincoln Heath, the Ancaster Gap, and the Kesteven Plateau. The site is located on the south side of the Ancaster Gap, around 0.95km south-east of the River Slea, at an elevation of around 12m AOD. The River Slea occupies a glacial valley with sand and gravel deposits, giving rise to small areas of acid and neutral grassland. To

the south of the valley, the Kesteven Plateau is covered with calcareous boulder clay, and is notable for supporting areas of deciduous woodland. The site is set in a lowland agricultural landscape of flat arable fields, bounded by ditches and some hedgerows; although there is a small copse adjacent to the site, the characteristic features of the Natural Area do not appear to be well represented in the immediate vicinity of the site.

Statutory Designated Sites

- 8.3.2 A site check on the Magic database revealed no statutory designated conservation sites of international or national importance within 5km of the site (search centred on grid reference 508585,345990). The nearest SSSI is Wilsford & Rauceby Warrens, located 5.2km to the SW. It comprises an extensive area of limestone grass heath developed over glacial meltwater deposits, with old sand pits which hold a great crested newt population.
- 8.3.3 Mareham Pastures Local Nature Reserve (LNR) is located 1.8km SW of the site, and Lollycocks Field LNR is 1.5km west of the site. Mareham Pastures is a former landfill site which has been restored with woodland and wildflower meadows.

Non-statutory Designated Sites

- 8.3.4 Lincolnshire Environmental Records Centre provided details of two non-statutory nature conservation sites:
- Kirkby-la-Thorpe Pit – 0.87km SW of site; and
 - Birch Wood Site of Nature Conservation Importance (SNCI) – adjacent to site.
- 8.3.5 Kirkby-la-Thorpe Pit is a flooded railway borrow pit, with open water, willow scrub and marshy grassland habitats. Birch Wood is an open, probably secondary deciduous sycamore and birch woodland, with oak and ash. The ground flora is typical of secondary woodland, while the fungal flora includes birch bracket (*Piptoporus betulinus*).

Protected Species Records

8.3.6 A list of protected species for a 5km radius of the site obtained from Lincolnshire Environmental Records Centre included the following:

- badger;
- otter;
- water vole;
- kingfisher;
- common lizard;
- grass snake; and
- great crested newt.

8.3.7 None of these species have been recorded within 0.5km of the site boundaries. Informal consultations with Natural England raised the possibility that arable field-breeding marsh harrier could be present, particularly if there were oil-seed rape fields or tall cereal fields on site. Barn owl could also potentially occur in the vicinity of the site.

Habitats

8.3.8 The disposition of habitats in and around the site is shown on Figure 8.1 (Habitat Survey), with mapping based on standard Phase 1 categories (JNCC, 1991). A series of 'target notes' indicated on the map are described in more detail in Appendix 8.1; a vascular plant species list for the site is given in Appendix 8.2. Site photographs are in Appendix 8.4.

8.3.9 The main part of the site comprises part of a much larger arable field, which had been left fallow until the 7th June habitat survey, when ploughing commenced. Three field drains had been newly installed, draining north to discharge into the peripheral ditch which forms the northern boundary of the site. The fallow field supported a fairly diverse range of plants typical of disturbed-ground habitats, interspersed with bare ground, such as scented mayweed (*Matricaria recutita*), field poppy (*Papaver rhoeas*) and black-grass (*Alopecurus myosuroides*). A perennial component of species such as creeping bent (*Agrostis stolonifera*) and rough meadow-grass (*Poa trivialis*) suggested that the field may have been uncultivated since the previous year.

