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Hole Farm Woodland Creation Project

Bat Survey Report (November 2022)

The Bat Survey Report was prepared by Atkins in November 2022 prior to the design of the Project being finalised. The Report presents the findings of the bat surveys undertaken of buildings 1, 2, 4 and 6 which was prior to buildings 4 and 6 being removed from the **Project's red line boundary. However, the results of the bat surveys for buildings 1 and 2 remain relevant to the Project as a European Protected Species mitigation licence will be sought from Natural England prior to the commencement of any works, and bat boxes suitable for Common and Soprano pipistrelle bats are proposed.** The findings of the Bat Survey Report are therefore still valid.



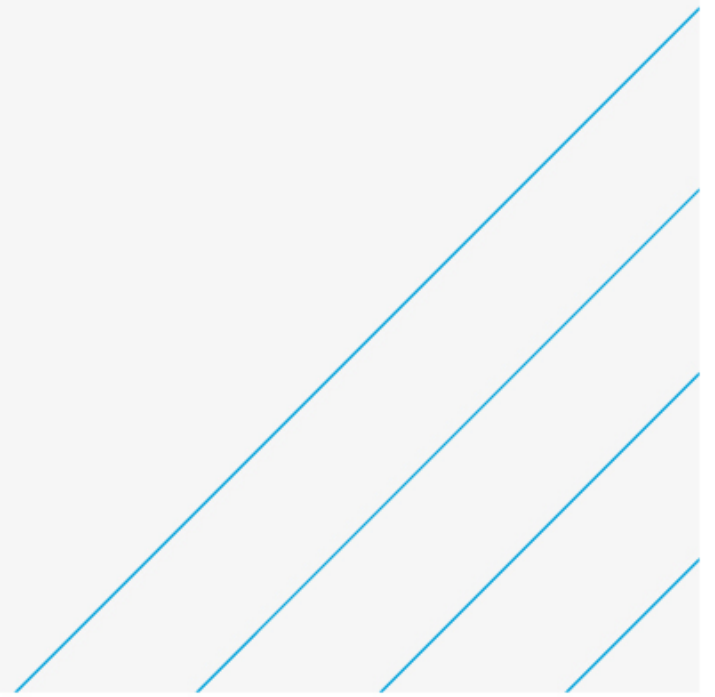
ATKINS

Member of the SNC-Lavalin Group

Hole Farm, Great Warley

Bat Survey Report

November 2022



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This document does not purport to provide legal advice.

This document has 25 pages including the cover.

Document history

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Client signoff

Client	National Highways
Project	Hole Farm, Great Warley
Job number	5198825.120
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Client signature / date	

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Non-technical Summary

Report purpose	<p>The aims of this report are to:</p> <ul style="list-style-type: none">• Identify key ecological constraints to the proposed works with regards to bats; and• Identify avoidance, mitigation, compensation and enhancement measures with regards to bats.
Proposed Scheme	<p>Approximately 70% of the Site equating to approximately 67 hectares is proposed for planting resulting in the change in land use of 100% of the arable habitat. The woodland will be predominantly broadleaf in nature and made up of a range of species carefully selected for their resilience and adaptability to tree pests and diseases and climate change and designed to complement the landscape character of the locality. The planting scheme design will be informed by the ecological surveys undertaken to date and any subsequent mitigation that is recommended. The aim of the initiative which is to create a multi-purpose woodland that provides bigger, better and more connected wildlife-rich habitats and provides opportunities for people to connect with nature and improve health and wellbeing.</p>
Desk studies and field surveys	<p>The buildings on site were subject to inspections on the 11th of July, Buildings 1 and 2 were found to support a roost of a small number of common pipistrelle bats. Building 4 was found to support a potential small maternity roost of brown long-eared bats. During the internal survey of Building 6 a feeding perch of brown long-eared bats was identified.</p>
Potential impacts and effects	<p>Demolishing/renovating buildings could cause disturbance to bats in their breeding or resting places, damage, obstruction or destruction of their roosts or/ and risk of killing and injury to bats.</p>
Avoidance, mitigation and compensation measures	<p>The works including localised vegetation clearance (e.g. ivy) and building demolition/renovations must be carried out under a licence issued by Natural England. Replacement roosts may also be needed to ensure the favourable conservation status of the affected species is maintained. If any mature trees are to be directly impacted by the tree planting proposals, it is recommended that those trees on Site be subject to a daylight inspection/ climbing inspection survey to categorise the trees according to the Bat Survey Guidelines (Collins, 2016).</p>

Report Validity

In the event of programme changes then updates to the surveys may be required to ensure the validity of the data, as per CIEEM guidance¹.

