

Preliminary Bat Roost Assessment

Twycross Zoo, Burton Road, Atherstone

A Report To: Baker Mallett LLP

Report Number: RT-MME-160474-03 Rev A

Date: October 2023

Quality Assurance

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Declaration of Compliance

This study has been undertaken in accordance with British Standard 42020:2013 "Biodiversity, Code of Practice for Planning and Development". The information which we have prepared is true, and has been prepared and provided in accordance with the Chartered Institute of Ecology and Environmental Management's Code of Professional Conduct. We confirm that the opinions expressed are our true and professional bona fide opinions.

Disclaimer

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Validity of Data

The findings of this study are valid for a period of 12 months from the date of survey. If works have not commenced by this date, it may be necessary to undertake an updated survey to allow any changes in the status of bats on site to be assessed, and to inform a review of the conclusions and recommendations made.

Non-Technical Summary

Project Background

In September 2023, Baker Mallett LLP commissioned Middlemarch to undertake an updated Preliminary Bat Roost Assessment of the site of a proposed development at Twycross Zoo, Atherstone. The updated survey is required to encompass the new proposed works boundary following the Preliminary Bat Roost Assessment carried out in November 2022. This assessment is required to inform a planning application associated with the demolition of the lemur house, removal of several animal enclosures and clearance of trees and vegetation to make way for the construction of a National Science Conservation Centre.

Scope of Survey

To fulfil the above brief to assess the potential for the existing buildings and trees on site to support roosting bats, an updated Preliminary Bat Roost Assessment was undertaken on 25th September 2023. The assessment was carried out in line with the specifications detailed in Bat Mitigation Guidelines (English Nature, 2004) and Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins, 2016).

Summary of Key Bat Features

Roosting Features: Building 1 and tree T21 were assessed as having high potential to support roosting bats and building 4 and tree T20 was assessed as having low potential to support roosting bats. The remaining buildings and trees had negligible potential to support roosting bats.

Commuting/Foraging Features: The mosaic of habitats on site, particularly the woodlands, trees, scrub, hedgerows, ditch, pond and grasslands, offer high value foraging habitat for bats. Furthermore, the site is set in a rural area and is well connected to other valuable habitats in the wider landscape via hedges and lines of trees.

Potential Impacts on Bats

The site supports numerous potential bat roosting features and highly suitable foraging and dispersal routes with extensive connectivity to further suitable habitats across the site and beyond. The proposed structure demolition works have the potential to disturb or destroy a bat roost if bats are found to be roosting within the structures. The proposed tree removal works should not impact the trees possessing bat roosting potential, however the construction phase will involve noise, lighting, vibration and dust which have the potential to disturb any bats roosting in the retained trees.

There is also the potential for any new lighting, either temporary or permanent, at the site to impact foraging and commuting bats. To increase the value of the site for bats, a recommendation is made in Chapter 6 regarding suitable plant species to incorporate into the soft landscaping to attract night flying insects.

Recommendations

- **Building 1:** The Lemur House has been identified as having high potential to support roosting bats. Bat Surveys: Good Practice Guidelines published by the Bat Conservation Trust (Collins, 2016) recommends that for structures with high bat roosting potential at least three dusk emergence and/or dawn re-entry surveys be undertaken during the bat emergence/re-entry survey season to determine the presence/absence of roosting bats within the structure.
- **Tree T21:** The ash tree T21 has been identified as having high potential to support roosting bats. Bat Surveys: Good Practice Guidelines published by the Bat Conservation Trust (Collins, 2016) recommends that for trees with high bat roosting potential at least three dusk emergence and/or dawn re-entry surveys be undertaken during the bat emergence/re-entry survey season to determine the presence/absence of roosting bats within the tree.
- **Building 4:** The ivy-covered shed has been identified as having low potential to support roosting bats. Bat Surveys: Good Practice Guidelines, published by the Bat Conservation

Trust (Collins, 2016), recommends for structures with low bat roosting potential that at least one survey be undertaken during the peak season for emergence/re-entry surveys.

- **All remaining trees and buildings:** All remaining trees surveyed were considered to have low or negligible potential for roosting bats. All remaining buildings were considered to have negligible potential for roosting bats. The survey data obtained for the site is valid for 12 months from the survey date. If proposed site works have not commenced within this timeframe it will be essential to update the survey effort to establish if the trees or buildings have developed features that could be used by roosting bats in the interim. In the unlikely event that a bat is found during works to the trees all works must immediately cease and a suitably qualified ecologist should be contacted.
- **Scheme Design:** The proposed development should be designed to minimise effects on bats in accordance with ecological mitigation hierarchy as set out in the National Planning Policy Framework (NPPF), and the National Planning Practice Guidance (NPPG).
- **Lighting:** In accordance with best practice guidance relating to lighting and biodiversity (Miles et al, 2018; Gunnell et al, 2012), any new lighting should be carefully designed to minimise potential disturbance and fragmentation impacts on sensitive receptors, such as bat species.
- **Habitat Enhancement:** In line with the National Planning Policy Framework, the development should aim to enhance the site for bats. This may include the provision of roosting opportunities through the installation of bat boxes, and the enhancement of foraging areas by planting species which attract night flying insects.

