

LINDHURST
MANSFIELD

APPENDIX 6.E BAT MITIGATION STRATEGY

CONTENTS

- E.1 Introduction
- E.2 Methodology
- E.3 Survey Results
- E.4 Potential Effects on the Local Bat Population
- E.5 Mitigation

Figures:

- E.1 Bat Transect Results July 2008
- E.2 Bat Transect Results August 2008
- E.3 Emergence & Roost Survey Results

Appendix

- E.i Bat Transect Survey Results July & August 2008

E.1 INTRODUCTION

E.1.1 This report provides an overall strategy for bats and forms part of the supporting documentation associated with a planning application in respect of a multi-purpose development at Lindhurst, Mansfield.

E.1.2 Across the site area the dominant habitat type is intensively managed arable land. Other habitats present include poor semi-improved grassland, scattered scrub, several waterbodies (balancing lagoons) and hedgerows. In the hedgerows and scattered throughout the arable land there are a small number of mature trees. Several structures (Firs Farm) comprising primarily of agricultural units and stone/brick built buildings are also present in the centre of the site.

E.1.3 Development of the site will involve the loss of a small amount of commuting/foraging habitat. The buildings of Firs Farm will also be lost during construction; these buildings range in suitability for use by bats. Building B8, a stone barn, had several old brown long eared *Plecotus auritus* droppings inside, but no further evidence was found. Three mature trees were identified with features that are suitable to be used as a bat roost; however, detailed survey work concluded that roosting bats were not present at the time of the survey.

E.1.4 The following mitigation strategy has been designed to minimise impacts associated with the loss of buildings at Firs Farm and small areas of commuting/foraging habitat and also to minimise potential impacts to trees with suitable feature to be used as bat roost sites. The development has been iteratively designed to improve biodiversity and enhance foraging/commuting habitat through the implementation of an extensive Green Infrastructure network.

E.2 METHODOLOGY

E.2.1 Survey methods follow those recommended by the Bat Conservation Trust's Bat Surveys: Good Practice Guidelines (2007) and the JNCC's Bat worker's Manual (3rd Edⁿ. 2004). Buildings at Firs Farm were inspected internally (where access was possible) and externally. Buildings identified with potential for roosting bats were surveyed using emergence and roost surveys. In addition, transect surveys were undertaken across the site as a whole to establish patterns of bat activity and areas of interest.

Building Inspections

E.2.2 The exterior and interior of buildings were visually assessed for evidence of occupation by bat species. External surveys sought to identify bat access points that were considered to comprise: gaps under lifted or missing roof / ridge tiles, gaps at the verges of these buildings and lifted areas of flashing. Internal inspections were made, seeking out evidence of the presence of bats. Such evidence included droppings, scratch marks and urine staining on timbers as well as the presence of live or dead bats. Access to the interiors of several buildings was unobtainable due to the presence of pigs and associated health and safety limitations.

Mature trees

E.2.3 Mature trees that could be affected by the proposed development were assessed for their roost potential. The presence of cracks / fissures in the bark, rot or woodpecker holes or significant ivy cover were considered as features that could be used as potential roost sites. Where such features were observed evidence of occupation comprising staining, bat droppings or urine staining within or below potential access points was sought.

Emergence Surveys

E.2.4 Licensed bat workers supervised the emergence and roost surveys, during which surveyors were positioned at strategic locations around the complex of farm buildings to ensure all aspects were observed. Bat detectors (Bat Box Duet, Anabat SD1 and Bat box III) and a digital video camera set to night mode (Sony HC19E) with infra-red illumination (invisible to bats) were used to aid the emergence and roost surveys. Both the emergence and roost survey were undertaken in August, at times of clement weather conditions (14.08.08 (dusk): 16°C, 50% Cloud, no rain; 15.08.08 (dawn): 10°C, Clear, no rain).

