

LINDHURST
MANSFIELD

6. ECOLOGY AND NATURE CONSERVATION

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6.0 ECOLOGY AND NATURE CONSERVATION

6.1 Introduction and Background

6.1.1 This chapter assesses the effects of the project on the ecology of the site. The assessment has been prepared by FPCR LLP and considers the ecological and nature conservation value based on the results of a series of ecological surveys undertaken between 2007 and 2009.

6.1.2 The aims of the assessment were:

- To characterise all habitats present at the site including woodland, scrub, grassland, hedgerows, fields and open water;
- To compile species lists for semi-natural vegetation in and around the development;
- To assess species distribution and diversity;
- To review habitats of nature conservation value in a local, regional and national context and within the context of current and emerging nature conservation policies;
- To assess the impact of the Proposals on the existing ecology;
- To identify areas of ecological interest and make recommendations to minimise the potential impact of the Proposals and where feasible, to consider opportunities for additional habitat creation.

6.1.3 Specifically, this document describes results of the following field surveys:

- An Extended Phase 1 Habitat survey;
- Hedgerow surveys assessing the conservation value in accordance with the Hedgerow Evaluation and Grading System (HEGS, Clements and Toft, 1992) and the Hedgerow Regulations 1997;
- Bat transect surveys and bat surveys of buildings affected by the Project;
- Breeding, crepuscular and overwintering bird surveys;
- Badger surveys;
- Great crested newt surveys;
- Reptile surveys;
- White clawed crayfish survey;
- Water vole and Otter survey.
- Chemical water quality testing;
- Freshwater macro-invertebrate survey;
- A Veteran tree survey (including assessment for bat roost potential);
- An Arboricultural tree assessment according to BS 5837;

Planning Context

6.1.4 Relevant existing and emerging planning policies in relation to nature conservation have been reviewed as part of the assessment (see Appendix 6A for full details).

Scoping and consultation for existing data

6.1.5 Informal scoping was undertaken with Natural England (NE), The Forestry Commission (FC) and Nottinghamshire Wildlife Trust (NWT), who were contacted and given the opportunity to comment on broad descriptions of the proposals.

6.1.6 As a result, whilst it is understood that the presence of nightjars within Sherwood Forest nearby could lead to its future designation as a Special Protection Area (SPA), it was concluded following informal discussions with NWT, NE and the Royal Society for the Protection of Birds (RSPB) that an Appropriate Assessment is not required as it was not designated as either a provisional SPA (pSPA) nor a SPA (this remains the case at the time of writing in February 2010). It was recommended that specific nightjar surveys including suitable nightjar habitats within 500m of the boundary should be undertaken and assessed as part of baseline surveys for the ES.

6.1.7 Foulevil Brook follows the site's southern boundary, ultimately discharging into Rainworth Lakes SSSI. Following discussion with NE it was recommended that a baseline assessment of the water quality at Rainworth Lakes SSSI should be undertaken to enable future monitoring and determine any changes over time as a result of the development.

6.1.8 The following organisations/individuals/databases were also consulted for existing information regarding species, habitats & non-statutory sites within 2km of the site:

- The Nottinghamshire Wildlife Trust (NWT);
- Nottinghamshire Biological and Geological Records Centre (NBGRC);
- The Nottinghamshire Bat Group;
- Nottinghamshire Bird Club
- National Biodiversity Network database www.searchnbn.net

6.1.7 The Multi-Agency Geographic Information for the Countryside (MAGIC) website www.magic.gov.uk was consulted for information on the location of statutory sites including Sites of Special Scientific Interest (SSSI) and National Nature Reserves

(NNR) up to 3km from the site and Special Areas of Conservation (SAC) and Special Protection Areas (SPA) up to 5km from the site. Where such sites were present the Natural England interactive map Nature on the Map www.natureonthemap.gov.uk was consulted for further details.

Surveys for Flora and Fauna

6.1.8 Habitats were surveyed using the standard Extended Phase 1 Habitat Survey methodology (JNCC 2003), hedgerows were surveyed using the Hedgerow Evaluation and Grading System (HEGS) (Clements and Tofts, 1992) and the Hedgerow Regulations 1997. Faunal surveys were completed during the appropriate survey seasons and all methodologies followed the published guidelines as accepted by statutory and non-statutory agencies including Natural England. Detailed survey methodologies for flora and fauna are provided at either Appendix 6B or within the relevant survey report.

Assessment Methodology

6.1.9 Detailed assessment methodology is also presented at Appendix 6B. Reference has been made to several assessment methodologies including the Guidelines for Baseline Ecological Assessment (1995) and to the Institute of Ecology and Environmental Management (IEEM) Guidelines for Ecological Impact Assessment (EclA) in the United Kingdom (July 2006).

6.2 Planning Context

6.2.1 The policy and guidance framework for nature conservation is provided by the following national, regional and local policies. Full details of these are supplied at Appendix A.

- Planning Policy Statement 9 (PPS9) Biodiversity and Geological Conservation;
- Government Circular: Biodiversity and Geological Conservation, Office of the Deputy Prime Minister, June 2005 (ODPM Circular 06/2005);
- The East Midlands Regional Plan, March 2009
- The Northern Sub-Regional Strategy (SRS)
- Strategic Plan for Greenwood Community Forest, September 2000
- East Midlands Regional Environment Strategy, East Midlands Regional Assembly, adopted August 2002
- the Mansfield District Local Plan, adopted in 1998 (currently under review as the emerging as the Mansfield District Local Development Framework
- Interim Planning Guidance (IPG) Note 11: Green Infrastructure, Adopted April 2009

Supplementary Guidance Documents

Biodiversity Action Plans (BAP)

6.2.2 Biodiversity Action Plans are part of the government's strategy for the implementation of the 1992 Convention on Biological Diversity. BAPs have been developed for the UK as a whole (UKBAP) and developed at local levels (LBAP) to protect a number of rare or declining species and habitats. Under the Countryside and Rights of Way Act (2000) and the Natural Environment and Rural Communities Act (2006) the government and local authorities have a duty to extend due regard to biodiversity in so far as is consistent with the proper exercise of their function.

6.2.3 The following UKBAP habitat and species action plans are considered potentially relevant to the assessment:

Habitat action plans:

- Arable Field Margins;
- Hedgerows;
- Lowland Mixed Deciduous Woodland;
- Ponds.

Species action plans:

- Bulfinch;
- Brown long eared bat;
- Nightjar;
- Dunnock;
- House Sparrow;
- Linnet;
- Reed Bunting;
- Skylark;
- Song Thrush;
- Yellow Hammer;
- Yellow Wagtail;
- Great crested newt;
- Noctule bat.

6.2.4 The following LBAP habitats and species action plans are considered potentially relevant to the assessment:

Habitat action plans:

- Farmland: Arable Farmland, Arable Field Margins and Improved Grassland;
- Hedgerows: Including Ancient and/or Species-Rich Hedgerows;

- Eutrophic and Mesotrophic Standing Waters.

Species action plans:

- Bats;
- Nightjar

6.3 Assessment of Ecological Baseline Conditions

Existing biological information

Designated Sites

6.3.1 No statutory or non-statutory designated sites of nature conservation interest lie within the site. Four statutory Sites of Special Scientific Interest (SSSI), five non-statutory Local Nature Reserves (LNR) and 17 non-statutory Sites of Interest for Nature Conservation (SINC) were located within the 2km search radius. Statutory site citations are included in Appendix 6C. A summary of all statutory and non-statutory protected sites is illustrated in Figure 6.1 and listed in Appendix 6C.

6.3.2 A large area of Sherwood Forest, approximately 4km north east of the site, has been highlighted by NWT and the RSPB as supporting a breeding population of nightjars which meets the minimum qualifying criteria for designation as a SPA. This may include Harlow Wood within its red line. At the time of writing (January 2010), this area is not currently designated as either a SPA or a pSPA. However, the National Nightjar Survey (RSPB, BTO, 2004) indicates the Sherwood Forest population as supporting between 1.47% and 2.05% of the British population. Qualifying criteria for SPA designation require a population to be at least 1% of the British population of a bird listed on Annex 1 of the EC Birds Directive. The nightjar population associated with Sherwood Forest is therefore considered to be of **international** importance. The current species action within the LBAP highlights Nottinghamshire as holding a nationally important population of nightjars.

6.3.3 Rainworth Lakes SSSI lies approximately 300m to the south of the site at its eastern extent and is the most proximal statutory site, designated for the presence of Fen Marsh and Swamp habitat (UK and LBAP priority habitats), open water, swamp, fen woodland, mixed broadleaved woodland and unimproved acid grassland. Three further SSSI were located within 2km of the site. Rainworth Heath has some of the best remaining areas of wet and dry heath in Nottinghamshire and is of both floral and faunal interest and located approximately 1.3km east of the site; Strawberry Hill Heaths comprise an

important remaining part of the formerly extensive dry acid lowland heathland of Central Nottinghamshire and are located approximately 1.1km northeast of the site and; Sherwood Forest Golf Course, lying on Triassic Bunter Pebble Beds which contains one of the largest blocks of lowland heathland in the country and is situated over 3km northeast of the site. These habitats are all afforded statutory protection under the WCA and are important at a **National** level.