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- 8.3.10 The arable field is contiguous with a much larger field which supported a pea (*Pisum sativum*) crop; a ditch shown along the western boundary on the 1:10000 base plan is no longer present. Other fields to the north supported cereal crops, with an irrigated potato (*Solanum tuberosum*) crop on the large field to the east.
- 8.3.11 The southern boundary of the site lies adjacent to the Sleaford – Kirby la Thorpe road, and includes a fairly low hedgerow with a single hedgerow tree. The hedge has a high diversity of woody species, including Midland hawthorn (*Crataegus laevigata*) and dogwood (*Cornus sanguinea*), with 10 species along its entire length, and 7 recorded in a sample 30m section. This qualifies it as Important under the 1997 Hedgerow Regulations. There is also a mature ash (*Fraxinus excelsior*) tree, situated ca. 83m west of the eastern site boundary; this is covered in ivy (*Hedera helix*). The hedgerow becomes more gappy to the east of this tree, with individual elder (*Sambucus nigra*) bushes interspersed with tall grasses and herbs.
- 8.3.12 Part of the eastern boundary of the site is formed by Birch Wood SNCI. This has a dense sycamore (*Acer pseudoplatanus*) – ash canopy, with birch (*Betula spp.*), and a dense shrub layer of elder. Because of the dense canopy, the field layer vegetation is largely suppressed, consisting of frequent arum lily (*Arum maculatum*); lighter patches support stinging nettle (*Urtica dioica*), ground-ivy (*Glechoma hederacea*) and cleavers (*Galium aparine*). A feature of the plantation is the presence of dead birch boles, which support fungi and provide a habitat for invertebrates.
- 8.3.13 The north-eastern site boundary is formed by a narrow shelterbelt. This consists of a line of very tall western balsam-poplar (*Populus trichocarpa*), with two rows of Lawson’s cypress (*Chamaecyparis lawsoniana*) either side. There is also an edge of shrubs and young ash trees.
- 8.3.14 The northern boundary of the site is formed by a recently re-profiled ditch, with very shallow water. The section adjacent to the site has no vegetation, but has had a hedge recently planted along the top of the south bank. The ditch turns north at the north-west corner of the site; this section does still support aquatic vegetation, including thread-leaved water-crowfoot (*Ranunculus trichophyllus*), and has a newly-planted hedge on its west bank top.

Protected Species

- 8.3.15 No signs of water voles were detected during the course of the survey. The ditch running north from the north-west corner of the site has some small pools of water all <3cm deep but is dry along most of the length surveyed. There is evidence of use by small mammals – possibly bank or field voles – but holes and runs are too narrow to suggest use by water voles. No latrines were found. The ditch along the northern boundary had been recently cleared of vegetation, no burrows, latrines or runs were evident and the ditch is now unsuitable for use by water voles. The ditch to the east of the site is densely vegetated and no evidence of use by any small mammals was found.
- 8.3.16 Several trees in the woodland and a large ash tree (*Fraxinus excelsior*) in the hedgerow are mature with cracks and holes which have potential to harbour roosting bats. Most of the trees are ivy covered and it was impossible to inspect the trees fully; however some holes and crevices were obvious. The trees are assessed as having medium risk of harbouring bats.
- 8.3.17 The surrounding agricultural land offers some foraging opportunity for bats, there are scattered small plantation woodlands and the hedgeline in which the ash tree was sited is one of few in the area. The hedgeline itself provides a flightline for foraging bats moving between plantations.
- 8.3.18 Details of the bat survey are provided in Appendix 8.3. Although bats were observed in the course of the surveys none were associated with the tree. Several bats appeared to be using the hedgeline as a route from one area to another with only a couple of instances of foraging by a noctule and common pipistrelle. Their identity was confirmed by analysis of recordings from the time-expansion bat detector. Details of these are presented within Figure 8.3.
- 8.3.19 No evidence of current use by badgers was found during the survey. There were signs that the wood has been used by badgers in the past. Two setts were found, one at the northern end of the conifer hedge and one at the northern end of the broadleaved section. The sett in the conifer section has been blocked with cut branches which appear to have been there for a period of time – probably in excess of a year. The sett in the broadleaved section had a old fox scat, containing badger hair, outside. The sett appeared to be in use

by rabbits having rabbit droppings in the entrance. Another hole in close proximity had also been blocked with branches in the past. No evidence of feeding activity was obvious although there was much digging by rabbits and no tracks were evident. Evidence of foxes using the wood was recorded – scats were found and a strong scent of fox was obvious in several areas of the wood.

8.3.20 No ponds have been identified on, or in the vicinity of, the site and therefore it is unlikely that great crested newts would be using the site as terrestrial habitat. The site would provide good terrestrial habitat for newts with a diverse range of habitats for feeding, shelter and hibernation. This included uncultivated arable land, wet ditches and trees and hedgerow shrubs, all of which would support a relatively diverse invertebrate community.