Transect Surveys

E.2.5 Two transect (nocturnal activity) surveys were undertaken across the site in July and August 2008 (during the optimum survey period) following methodologies adapted from the Bat Workers Handbook (JNCC, 3rd Edition 2004) and Bat Surveys: Guidelines for Best Practice (BCT 2007). The surveys began around 0.5 hours after dusk and continued for approximately 2.5 hours thereafter. The site was divided into two halves, north & south (Sherwood Way being the line splitting each of the survey areas), with a pair of surveyors walking set routes around each half. Surveyors used Bat Box Duet ultrasonic frequency division bat detectors coupled with MP3 recorders, or Anabat SD1 bat detectors to aid the transect surveys; the results of which are shown on Figures 6.3 & 6.4 and tabulated in Appendix I of this mitigation strategy. All transects were carried out when conditions were suitable (i.e. when the ambient air temperature exceeded 10°C and there was little wind and no rain).

E.3 RESULTS

Building Inspections

- E.3.1 Table 6E.1 below details the results of the building inspection survey which are summarised here. The building inspections resulted in recording a small concentration of old brown long eared bat *Plecotus auritus* droppings in the roof void of Building B8 (refer to Emergence & Roost Plan Figure 6.5 for building reference numbers).
- E.3.2 Buildings B1, B2, B3, B5, B9 and B12 were all of similar construction, being modern metal frame and corrugated metal/asbestos sheet buildings constructed on a breeze block base with pitched metal/asbestos sheet roofs. Full internal access was not available to these buildings due to the number of pigs inside each, however a lack of any suitable internal features was recorded through entrance doors to these buildings. These six buildings held very little potential for roosting bats and their loss would not be likely to impact the local bat population.
- E.3.3 Building B4 was an old brick built stable block, which had a pitched roof half covered with slates and half covered with corrugated asbestos sheeting. Although open fronted, the building offered moderate potential to roosting bats. This building had a colony of nesting barn swallows *Hirundo rustica* beneath the ridge beam.
- E.3.4 Buildings B6, B7 & B8 were all stone built barns with pitched slate tiled roofs. Internally each had large wooden beams in the roof void. These buildings had numerous potential bat access points including cracks in the mortar between stonework, at the verges and eaves as well as gaps in the roof tiles providing moderate to high potential for roosting bats.
- E.3.5 Building B10 was a c.1930s farmhouse which was stone and brick built and rendered, with a pitched slate tiled roof. Although no access could be gained to the roof void of the farmhouse, several potential access points were observed associated with the roof of this building and at the eaves, where the roof met corbelled stonework.

Table 6E.1 Building Inspection survey results

Building Ref. No:	Building Construction/Description.	Structural Features Present						Other Structural Features of Note	Potential Bat Access Points	Internal Features	Bat Potential
		Gables	Barge Boards	Soffit Boards	Fascia Boards	Flashing	Roof Void				
B1	Single storey pig shed, asbestos and plywood, pitched asbestos sheet roof with breeze block base.	✓	✓	x	✓	x	x	None	Gaps under barge boards and in corrugations of asbestos roof.	Full internal access unavailable. No features of note (i.e felt or sarking) present	Low
B2	Breeze block and corrugated metal with timber cladding on walls.	✓	✓	x	✓	x	x	Skylights	Gaps under barge boards and in corrugations of asbestos roof.	Full internal access unavailable. No features of note (i.e felt or sarking) present	Low
B3	Breeze block and corrugated metal with timber cladding on walls	✓	✓	x	x	x	x	Skylights	Open above breeze block base. Some gaps in asbestos gable end, no cavity behind	Full internal access unavailable. No features of note (i.e felt or sarking) present	Low
B4	Single storey shed / stable building, brick built with pitched slate roof. ½ asbestos roof.	✓	x	x	✓	x	x	None	Gaps – lifted and slipped slates, under ridge tiles, under fascias, at verges in mortar	Swallows nest	Moderate
B5	Metal shed, breeze block base, open fronted	✓	✓	x	x	x	x	Skylights, external lighting	Front of building was open	Full internal access unavailable. No features of note (i.e felt or sarking) present	Low
B6	Barn, ½ metal roofed, ½ slate tiled pitched roof. Stone built. Open fronted.	✓	✓	x	✓	x	x	Bird's nest in cavity wall. Corbelled stone work at eaves	Many gaps in mortar and tiled section of roof where tiles have slipped. Eaves. Cracks in walls	Swallows	Moderate
B7	Stone built barn / stables/. Single storey with hipped corrugated steel roof.	✓	x	x	✓	x	✓	Windows partly bricked up. Corbelled stonework.	Gaps in masonry and mortar. Gap above hay loft door at west end.	False ceiling at wall plate creating roof void.	Moderate