- 6.3.4 Seventeen SINC and five LNR were located within the 2km search radius. Harlow Wood SINC, a coniferous plantation designated for its rich flora over acid grassland, is the closest of these sites, abutting the south western boundary of the site. Many of the remaining sites are clustered together in pockets, such as those around Rainworth, and around the woodland and lowland heath in the surrounding countryside. Other SINCS are located over 1km from the site and, with the exception of Cave Pond and Wood SINC which is located to the south beyond further arable field compartments, are separated from the assessment site by existing roads and/or development. SINC sites are designated according to the qualifying criteria set out in the SINC Selection in Nottinghamshire, Nottingham City Council, 2007. Whilst not afforded statutory protection, they are therefore of **County** level importance.

Species Records (refer to Figure 6.1 and Appendix 6C)

- 6.3.5 Protected and notable species records have been received for the area 2km search area. In summary, no protected species records were supplied for the assessment site itself, with two UK BAP bird species recorded on site (grey partridge *Perdix perdix* and Eurasian woodcock *Scolopax rusticola*). Nightjar records (individually protected under the WCA) were supplied for Harlow Wood SINC, adjacent to the site. All other protected species records were at least 500 metres from the boundary. Full details are presented in Appendix 6C.

Field Survey

Site Description and Context

- 6.3.6 The site covers 169.3ha and comprises two distinct areas of land, bisected into northern and southern compartments by the Sherwood Way (A617). The site is further bisected east-west by Black Scotch Lane public bridleway and Adamsway, running into Mansfield town centre. It is bordered by the urban fringe of Mansfield to the north; the A60 Mansfield - Nottingham road to the west and the A6191 along the eastern boundary. Harlow Wood SINC is located along the southern boundary at its western end. Rainworth Lakes SSSI lies approximately 300m to

the south at the site's eastern extent. Sherwood Business Park is situated north of the site at its eastern extent and Lindhurst Farm and associated residential buildings and cottages are located adjacent to the southern site boundary. The site is centred on ordnance survey grid reference SK 570580. Site location is shown on Figure 6.1 Site Location and Consultation Data.

- 6.3.7 The site principally comprises field compartments of intensively managed arable farmland divided by native hedgerows, typically dominated by hawthorn *Crataegus monogyna* and blackthorn *Prunus spinosa*, and by post & wire fencing, with occasional pockets of plantation woodland, groups of trees and several buildings. Areas of species poor semi-improved grassland are present in the north-western area. Immature mixed plantation lines the cutting of Sherwood Way, with four flood attenuation facilities also in the area here. Semi-improved grassland verges line the Adamsway Road. A small number of semi-mature and mature trees are scattered throughout the site. Firs Farm, a pig farm, lies within the northern half of the site and is of mixed construction, with metal sheds sited around an older complex of stone barns and a farmhouse. These are the only buildings within the site.

Habitats (Figure 6.2 & Appendix 6D)

Mixed Plantation

- 6.3.8 The cutting and embankment of Sherwood Way has been planted with mixed saplings, now between 2 and 4m in height, comprising around 12ha of immature plantation. Species comprised largely native trees such as pedunculate oak *Quercus robur*, silver birch *Betula pendula*, beech *Fagus sylvatica*, rowan *Sorbus aucuparia* and alder *Alnus glutinosa*, with scrub species such as goat willow *Salix caprea*, holly *Ilex aquifolium*, hawthorn *Crataegus monogyna*, dog rose *Rosa canina* and gorse *Ulex europaea*. Trees are relatively limited in their diversity, but provide some connectivity through the site for local fauna and as such this habitat is considered to be of **site** nature conservation value. As they mature with time, these strips of plantation may become more valuable providing increased foraging and sheltering opportunities to a range of local fauna.

Scrub

- 6.3.9 A small pocket of bramble *Rubus fruticosus agg.* scrub was present to the west of Firs Farm, with scattered scrub across the site, with species including bramble, goat willow and hawthorn. Occasional outgrowths hawthorn scrub followed the edge of the ruderal vegetation strip described below, probably indicating the

location of a former hedgerow. Due to small and scattered extent of this resource, scrub is considered to be of **negligible** nature conservation value.

Unimproved roadside verges

- 6.3.10 The unmanaged Adamsway roadside verges near to Firs Farm were on steep free draining slopes and dominated by pea species such as black medick *Medicago lupulina*, common vetch *Vicia sativa*, red clover *Trifolium pratense*, and hairy tare *Vicia hirsuta*. Grass species included abundant meadow foxtail *Alopecurus pratensis*, false oat-grass *Arrhenatherum elatius*, barren brome *Anisanthus sterilis*, sweet vernal-grass *Anthoxanum odoratum* and annual meadow grass *Poa annua*. Other herbs in the sward included yarrow *Achillea millefolium* and common sorrel *Rumex acetosa*. The verges are a common and widespread habitat, they lack obvious management and support a low-moderate diversity of common species. Whilst unimproved neutral grassland is listed on the NBAP, comprising mainly hay meadows, pastures and fragments of such meadows now forming road-side verges, the verges on this assessment site do not support the range or typical criteria species required for this LBAP habitat. The verges do however provides a degree of limited connectivity through the site, although form only a small proportion (totalling 1.75ha) of the verges recorded on site. They are therefore considered to be of **site** level nature conservation importance, providing some interest and diversity within their immediate context only.

Species-poor semi-improved grassland

- 6.3.11 Several field compartments were cropped for hay where the sward composition was relatively limited, dominated by perennial rye grass *Lolium perenne* with abundant false oat-grass and soft brome *Bromus mollis*. Locally frequent areas of red fescue and Yorkshire fog *Holcus lanatus* as well as clumps of cock's-foot *Dactylis glomerata* and timothy *Phleum pratense* were recorded. Herbs present included dove's-foot crane's-bill *Geranium molle*, ribwort plantain *Plantago lanceolata*, greater plantain *Plantago major*, red clover *Trifolium pratense* and autumn hawkbit *Leontodon autumnalis*. Whilst this grassland does provide a slight increase in diversity for the immediate area and is connected to other linking habitats, such as hedgerows, it is considered to be of **negligible** nature conservation value - it is not listed as a priority habitat in the UKBAP or the LBAP, is relatively small in area (approximately 15ha) and of limited value to local fauna due to inappropriate management for nature conservation.

Bracken

- 6.3.12 A strip of bracken *Pteridium aquilinum* dominated vegetation was adjacent to hedge H30 and Black Scotch Lane. This is of **negligible** value.

Tall Ruderal Herb vegetation

- 6.3.13 An area of ruderal vegetation was present in a field which had been left fallow in the south western quarter of the site. The community was dominated by mugwort *Artemisia vulgaris* with abundant common nettle *Urtica dioica*, cow parsley *Anthriscus sylvestris*, creeping thistle *Cirsium arvense* and curled dock *Rumex crispus*. Similar vegetation was also present along narrow field margins. All species were common and widespread and typical for this habitat type, individual areas were limited in size (covering 0.95ha in total), with field margins also being narrow. This habitat is therefore considered to be of **negligible** nature conservation value.

Open water

- 6.3.14 Four water-bodies are extant within the site boundary: W2, W3, W4 and W10. All other water-bodies are outside the boundary.

On site water-bodies

- 6.3.15 The four water-bodies within the site (W2, W3, W4 & W10) comprise a series of dry attenuating facilities for run-off from Sherwood Way. W5 also forming part of this series lies just outside the western boundary. The water-bodies are apparently dry most of the year by design, with water only present following rainfall. At the time of survey, they contained a maximum water depth of 1m and were surrounded by dry grassed banks. No aquatic or marginal vegetation was associated with these waterbodies, although occasional patches of soft rush *Juncus effusus* were recorded at margins. Their value to local wildlife and to those herpetofauna in particular which might use aquatic environments, is limited and no such protected species were identified using these areas. They are not considered to meet the classification as a UKBAP priority habitat. The value is therefore considered to be of **negligible** nature conservation importance.

Off site water-bodies

- 6.3.16 W1 was a shallow man-made pond approximately 20m beyond the south eastern site boundary. The pond supports a well developed marginal and aquatic flora, including a large area of reed-bed dominated by greater reedmace *Typha latifolius* in wetter areas and soft rush on its margins. The pond is considered to

have **local** nature conservation value at most. It did not support protected species such as great crested newt, but is likely to be of localised interest to a range of other small mammals and invertebrates in the immediate area.

6.3.17 Three lakes (W6,W7 & W8) forming part of The Rainworth Lakes SSSI were surveyed for this assessment. W6 was the smallest of the three (~1000m²) and has an established emergent and marginal flora, dominated by reed-mace. W7 was larger (~3250m²) and had limited aquatic flora, as had W8, also a similar size to W7. The habitats of the SSSI are defined and described in more detail in the citation documentation at Appendix 6C. The water quality of these three lakes is addressed later in this chapter and also in more detail at Appendix 6I. As a SSSI these are assessed as having **national** importance for nature conservation.

6.3.19 W9 is a small man-made pond to the west of Rainworth Lakes which lies within a section of marshy grassland dominated by soft rush. The pond is approximately 1m deep, abundant reed-mace dominated the margins with a small area of open water at its centre and is assessed as being of **local** importance at most.

Arable Land

6.3.20 The majority of field compartments within the site boundary are under arable production and are intensively managed, comprising approximately 130ha of the site area. In the north and western areas, this appeared to provide fodder for the pigs at Firs Farm, whereas in the southern areas of the site, barley and wheat production was dominant.