¹ CIEEM (2019) Advice Note on the Lifespan of Ecological Reports and Surveys

1. Introduction

Terms of Reference

- 1.1. Atkins Limited, member of the SNC-Lavalin Group was commissioned by National Highways to assess the ecological constraints in connection with the proposed tree planting Scheme at Hole Farm, Great Warley (hereafter referred to as the Scheme). The Scheme is located within Great Warley, Essex as shown on Figure A-1 in Appendix A (hereafter referred to as the Site).
- 1.2. Bat surveys were recommended following a Preliminary Ecological Appraisal (PEA) of the Scheme, which was undertaken by Sonar Ecology in 2021². The PEA identified a number of buildings considered suitable to support roosting bats.
- 1.3. This report has been undertaken with reference to current good practice³ and provides an initial appraisal of any likely ecological constraints with regards to roosting bats.
- 1.4. Bats are protected under the Wildlife and Countryside Act 1981. A summary of this legislation can be found in Appendix B.
- 1.5. This report is intended to inform design development, Site layout and/or Site investigations.

The Site

- 1.6. The Site is approximately 95 ha in area and is centred at Ordnance Survey national grid reference (OSNGR) TQ584897, nearest postcode CM13 3JD. The Site comprises arable fields, woodland copses, grass field margins, hedgerows, treelines, waterbodies and farm buildings. The surrounding landscape comprises residential development, agricultural land and roads including the M25 to the west. Figure A-1 in Appendix A shows the Site location.

The Scheme

- 1.7. Approximately 70% of the Site equating to approximately 67 hectares is proposed for planting resulting in the change in land use of 100% of the arable habitat. The woodland will be predominantly broadleaf in nature and made up of a range of species carefully selected for their resilience and adaptability to tree pests and diseases and climate change and designed to complement the landscape character of the locality. The planting scheme design will be informed by the ecological surveys undertaken to date and any subsequent mitigation that is recommended. The aim of the initiative is to create a multi-purpose woodland that provides bigger, better and more connected wildlife-rich habitats and provides opportunities for people to connect with nature and improve health and wellbeing. Details of the Scheme are shown on Figure A-2 in Appendix A.

Scope of Assessment

- 1.8. This report presents the methods, results, discussion, recommendations and conclusions following the bat surveys conducted by Atkins in July, August, and September 2022.
- 1.9. The aim of the bat surveys was to determine the presence or likely absence of roosting bats within the buildings on Site deemed to be affected by the Proposed Scheme. Where roosting was identified, efforts were made to characterise the roost/s present in terms of the species and numbers of bats and how they utilise each structure. This information aids future mitigation and development licensing.

² Sonar Ecology (2021) Hole Farm, Great Warley Preliminary Ecological Appraisal Survey.

³ CIEEM (2017) Guidelines for Ecological Report Writing. Chartered Institute of Ecology and Environmental Management, Winchester.

2. Methodology

Ecological Field Surveys

- 2.1. The geographical area for undertaking ecological field surveys has been determined using the current survey guidance, professional judgement and the zones of influence, which have been determined based on the nature of the impacts arising from the Proposed Scheme.

Surveyor Competencies

- 2.2. All the surveys were led by surveyors who have been assessed⁴ to be at least of capable experience following the Chartered Institute of Ecology and Environmental Management (CIEEM) competency framework⁵.

Preliminary Bat Roost Assessment

- 2.3. The Preliminary Bat Roost Assessment (PBRA) survey was undertaken in accordance with the Bat Conservation Trust (BCT) Good Practice Guidelines⁶ and was undertaken by suitably experienced ecologists.
- 2.4. The survey was aided by the use of a torch and binoculars. The survey involved a visual examination of the exterior and interior (where access allowed) of each building, from ground level, and recorded information of any potential bat roost features, identification of potential entry/exit points for bats, and included a search for evidence of the presence of bats (this includes live or dead bats, bat droppings, urine splashes, fur-oil staining and feeding remains. Accessible droppings were collected for DNA analysis by a specialist laboratory.
- 2.5. Table 2-1 - Description of Suitability Categories for Roosting Bats below is taken from the BCT Good Practice Guidelines and provides guidance that was followed to inform the assessment of suitability of each building for roosting bats.