Building Ref. No:	Building Construction/Description.	Structural Features Present						Other Structural Features of Note	Potential Bat Access Points	Internal Features	Bat Potential
		Gables	Barge Boards	Soffit Boards	Fascia Boards	Flashing	Roof Void				
B8	Stone built barn, two storey with a slate tiled pitched roof.	✓	x	x	x	✓	x	Traditional wooden beam construction. Damaged stonework & mortar	Gaps in tiles & windows at eaves. Possible cavities in stone walls	Wooden beams and trusses. No felt / boards. Heavy cobwebbing, pigs on ground floor	Small concentration of old Brown Long Eared bat droppings; high potential
B8a	Block built stable with single pitch sloping corrugated metal sheet roof	x	x	x	✓	x	x	Open stable doors	Open stable doors	Full internal access unavailable. No features of note (i.e felt or sarking) present	Low
B9	Metal framed barn. Open sided hay store. Pitched corrugated asbestos sheet roof.	✓	✓	x	x	x	x	Open fronted	Open fronted	Hay to roof	None
B10	1930s farmhouse. Stone built with pitched slate tiled roof. Two storey and single storey sections. Series of single storey outbuildings.	✓	x	x	x	x	✓	Corbelled stonework. 3 tiers.	Missing tiles in roof. Gaps in ridge and next to the chimneys	No access	Moderate
B11	Chemical store. Brick built with hipped tiled roof.	x	x	x	✓	x	x	Ventilator ridge tiles	Ventilator ridge tiles. Gaps in structure.	No features of note (i.e felt or sarking) present	Mod - low
B12	Pig shed, block and asbestos construction. Asbestos pitched roof.	✓	✓	x	✓	x	x	Ventilator ridge tiles	Ventilator gaps at ridge.	Full internal access unavailable. No features of note (i.e felt or sarking) present	Mod-low

Emergence/ Roost Surveys of Firs Farm (Refer to Figure 6.5)

- E.3.6 The emergence survey began one hour before sunset and continued for approximately one hour after sunset. No bats were observed emerging from any of the buildings of Firs Farm, however throughout the survey, heavy foraging activity was recorded within the immediate surrounds of the farm buildings, predominately by common pipistrelle *Pipistrellus pipistrellus*. One passing Leisler's bat *Nyctalus leisleri* and two passes by noctule bats *Nyctalus noctua* were recorded, with all individuals of these species flying high over the site from east to west, most likely commuting to foraging grounds in that direction. The first bat contact was the Leisler's bat passing over the site at 21:40.
- E.3.7 The roost survey began 1.5 hours prior to dawn and ended approximately 1.5 hours after sunrise. Cloud had dissipated through the course of the night which led to a rather cool start to the morning however plenty of bats were still foraging around the farm buildings and adjacent trees. No bats were observed entering any of the buildings at Firs Farm; however one Noctule bat persisted within the area for an extended period after sunrise. This bat flew north towards Mansfield at the end of the roost survey. The first bat contact was a common pipistrelle at 04:47.