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1. Introduction

1.1 Project Background

In September 2023 Baker Mallett LLP commissioned Middlemarch to undertake an updated Preliminary Bat Roost Assessment at Twycross Zoo, Atherstone. The updated survey is required to encompass the new proposed works boundary following the Preliminary Bat Roost Assessment carried out in November 2022. This report supersedes the 2022 report. This assessment is required to inform a planning application associated with the demolition of the lemur house, removal of several animal enclosures and clearance of trees and vegetation to make way for the construction of a National Science Conservation Centre. Middlemarch has previously carried out a number of surveys for Baker Mallett LLP at this site, those from 2022 were in connection with the current project. The findings of these surveys are detailed in the following reports:

- Preliminary Ecological Appraisal, 2019, report RT-MME-131054-01;
- Preliminary Bat Roost Assessment, 2019, report RT-MME-131054-02;
- Preliminary Ecological Appraisal, 2019, report RT-MME-150735-01;
- Preliminary Bat Roost Assessment, 2019, report RT-MME-150735-02;
- Preliminary Arboricultural Assessment, 2022, report RT-MME-159277-01;
- Preliminary Ecological Appraisal, 2022, report RT-MME-159277-04; and,
- Preliminary Bat Roost Assessment, 2022, report RT-MME-159277-05.

Middlemarch has also been commissioned to undertake an updated Preliminary Ecological Appraisal (report RT-MME-160474-02 Rev A) as well as the following assessments for Baker Mallett LLP at this site in connection with the construction of the National Science Conservation Centre:

- Habitats Regulation Assessment Stage 1 Screening, report RT-MME-160474-01;
- Biodiversity Metric Assessment, report RT-MME-160474-04; and,
- Great Crested Newt Habitat Suitability Index Assessment, report RT-MME-160474-05 Rev A.

To fulfil the above brief to assess the potential for the existing buildings and trees on site to support roosting bats, a Preliminary Bat Roost Assessment was undertaken on 15th November 2022 and an updated Preliminary Bat Roost Assessment was undertaken on 25th September 2023.

All UK bat species are legally protected species and they are capable of being material considerations in the planning process. A summary of the legislation protecting bats is included within Appendix 1.

1.2 Site Description and Context

Table 1.1 provides a brief summary of the site and its surroundings.

Attribute	Description
Location	Twycross Zoo, Burton Road, Atherstone
National Grid Reference	SK 31559 06068
Site Area (ha)	2.19

Table 1.1: Summary of Site and Surroundings (continues)

Attribute	Description
Topography	Generally flat, slight slope down going south.
Land Cover (on site)	The site forms the south-west corner of the larger site of Twycross Zoo and a stretch of land immediately south of the current zoo boundary. Approximately one third of the site was composed of semi-improved grassland with scattered scrub. The remaining land comprised a mosaic of dense scrub, amenity grass, conifer plantation, broad-leaved woodland, scattered and groups of planted trees, hedgerow, ditch, pond, hardstanding paths and animal enclosures, mainly containing bark chippings and grasses.
Land Cover (site surrounds)	The remaining part of the zoo is located to the north-east. The wider landscape is dominated by farmland with hedgerow delineated fields and associated buildings. The M42 lies around 3 km to the west.

Table 1.1 (continued): Summary of Site and Surroundings

1.3 Documentation Provided

The conclusions and recommendations made in this report are based on information provided by the client regarding the scope of the project. Documentation made available by the client is listed in Table 1.2.

Document / Drawing Number	Author
Combined Landscape masterplan / P22009-00-001-DZ- 0110-02	Dearadh Zú
Soft Landscape Strategy / P22009-00-001-DZ-400-00	Dearadh Zú
Proposed Site Plan / TWZ-HLM-00-00-DR-L-00001	HLM Architects
Proposed Soft Landscape (Draft) / TWZ-HLM-00-00-DR-L-45001	HLM Architects

Table 1.2: Documentation Provided by Client

2. Methods

2.1 Desk study

As part of the Preliminary Ecological Appraisal (Report RT-MME-159277-04) an ecological desk study was undertaken. The consultees for the desk study were:

- Natural England - MAGIC website for statutory conservation sites;
- Warwickshire Biological Records Centre; and,
- Leicestershire and Rutland Environmental Records Centre.

Middlemarch then assimilated and reviewed the desk study data provided by these organisations. Relevant bat data are discussed in Chapter 3. In compliance with the terms and conditions relating to its commercial use, the full desk study data are not provided within this report.

The desk study included a search for statutory nature conservation sites designated for bats within a 10 km radius of the site.

2.2. Field Survey

A Preliminary Bat Roost Assessment of the buildings and trees affected by the proposed works was carried out on site in line with the specifications detailed in Bat Mitigation Guidelines (English Nature, 2004)¹ and Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins, 2016)². The original assessment was conducted on 15th November 2022 and updated on 25th September 2023 by Charline Hue (Senior Ecological Consultant) and Joanne Harper (Ecological Project Officer). Weather conditions were recorded and are presented in Table 2.1.

Parameter \ Condition	15/11/2023	25/09/2023
Temperature (°C)	12	18
Cloud (%)	100	0
Wind (Beaufort)	F2-3	F2
Precipitation	Rain	Dry

Table 2.1: Weather Conditions During Field Survey

A visual assessment was conducted during daylight hours of the buildings and trees to determine the presence of any Potential Roost Features (PRFs), together with a general appraisal of the suitability of the site for foraging and commuting bats. Please refer to Appendix 2 for a list of example PRFs. Any accessible PRFs were inspected using binoculars, a torch and endoscope for evidence of possible bat presence. Buildings were surveyed externally and internally.