Table 2-1 - Description of Suitability Categories for Roosting Bats

Roosting suitability	Description
Negligible	Negligible habitat features on site likely to be used by roosting bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and / or suitable surrounding habitat to be used on a regular basis or by large numbers of bats (i.e. unlikely to be suitable for maternity or hibernation.)
Moderate	A structure with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only – the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).
High	A structure with one or more potential roost sites that are obviously suitable for roosts by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions, and surrounding habitat.

⁴ Assessment undertaken by Atkins ecological technical leadership team in accordance with CIEEM competency criteria.

⁵ <https://www.cieem.net/competency-framework>

⁶ Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition). The Bat Conservation Trust, London.

Bat Presence/Likely Absence Survey Methodology

- 2.6. Since the Sonar Ecology PEA report all of the buildings have been re-numbered by the client. Buildings 1, 2, 3, 4, and 5 (Figure A-3 in Appendix A), are now known as buildings 2, 1, 4, 6, and 7 respectively. A plan showing the building locations is shown in Figure A-4 in Appendix A.
- 2.7. In accordance with best practice guidelines⁷, Buildings 1 and 2 were found to offer moderate and low bat roosting potential respectively, while Buildings 4 and 6 were both found to have confirmed roosts. Building 1 (assessed as moderate potential for roosting bats) was intended to be subject to two surveys (both dusk emergence surveys) during which a bat roost was confirmed, and therefore a third survey (a dusk emergence survey) was undertaken as per best practice guidelines for buildings with confirmed roosts. Building 2 (assessed as low potential for roosting bats) was subject to two surveys (both dusk emergence surveys) during the second of which a bat roost was found. Despite being a confirmed roost no third survey was conducted (see Survey Limitations for an explanation and significance of this omission). Buildings 4 and 6 (confirmed roosts) were both subject to three bat surveys (two dusk emergence surveys and a dawn re-entry survey). The dates of the surveys are provided within the Results section below; surveys on the same building were spaced a minimum of two weeks apart and all surveys were undertaken in suitable weather conditions⁸.
- 2.8. The dusk emergence surveys commenced 15 minutes before sunset and continued until up to 90 minutes after sunset. The dawn re-entry surveys commenced between 90 minutes before sunrise and continued until 15 minutes after sunrise. To adequately cover the features of bat potential at each building, Building 1 required four surveyors, Building 2 required three surveyors, Building 4 required three surveyors, and Building 6 required two surveyors. Each surveyor was equipped with full spectrum bat recording devices (either Anabat Walkabout or Elekon Bat Logger detectors) which record bat calls onto an SD card for post-survey analysis. Surveyors were positioned around the structures in order to observe all potential bat roosting features identified from the PBRA. Two infrared cameras were utilised to aid surveyors view of the building.
- 2.9. Following the survey all sound files recorded by each surveyor were analysed using Kaleidoscope software to identify the bats recorded to species-level (where possible) and check for any potential additional bat passes missed by surveyors.

Survey Limitations

- 2.10. This section identifies any limitations to the surveys or assessment and provides an explanation as to the effect of these on the assessment.
- 2.11. Internal access to Building 1 was not possible as the building was locked. The building was later confirmed as a pipistrelle roost, and as such this was not considered a significant limitation. Internal access will be beneficial in future to aid roost characterisation and inform the required European Protected Species (EPS) mitigation licence from Natural England.
- 2.12. The third survey for Buildings 2 and 6, which were programmed for the last week of September 2022, were cancelled by the client when the fee proposal for further surveys was rejected. As these buildings have both been confirmed to be active roosts this is not considered to be a significant limitation, although a third survey visit will need to be conducted during the May-September active season in 2023 for roost characterisation purposes and to inform the required licence.

⁷ Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition). The Bat Conservation Trust, London.

⁸ In accordance with Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition). The Bat Conservation Trust, London. "It is usually advised to avoid very heavy rain, strong winds, mists and dusk temperatures below 10 degrees".

3. Results

Preliminary Bat Roost Assessment

Building 1

- 3.1. A pitched building constructed of a mixture of breeze blocks, metal panels, and asbestos panels, with a corrugated asbestos roof. Two large doors were slightly open on the eastern face of the building. The southern face of the building included dense ivy coverage.
- 3.2. Building 1 was assessed to have moderate potential to support roosting bats due to a number of gaps in the asbestos cladding and the soffit board, as well as openings in the doors on the eastern and north-eastern faces of the building.
- 3.3. No internal inspection was possible as the doors of this building were locked, and as such no evidence of roosting bats was identified.