Transect Surveys (Refer to Figures 6.3 & 6.4 and Survey Results Tables)

- E.3.8 In summary, the majority of bat contacts recorded during the first transect survey (17.07.08) were common pipistrelles foraging along edge habitats and hedgerows. Soprano pipistrelles *Pipistrellus pygmaeus* were also recorded foraging along Hedgerow H21, the northern site boundary.
- E.3.9 The second transect survey (14.08.08) recorded significantly more contacts in the northern half of the site, with both survey areas containing a similar abundance of common pipistrelles foraging along hedgerows and woodland edges. Several contacts with Leisler's bats and a Myotis bat *Myotis spp.* were recorded along hedgerow H19, the northern boundary of the north western quarter of the site. The majority of hedgerows within the site were used by bats either for foraging or to commute along between roost sites and foraging areas.

Mature Trees

E.3.10 All mature trees on site were assessed for their potential to support roosting bats. The site had two mature oaks (T1 & T2) and one veteran oak (T3) within its boundaries. There were several standard trees present in hedgerows, which were therefore assessed for their bat potential at the same time as the hedges. The veteran tree survey, conducted at a separate time resulted in the classification of just one tree (T3) as a veteran. T1 had some dead wood in the canopy, a small hole and a fissure in the trunk, which means it has moderate potential to support roosting bats. T2 was in good condition with no features observed that would be suitable for roosting bats. T3 had exposed heartwood, split and loose bark and significant quantities of dead wood in the canopy. This tree had good potential for roosting bats.

E.3.11 Tree group (TG) 1 was a line of 13 semi-mature sycamores along the northern edge of the buildings at Firs Farm. One woodpecker hole was identified in one tree, and two trees were recorded as having sections of lifted bark. These features offer low/moderate potential for roosting bats, the ten remaining trees however, had no features suitable for bats. TG2 comprised three semi-mature ash *Fraxinus excelsior* in hedgerow H33. No features were recorded within these trees that would be suitable for roosting bats.

Table 6E.2 Table of Roost Potential for Bat Surveys of Trees

Roost Potential	Description of Feature
High	<i>Large number of potential roost sites/access points and/or more than one feature/s of note such as a large cavity which potentially leads to a roost site.</i>
Mod/High	<i>Number of potential roost sites/access points and/or more than one feature/s of note such as a large cavity which potentially leads to a roost site.</i>
Moderate	<i>A number of potential roost sites/access points and/or one feature of note such as a large cavity.</i>
Low/Moderate	<i>A number of potential roost sites/access points and/or one feature of note.</i>
Low	<i>A limited number of potential roost sites/access points.</i>
None	<i>No access points/roost sites. Typically this relates to fallen trees.</i>

E.3.12 From the table above and results of the tree survey, T1 was considered to have high potential for roosting bats; T2 had low potential and T3 was considered to have moderate potential.

E.4 POTENTIAL EFFECTS ON THE LOCAL BAT POPULATION

- E.4.1 All species of bat are listed as priority species both on the UK BAP and Nottinghamshire's Local BAP. The common pipistrelle bat was removed from the UK BAP in a review of Species Action Plans in 2007 as its population was thought to have stabilized nationally; however it remains a Species of Conservation Concern in Nottinghamshire and remains on the Nottinghamshire BAP. Bat roosts, whether occupied or not are protected under the Wildlife & Countryside Act 1981 (as amended) and Habitat Regulations 1994 (as amended).
- E.4.2 During the building inspections completed at Firs Farm a small concentration of old brown long eared droppings were recorded in the roof void of building B8, however no bats were recorded emerging from or entering this (or any other) building during nocturnal surveys. Buildings B4, B6, B7, B8 and B10 were noted as having moderate to high potential to support roosting bats due to their construction, age and number of potential access points present. Although no bats were recorded emerging from or entering any building on site, due to the transitory nature of small roosts, it is possible that these buildings contain small occasional roosts. This was supported by the amount of foraging activity observed around the buildings around sunset. Buildings B1, B2, B3, B5, B9, B11 and B12 were considered to provide no, or very limited potential roosting opportunities for bats.
- E.4.3 Due to the low number of droppings recorded in building B8 and the lack of a significant population or the presence of a roosting uncommon-rare species being recorded during surveys, it is recommended that the buildings with moderate-high potential, as per Table 6E.1 above be demolished under a method statement which would have to be agreed with Natural England. Further internal and nocturnal surveys between June and September 2009 should be carried out to monitor the situation. Should significant roosts or uncommon bats be recorded roosting in any of the buildings a license would be applied for from Natural England to legitimise the demolition of Firs Farm. Ample mitigation for the loss of any roost is provided throughout the scheme regardless of the limited evidence of use by bats.