The lemur house (Building 1) could only be accessed via the eastern side, the northern, western and southern side were part of the lemur enclosures and no access was provided. The outside of the building was observed through vantage points but a closer inspection was not possible.

¹ English Nature (2004). *Bat Mitigation Guidelines*. English Nature, Peterborough.

² Collins, J. (ed). (2016). *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Ed.)*. The Bat Conservation Trust, London.

Therefore, potential features could not be ruled out for the presence of bats and a precautionary approach has been taken regarding this building.

For reasons of health and safety, the survey was only undertaken in areas accessible from 3.5 m ladders.

Based on the PRF's present, the survey area was assessed using the suitability classes detailed within Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins, 2016)², as detailed in Table 2.2. Trees with features present that are suitable to support roosting bats (high and moderate suitability) are discussed more fully in the report.

A summary of the trees within the survey area without suitable features to support roosting bats (low and negligible suitability) is provided within the report. Due to their negligible potential to support roosting bats, the Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins, 2016)² recommend no further survey work is required for these tree classes.

Suitability	Description
High	A structure with one or more potential roost sites that are obviously suitable for use 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. A tree with one or more potential roost sites that are obviously suitable for use 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.
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). A tree 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).
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 larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation). A tree of sufficient size and age to contain PRFs but with none seen from the ground or features seen with only very limited roosting potential.
Negligible	Negligible habitat features on site likely to be used by roosting bats.

Table 2.2: Classification of Buildings and Trees with Bat Potential (Adapted from Collins, 2016)²

2.3 Constraints

Due to the location of the lemur house within its enclosure, it was not possible to get sufficiently close to the sides and rear of the building for a full external inspection. Additionally, due to its small size, it was not possible to fully inspect the loft space within the lemur house.

3. Desk Study

3.1 Statutory Nature Conservation Sites

The site is not located within 10 km of any statutory nature conservation sites designated for the presence of bats.

3.2 Species Records

The data search was carried out on 10th November 2022 by Leicestershire and Rutland Environmental Records Centre and Warwickshire Biological Records Centre. Records of bat species within a 1 km radius of the survey area provided by the consultees are summarised in Table 3.1. It should be noted that the absence of records should not be taken as confirmation that a species is absent from the search area.

Species	No. of Records	Most Recent Record	Proximity of Nearest Record to Survey Area	Species of Principal Importance?	Legislation / Conservation Status
Brown Long-eared bat <i>Plecotus auritus</i>	4	2018	170 m north-east	✓	ECH 4, WCA 5, WCA 6
Soprano pipistrelle <i>Pipistrellus pygmaeus</i>	1	2010	650 m east	✓	ECH 4, WCA 5, WCA 6
Common pipistrelle <i>Pipistrellus pipistrellus</i>	1	2010	650 m east	-	ECH 4, WCA 5, WCA 6
Daubenton's Bat <i>Myotis daubetonii</i>	1	2010	650 m east	-	ECH 4, WCA 5, WCA 6
Noctule Bat <i>Nyctalus noctula</i>	1	2010	650 m east	✓	ECH 4, WCA 5, WCA 6
Key: ECH 4: Annex IV of the European Communities Council Directive on the Conservation of Natural Habitats and Wild Fauna and Flora. Animal and plant species of community interest in need of strict protection. WCA 5: Schedule 5 of Wildlife and Countryside Act 1981 (as amended). Protected animals (other than birds). WCA 6: Schedule 6 of Wildlife and Countryside Act 1981 (as amended). Animals which may not be killed or taken by certain methods.					

Table 3.1: Bat Species Records Within 1 km of Survey Area

3.3 Previous Bat Surveys

No previous bat surveys have been carried out in this part of the zoo. Other surveys have been carried out by Middlemarch in recent years, but they were not part of this survey area.

4. Survey Results

4.1 Building/Structures

Building 1 – Lemur House

External Assessment

The lemur house is of timber construction with a pitched wooden roof covered with felt. On close inspection of the front of the building (eastern elevation) no gaps or other bat features were detected along the eaves, doors, windows or walls (Plates 4.1 and 4.2). It was not possible to access the other elevations directly as they were within animal enclosures, however they were viewed from across the enclosures. An air vent was visible, which could potentially allow access to bats, rodents and nesting birds (Plates 4.3 and 4.4). It was not possible to see directly under the eaves of the remaining elevations to observe if any gaps or crevices were present. No evidence of bats was recorded.



Plate 4.1: Front elevation of lemur house



Plate 4.2: Front elevation of lemur house



Plate 4.3: Rear elevation of lemur house



Plate 4.4: Air vent at rear of lemur house

Internal Assessment

The loft space was surveyed through a hatch along the eastern elevation. Due to the small size of the hatch, it was not possible to gain access inside the loft so a visual inspection was made from the loft hatch. The roof was made from tightly fitted wooden boards (Plates 4.5 – 4.10), covered with felt on the outside. There was insulation on the loft floor (Plates 4.5 – 4.10) and rat droppings were observed on the insulation and boards (Plate 4.9). Two bird nests were observed in both eastern corners of the loft (Plates 4.8 and 4.10). The loft possessed very little amount of cobwebs, confirming recent use by fauna. A small plywood board was present on the other side of the vent

observed from outside. No evidence of bats was found in the loft, although a full inspection was not possible in the western corner.