6.3.21 Many of these fields had narrow margins extending between 1 and 4m into the field compartments, and were dominated by tall herb/ruderal species as described above at paragraph 6.3.13, also with chicory *Chichorium intybus*, agrimony *Agrimonia eupatoria*, black knapweed *Centaurea nigra*, harebell *Campanula rotundifolia* and cuckoopint *Arum maculatum* in places. No rare or scarce species associated with arable land were recorded in these fields or their margins. Arable land provides potential habitat for breeding skylark and lapwing, both UKBAP & LBAP species, with the former confirmed as breeding in small numbers in the east of site. *Farmland: Arable farmland, arable field margins and improved grassland* is a priority habitat in the LBAP, for its potential for breeding and overwintering avi-fauna as well as the occurrence of scarce and rare arable weeds. Whilst not supporting a rare or particularly high diversity of botanical species, the arable fields and in particular their associated margins, provide habitat for

farmland and over wintering birds as well as connectivity and a foraging resource for the local bat population (see paragraphs 6.3.26 and 6.3.33 below). They are considered to be of **site** level importance for nature conservation value, given the extent of this resource in the local area.

Hedgerows

6.3.22 There are 40 hedgerows present within the site boundary extending to around 6 linear km; Table 6.1 below summarises these. The majority of the hedgerows surveyed were of limited conservation interest with low species diversity. Eight hedgerows were classified as having nature conservation priority under HEGS, that is grade 2 and above (H2, H15, H17, H19, H22, H23, H24, H38)) and all hedgerows on site qualified as UK BAP Priority Habitats comprising 80% or more native woody species. Hedgerows were typically dominated by hawthorn and were not considered to be species rich. The hedgerows in general provide movement and foraging routes for local fauna using the site including bats and provide nest sites and foraging habitats for farmland birds. All hedgerows are assessed as having only **site** level value, being of moderate structure but of low species diversity, providing some foraging habitat and connectivity to the wider countryside for the fauna using the site.

Table 6.1 – Hedgerow Classification Table

Bold indicate Important hedgerows under the Hedgerow Regulations 1997

Italics indicates hedgerows of conservation priority under HEGS

Number	No. Canopy species	Associated Features: Bank or wall; <10% gaps; Ditch along half its length; connections; >1 standard tree/50m; parallel hedge within 15m or public byway	Important under Hedgerow Regulations	Grade under HEGS	Species Rich	Length (m)
1	2	<1 standard tree/50m, hedge bank, public byway.	No	3+	No	400
2	3	<1 standard tree/50m, hedge bank, grass verge, public byway	No	2-	No	120
3	3	<1 standard tree/50m, hedge bank, grass verge	No	2-	No	230
4	3	hedge bank, grass verge	No	2-	No	230
5	3	hedge bank, grass verge, public byway	No	2	No	700
6	1	Grass verge	No	3-	No	120
7	4	hedge bank, grass verge, public byway	No	3+	No	500

Number	No. Canopy species	Associated Features: Bank or wall; <10% gaps; Ditch along half its length; connections; >1 standard tree/50m; parallel hedge within 15m or public byway	Important under Hedgerow Regulations	Grade under HEGS	Species Rich	Length (m)
8	3	<1 standard tree/50m, hedge bank, grass verge. Public byway	No	3	No	640
9	2	hedge bank, grass verge	No	2-	No	350
10	2	Hedge bank, grass verge	No	3+	No	200
11	2	Grass verge	No	3+	No	160
12	3	hedge bank, grass verge, public byway	No	2-	No	230
13	2	public byway	No	3-	No	400
14	2	>1 standard tree/50m, hedge bank	No	4	No	300
15	2	grass verge, public byway	No	2+	No	270
16	3	grass verge	No	4	No	140
17	2	grass verge, public byway	No	2+	No	240
18	3	grass verge	No	4	No	180
19	2	grass verge, public byway	No	2+	No	190
20	5	hedge bank, grass verge	No	3	No	420
21	4	1 standard tree/50m, grass verge, public byway	No	3+	No	300
22	5	hedge bank, grass verge	No	2	No	570
23	4	> 1 standard tree/50m, hedge bank, grass verge, public byway	No	2	No	290
24	3	3-<5 standard tree/50m, grass verge	No	2	No	200
25	1	hedge bank, grass verge, public byway	No	3	No	160
26	3	1standard tree/50m, grass verge	No	2-	No	200
27	3	grass verge	No	3-	No	150
28	4	<1 standard tree/50m, hedge bank, grass verge	No	3+	No	920
29	2	grass verge	No	3-	No	300
30	2	hedge bank, grass verge	No	3	No	260
31	2	hedge bank, grass verge	No	3+	No	200
32	3	hedge bank, grass verge	No	3	No	250
33	2	hedge bank, grass verge	No	2-	No	120
34	2	>1 standard tree/50m, Hedge bank, grass verge	No	2-	No	100

Number	No. Canopy species	Associated Features: Bank or wall; <10% gaps; Ditch along half its length; connections; >1 standard tree/50m; parallel hedge within 15m or public byway	Important under Hedgerow Regulations	Grade under HEGS	Species Rich	Length (m)
35						50
36	2	-	No	2-	No	80
37						35
38	3	1 standard tree/50m , hedge bank, grass verge	No	2	No	40
39	2	>1 standard tree/50m, grass verge	No	2-	No	30
40	3	ditch, grass verge	No	2-	No	80

Veteran Trees & Tree Groups (see Appendices 6J and 6K)

6.3.23 Very few trees were present within the site boundary. Trees on site included two mature oaks (T1 & 2) one tree group (TG1) adjacent to Firs Farm buildings and a cluster of trees on and just beyond the southern site boundary in domestic gardens. TG1 was a line of 13 semi-mature sycamores *Acer pseudoplatanus* along the northern edge of the buildings at Firs Farm. A veteran tree survey and arboricultural survey were conducted on all trees within the site to assess the status as veterans, their quality, condition and retention category. In summary, there was one veteran oak located within the site (T3 on Figure 6.2), with TG2 classified as near-veterans. Whilst trees provide resources for a wide range of wildlife using the site, they are limited with few trees present and all trees or tree groups have been determined to be of **site level** importance to biodiversity, with the exception of T3 and TG2. These trees have been identified as a veteran or near veterans and considered to be of **district** level importance.

Invasive plant species

6.3.24 No invasive plant species were recorded within the site.

Fauna

Badger

6.3.25 Badgers are protected under the Protection of Badgers Act 1992. The habitats within the site are suitable for badger. A badger survey was undertaken across the site and within the adjacent habitats up to 150m from the site. No setts, latrines, prints or other evidence of badgers using the site or the surrounding area

were observed during this survey, or at any other time while conducting other surveys. The site is of **negligible** nature conservation to badgers.

Bats (Refer to Appendix 6E & Figure 6.3)

6.3.26 Bats recorded using the site were predominantly common pipistrelle, although soprano pipistrelle *P. pygmaeus*, Leisler's *Nyctalus leisleri* and *Myotis sp.* Were also recorded. Evidence indicated foraging and commuting along edge habitats and hedgerows across the site, with concentrations of activity around the peripheries of the site, in particular the hedgerows along the northern site boundary (H5, H7, H8 & H17) and the Harlow Wood woodland edge with the southern site boundary. No use was made of the arable fields.

6.3.27 A small concentration of old brown long eared bat droppings (<5) were recorded in Building B8 during the building inspection at Firs Farm. No bats were observed exiting or entering this building during the subsequent emergence/roost surveys, suggesting this is only a small and occasionally used roost. No further roosts were recorded within any buildings. Suitable features for use as roost sites were recorded in Trees T1, T2 and T3 but no tree roosts were confirmed during subsequent surveys.

6.3.28 Six species of bat are listed as priority species on the UK BAP, of which only the soprano pipistrelle was recorded on the assessment site; all bat species are listed on the LBAP. All species of bat and their roosts, whether occupied or not, are protected under the WCA and Habitat Regulations. The roost recorded at Firs Farm is assessed as being of **site** level nature conservation value only, due to its small size and likely occasional use only. The majority of the site was of limited value to bat species, using only linear features, particularly along the site boundaries, for movement and foraging. The site is considered to provide a resource of **local** level importance to the local bat population.

Birds

Breeding birds (see appendix 6F and Figure 6.4 for full details)

6.3.29 Surveys were undertaken between April and June 2008, with a further single survey in 2009. A total of 44 bird species were recorded. No birds listed on Schedule 1 of the WCA or Annexe 1 of the Habitat Regulations were recorded within the site. Ten species were possibly breeding; 26 were probably breeding and seven were confirmed as breeding. One was only passing over. Activity was widespread across the site mainly found concentrated along linear and edge

features, although open arable and grassland were also used by a small number of species.

6.3.30 Fifteen species of note (that is, included on either, the UK Birds of Conservation Concern 3 (UKBoCC) red and amber lists (RSPB, June 2009); the Nottinghamshire BoCC (NBoCC) list, or the UKBAP) were recorded as breeding or probably breeding. Table 6.2 below summarises this.