Breeding Birds

8.3.21 Thirty-five species of bird were observed in and around the survey area, of which seventeen species were recorded within the site (see Appendix 8.5). These included:

- no species with special legal protection under Schedule 1, Part I of the Wildlife & Countryside Act (1981), or Annex I of the EU Birds Directive;
- 5 species listed under Section 74 of the 2000 Countryside & Rights of Way Act, all of which are also UK BAP priority species (2 on site);
- 6 species on the RSPB/BTO 'Red List' of birds of conservation concern;
- 11 species on the RSPB/BTO 'Amber List' of birds of conservation concern; and
- 9 Lincs BAP priority species.

8.3.22 Note that there is some overlap between categories.

8.3.23 The fallow field which makes up the main part of the site supported two of the 'Section 74' species recorded, and one Amber List species. One pair of skylarks were believed to be breeding near the north-western corner of the site, while a pair of partridge were recorded in the same area, although breeding was unconfirmed. Meadow pipit (an Amber List species) were also breeding in the field.

8.3.24 Peripheral habitats of hedgerows and ditches provided a further habitat for birds. Another Section 74 species, reed bunting, was recorded just to the north of the site, although not thought to be breeding. The hedgerow on the southern boundary of the site held a number of species, including dunnock whitethroat, blackbird and goldfinch; linnet (non-breeding), yellowhammer, and greenfinch (non-breeding) were recorded further along the hedgerow to the west of the site. The tall conifer / poplar hedge along the north-eastern site boundary supports robin, wren, dunnock and chaffinch.

8.3.25 Birch Wood supports breeding great-spotted woodpecker, together with typical woodland species such as robin, wren, dunnock, blue tit, great tit and chaffinch.

8.3.26 No raptors or owls were recorded in the evening surveys, although a sparrowhawk was noted hunting at the edge of the tall conifer hedge on the eastern boundary of the site. Kestrel bred successfully in the wider vicinity of the site; three birds, including two juveniles, were recorded in an ash tree some 240m north-west of the north-western site boundary.

Summary of Ecological Interest Features

8.3.27 The following ecological interest features are present in or adjacent to the site:

Feature	Scale of importance	Reason
Birch Wood SNCI	District	
Mature hedgerow ash tree	Local	Medium risk of supporting bat roost
Skylark	Local	Section 74 species, but widely distributed and common
Grey partridge	Local	
Southern boundary hedgerow	Local	Important under 1997 Hedgerow Regulations – high species diversity. Provides flightline for foraging bats

8.4 Impact Assessment

8.4.1 Construction and operation of the development will primarily affect an area of actively managed arable land, which was being ploughed in June 2007, and

had recently had new field drains installed. There are no features of high nature conservation interest on this part of the site, and the direct impacts of the development are unlikely to be significant.

- 8.4.2 The key feature likely to be impacted as a consequence of the development is the hedgerow along the southern boundary. The need to construct site access, with appropriate visibility splays, is likely to result in the loss of most of this feature, including a mature ash tree.
- 8.4.3 Loss of the hedgerow is a negative impact of local significance; there are few hedgerows in the immediate vicinity of the site, and it is used by local foraging bats as a flightline.
- 8.4.4 Birch Wood SNCI should not be directly affected by the proposed development. There are unlikely to be any indirect impacts; for example there are no features within the site which would be vulnerable to localised changes in air quality, such as increased nitrogen deposition.
- 8.4.5 One pair of skylarks, and a pair of grey partridges, both Section 74 bird species, will be displaced from the development area. The value of the site to these species was at least partly due to the fallow field present in spring 2007, a temporary feature which has recently been ploughed. In an arable agricultural landscape, the suitability of any particular area for skylark varies spatially and temporally, and the development will result in a minor, non-significant (although permanent) loss of suitable habitat.
- 8.4.6 Reed bunting will not be adversely affected by the development, as there is very limited suitable habitat for this species on site.
- 8.4.7 Given the insignificant nature of the individual impacts listed above, the ecological assessment has not considered cumulative effects.

8.5 Mitigation and Ecological Enhancement

Mitigation Measures

- 8.5.1 Loss of the southern boundary hedgerow should be kept to the minimum consistent with acceptable site lines for traffic emerging from and turning into the development. It is understood that the need to maintain sightlines will require the loss of the mature ash tree, and most of the hedgerow to the south of the development site.
- 8.5.2 A summary of mitigation measures is given in Appendix 8.6. This brings together statutory measures (e.g the protection of breeding birds during vegetation clearance) and those specific to the development (e.g. lighting design). Further details of lighting design can be found in Chapter 4 of this ES.