Plate 4.5: Loft space of lemur house



Plate 4.6: Tightly fitted wooden boards



Plate 4.7: Loft with insulation



Plate 4.8: Bird nest in south-east corner



Plate 4.9: Rat droppings



Plate 4.10: Bird nest in north-east corner

Roosting Potential

The lemur house has been assessed as having high bat roosting potential. No gaps were observed along the eastern elevation, but large air vents were present on the western elevation which could potentially lead inside the loft. It was not possible to fully inspect all elevations. The presence of two bird nests, rat droppings and the absence of cobwebs in the loft space indicate that an ingress point is present in the building, possibly via the eaves or through the air vents. The features were

recorded at a height and location which did not allow a detailed inspection, therefore the presence/absence of bats could not be confirmed.

Building 2 – Tufted deer shed East

External Assessment

A wooden shed in moderate condition used as a shelter for tufted deer in the east of the central site. It was a gable end shed with a felted roof, no gaps were present along the walls, at the gable end or eaves (Plates 4.11 and 4.12). No evidence of bats was recorded on the building.



Plate 4.11: Side of shed East



Plate 4.12: No gaps along the eaves

Internal Assessment

The walls and ceiling of the shed were covered in plywood, no gaps were present (Plate 4.13). No evidence of bats was recorded.



Plate 4.13: Interior of tufted deer shed East

Roosting Potential

The building had no features for bats and no evidence of bats was recorded. This building is considered to have negligible potential for use by roosting bats.

Building 3 – Tufted deer shed West

External Assessment

A wooden shed in moderate condition used as a shelter for tufted deer in the central site, west of the other tufted deer shed. It was of similar construction with a gable end and felted roof, no gaps were present along the walls, at the gable end or eaves (Plates 4.14 and 4.15). No evidence of bats was recorded on the building.



Plate 4.14: Side of shed West



Plate 4.15: No gaps along the eaves

Internal Assessment

The walls and ceiling of the shed were covered in plywood, no gaps were present (Plate 4.16). No evidence of bats was recorded.



Plate 4.16: Interior of tufted deer shed West

Roosting Potential

The building had no features for bats and no evidence of bats was recorded, this building is considered to have negligible potential for use by roosting bats.

Building 4 – Ivy-covered shed

External Assessment

A disused, wooden shed in poor condition covered in thick ivy (Plate 4.17) located in the centre of the site, to the west of the tufted deer sheds. The building had no visible access points for bats, but dense vegetation prevented close inspection. The building was in a state of disrepair with rotting timber on the gable frame (Plate 4.18).



Plate 4.17: Ivy covered hut within dense scrub



Plate 4.18: Hut with rotting timbers on roof

Internal Assessment

No internal access was provided.

Roosting Potential

This building has been assessed as having low bat roosting potential due to the presence of dense scrub and dense ivy preventing a close inspection of the building. Therefore, it was not possible to confirm the presence/absence of roosting bats.

Building 5a – Covered porchway north

External Assessment

A wooden structure used as a security porchway for the current lemur walkthrough enclosure (Plate 4.19). It was made of half log cladding with a gable end roof made of half logs as well. This structure was open to the elements and subject to high levels of daylight and human disturbance.



Plate 4.19: Wooden northern porchway

Internal Assessment

Internal inspection of the structure showed a damaged membrane under the half logs as well as some gaps between the half logs along the wall and on the roof (Plates 4.20 and 4.21). This structure was not fully waterproof.



Plate 4.20: Inside of northern wooden porchway



Plate 4.21: Inside of northern wooden porchway

Roosting Potential

The building is considered to have negligible potential for roosting bats due to the high levels of daylight and human disturbance, the openness to the elements, the lack of insulation and the lack of protection from the rain, which all contribute to render the building unsuitable.

Building 5b – Covered porchway south

External Assessment

A similar wooden structure was used as a security porchway to the south of the current lemur walkthrough enclosure (Plate 4.22). It was also made of half log cladding with a gable end roof made of half logs as well. This structure was open to the elements and subject to high levels of daylight and human disturbance.



Plate 4.22: Wooden southern porchway

Internal Assessment

Internal inspection of the structure showed some gaps between the half logs along the wall and on the roof. This structure was not fully waterproof.

Roosting Potential

The building is considered to have negligible potential for roosting bats due to the high levels of daylight and human disturbance, the openness to the elements, the lack of insulation and the lack of protection from the rain, which all contribute to render the building unsuitable.

Building 6 – Tiger viewing porchway

External Assessment

A wooden structure used as a viewing porchway for the tiger enclosure (Plates 4.23 and 4.24). It was made of timber with a half gable roof made of corrugated metal, it had a glass panel overlooking the enclosure. This structure was open to the elements and subject to high levels of daylight and human disturbance.



Plate 4.23: Tiger viewing porchway



Plate 4.24: Tiger viewing porchway

Internal Assessment

Internal inspection of the structure showed gaps between the roof and the glass wall (Plate 4.25), the structure was mostly open on the opposite side (Plate 4.26).