Building 2

- 3.4. Building 1 is a farm building constructed of breeze blocks to a height of three meters, and then wooden panelling above this, with a corrugated asbestos roof. The building is open on two sides (north-east and south-west) and has eight skylights in the roof. One internal corner includes dense ivy. There were a number of gaps in the wooden panelling that allow access into the building.
- 3.5. No roosting bats were observed during the inspection, and no signs of roosting bats were observed.
- 3.6. Building 1 was assessed to have low potential for small numbers of common species of crevice dwelling bats due to crevice features within the ivy and wooden panelling.

Building 4

- 3.7. A farm building constructed of breeze blocks and corrugated asbestos, with a corrugated asbestos roof. The building is open on the north-west side, and there is dense vegetation on the south-eastern and southern sides of the building.
- 3.8. A number of gaps were identified where the asbestos sheets meet the breeze blocks allowing access to the building. Droppings (both fresh and old) and feeding remains (moth wings) were found under the internal ridge, suggesting a possible feeding perch of long-eared bats (*Plecotus* sp.). These droppings were sent to a specialist laboratory for DNA testing and were confirmed to be brown long-eared bat droppings (*Plecotus auritus*) (See 5.7.Appendix C). As such this building has been assessed as having a confirmed roost.

Building 6

- 3.9. A farm building constructed of brick and corrugated metal, with a corrugated asbestos roof. The building has a large window on the western side of the building, with two panes missing. There is dense ivy on the western side of the building.
- 3.10. There are a number of gaps between the wooden soffit and the asbestos roof, as well as an open door on the northern side of the building, that provides access to the building.
- 3.11. A number of bat droppings, and some feeding remains, were found within the building, confirming it as a roost. There were insufficient droppings to undertake DNA analysis, but they appeared to be from a long-eared bat.

Bat Presence / Likely Absence Survey Results

Table 3-1 - Survey summary for Building 1

Date	Survey type	Sunset / sunrise time	Start / end time	Weather conditions	Results
20/07/2022	Dusk emergence	21:04	Start: 20:49 End: 22:34	Temperature: 25°C Humidity: 59% Wind speed*: 2 Wind direction: W Cloud cover**: 8 Rain***: 0	Occasional common pipistrelle bat passes, with some soprano pipistrelle passes, and rare noctule bat passes.
25/08/2022	Dusk emergence	20:00	Start: 19:45 End: 21:30	Temperature: 19°C Humidity: 83% Wind speed*: 1 Wind direction: SE Cloud cover**: 8 Rain***: 0	Frequent foraging of common pipistrelle bats with occasional soprano pipistrelle bats. Occasional commuting and foraging past the building by pipistrelle bats. Occasional noctule bats were also recorded. An emerging common pipistrelle bat was recorded coming from below the roof line on the eastern side of the building around the SE corner.
12/09/2022	Dusk emergence	19:20	Start: 19:05 End: 20:50	Temperature: 24°C Humidity: 5% Wind speed*: 1 Wind direction: NE Cloud cover**: 8 Rain***: 0	Frequent foraging of common pipistrelle bats with occasional soprano pipistrelle bats. Occasional commuting and foraging past the building by pipistrelle species. Occasional noctule bats were also recorded. An emerging common pipistrelle bat was recorded coming from below the roof line on the eastern side of the building around the SE corner (approximately the same location as the previous survey).

- 3.12. In accordance with BCT best practice guidelines, as Building 1 was assessed as having low potential, initially one survey was planned. A precautionary second survey was undertaken, and during this survey an emergence was observed, so the building was re-assessed to support a confirmed roost.

Table 3-2 - Survey summary for Building 2

Date	Survey type	Sunset / sunrise time	Start / end time	Weather conditions	Results
21/07/2022	Dusk emergence	21:03	Start: 20:48 End: 22:33	Temperature: 20oC Humidity: 71% Wind speed*: 3 Wind direction: W Cloud cover**: 8 Rain***: 0	Frequent foraging of common pipistrelle bats with occasional soprano pipistrelle bats. Occasional commuting and foraging past the building of pipistrelle bats. Occasional noctule bats were also recorded.
16/08/2022	Dusk emergence	19:50	Start: 20:19 End: 20:04	Temperature: 26oC Humidity: 54% Wind speed*: 1 Wind direction: N Cloud cover**: 3 Rain***: 0	Frequent foraging of common pipistrelle bats with occasional soprano pipistrelle bats of pipistrelle bats. Occasional commuting and foraging past the building. Occasional noctule bats were also recorded. Two emerging common pipistrelle bats were recorded coming from within the building on the south-western side of the building.