Table 6.2: Notable breeding birds on site

Species	Conservation status			Site Breeding Status
	UK BoCC Status	UK BAP	Notts BoCC	
Bullfinch	Amber	✓	✓	Probable
Dunnock	Amber	✓	✓	Probable
Kestrel	Amber	-	✓	Possible
Lapwing	Red	✓	✓	Confirmed
Linnet	Red	✓	✓	Confirmed
Meadow pipit	Amber	-	✓	Probable
Mistle thrush	Amber	-	✓	Probable
Reed bunting	Amber	✓	✓	Probable
Skylark	Red	✓	✓	Probable
Song thrush	Red	✓	✓	Probable
Starling	Red	✓	✓	Probable
Swallow	Amber	-	✓	Probable
Tree sparrow	Red	✓	✓	Unknown*
Yellowhammer	Red	✓	✓	Confirmed

* pair recorded during the single survey in 2009 only. Breeding status cannot be ascertained on basis of single survey.

6.4.31 Typically, areas within the site of greatest value in terms of species diversity and presence of more local species, were the woodland edges, hedgerows and arable margins. The assemblage of breeding birds recorded in each habitat has been assessed against the Nottinghamshire SINC selection criteria (criterion 4) using the weightings and UK Breeding Score listed in Appendix 2 of that document. No assemblage in any habitat within the site met the threshold value of SINC selection. The site is assessed as being of **local** level value to breeding birds.

Crepuscular Birds: Nightjars (See Appendix 6G & Figure 6.5)

- 6.3.32 Details of the survey are included at Appendix 6G which should be treated as confidential and made available to *bona fide* organisations only, to protect this species. Several records of nightjar & woodlark were received during the consultation, both species are listed on Schedule 1 of the WCA. The closest records were for Harlow Wood SINC, found approximately 100m south of the site boundary. Nightjar specific surveys were carried out within the site and a 500 metre radius around it in 2008 and 2009. No nightjars or woodlark were recorded in the site. Seven separate nightjar territories (represented by churring males) were recorded off-site in 2008, with ten separate off-site territories recorded in 2009, several within Harlow Wood. Most of territories recorded were over 500 metres from the site boundary, although the closest was approximately 100m from the assessment site. Nightjars at Harlow Wood (and those known elsewhere in the local area) are thought to form part of the known population at Sherwood Forest approximately 4km to the east. The current nightjar Species Action Plan for the LBAP states that Nottinghamshire as a whole holds a nationally important population of nightjars. Little potential habitat which could provide potential foraging and cover for this species is present on site and the site itself is not considered to be particularly important for the local population at Harlow Wood, which is considered to be of **county** level importance to this species. No woodlark were recorded on or off site during crepuscular surveys.

Wintering birds (see Appendix 6H and Figure 6.6 for full details)

- 6.3.33 Winter bird surveys were undertaken between November and February (inclusive) 2008/2009. A total of 36 species were recorded on site. As with the breeding birds, activity was widespread across the site. Two birds (fieldfare and redwing) afforded species protection for their rare breeding status under Annexe 1 of the Habitat Regulations have been recorded during winter bird surveys. This does not relate to their winter presence. Fourteen species of note (BoCC red or amber lists, NBoCC and/or UKBAP) were recorded, this is summarised in Table 6.3 below. No LBAP species were recorded. The assemblage of wintering birds recorded has been assessed against the Nottinghamshire SINC selection criteria (criterion 6) and no assemblage recorded on site meets the threshold levels required for SINC status. The site is therefore assessed as being of **local** level value to over-wintering birds.

Table 6.3 Protected and Notable Overwintering birds on site

Species	Conservation status		
	UK BoCC Status	UK BAP	Notts BoCC
Black-headed gull	Amber	-	✓
Bullfinch	Amber	✓	✓
Duncock	Amber	✓	✓
Fieldfare*	Red	-	-
House sparrow	Red	✓	✓
Kestrel	Amber	-	✓
Lapwing	Red	✓	✓
Meadow pipit	Amber	-	✓
Mistle thrush	Amber	-	✓
Redwing*	Red	-	-
Reed bunting	Amber	✓	✓
Skylark	Red	✓	✓
Song thrush	Red	✓	✓
Starling	Red	✓	✓
Yellowhammer	Red	✓	✓

Great crested newts

6.3.34 Ten waterbodies (W1 – W10) providing potential aquatic habitat for great crested newts were confirmed on or within 500m of the site, with four (W2-W4 and W10) located on site. Limited terrestrial habitat is present on site, restricted mainly to field margins. Presence/absence surveys were undertaken on water-bodies W1-5 in 2007 and on all ten water-bodies in 2008. The nearest identified pond supporting great crested newts was located to the northwest at Robins Down Hill, within a private pond approximately 500m away and separated from the site by residential development and infrastructure. No great crested newts were recorded during any of the surveys; however, several other species of amphibian were recorded. Small populations of smooth newt *Lissotriton vulgaris* and small populations of common toad were also recorded in ponds off site; the latter species being a UKBAP as a priority species. The site is considered to be of **negligible** interest to amphibians.

Reptiles (see Figure 6.7)

6.3.35 Consultation records indicated the presence of common lizard and grass snake within 2km of the site boundary to the north and east, however suitable reptile habitats within the site boundary were limited. Reptile surveys were undertaken on suitable habitats on and adjacent to site and results are summarised in Table 6.4 below. No reptiles were recorded within the site. A small population of common lizard and grass snake was identified within 100m of the site to the south east. The approximate locations of reptiles recorded during surveys are shown on Figure 6.7. Reptiles were concentrated beyond the south east boundary of the site, predominately on the southern edge of the woodland strip leading down to Rainworth Lakes SSSI. There is therefore some limited potential that very small numbers of either species may occur within the site using the hedgerow and woodland edge habitats connected to this area, depending on the nature of agricultural practice currently in operation, as a result, the site is considered to be of **site** level value to the group.

Table 6.4 Reptile Survey Results (all reptiles recorded were off site)

Date and Time	Weather	Results
06/06/2008 – 16:00	17°C, 40% cloud	3 common lizard
15/07/2008 – 08:00	20°C, 70% cloud, moving to 40% cloud	None
16/07/08 - 08:30	17-18°C, 65% cloud, breezy	Grass snake eggs found
17/06/08 – 17:00	18°C, Clear skies	None
22/07/2008 - 08:30	20°C, 100% cloud, Humid, still and dry	2 common lizard
22/07/2008 - 14:30	22°C, 90% cloud, Humid, still and dry	5 common lizard
23/07/2008 - 08:30	19°C, 20% cloud, dry	3 common lizard

Water Vole

6.3.36 No suitable habitat was recorded on site. Surveys were extended to include potential habitats off-site, within nearby water-bodies and along the course of the Foulevil Brook which flows away from the site, just south of its southern boundary. The brook channel was approximately 2m wide with vertical banks for the majority of its length; broadleaved woodland (alder-oak dominated) lined and over-shaded the banks, resulting in very sparse bank side, marginal and aquatic vegetation. Water depth fluctuated between pools and riffles ranging between 5cm to maximum depth of 1m. Debris in the channel comprised fallen branches, damming sections and creating pools on their upstream side. Two water-vole feeding

stations (with trimmed vegetation at a 45° angle, typical of the species) were recorded in W7 at Rainworth Lakes. No other evidence was found in any water body or along the course of Foulevil Brook, which is not considered suitable habitat for this species. The site is considered to hold **no** nature conservation interest for this species, with W7 likely to provide local value at most to this species.

Otter

- 6.3.37 No evidence of this species was found during the survey, which included off site habitats along Foulevil Brook and the nearby water-bodies. No suitable habitats for this species exist within the site and the site is assessed as having **no** interest to this species.

White-Clawed Crayfish

- 6.3.37 No suitable habitat for this species was present on site and it is therefore considered to have **no** nature conservation value for white-clawed crayfish. Off-site, suitable refuges were identified within the bank sides of the Foulevil Brook and included undercuts and exposed tree roots. No crayfish were recorded during the hand search. No crayfish, native or alien, were caught during the trapping survey of the potentially suitable ponds, W1, W6, W7, W8 or W9.

Invertebrates

- 6.3.38 Local records received from consultees and obtained during online database searches yielded the presence of two UK BAP invertebrate species within 500m of the site. It was considered that habitats within the site were not of sufficient quality for invertebrates to warrant a specific invertebrate survey, being dominated by intensively managed land.

Water Quality (see Appendix I)

- 6.3.39 During informal scoping, NE recommended water quality surveys be undertaken to provide a baseline for future monitoring as the Foulevil Brook flows into Rainworth Lakes SSSI. The invertebrate assemblage recorded during the BMWP survey indicated that the lakes are likely to be of average water quality at present, with W6, the upper most lake, having the best water quality. Full results of the freshwater invertebrate BMWP survey of Rainworth Lakes are provided and discussed at Appendix 6I.

6.3.40 Chemical water quality analysis was also undertaken at four sample points. The chemical analysis results showed that the waterbodies had no major contamination issues and were of average quality.

Overview of Nature Conservation Value

6.3.41 Overall the site itself is of limited conservation value. No habitats on site were assessed as being as more than district level (veteran and near veteran trees), with most being of interest at a site or local level only. Both field surveys and desk top surveys indicate that protected species on site were limited, restricted to bats and two bird species recorded during winter bird surveys, protected for their rare breeding, not over wintering status. A number of notable farmland birds were recorded using the site. Few habitats with the potential to support such species were recorded on site. It should be noted however, that a number of nearby habitats are of higher value, including statutory and non-statutory designations within 500 metres of the red-line and protected species. Table 6.5 below provides a summary of the features of interest of relevance to this assessment, on and off-site.