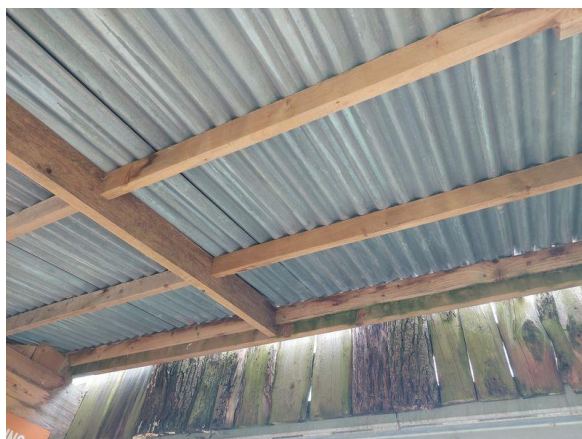


Plate 4.25: Inside of tiger viewing porchway



Plate 4.26: Inside of tiger viewing porchway

Roosting Potential

The building is considered to have negligible potential for roosting bats due to the high levels of daylight and human disturbance, the openness to the elements, the lack of insulation and the little protection from the rain and wind, which all contribute to render the building unsuitable.

Additional buildings – Lemur enclosure huts

External Assessment

Small, open, wooden huts were present within the lemur walkthrough (Plate 4.27). These huts had tightly fitted roofs and eaves and presented no features suitable for bats to roost in.

Internal Assessment

The huts had small heat lamps in the apex of the roof which were covered by mesh (Plate 4.28).



Plate 4.27: General view of a hut



Plate 4.28: Mesh over heat lamp

Roosting Potential

The huts had no features suitable for bats and are considered to have negligible potential for use by roosting bats.

4.2 Trees

Species present in the survey were hybrid black poplar *Populus nigra* subsp., hornbeam *Carpinus betulus*, English oak *Quercus robur*, ash *Fraxinus excelsior*, wild cherry *Prunus avium*, Scots Pine *Pinus sylvestris*, white poplar *Populus alba*, field maple *Acer campestre*, copper beech *Fagus sylvatica f. purpurea*, whitebeam *Sorbus aria*, hawthorn *Crataegus monogyna*, cypress, hazel *Corylus avellana*, red oak *Quercus rubra*, sycamore *Acer pseudoplatanus*, cockspur hawthorn *Crataegus crus-galli* and dogwood *Cornus sanguinea*.

Trees with High or Moderate Potential to Support Roosting Bats

The tree considered to have potential for use by roosting bats is described in Table 4.1.

Tree No.	Species	Description	BCT Suitability Class
T21 (PAA ref)	Ash	Mature tree with a woodpecker hole on the western elevation. Potential crevices and rot holes.	High

Table 4.1: Description of Tree With High Suitability for Bats Within the Survey Area

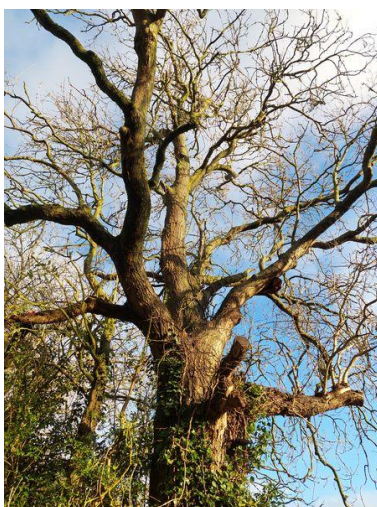


Plate 4.29: Western elevation of T21

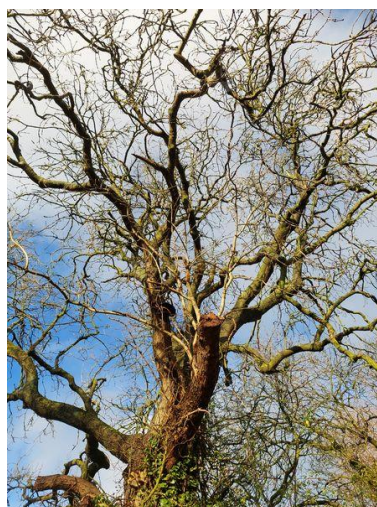


Plate 4.30: Southern elevation of T21 with rot holes



Plate 4.31: Close up of woodpecker hole

Trees with Low or Negligible Potential to Support Roosting Bats

T20, the early-mature ash to the east of T21, presented some dense ivy which prevented a full inspection. It was deemed to be of low potential to support roosting bats.

The remaining trees along the hedge on the current zoo southern boundary including early mature oak, hawthorn, wild cherry, sycamore and ash trees (referred to as G13, G12, G10 and T19 in report RT-MME-159277-01), along with the three young red oak trees parallel to the southern boundary of the site, presented no features suitable for roosting bats and are considered to be of negligible potential.

The early-mature to mature hybrid black poplars referred to as G15 in report RT-MME-159277-01 (Plate 4.32) are considered to have negligible potential to support roosting bats. G15-T1 and G15-T2 (see drawing C160474-03-01) have storm-damaged tops (Plates 4.33 and 4.34), but the opening faces upwards and will be affected by direct rainwater ingress, as witnessed during the field visit; which render the potential feature unsuitable for bats. G15-T3, which lies immediately west of the tufted deer enclosure was a larger specimen with small cut branch with a hole in the middle of it. However, hole did not provide a big enough space for bats to roost in, moreover the feature was really wet at the time of survey which render this unsuitable for bats. No other features were observed in this group of trees, therefore all these trees are considered to have negligible potential to support roosting bats.