*Wind speed (where available) & score of 0-12 against Beaufort scale where 0 = calm, 2 = light breeze, 4 = Moderate breeze, 6 = strong breeze, 7 = High wind, 9 = Strong gale, 12 = Hurricane

**Estimated cloud cover of 0-8 where 0 = Sky completely clear, 4 = Sky half cloudy, 8 = Sky completely cloudy.

***Estimate precipitation intensity on scale of 0-5 where 0 = Dry, 1 = Light drizzle, 2 = Light rain, 3 = Moderate rain, 4 = Heavy rain, 5 = Torrential rain.

Table 3-3 - Survey summary for Building 4

Date	Survey type	Sunset / sunrise time	Start / end time	Weather conditions	Results
26/07/2022	Dusk emergence	20:56	Start: 20:41 End: 22:26	Temperature: 22°C Humidity: 54% Wind speed*: 2 Wind direction: S Cloud cover**: 2 Rain***: 0	Occasional common pipistrelle bat passes, with brown long-eared bats seen flying around continuously within the building once it was dark. Brown long-eared bats were seen flying around a beam feature at the gable within the building and one bat was seen entering the feature. The level of activity observed, the droppings and feeding remains and the time of year (around the time when young bats would be learning to fly) suggest a small maternity or satellite roost is present. A long-eared bat was seen flying towards the house to the north, which could potentially be the site of a linked larger roost.
24/08/2022	Dusk emergence	20:03	Start: 19:48 End: 21:33	Temperature: 26°C Humidity: 54% Wind speed*: 1 Wind direction: N Cloud cover**: 3 Rain***: 0	Occasional common pipistrelle bat passes, with brown long-eared bats seen flying within the building.
21/09/2022	Dusk emergence	18:59	Start: 18:44 End: 20:29	Temperature: 17°C Humidity: 59% Wind speed*: 1 Wind direction: NW Cloud cover**: 2 Rain***: 0	Occasional common and soprano pipistrelle bat passes, with brown long-eared bats seen flying within the building. Some noctule bats were recorded toward the start of the survey.

Table 3-4 - Survey summary for Building 6

Date	Survey type	Sunset / sunrise time	Start / end time	Weather conditions	Results
28/07/2022	Dusk emergence	20:53	Start: 20:38 End: 22:23	Temperature: 21°C Humidity: 51% Wind speed*: 1 Wind direction: E Cloud cover**: 2 Rain***: 0	Occasional common and soprano pipistrelle bat passes, with some brown long-eared bat passes.
17/08/2022	Dusk emergence	20:12	Start: 20:07 End: 21:41	Temperature: 19°C Humidity: 90% Wind speed*: 1 Wind direction: SW Cloud cover**: 8 Rain***: 0	Occasional common and soprano pipistrelle bat passes, with some brown long-eared bat passes.

4. Impacts

- 4.1. Buildings 1 and 2 were found to support a small number of common pipistrelle bats. [REDACTED] was found to support a potential small maternity roost of brown long-eared bats. During the internal survey of Building 6 a feeding perch of brown long-eared bats was identified.
- 4.2. In the absence of mitigation, the demolition of structures at Hole Farm could result in injury or fatality of a small number of common and soprano pipistrelle bats, and brown long-eared bats, which are common and widespread species. For buildings 1, 2 and 6 the roosts are of low conservation significance for common and soprano pipistrelle, and brown long-eared bat. [REDACTED] has a confirmed brown long-eared bat roost, which is thought to be a small maternity roost of medium conservation significance. Demolition / major renovation of the buildings would result in the disturbance and loss of roost sites. As bats have been found to be roosting in all the on-site buildings surveyed³, the works including localised vegetation clearance (e.g. ivy) and building demolition/renovations must be carried out under a European Protected Species (EPS) mitigation licence issued by Natural England.
- 4.3. Due to an increase in human presence and changes of the Application Site during demolition/renovation of buildings and tree planting, there is likely to be a low short-term impact on foraging use of the Application Site by bats. As the current site will be replaced with a community forest there will be a substantial increase in the long-term utility of the site for both roosting and foraging bats compared to the current baseline of intensive arable farmland.