Table 6.5: Summary of Nature Conservation Value

Feature of interest	Location	Comments	Nature Conservation Value
Nightjar population at Sherwood Forest	Off site	Located 4km to the north east of the site, Sherwood Forest supports a significant population of breeding nightjars (protected under the WCA), which meets the criteria for designation as a SPA, although has not as yet been designated as a SPA or pSPA.	International
Rainworth Lakes SSSI (including W6, W7 and W8)	Off site	Situated 300m to the south east of the site. Foulevil Brook immediately south of the site's southern boundary, drains into these lakes. The site has statutory protection.	National
Harlow Wood SINC	Off site	Immediately adjacent to the south western boundary, the SINC has no statutory protection but is afforded some protection through the planning system. The wood supports a population of breeding nightjars.	County
Tree T3 and Tree group TG2 – Veterans or near-veterans	Site	These provide longevity and are not easily replaceable, providing intrinsic value and micro-habitats for a range of species.	District
W1 and W9	Off-site	Located close to Rainworth Lakes, both provide low-moderate botanical diversity, with well developed marginal and aquatic vegetation. Although not known to support protected species they provide habitats for other local fauna.	Local

Feature of interest	Location	Comments	Nature Conservation Value
Mixed Plantation Unimproved grassland verges Arable land and margins Trees T1 and T2 and tree group TG1	Site	These habitats provide some connectivity around and through the site, provide additional interest within the immediate surroundings and provide habitat for use by local fauna.	Site
Hedgerows	Site	Hedgerows provide valuable foraging and sheltering habitat to local fauna. They also provided green corridors of movement to local wildlife between habitats within the wider area. Hedgerows on site have moderate structural quality but are species poor.	Site
Species - poor semi -improved grassland Bracken Scrub Tall herb and ruderals W2, W3, W4, W10	Site	These areas are all small in size, with limited species diversity and poorly connected to other habitats. No protected or notable species have been recorded using them and they offer limited potential to such species.	Negligible
Bats – foraging	Site	Large areas of site of negligible value to the local bat population. Four species of bat recorded using hedgerows and woodland edges for foraging and commuting. Only soprano pipistrelle recorded is listed on UK BAP. All bats are listed on the Nottinghamshire BAP.	Local
Breeding birds	Site	Woodland edges, hedgerows and arable field margins of greatest value to birds recorded. 15 notable species recorded (BoCC, Notts BoCC, UKBAP).	Local
Wintering birds	Site	Habitats of greatest value were woodland edges, hedgerows and arable field margins. Two Schedule 1 birds recorded. This does not relate to their over-wintering status. 14 notable species recorded (BoCC, Notts BoCC, UKBAP).	Local
Bats - roosting	Site	One occasionally used small brown long eared roost recorded in buildings at Firs Farm, no evidence of current occupation at time of survey. All roosts whether occupied or not are protected under EU and UK law. Listed on LBAP.	Site
Reptiles	Site	Small areas of limited but potentially suitable habitats within the site. No reptiles recorded on site. However, small population of grass snake and lizard recorded to south east of site could use habitats on site.	Site
Nightjars	Site	The habitats on site provide limited value for this species. None have been recorded using the site (see Harlow Wood above).	Negligible

Feature of interest	Location	Comments	Nature Conservation Value
Great crested newts	Site	The site provides limited terrestrial or aquatic habitat for this species. None were recorded on site or within ponds within 500m of site boundary.	Negligible
Badgers	Site	Limited habitat for foraging or habitation on site. No evidence of use of site with no setts, prints or latrines recorded.	Negligible
Water vole Otter	Site	No suitable habitat on site. Both species protected under UK law NB: 2 water-vole feeding stations found in W7 offsite at Rainworth Lakes, where suitable habitat exists for both species.	None
White clawed crayfish	Site	No suitable habitat on site. Off-site Foulevil Brook provides some suitability as do W1, W6, W7, W8 and W9. No evidence recorded in these areas.	None

6.4 Project Design

6.4.1 Design principles have taken into account the ecological interests and nature conservation value of the site from an early stage to protect key features of interest and to maximise and enhance the existing biodiversity value. Figure 6.8 illustrates the proposed ecological enhancements in relation to the design and green infrastructure framework. The design aims to create an area of higher biodiversity value integrated with the surrounding countryside and habitats more than currently, providing a significant green infrastructure of recreational, biodiversity and sustainability benefits. In total 47.4ha of green space will be provided. Enhancements have been designed with the guidance of Mansfield District Councils IPG Note 11: Green Infrastructure, taking into account both UK and LBAP priorities.

6.4.2 Much of the site comprises intensively managed arable land. With the exception of veteran / near veteran trees no habitats or species using the site have been assessed as having more than local level value. Those habitats of greater value within the context of the site are relatively small in comparison to those areas of lesser value. Within the immediate and wider area, higher quality habitats exist, including heathland, woodland and wetland habitats, supporting a range of fauna of varying value and importance. Project design has taken these features into consideration as follows:

- Hedgerows will be retained within greenways between 15 and 30 metres wide creating an extended hedgerow network. Hedgerows will be planted in staggered double rows and include standard trees at 20 metre intervals. Swales and species rich grass verges will be incorporated along side hedgerows to maximise their biodiversity value.
- Buffers will be created to protect ecologically sensitive or valuable habitats off site, including buffering to Harlow Wood incorporating a SUDS scheme
- New linkages and stepping stone habitats will enable movement of fauna around the project and between habitats of interest on and off site. These are based around existing linkages and habitat corridors on site including:
 - Forest Stone Community Park will provide the main block of green space near the south of the site, from which other corridors will extend across the site. This park will provide 10ha of predominantly informal land creating a mosaic of new habitats of ecological value. It will be designed to integrate sensitively with the buffer around Harlow Wood.
 - A habitat corridor will extend along Sherwood Way, linking the northern edges of Thieves & Harlow Woods, the northern and southern edges of the new Forest Stone Community Park and northern edge of the proposed cemetery to improve habitat links with Rainworth Lakes SSSI.
 - There will be a north south link between with the northern boundary habitat corridors and the wider countryside to the south.
- Create new habitats either not represented, or poorly represented within the Project including broadleaved woodland, wet woodland, species rich grassland and meadows (including road verges), wetland habitats as part of the SUDS scheme, with water-bodies, wet grassland and reed-beds.
- The majority of habitats created will all be valuable for those species known to use, or with the potential to use the site at present, taking into account UK and LBAP priority species.
- Use of ornamental species will be restricted to more formal or built areas. Informal areas will use native species, appropriate to the local area and of local provenance.

6.4.3 Detailed design will also consider the use of the project area by fauna incorporating a number of features:

- A variety of nest boxes suitable for a range of birds, including hole-nesting and eave dwelling species within selected appropriate buildings and on mature trees.

- Bat boxes will be erected on suitable trees and where possible boxes, bricks or bat lofts incorporated into the design of a number of suitable buildings, particularly close to known or existing potential roosts and foraging areas as well close to new habitats suitable for foraging bats
- Habitats suitable for amphibians and reptiles in general, including artificial hibernacula will be created.
- Hop-overs will be used along linear features where new or existing roads or pathways bisect known or potential new commuting and foraging routes. These will comprise semi-mature trees and vegetation at hedgerow ends to raise the height of bats and birds above the height of traffic.
- Lighting will be carefully designed throughout the site and in development areas adjacent to existing or potential bat commuting lines or foraging areas and adjacent to known nightjar habitats within Harlow Wood. Where lighting cannot be avoided, for example due to safety or security purposes, lighting used will be designed to reduce spill and be downwardly directional. All new lighting will meet the current environmental standards of good practice in order to reduce potential light pollution and will use the lowest intensity possible for its purpose. Lighting will not be used adjacent to any habitats which nightjars are known to use.
- New water-bodies will be designed with wildlife mind wherever possible with scalloped edges and shallow margins and/or berms below water level to allow establishment of marginal vegetation. Central deeper water areas will allow year round open water. Bank-side vegetation will include sections of willow carr where appropriate. Where possible any proposed dry balancing facilities will include a damp central section or ditch for added interest and value. Shallow scrapes will be created adjacent to water-bodies for further interest, with nearby artificial hibernacula for hibernating herpetofauna. Ditches will have stepped margins and will have features which to create variety of form and flow, including a meandering course where possible.
- Detailed design will also include the creation of a number of green and brown roofs where feasible on commercial and/or community buildings in the north east of the site. These will be a mix of either intensive stonecrop *Sedum sp.* Roofs; deeper substrate planted with a range of grasses and herbs; or, extensive, sparsely planted brown roofs. Brown roofs in particular will be suitable for a number of bird species known to nest and

use suitable habitats in the local area, including woodlark and lapwing and potentially little ringed plover.

- A framework of appropriate native species trees and shrubs will be introduced into all private residential gardens at the outset. New occupiers will be supplied with a 'Wildlife Garden' information pack to encourage biodiversity enhancements at a small scale domestic level, with other details of the GI framework and opportunities for wider community involvement.

6.4.4 All new and retained habitats will be managed in accordance with a detailed Green Infrastructure Management Plan to be developed as the project progresses in conjunction with relevant bodies. It will include detailed prescriptions for the creation and enhancement of all new and retained habitats and a rolling five year work plan and monitoring. This plan will ensure the biodiversity of the habitats are retained and enhanced in the long term. Species lists for the component habitats will be agreed at the time, with plants and seeds sourced from local native seed and nursery suppliers or using seeds / green hay from nearby wildlife sites to ensure continuity with the local area.