Plate 4.32: Group of hybrid black poplars G15



Plate 4.33: G15-T1



Plate 4.34: G15-T2

The trees to the east of G15 (referred to as T22 to T25 in report RT-MME-159277-01) included mature hybrid black poplar and semi-mature field maple along with a young wild cherry tree presented no features suitable for roosting bats; therefore they were considered as being of negligible potential.

The copper beech tree (T26 in report RT-MME-159277-01) along with the saplings forming the new plantation woodland around T26 did not present any features suitable for roosting bats; therefore they were considered as being of negligible potential.

The trees within the plantation coniferous woodland were all young and presented no features suitable for roosting bats and are considered to be of negligible potential.

The double line of semi-mature hornbeams (referred to as G1 in report RT-MME-159277-01) (Plates 4.35 and 4.36) presented no features and are considered to have negligible potential to support roosting bats.



Plate 4.35: Overview of lines of trees



Plate 4.36: Close-up of a hornbeam tree

4.3 Site and Surrounding Habitats

In addition to the roosting potential within the survey area, the site contains important foraging resources within the trees, woodlands, grasslands, hedgerows, scrub, ditch and pond. The hedgerows and trees also constitute important commuting features within the site itself and connecting it to the wider landscape, including mature woodlands. The site also benefits from the absence of artificial light and human disturbance in the south and west.

Habitats within 1 km of the site suitable for roosting, commuting and foraging include:

- Residential houses and associated gardens;
- Farmhouses and associated agricultural buildings;
- Running water and standing waterbodies;
- Pockets of woodland; and,
- Agricultural fields with tree and hedge lined boundaries.

5. Impact Assessment

5.1 Summary of Proposals

It is understood that the proposals involve the demolition of the lemur house, the removal of several animal enclosures and the clearance of trees and vegetation to make way for the construction of a National Science Conservation Centre. It is understood that all buildings are to be demolished; the lines of hornbeam trees, the plantation coniferous woodland, part of the plantation broadleaved woodland abutting the pond, the poplars within the tufted deer enclosures, the ash, cherry, oak and sycamore trees within the hedge and two out of the three red oak trees along the southern boundary are all to be removed. Therefore, permanent loss of these habitats is anticipated, as well as permanent and temporary loss of grasslands and scrub.

5.2 Summary of Key Bat Features

Roosting Features: Building 1 and tree T21 were assessed as having high potential to support roosting bats and building 4 and tree T20 were assessed as having low potential to support roosting bats. The remaining buildings and trees had negligible potential to support roosting bats.

Commuting/Foraging Features: The mosaic of habitats on site, particularly the woodlands, trees, scrub, hedgerows, pond and grasslands, offer high value foraging habitat for bats. Furthermore, the site is set in a rural area and is well connected to other valuable habitats in the wider landscape via hedges and lines of trees.

5.3 Potential Impacts on Bats

The site supports numerous potential bat roosting features and highly suitable foraging and dispersal routes with extensive connectivity to further suitable habitats across the site and beyond.

The proposed structure demolition works have the potential to disturb or destroy a bat roost if bats are found to be roosting within the structures. Therefore, further survey effort, in the form of dusk emergence and dawn re-entry bat surveys, is required to establish the presence/absence of roosting bats within the structures. Recommendations regarding further survey work are made in Chapter 6.

Tree T21 is proposed to be removed, this has the potential to disturb or destroy a bat roost if bats are found to be roosting within tree T21. Therefore, further survey effort, in the form of dusk emergence and dawn re-entry bat surveys, is required to establish the presence/absence of roosting bats within the tree. Recommendations regarding further survey work are made in Chapter 6.

The remaining proposed tree removal works should not impact the trees possessing bat roosting potential, however the construction phase will involve noise, lighting, vibration and dust which have the potential to disturb any bats roosting in the retained trees.

There is also the potential for any new lighting, either temporary or permanent, at the site to impact foraging and commuting bats. Therefore, a recommendation regarding sensitive lighting is made in Chapter 6.

To increase the value of the site for bats, a recommendation is made in Chapter 6 regarding suitable plant species to incorporate into the soft landscaping to attract night flying insects.

6. Recommendations

All recommendations provided in this section are based on Middlemarch's current understanding of the site proposals, correct at the time the report was compiled. Should the proposals alter, the conclusions and recommendations made in the report should be reviewed to ensure that they remain appropriate.