5. Recommendations

- 5.1. Redevelopment would result in the loss of the roosts supported by structures at Hole Farm. Therefore, an EPS mitigation licence from Natural England will be required prior to the proposed demolition / renovation commencing.
- 5.2. An ecological management plan⁹ has been prepared in line with published guidance in order to mitigate for the loss of roosts caused by the demolition /renovation of the structures at Hole Farm. This plan covers vegetation clearance, building demolition, and impacts on trees. The ecological management plan is subject to change if the scope or details of the Scheme change.
- 5.3. As bats have been found to be roosting in all the on-site buildings surveyed³, the works including localised vegetation clearance (e.g. ivy) and building demolition/renovations must be carried out under a licence issued by Natural England. Replacement roosts may also be needed to ensure the favourable conservation status of the affected species is maintained. For buildings 1, 2 and 6 where roosts of low conservation significance have been confirmed (common and soprano pipistrelle and brown long-eared bat), bat boxes may provide an appropriate form of mitigation, either alone or, preferably, in combination with the provision of new roosts in buildings. In such cases, the type of bat box provided should be appropriate to the species. For building 4 which has a confirmed brown long-eared bat roost, which is thought to be a small maternity roost (medium conservation significance), where it is not feasible to maintain roosts in situ, purpose-built bat houses would be required as an alternative. This could comprise a 'hotbox' suitable for maternity colonies mounted within the roof of an existing retained building on Site (or in the near vicinity) or a large free-standing bespoke bat structure or large pole mounted bat box. The replacement roost should normally be situated as close as possible to the roost to be lost and should be constructed before the works take place to allow the bats time to locate the new roost before the original is lost¹⁰.
- 5.4. If any mature trees are to be directly impacted by the tree planting proposals, it is recommended that those trees on Site be subject to a daylight inspection/ climbing inspection survey to categorise the trees according to the Bat Survey Guidelines (Collins, 2016).
- 5.5. Should a bat(s) be found to be roosting in any of the on-site trees, works may need to be carried out under a licence issued by Natural England if loss/disturbance cannot be avoided. Additional surveys may be required, and replacement roosts may also be needed to ensure the favourable conservation status of the roosting species is maintained.
- 5.6. There should be retention and enhancement of the edge habitats and boundary features on site which act as a wildlife corridor will ensure the continued use of the Site by commuting, foraging and roosting bats.

Report Validity

- 5.7. In the event of programme changes then updates to the surveys may be required to ensure the validity of the data, as per CIEEM guidance¹¹.

⁹ Atkins (2022), Hole Farm Ecological Management Plan

¹⁰ [Bat mitigation guidelines](#)

¹¹ CIEEM (2019) Advice Note on the Lifespan of Ecological Reports and Surveys

Appendices





Appendix A. Site Location and Scheme Drawings

Figure A-1 - Site Location (Red line boundary)



Legend

-  Redline Boundary
-  50 m Buffer

0 100 200 m



Base Mapping: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, and the GIS User Community

Original scale:
1:6000

Figure No. A-1

Atkins Limited ©, Woodcote Grove, Ashley Road, Epsom, England, KT18 5BW

Project: Hole Farm

Client: National Highways

Title: Redline Boundary and Survey Area

Drawn by:
EH
Date:
18/11/2022

Checked by:
KL
Date:
18/11/2022

Reviewed by:
VH
Date:
21/11/2022

Figure A-2 - Landscape Concept Plan

Landscape Concept Plan

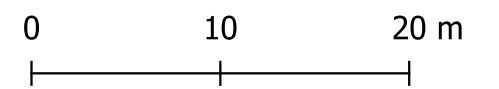


Figure A-3 – Original Building Locations



Legend

Building




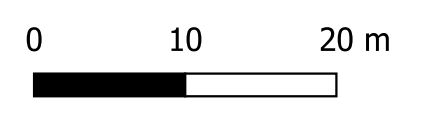
Atkins Limited © Woodcote Grove Ashley Road Epsom England KT18 5BW	Project: Hole Farm	Title: Location plan of buildings subject to bat surveys	Original scale: 1:400	Drawn By: EH	Checked By: KL	Reviewed By: VH
	Client: 	Drawing number: N/A		Date: 18/11/2022	Date: 18/11/2022	Date: 21/11/2022