General design considerations

6.4.5 The potential for effects and disturbance to retained habitats outside of the immediate working area during construction activities will be minimised through erection of appropriate protective fencing around the site and ensure no encroachment by activities. All working areas will be kept to the minimum required, enabling the retention of as much of the existing vegetation as feasible. Notices will be used as appropriate to inform all site workers of the importance of retained habitats or sensitive fauna. A 5m buffer zone will be retained either side of all hedgerows to be retained. Similarly no works will take place within the root protection zone of any retained trees and all trees and hedgerows will be protected according to best practice as set out in BS5837 Guidance to Trees in Relation to Construction and the Arboricultural Assessment at Appendix K.

6.4.6 Site management protocols will be put in place to ensure best practice on site during construction, with a Construction Code of Practice (CCoP) drawn up and agreed with relevant bodies. This is described in more detail in Chapter 2: Project Description of this ES and also within the relevant topic chapters. In summary, it will include methods to protect water-courses; appropriate storage of materials and chemicals; strategies for remediation and contamination incidents in the

unlikely event of their occurrence; methods for reducing construction noise and an air quality strategy to control air borne particulates and dust deposition. The CCoP will have regard to the relevant recommended guidance and policies.

Legislation

- 6.4.7 All relevant legislation in relation to nature conservation will be adhered to during construction to ensure that no offences are committed under the WCA and the Conservation (Natural Habitats & c) Regulations 1994 (as amended).
- 6.4.8 Construction works will avoid the bird nesting season (March – August inclusive), as all birds, nests, eggs and fledgling young are protected whilst on the nest under the WCA. Where this is not possible, an ecologist will check vegetation to be removed, including vegetation for ground nesting birds where appropriate. If birds are actively nesting an appropriate buffer zone for that species will be created around the nest. Advice would be supplied at the time by the supervising ecologist.
- 6.4.9 No trees are scheduled for removal. However, if this changes at any time, trees would require re-checking prior to removal for the potential for roosting bats by a licensed ecologist, as all species of bats and their roosts, whether occupied or not are protected under the HR and WCA. Specific advice would be supplied at the time as to whether further survey or action required. The small occasional bat roost at Firs Farm will be also re-checked for current use prior to removal (see below).
- 6.5.10 No reptiles were confirmed on site, although some limited habitat suitable for their use recorded. Reptiles are protected under the WCA from harm or sale. To prevent an offence being caused, clearance of these areas will be undertaken outside of the hibernation season and/or follow a strict method statement.
- 6.5.11 No works are proposed which would affect the habitats or fauna of the water-course on site and this water-course currently supports no protected species. If proposals change at any time, the brook would be re-surveyed to ensure no protected species were present at the time and relevant measures undertaken if any such species were identified.

6.5 Assessment of Effects

6.5.1 This section addresses the potential effects of the Project both during and following construction (the operational phase). The significance of an effect is a matter of professional judgement, but is described in general terms as being a product of the ecological or nature conservation value of a receptor (site, habitat, community or species) and the magnitude of the predicted effect. As a general rule, the more ecologically valuable a receptor is and the greater the magnitude of the effect, the higher the significance of that effect is likely to be.

Construction Effects

Statutory and non statutory sites

6.5.2 Rainworth Lakes SSSI is the closest statutory site of national importance. It is considered that the main potential effects that could affect its conservation status are changes to the hydrology and water quality. Foulevil Brook flows east to the Lakes adjacent to the southern boundary. Potential impacts on water quality include increased turbidity and siltation, accidental pollution events and contaminated run-off. The design of the Project includes a CCoP as outlined in section 5 above, which will minimise the potential for pollution during construction. As a result there are expected to be no effects on the water quality of the SSSI from construction of the site.

6.5.3 Dust deposition, pollution and other accidental spillage effects during construction may lead to damage and degradation of habitats, in turn affecting the fauna using these habitats. The CCoP will reduce the potential for such effects and provide strategies to deal with any incidents should they occur. These are outlined above and in chapter 2 and within chapters 9 and 11. Negative effects are therefore expected to be negligible on Harlow Wood SINC, which lies adjacent to the site. There are not expected to be any negative effects on other statutory and non-statutory sites in the local area given their distance from the site and the implementation of the CCoP methods.

Habitat Loss

6.5.4 Land take and habitat loss is an inevitable consequence of development. The Project has sought to retain those habitats and features of interest within the framework design, minimising the effects of this loss. The vast majority of the site, around 75%, currently comprises intensively managed arable land of negligible value for nature conservation and whilst there will be total loss its effects are considered to be **negligible**.

- 6.5.5 Although arable margins are more diverse than the field compartments, they are not species rich and are variable in width. With the retention of the vast majority of hedgerows and their associated field margins within the design, effects of loss are **significant at a site level** only. New species rich grassland margins and buffer planting will be created alongside new and existing hedgerows as part of the greenways and where existing margins are temporarily affected through hedgerow breaches these will be made good, ultimately enhancing their biodiversity value and connectivity around the project.
- 6.5.6 All (15.8 ha) of the species-poor semi-improved grassland will be lost. These areas are not particularly diverse and their loss is considered to be only **significant at site level**. New areas of informal open spaces will comprise species rich hay meadow grassland, with wet grassland areas also created, increasing vegetative diversity and will result in a probable positive effect.
- 6.5.7 Hedgerows total approximately 6km in length. Losses to this habitat are expected to be minimal. No hedgerows of high value or important under the Hedgerow Regulations 1997 are proposed for removal or lie within development areas. Loss is therefore considered be **significant** at a site level only. The implementation of the GI and Forest Park will lead to a positive effect in the long term at a local, possibly district level.
- 6.5.8 All existing ruderal, bracken and scrub habitats will be lost. Effects of these losses are **negligible**.
- 6.5.9 The existing attenuation ponds on site will all be retained, within areas of existing or new habitat and there will be **no effect** on these. New water-bodies of a variety of form and size will be created which will enhance the existing resource, including open standing water and reed-beds. There are therefore expected to be positive effects at a local level in the medium to long term upon establishment and maturation.
- 6.5.10 No trees will be lost. Planting includes buffering of mature trees, in particular those of near veteran and veteran status, to ensure their protection and there will be **no effect** on these trees. All trees (and hedgerows) will be protected during construction according to best practice and guidance as set out in BS5837 Guide to Trees in Relation to Construction. Existing and trees form an integral part of the

greenways and overall green infrastructure and there is expected to be a positive at a local level on the tree resource in the long term.

Effects of habitat loss on Fauna

Birds

6.5.11 Construction effects include the loss of habitat for birds. Vegetation clearance across the site will be phased, staggering removal and allowing some habituation of breeding birds, minimising effects from the outset. Vegetation will be removed outside the breeding season (March – August inclusive) to further minimise effects. Whilst farmland habitats will be lost, the creation of new hedgerows and edge habitats of most value to many farmland species will increase the availability of suitable habitats in the long term. New habitats will provide a substantial variety of foraging and nesting opportunities for a range of species, encouraging use of the site by a greater diversity of birds than at present. Detailed design will include a range of nesting box styles incorporated onto selected suitable buildings to further improve nesting opportunities whilst the scheme matures.

6.5.12 As the main nesting and foraging sites for breeding birds were confirmed to be within hedgerows and effects through habitat loss are therefore considered to be **negligible** given the small extent of hedgerow and tree removal. There will be longer term benefits at a local level for the majority of bird species.

6.5.13 Negative effects, **significant at a site level** only are expected for skylarks and lapwings, through the loss of arable and grassland habitat. Skylark were confirmed as breeding in only a small number of grassland areas and site losses are not expected to affect their wider, local conservation status. Low numbers of lapwing were confirmed breeding within the arable land and the availability of abundant arable land off-site means that the local conservation status of this species is not expected to be affected by these site losses. Similarly effects of the loss of farmland as over-wintering habitat for birds including both these species and also linnet which forages over farmland in winter, are expected to be **significant at site level** only, given the abundance of available habitat off-site and relatively low numbers recorded.

Bats

6.5.14 Effects on bats will be mainly restricted to the loss of small lengths of foraging/commuting routes along the hedgerows across the site. Greenways will create new corridors and enhance existing links improving habitat connectivity for

bats in the long term, while allowing continued foraging within the site. Connectivity to areas of habitat outside the site will be improved, leading to an expansion of foraging areas, providing benefits to the local bat population. The hedgerows along the southern and the northern boundary were confirmed to be the key foraging areas for three species of bats and these will be linked with other linear features and the SUDS scheme along the southern boundary, providing improved foraging here. The main foraging route in the east of the site (the strip of woodland leading southeast along Foulevil Brook to Rainworth Lakes SSSI) will also be enhanced. Habitat loss effects are therefore expected to be **negligible**, given the current low value of the site to the local bat population.

- 6.5.15 Firs Farm which supports a small occasionally used brown long eared bat roost will be demolished. This is **significant at a site level** only given the low value of the roost. A further emergence survey will be undertaken prior to demolition to assess whether the roost in use at that time and the roof taken down under a method statement agreed at the time.