Compensation Measures

- 8.5.3 The site landscape design should incorporate linear scrub features utilising a similar mix of species to that which occurs in the local hedgerows, ideally sourced from local provenance plant material. A suitable palette of species could include the following:

Species	English Name
Acer campestre	Field maple
Cornus sanguinea	Dogwood
Corylus avellana	Hazel
Crataegus laevigata	Midland hawthorn
Crataegus monogyna	Hawthorn
Euonymus europaeus	Spindle
Fraxinus excelsior	Ash
Ligustrum vulgare	Wild privet
Prunus spinosa	Blackthorn
Rosa canina	Dog rose
Rosa rubiginosa	Sweet briar
Salix cinerea ssp. cinerea	Grey willow (East Anglian sub-species)
Sambucus nigra	Elder

- 8.5.4 The aim with the planting design should be to create a belt of scrub and young woodland to the south of the plant, which links Birch Wood with the remaining roadside hedge to the west of the development. As this matures, it will

compensate for the loss of the roadside hedge, providing a habitat for foraging bats, and will also extend the available scrub / hedgerow habitats for breeding birds.

Ecological Enhancement Measures

- 8.5.5 The land-take around the development provides further opportunities to create new habitats, which would complement those present in the vicinity of the development. As well as hedgerow / scrub habitats, the most valuable would be wetland habitats (complementing the ditches) and woodland (locally restricted in area, complementing Birch Wood and other copses in the wider vicinity of the site). Unimproved grassland habitats, while now rare in this part of Lincolnshire, are also very valuable, and can exploit the underlying base-rich nature of the soil.
- 8.5.6 The wetland habitat results from the inclusion of a SUDS type surface water drainage scheme (described fully in Chapter 9 of this ES). This drainage scheme would not result in a permanent area of open water, but a valuable wetland habitat need not necessarily include such a feature; a drainage swale or similar feature which would be periodically inundated could support a small area of marshy grassland or fen habitat. In order to maximise the value of wetland habitats, site drainage should where possible be in open ditches rather than piped drains. These measures may result in use of the site by reed bunting, a Section 74 species recorded in the vicinity of the site.
- 8.5.7 The most effective location for the creation of new woodland and hedgerow planting is adjacent to Birch Wood. This would maximise ecological connectivity for species which are dependent on the woodland and scrub habitats.
- 8.5.8 The creation of grassland habitats may be more problematical, because of residual fertility arising from the former arable use of the site. It may be more valuable to use areas of exposed subsoil, subject to testing for physico-chemical suitability. This would reduce the productivity of the grassland, increasing the likelihood of creating a diverse, possibly calcareous, grassland.

8.6 Summary and Conclusions

- 8.6.1 The proposed site contains few features of significant nature conservation interest, although it lies adjacent to a woodland which has been designated as a non-statutory site of conservation importance. The hedgerow along the southern boundary has a high woody plant diversity, and would qualify as Important under the 1997 Hedgerow Regulations.
- 8.6.2 The predicted impacts of the development will involve the loss of most of the hedgerow along the site frontage, in order to provide road access to the site with appropriate visibility splays. This will also affect the current usage of the roadside by foraging bats.
- 8.6.3 The development will result in the displacement of one pair of skylarks and one pair of grey partridge, species listed under Section 74 of the 2000 Countryside and Rights of Way Act. However, it will not significantly or legally affect any species with special legal protection. The adjacent woodland will not be affected.
- 8.6.4 Mitigation, compensation and enhancement measures are proposed which involve:
- planting locally-native scrub species to compensate for hedgerow loss; and
 - creating new wetland (not permanently wet, see paragraph 8.5.6), grassland and woodland areas around the development
- 8.6.5 Based on currently available data, the development would result in a negative ecological impact of local significance. With compensation and mitigation measures, this impact can be ameliorated to provide a positive impact of local significance through the creation of new habitats. Species which could benefit include reed bunting and linnet, while suitable habitat will be created for foraging bats as scrub and tree planting matures.
- 8.6.6 A summary of measures that will be taken to mitigate ecological impacts is presented in Appendix 8.6.

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