Figure A-4 - Updated Building Locations



Legend

Building numbers



Original scale: 1:500	Figure No. A-4
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Atkins Limited ©, Woodcote Grove, Ashley Road, Epsom, England, KT18 5BW

Project:
Hole Farm, Great Warley

Client:
National Highways

Title:
Updated Building Locations

Drawn by: EH Date: 11/10/2022	Checked by: KL Date: 11/10/2022	Reviewed by: VH Date: 12/10/2022
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Appendix B. Site photos

Building 1

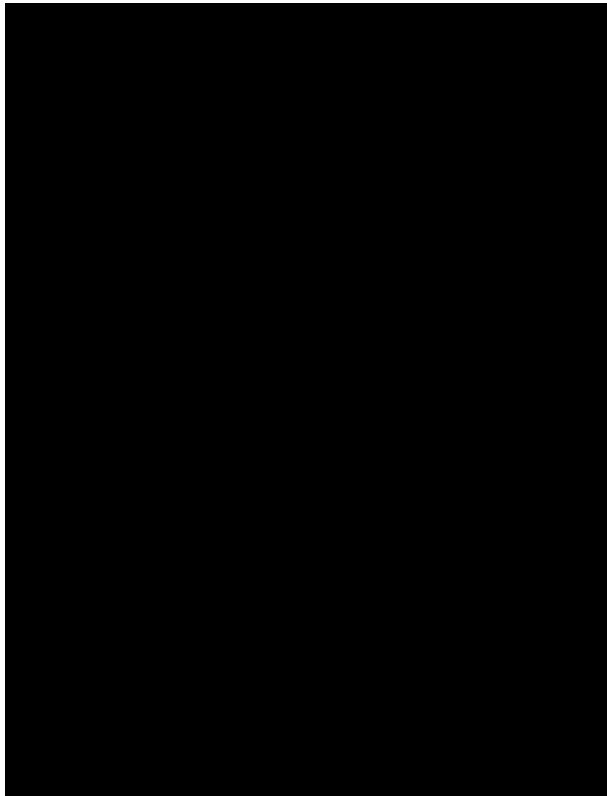


An inaccessible large agricultural building that was found to support a day roost used by a single common pipistrelle bat (Confirmed roost). Building 2 is shown to the far right of the picture

Building 2



An open large agricultural building in use that was found to support a day roost used by two common pipistrelle bats (Confirmed roost)



An open fronted disused agricultural building that was found to support a small maternity roost of brown long-eared bats (Confirmed roost)

Building 6



A largely wooden building used for storage adjacent to building 4 that contained evidence of use as a feeding perch for brown long-eared bat (Confirmed roost)

Appendix C. DNA Analysis Report

Figure C-1 – DNA Analysis Report

Folio No: E15320
 Report No: 1
 Purchase Order: PO176166_5198325.120
 Client: ATKINS LTD
 Contact: Sarah Briscoe

TECHNICAL REPORT

ANALYSIS OF BAT DROPPINGS FOR SPECIES OF ORIGIN IDENTIFICATION

SUMMARY

The droppings of bats contain small amounts of DNA belonging to the organism from which they originated. By analysing droppings collected from a bat roost or colony for the presence of DNA, a robust identification of the species present can be made. Recent advancements in molecular methods including PCR (polymerase chain reaction) and DNA sequencing mean that 92% of bat species worldwide can be identified including all 17 UK resident bat species.

RESULTS

Date sample received at Laboratory: 30/08/2022
Date Reported: 08/09/2022
Matters Affecting Results: None

Lab Sample ID.	Site Name	O/S Reference	Genetic Sequence	Common Name	Result	Sequence Simliarity
B1161	A.1 Hole Farm		CTAATAATTGGAGCCCCTGA TATAGCTTTTCCCGAATAA ATAACATAAGCTTCTGACTG CTTCCCCATCTTTTCTACTA CTTTAGCTTCGTCTGCAGT AGAGGCTGGAGCAGGTACC GGTTGAACAGTCTATCCTCC TTTAGCGGGAAA	Brown long-eared bat	<i>Plecotus auritus</i>	99.31%
B1162	B.1 Hole Farm		CTAATAATTGGAGCCCCTGA TATAGCTTTTCCCGAATAA ATAACATAAGCTTCTGACTG CTTCCCCATCTTTTCTACTA CTTTAGCTTCGTCTGCAGT AGAGGCTGGAGCAGGTACC GGTTGAACAGTCTATCCTCC TTTAGCGGGAAA	Brown long-eared bat	<i>Plecotus auritus</i>	99.31%
B1163	C.1 Hole Farm		TATAGCTTTTCCCGAATAA ATAACATAAGCTTCTGACNG CTTCCCCATCTTTTCTACTA CTTTAGCTTCGTCTGCAGT AGAGGCTGGAGCAGGTACC GGTTGAACAGTCTATCCTCC TTTAGCGGGAAA	Brown long-eared bat	<i>Plecotus auritus</i>	100%