Reptiles

- 6.5.16 Effects on reptiles are considered to be **significant at a site level** only. It is recommended that any suitable reptile habitat areas, linked with the existing off-site population of reptiles are cleared outside of the hibernating season (November to March inclusive) to minimise the risk of any animals which may be using these habitats being harmed. Clearance should be undertaken according to a method statement agreed at the time.

Other fauna

- 6.5.17 **No effects** of habitat loss arising from construction are expected on any other species.

Habitat Fragmentation and Isolation

- 6.5.18 Isolation of populations through habitat fragmentation affects population viability and persistence. Connectivity along linear features, or ecological corridors, provides population stabilisation by allowing movement between areas of suitable habitat, particularly for terrestrial species, or aerial species which use linear features to navigate by. The GI design improves such linkages on site, enhancing corridors of movement around the site and strengthening links with habitats of value off site. Habitat connectivity on site is currently provided mainly by hedgerows and effects of fragmentation and isolation have been minimised by the

minimal losses and creation of hop-overs along these. Negative effects of habitat fragmentation and isolation are therefore expected to be **negligible**.

Disturbance to wildlife

Bats

- 6.5.19 Works adjacent to identified and potential commuting / foraging areas will be undertaken during daylight hours. Any works undertaken next to the known bat roost at Firs Farm prior to its demolition and to the three mature trees which have features with the potential to support roosting bats will be undertaken during daylight hours. Disturbance effects are therefore expected to **negligible** for these receptors. Small lengths of hedgerows will be temporarily lost to facilitate construction. Where affected hedgerows have been identified as key foraging lines there will be a temporary, negative effect **significant at site level** only. Overall effects of construction on bats are expected to be **significant at site level** and will not affect the conservation status of the local bat population.

Birds

- 6.5.20 Construction operations have the potential to disturb birds using the site for roosting, foraging and breeding. Operations which will disturb nesting/breeding birds include noise from site vegetation clearance and initial ground works and some construction activities such as piling, which are of low frequency but of high amplitude. Active, high level, infrequent disturbance causes most birds to be displaced for short periods (Trewick, 1999). During the breeding season disturbance may lead to nest desertion or the avoidance of the area. Phased operations will minimise these effects and will allow for some degree of habituation to noise levels, and together with the use of buffer zones around any active nests will minimise potential effects. Whilst there is some potential for breeding success to be reduced, this is not expected to affect the local conservation status of any bird using the site for breeding. Disturbance effects on birds are therefore expected to be short-term and temporary and are **significant at a site** level only.

Nightjars

- 6.5.21 No habitats suitable for nightjars are present on site and none have been recorded using it. Nightjars have been confirmed as breeding off-site in Harlow Wood, managed commercially by the Forestry Commission. Sherwood & Lincolnshire Forest District 2007-2011 Economic Felling Plan (Forestry Commission) sets out their phased programme of clearance. Areas of clear felling

are more attractive to breeding nightjars which will begin to abandon areas as they re-grow, in preference to other clear felled areas, tending to stay in one area for a period of between six and 10 years following felling. One section of a clear felled area currently partially abuts the southern-most boundary adjacent to the proposed cemetery - on site construction in this area is therefore expected to be minimal and of low intensity for the period in which viable habitat remains available here. Phased construction and the creation and maintenance of buffer zones around known active nightjar nests within Harlow Wood at the time of construction activities will reduce possible effects of construction. Periodic review of the new felling plans will help determine whether potential conflicts may arise and enable appropriate phasing of construction and implementation of mitigation to avoid potential disturbance effects on off-site breeding. Further details are presented in Appendix 6G. Construction effects are expected to be **not significant** on the conservation status of the local population of nightjars.

Other fauna

- 6.5.22 There are not expected to be any effects on other fauna as a result of disturbance.

Operational Effects

Statutory and non-statutory sites

- 6.5.23 Rainworth Lakes SSSI will remain on private land where access is restricted and there will be **no effect** from increased public pressure.
- 6.5.24 To avoid the pollution of the aquatic environment including Rainworth Lakes, all drainage systems will be designed following good practice criteria (Environment Agency Pollution Prevention Guidelines). A SUDS scheme will feed into Foulevil Brook and ultimately Rainworth Lakes. The scheme will incorporate reed beds, settling ponds and ditches to filter out pollutants and silt and to lower the flow rate at times of high discharge. The sustainable urban drainage infrastructure proposed as part of the development will also incorporate trapped gullies and/or silt traps. Further details can be found in Chapter 9. There are expected to be **no operational effects** of the development on the SSSI.
- 6.5.26 Effects on Harlow Wood are discussed in paragraphs 6.5.30 – 6.5.35 below.

6.5.27 Forest Park and other greenways and habitats are designed to provide amenity and recreational spaces for residents and users of the project in close proximity to their living and working places. It is not expected that there will be any operational effects on other designated sites and their constituent fauna as they are separated from the development area and its more accessible and available open spaces. The effects of additional recreational pressures on other nearby and accessible designated sites are therefore considered to be **negligible**.

Habitats on site

6.5.28 There is potential for all new and retained habitats to be affected by recreational activities, including dog-walking. Use will be discouraged away from some of the more ecologically valuable areas within Forest Park through footpath provision and the incorporation of natural barriers to avoid the creation of desire lines, with interpretation boards encouraging a sense of ownership and understanding of local biodiversity. Litter bins for general and dog litter will be provided. All new and enhanced habitats on site will be the subject of a management plan to ensure a balance between recreational and conservation needs. As a result effects on on-site habitat quality are expected to be **not significant**.

Fauna

6.5.29 The design of the project maintaining key bat foraging lines, the creation of new linear habitats, creating hop-overs over roads and pathways, use of directional low intensity lighting where possible will minimise negative operational effects of the project such that they are considered to be **negligible** for the majority of fauna using the site.

6.5.30 Harlow Wood supports a population of breeding nightjar of value at a county level. Operational effects on this species are related to the potential for disturbance through increased recreational pressures in the woodland, which may lead to decreased breeding success, as nightjars readily abandon nests following disturbance, particularly human interference. Disturbance could include walkers, dog-walkers, particularly where dogs are not on leads and from increased predation by domestic cats, passing close by nest. Operational effects have the potential to be **significant at a county** level. Design aspects to reduce these effects include the buffering of the woodland. This includes the SUDS wetlands, ditches and dense woodland areas, which aim to discourage uncontrolled entry into the woodland, by acting as a natural barrier. Access alongside the woodland will be encouraged by the creation of pathways within the buffer which direct

users towards the habitats of Forest Park and away from any sensitive areas of Harlow Wood. To further encourage use of Forest Park and the local greenways, interpretation boards will be erected at the entrances of the park highlighting the habitats, biodiversity and flora and fauna to be seen, walks and opportunities for recreation. Similar information will be provided in a leaflet campaign to newly occupied houses and businesses in the area. Car-parking for Forest Park will be kept away from Harlow Wood, again designed to minimise excessive use and disturbance of this woodland. Interpretation boards at the woodland edge will be used to highlight the sensitive nature of the wood, encourage people to remain on pathways encourage use of dog leashes and educate local people on the biodiversity value of the woodland.

- 6.5.31 Consultation will be carried out in conjunction and agreement with the Forestry Commission, as owners and managers of Harlow Wood and with any other relevant bodies. The Forest Design Plan and any other relevant plans which the Forestry Commission has in place for the woods will be considered.
- 6.5.32 The new habitats proposed in the GI framework extending from the woodland and out in the wider countryside will also provide potential foraging for nightjars and will help improve linkages to populations identified at Rainworth Forest to the east of the site via strengthened corridors from Harlow Wood. Care should be taken with lighting along these as lighting will discourage nightjars. Lighting mitigation measures for bats will also be suitable for nightjars.
- 6.5.33 Given the transient nature of breeding sites linked to clear-felled areas it could be expected that where felled areas within the woodland and therefore breeding territories lie closer to the development, there remains the potential for disturbance and these areas are likely to see a reduction in breeding success. However, areas away from these may still support successfully breeding nightjars. Operational effects are therefore expected to be cyclical in nature, affecting different areas at different times and whilst it is considered that mitigation will avoid a major significant effect on this local population, effects are expected to be of **moderate significance at a county level** in a worst case scenario.
- 6.5.34 It is recommended that ongoing monitoring be undertaken annually to provide current breeding patterns and numbers and inform ongoing mitigation to protect sensitive areas.

Cumulative effects

- 6.5.35 Other known proposed forthcoming developments within the local area include the relocation of West Nottinghamshire Further Education College from its existing site to farmland north of Rushley's Farm, east of the project. Whilst there may be some small loss of habitats similar to those present on this site, when combined, the effects at this site and those for the college are not expected to be any greater than those assessed for this project alone and are therefore **not significant**.
- 6.5.36 Lindhurst Wind Farm incorporating 5no. turbines is proposed for location on land immediately to the south and east of the proposed project, granted approval in December 2008. If the scheme goes ahead, RWE npower renewables (the applicant) state that the windfarm will be operational by the end of 2010. Assessments undertaken indicate that the wind farm site provides no habitat suitable for nightjars, including foraging habitat, comprising predominantly arable land within which the turbines will be situated. Potential impacts to any foraging birds moving from their breeding sites (the closest being at Harlow Wood) to their foraging areas elsewhere were therefore found to be not significant, as they were considered unlikely to fly over these habitats prior to, or following its development. Similarly, nightjars are also not considered to use this project's assessment site for movement or foraging purposes, more likely using the semi natural habitats further to the south, which are linked with the south eastern corner of Harlow Wood. There are therefore expected to be no additional effects on the local population of nightjars as a result of this project above those identified within it when considered cumulatively with those assessed for the wind farm.
- 6.5.37 The Proposed Energy Recovery Facility (ERF) at the former Rufford Colliery, Rainworth, proposed by Veolia Environmental Services is awaiting determination pending a Public Inquiry in April 2010. This facility is located at least 2.5km east of the site under assessment in this ES, between this site and Sherwood Forest, close by Rainworth Wood. Both latter sites support nightjars to which the ERF may cause disturbance during construction and operation through increased noise levels, although this was not assessed as significant. It is not considered that this project will have adverse effects on either of these populations and therefore when considered cumulatively there will be no additional effects on the local population of nightjars, above those determined in this ES.