- R1 Building 1:** The Lemur House has been identified as having high potential to support roosting bats. Bat Surveys: Good Practice Guidelines published by the Bat Conservation Trust (Collins, 2016)² recommends that for structures with high bat roosting potential at least three dusk emergence surveys be undertaken during the bat emergence/re-entry survey season to determine the presence/absence of roosting bats within the structure. The bat emergence/re-entry survey season extends from May to September. At least two of the surveys should be undertaken during the peak season for emergence/re-entry surveys between May and August. If a roost is discovered during these surveys, a Natural England licence application may be required.
- R2 Building 4:** The ivy-covered shed has been identified as having low potential to support roosting bats. Bat Surveys: Good Practice Guidelines, published by the Bat Conservation Trust (Collins, 2016)², recommends for structures with low bat roosting potential that at least one survey be undertaken during the peak season for emergence surveys (May to August) to determine the presence/absence of roosting bats within the structure. Should this survey confirm the presence of roosting bats, it will be necessary to undertake additional surveys in order to inform a Natural England licence application. In addition, should the survey identify the presence of significant levels of bat activity at the site, it may be necessary to undertake further survey visits to comprehensively assess the value of the site to bats.
- R3 Tree T21:** The ash tree T21 has been identified as having high potential to support roosting bats. Bat Survey: Good Practice Guidelines published by the Bat Conservation Trust (Collins, 2016)² recommends that for trees with high bat roosting potential at least three surveys be undertaken during the bat activity season to determine the presence/ absence of roosting bats within the tree. The bat activity season extends from May to September.. If a roost is discovered during these surveys, a Natural England licence application may be required.
- R4 All remaining trees and buildings:** All remaining trees surveyed were considered to have low or negligible potential for roosting bats. All remaining buildings were considered to have negligible potential for roosting bats. The survey data obtained for the site is valid for 12 months from the survey date. If proposed site works have not commenced within this timeframe it will be essential to update the survey effort to establish if the trees or buildings have developed features that could be used by roosting bats in the interim. In the unlikely event that a bat is found during works to the trees all works must immediately cease and a suitably qualified ecologist should be contacted.
- R5 Scheme Design:** The proposed development should be designed to minimise effects on bats in accordance with ecological mitigation hierarchy as set out in the National Planning Policy Framework (NPPF), and the National Planning Practice Guidance (NPPG): The ecological mitigation hierarchy requires all development schemes to apply to following principles:

- *Avoidance* – the proposed development should seek to avoid/minimise losses of features with bat potential, in the first instance and incorporate these features in the landscaping layout of the scheme accordingly. Similarly, protection measures for retained features and surrounding habitats should be considered to prevent incidental damage or disturbance during the construction phases. These measures will help to reduce the likelihood of impacting bats and minimise losses of suitable bat roosts and habitat.
- *Mitigation* – where significant harm cannot be wholly or partially avoided, adverse should be minimised by design or through the use of effective mitigation measures such as minimising light spill (see recommendation 6 below) and planting more trees or hedgerow along the site boundary to provide connectivity for foraging and commuting to other woodland areas and hedgerows, which will be lost by the construction of the science centre. Bats commute along linear structures and the fragmentation of hedgerows and tree lines can alter their established commuter routes.
- *Compensation* – where unavoidable losses occur and mitigation cannot be provided, compensation for significant residual harm will be required as a last resort or planning permission could be refused. Where there is a significant effect on a bat roost, a compensation strategy sufficient to obtain a development licence from Natural England may also be required.

R6 Lighting: In accordance with best practice guidance relating to lighting and biodiversity (Miles et al, 2018³; Gunnell et al, 2012⁴), any new lighting should be carefully designed to minimise potential disturbance and fragmentation impacts on sensitive receptors, such as bat species. Examples of good practice include:

- Avoiding the installation of new lighting in proximity to key ecological features, such as hedgerows, pond, mature trees and woodland edges.
- Using modern LED fittings rather than metal halide or sodium fittings, as modern LEDs emit negligible UV radiation.
- The use of directional lighting to reduce light spill, e.g. by installing bespoke fittings or using hoods or shields. For example, downlighting can be used to illuminate features such as footpaths whilst reducing the horizontal and vertical spill of light.
- Where the use of bollard lighting is proposed, columns should be designed to reduce horizontal light spill.
- Implementing controls to ensure lighting is only active when needed, e.g. the use of timers or motion sensors.
- Use of floor surface materials with low reflective quality. This will ensure that bats using the site and surrounding area are not affected by reflected illumination.
- For internal lights, recessed light fittings cause significantly less glare than pendant type fittings. The use of low-glare glass may also be appropriate where internal lighting has the potential to influence sensitive ecological receptors.

R7 Habitat Enhancement: In line with the National Planning Policy Framework, the development should aim to enhance the site for bats. Bat boxes should be installed to provide roosting habitat for species such as pipistrelle. In general, bats seek warm places

³ Miles, J., Ferguson, J., Smith, N. and Fox, H. (2018) *Bats and artificial lighting in the UK. Bats and the Built Environment Series*. Bat Conservation Trust and Institution of Lighting Professionals.

⁴ Gunnell, K., Grant, G. and Williams, C. (2012) *Landscape and urban design for bats and biodiversity*. Bat Conservation Trust.

and for this reason boxes should be located where they will receive full/partial sun, although installing boxes in a variety of orientations will provide a range of climatic conditions. Position boxes at least 4 m above ground to prevent disturbance from people and/or predators. The planting of species which attract night flying insects is encouraged as this will be of value to foraging bats, for example: evening primrose *Oenothera biennis*, goldenrod *Solidago virgaurea*, honeysuckle *Lonicera periclymenum* and fleabane *Pulicaria dysenterica*.