- E.4.4 All mature trees, under the current proposals, are to be retained and buffered within the sites proposed green infrastructure. At the time of survey no evidence of current or previous occupation was observed in association with these trees. Consequently, it was concluded that the proposals will not impact on a roost associated with the trees on site.
- E.4.5 The majority of hedgerows within the site were used by bats either for foraging or to commute between roost sites and foraging areas. Crevice dwelling bats such as common pipistrelles and some Myotis bats (whiskered *M. mystacinus* Brandt's *M. brandtii*, and Natterer's *M. Nattererii*) often use buildings as roost sites and it is likely that the buildings to the north of the site are home to the bulk of the bats recorded on site. Noctule, Leisler's and other *Myotis spp.* bats (Daubenton's *M. daubentonii* and Bechstein's *M. bechsteinii*) tend to select trees for roost sites over buildings; although suitable features were recorded in Trees T1, 2 and 3 no tree roosts were confirmed.
- E.4.6 The remaining habitats in the site provided limited foraging for the local bat population, in particular large open arable field compartments, which can restrict the movement of the smaller bat species. The edge habitats within and bordering the site, including woodland edges, immature plantation, hedgerows and field margins provide good connectivity for the local bat population to move between roosts sites within the local area and key foraging habitats within and around the site.

E.5 IMPACTS & MITIGATION

- E.5.1 The loss of a potentially small, occasionally used brown long eared bat roost will be mitigated for by the implementation of suitable roost features into some of the built structures within the development. To avoid potential conflict with occupants of the residential dwellings it is recommended that these features should be incorporated into a proportion of detached garages located throughout the site area. Potential features that could be installed could include the provision of ridge / roof tile access points and the creation of roof voids in the garage units which would be suitable for Brown Long Eared bats. The location and number of such features installed within the final design should be agreed in writing with the Local Planning Authority at the detailed planning application stage. This coupled with the provision of bat boxes, bricks and tubes on or integrated within proposed buildings would result in a net gain in roosting opportunities within the site.
- E.5.2 A potential impact of the proposed development is the effect of lighting on the use of the site by bats. It is considered that the scale of this impact will be significantly reduced through the use of low level light or directional lighting. This lighting will minimise light-spill onto the foraging routes and minimise potential disturbance caused through lighting of ecological corridors.
- E.5.3 A further potential impact is breaks in hedgerows resulting from construction of the proposed infrastructure. To mitigate for these breaks in hedgerows, connectivity will be enhanced by dense hedgerow planting and introduction of semi-mature standard trees where proposed infrastructure bisects hedgerows. These 'hop-overs' will be managed to have no understorey vegetation to encourage bats to fly up and over road ways, thus reducing the impact of the road by reducing the risk of traffic mortality. This mitigation will also allow continuation of flight lines and corridor routes along these hedgerows and would be of benefit to nocturnal/crepuscular bird species also.
- E.5.4 Given the proposed habitat creation of grassland, hedgerows, heathland areas of broadleaved woodland and a number of waterbodies, in addition to the retention of existing habitats of ecological value, the proposals will improve the overall foraging resource within the local area. Furthermore, the creation of the Green Infrastructure (GI) routes throughout the site will improve connectivity through the built development. Further enhancements to the GI should include incorporating

scalloped edges to areas of woodland planting to increase their value for foraging bats.