6.6 Statement of Effects

- 6.6.1 The majority of negative residual effects have been assessed as being **insignificant** and are identified as: increased recreational pressure on all publicly accessible habitats at off-site existing statutory and non statutory designated sites adjacent or in close proximity to the development and, the loss of breeding and foraging habitat for ground nesting and over wintering birds.
- 6.6.2 Mitigation will be put in place to minimise effects on nightjars as much as possible, particularly during operation. Negative residual effects are possible on the nightjar population of Harlow Wood, depending in the location of future clear-felled compartments. These have been assessed as having a worst case scenario of **moderate significance at a county level**. These are operational and relate to a possible reduction in the breeding success of birds close to areas where potential for disturbance, in particular as a result of human disturbance and interference remains, including by dog walkers and predation by domestic pets.
- 6.6.3 There will be substantial **positive effects** on the biodiversity of the local area in the long term through habitat creation and the subsequent management of new and retained habitats. The GI network will lead to an increase in the diversity and quality of habitats represented in the local area, complementing those of value in the wider county area, which will be of value to a greater range of fauna than currently present. Creative conservation techniques will guide detailed implementation and long term management targeting biodiversity enhancement. Positive effects identified are expected to be **significant at a local level at the least** and in time upon maturation and establishment will contribute to the biodiversity of the wider district.

Table 6.8: Summary of Effects Including Residual Impacts

Description of Feature of Ecological Value (including policy/legal factors)	Proposed Activity	Characterisation of un-mitigated impact	Significance without mitigation / design	Proposed Mitigation/ Design Measures	Scale of Ecological Significance of Residual Impact
CONSTRUCTION IMPACTS					
<p>Rainworth Lakes SSSI</p> <ul style="list-style-type: none"> National value 300m southeast of site Protected by the WCA and Mansfield Local Plan Policy NE12 Currently of Favourable Conservation Status. <p>Series of lakes with valuable and fragile fen/marsh/swamp vegetation which are fed by Foulevil Brook which runs east from Lindhurst Cottages (on the site boundary) to the SSSI. Any impacts to this site resulting from the development must be anticipated and planned for.</p>	<p>Potential for hydrological change and surface water contamination as a result of construction. Soil compaction or introduction of hardstanding results in increased run-off, hydrological disruption and sometimes pollution of watercourses.</p>	<p>Negative impact</p> <p><u>Magnitude:</u> all lakes in complex <u>Extent:</u> not known <u>Duration:</u> length of construction period <u>Reversibility:</u> reversible <u>Frequency:</u> multiple events during construction period</p>	<p>Significant adverse impact prior to mitigation due to high value and sensitivity of site at a national level.</p> <p><u>Confidence level:</u> near certain</p>	<p>Project design incorporates use of best practice methods and use of site wide management protocols during construction phase to minimise any risk of pollution and contamination.</p>	<p>Not Significant</p> <p><u>Confidence Level:</u> Certain</p>
<p>Harlow Wood SINC</p> <ul style="list-style-type: none"> Coniferous plantation Noteworthy flora S1 bird species recorded forming part of a potentially internationally important population centred on Sherwood Forest 	<p>Potential for dust deposition and accidental pollution spillages.</p> <p>Disturbance to sensitive bird species and decline in breeding</p>	<p>Negative impact</p> <p><u>Magnitude:</u> 1 SINC <u>Extent:</u> not known <u>Duration:</u> Length of construction period adjacent to wood <u>Reversibility:</u> reversible <u>Frequency:</u> multiple events during construction period</p>	<p>Significant at County level</p> <p><u>Confidence in Impact Occurring:</u> certain</p>	<p>Project design incorporates use of best practice methods and use of site wide management protocols during construction phase.</p> <p>Phased construction should correlate with Felling Plan to minimise risk in sensitive areas</p> <p>Creation of buffer zones to protect flora and fauna as necessary</p>	<p>Not significant</p> <p><u>Confidence level:</u> Near certain.</p>

Description of Feature of Ecological Value (including policy/legal factors)	Proposed Activity	Characterisation of unmitigated impact	Significance without mitigation / design	Proposed Mitigation/ Design Measures	Scale of Ecological Significance of Residual Impact
Trees – veteran and near veteran trees	Construction may affect tree health and longevity, in particular for veteran trees	<u>Magnitude:</u> 1 tree and 1 tree group <u>Extent:</u> N/A <u>Duration:</u> Permanent <u>Reversibility:</u> irreversible <u>Frequency:</u> single event	Significant at District level for veteran / near veteran trees <u>Confidence in Impact Occurring:</u> probable	Tree Protection measures to BS5837. Sensitive incorporation into scheme. Sympathetic future management	Not significant <u>Confidence level:</u> Certain.
Breeding and Wintering Birds – on site 2 winter birds with protection under S1 of WCA (protection relates to breeding status only). UKBAP, BoCC and Nottinghamshire BoCC red/amber listed species	Land take will cause loss of breeding and foraging habitat for ground nesting and over wintering birds. Construction activities will cause disturbance to nesting birds, reduction in breeding uptake through increased noise	Negative effect <u>Magnitude:</u> all ground nesting species and over-wintering foragers <u>Extent:</u> all arable and grassland fields (145.64ha) <u>Duration:</u> Permanent <u>Reversibility:</u> irreversible <u>Frequency:</u> single event Negative effect <u>Magnitude:</u> all hedgerow/tree nesting birds <u>Extent:</u> all retained hedgerows and trees (6 linear km) <u>Duration:</u> Temporary <u>Reversibility:</u> Reversible <u>Frequency:</u> Multiple events	Significant at site level due to relatively low use of site and abundance of habitats off site <u>Confidence in Impact Occurring:</u> Certain Significant at site level only <u>Confidence in Impact Occurring:</u> Certain	New habitats (including possible creation of brown roofs) may provide some areas suitable nesting habitat Removal outside of nesting season. Buffers established where works are close to nest sites Phased operations across site	Significant at site level <u>Confidence level:</u> Near Certain Not significant <u>Confidence level:</u> Certain
Breeding Birds - off-site Nightjars breed in Harlow Wood of County value. Protected under S1 of WCA. UK and LBAP species. BoCC Red list	Disturbance to birds during breeding season affecting breeding uptake, foraging ability, nesting Disturbance to foraging birds during breeding season	Negative effect <u>Magnitude:</u> Seven churring males (7 separate territories) recorded <u>Extent:</u> Harlow Wood SINC <u>Duration:</u> Temporary <u>Reversibility:</u> Reversible <u>Frequency:</u> Multiple events	Significant at County level <u>Confidence in Impact Occurring:</u> Certain	Phased construction. Implementation of buffer zones from nesting birds.	Not significant <u>Confidence level:</u> Probable

Description of Feature of Ecological Value (including policy/legal factors)	Proposed Activity	Characterisation of un-mitigated impact	Significance without mitigation / design	Proposed Mitigation/ Design Measures	Scale of Ecological Significance of Residual Impact
OPERATIONAL IMPACTS					
Rainworth Lakes SSSI	Potential pollution and siltation from surface water, drainage and run-off	Negative effect: <u>Magnitude:</u> all lakes <u>Extent:</u> not known <u>Duration:</u> Permanent <u>Reversibility:</u> reversible <u>Frequency:</u> Multiple events	Significant at national level due to sensitive nature of habitats and designation <u>Confidence in Impact Occurring:</u> Near certain	SUDS in place to filter out contaminants and silts	Not significant <u>Confidence level:</u> Certain
Nightjars off site	Disturbance to breeding and foraging nightjars located off site through increased recreational pressure, including disturbance from walkers, particularly dog walkers and predation by cats	Negative effect: <u>Magnitude:</u> Seven churring males (7 separate territories) recorded <u>Extent:</u> Harlow Wood SINC <u>Duration:</u> temporary and cyclical dependent on felling regime <u>Reversibility:</u> reversible <u>Frequency:</u> Multiple events	Of major significance at a County level <u>Confidence in Impact Occurring:</u> Certain	Buffer zone around woodland edge designed to deter entry into woodland by walkers. SUDS scheme incorporated into buffer to deter predatory cats accessing woodland. Design and promotion of Forest Park as main local recreational area with biodiversity and recreational interest. Use of interpretation boards and leaflets to newly occupied dwellings and businesses. Pathways lead visitors away from Harlow Wood Consultation with wood owners and managers for future management Ongoing monitoring of population to inform mitigation.	Moderately significant at County level <u>Confidence level:</u> Probable Positive benefits through increased foraging habitat created by greenways, Forest park and other green infrastructure <u>Confidence level:</u> Possible