7. Drawings

Drawing C160474-03-01 – Preliminary Bat Roost Assessment



Legend

- Site boundary
- Tree with high potential
- Tree with low potential
- Tree with negligible potential
- Line of broad-leaved trees
- Building with high potential
- Building with low potential
- Building with negligible potential
- Woodland with negligible potential

Project	
Twycross Zoo	
Drawing	
Preliminary Roost Assessment	
Client	
Baker Mallett c/o Twycross Zoo	
Drawing Number	Revision
C160474-03-01	00
Scale @ A3	Date
1:700	September 2023
Approved By	Drawn By
CH	BD



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C160474-03-01

Appendix 1

Relevant Legislation

Bats and the places they use for shelter or protection (i.e. roosts) receive legal protection under the Conservation of Habitats and Species Regulations 2017 (Habitats Regulations 2017) and the Conservation of Habitats and Species Regulations (Amendment) (EU Exit) Regulations 2019 (Habitats Regulations 2019). They receive further legal protection under the Wildlife and Countryside Act (WCA) 1981, as amended. This protection means that bats, and the places they use for shelter or protection, are capable of being a material consideration in the planning process.

Regulation 41 of the Habitats Regulations 2017, states that a person commits an offence if they:

- deliberately capture, injure or kill a bat;
- deliberately disturb bats; or
- damage or destroy a bat roost (breeding site or resting place).

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

It is an offence under the Habitats Regulations 2017 for any person to have in his possession or control, to transport, to sell or exchange or to offer for sale, any live or dead bats, part of a bat or anything derived from bats, which has been unlawfully taken from the wild.

Changes have been made to parts of the Habitats Regulations 2017 so that they operate effectively from 1st January 2021. The changes are made by the Habitats Regulations 2019, which transfer functions from the European Commission to the appropriate authorities in England and Wales.

All other processes or terms in the 2017 Regulations remain unchanged and existing guidance is still relevant.

The obligations of a competent authority in the 2017 Regulations for the protection of species do not change. A competent authority is a public body, statutory undertaker, minister or department of government, or anyone holding public office.

Whilst broadly similar to the above legislation, the WCA 1981 (as amended) differs in the following ways:

- Section 9(1) of the WCA makes it an offence to *intentionally* kill, injure or take any protected species.
- Section 9(4)(a) of the WCA makes it an offence to *intentionally or recklessly** damage or destroy, or *obstruct access to*, any structure or place which a protected species uses for shelter or protection.
- Section 9(4)(b) of the WCA makes it an offence to *intentionally or recklessly** disturb any protected species *while it is occupying a structure or place which it uses for shelter or protection*.

*Reckless offences were added by the Countryside and Rights of Way (CROW) Act 2000.

As bats re-use the same roosts (breeding site or resting place) after periods of vacancy, legal opinion is that roosts are protected whether or not bats are present.

The reader should refer to the original legislation for the definitive interpretation.

The following bat species are Species of Principal Importance for Nature Conservation in England: barbastelle bat *Barbastella barbastellus*, Bechstein's bat *Myotis bechsteinii*, noctule *Nyctalus noctula*, soprano pipistrelle *Pipistrellus pygmaeus*, brown long-eared bat *Plecotus auritus*, greater horseshoe bat *Rhinolophus ferrumequinum* and lesser horseshoe bat *Rhinolophus hipposideros*. Species of Principal Importance for Nature Conservation in England are material considerations in the planning process. The list of species is derived from Section 41 list of the Natural Environmental and Rural Communities (NERC) Act 2006.

Appendix 2

Examples of Potential Roost Features

External Features

- access through window panes, doors and walls;
- behind peeling paintwork or lifted rendering;
- behind hanging tiles;
- weatherboarding;
- eaves;
- soffit boxes;
- fascias;
- lead flashing;
- gaps under felt (even including those of flat roofs);
- under tiles/slates;
- existing bat and bird boxes; and
- any gaps in brickwork or stonework permitting access into access to cavity- or rubble-filled walls.

Internal Features

- behind wooden panelling;
- in lintels above doors and windows;
- behind window shutters and curtains;
- behind pictures, posters, furniture, peeling paintwork;
- peeling wallpaper, lifted plaster and boarded-up windows;
- inside cupboards and in chimneys accessible from fireplaces.
- within attic voids:
- the top of gable end or dividing walls;
- the top of chimney breasts;
- ridge and hip beams and other roof beams;
- mortise and tenon joints;
- all beams (free-hanging bats);
- the junction of roof timbers, especially where ridge and hip beams meet;
- behind purlins;
- between tiles and the roof lining; and
- under flat felt roofs.

Potential Roost Features (Adapted from Collins, 2016)²

Trees

- Bat, bird and dormouse boxes on trees;
- Cankers (caused by localized bark death) in which cavities have developed;
- Compression forks with included bark, forming potential cavities;
- Cracks/splits in stems or branches (both vertical and horizontal);
- Crossing stems or branches with suitable space between for roosting;
- Ivy stems with diameters in excess of 50 mm with suitable roosting space behind (or where a roosting space can be seen where a mat of thinner stems has left a gap between the mat and the trunk);
- Man-made holes (e.g. cavities that have developed from flush cuts);
- Natural holes (e.g. knot holes) arising from naturally shed branches, or cavities created by branches tearing out from parent stems;
- Other hollows or cavities, including rot holes and butt rots;
- Partially detached or loose, platy bark;
- Woodpecker holes; or,
- Other features that offer a place of shelter.

Potential Roost Features (Adapted from Collins, 2016)²