If you have any questions regarding results, please contact us: ForensicEcology@surescreen.com

Reported by: Chelsea Warner

Approved by: Chris Troth

METHODOLOGY

Once samples have arrived in the laboratory, a single bat dropping is selected for its suitability (freshness and size). The DNA is then isolated using a commercial DNA extraction kit. Using PCR, bat DNA (if present within the sample) is amplified using bat DNA-specific molecular markers designed to amplify a short fragment of the mitochondrial gene. If amplification is successful, the resulting DNA sequence is revealed using a process known as Sanger Sequencing in order to obtain the genetic sequence. The sequence results are aligned against a library of known bat reference sequences using bioinformatics software, which enables us to determine which species the extracted DNA matches with, informing the species identity and sequence similarity (%).

If the initial analysis is unsuccessful, the entire process is repeated up to two additional times with fresh reserve droppings. If no DNA is detected after three attempts, we can be confident that any further analysis of the sample will likely also fail to result in species identification.

INTERPRETATION

Genetic Sequence: The unique DNA sequence obtained from the sample.

Sequence Similarity: How closely matched the DNA sequence from your sample is to the sequences within our reference database. This can be interpreted as a score of result accuracy, with the maximum score of 100% indicating an exact match of dropping to the indicated species' reference sequence. Lower scores (80-99%) indicate some variation between the sample and reference sequence, likely due to natural variation between individual genetic sequences and/or systematic variations generated through the sequencing process. Scores below 80% similarity should be interpreted with care and can indicate part degraded or part contaminated samples.

Inconclusive Result:

Degraded sample:
DNA degraded, unable to determine species identification due to degradation of sample DNA. This can happen either before sample collection (old droppings, exposure to UV etc.) or after sample collection if stored for long periods before analysis or not handled correctly.

Inhibited/contaminated sample:
Unable to determine species identity due to contamination or the suspected presence of large quantities of PCR inhibitors. Contamination sources can come from other species which come into contact with droppings, human contamination during sample collection.

Alternative Result: Sometimes, other mammalian species such as rodents are detected. We find this to be a common occurrence as some bat droppings can be similar in appearance to rodent droppings. Although sometimes unexpected, repeat analyses in these cases would likely return the same results.



Appendix D. Legislation

Species	Legislation	Offences	Licensing procedures and guidance
Bats <i>European protected species</i>	Conservation of Habitats and Species Regulations 2017 (as amended) Reg 43	Deliberately ¹² capture, injure or kill a bat; deliberate disturbance ¹³ of bats; or damage or destroy a breeding site or resting place used by a bat. [The protection of bat roosts is considered to apply regardless of whether bats are present.]	A Natural England (NE) licence in respect of development is required. Guidance documents: <i>NE Standing Advice for protected species 2013</i> <i>European Protected Species: Mitigation Licensing- How to get a licence</i> (NE 2013) <i>Bat Mitigation Guidelines</i> (English Nature 2004) <i>Bat Workers Manual</i> (JNCC 2004)
	Wildlife and Countryside Act 1981 (as amended) S.9	Intentionally or recklessly obstruct access to any structure or place used for shelter or protection or disturb ¹⁴ a bat in such a place.	Licence from NE is required for surveys (scientific purposes) that would involve disturbance of bats or entering a known or suspected roost site.

¹² Deliberate capture or killing is taken to include “accepting the possibility” of such capture or killing

¹³ Deliberate disturbance of animals includes in particular any disturbance which is likely a) to impair their ability (i) to survive, to breed or reproduce, or to rear or nurture their young, or (ii) in the case of animals of hibernating or migratory species, to hibernate or migrate; or b) to affect significantly the local distribution or abundance of the species to which they belong.

¹⁴ Lower levels of disturbance not covered by the Conservation of Habitats and Species Regulations 2017 (as amended) remain an offence under the Wildlife and Countryside Act 1981 (as amended) although a defence is available where such actions are the incidental result of a lawful activity that could not reasonably be avoided.

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