

Bat Management Plan



St Mary the Virgin, Clothall

On behalf of The Bats in Churches Project

October 2021

Ecology by Design Ltd,

Hampden House, Monument Park, Chalgrove, Oxon OX44 7RW.

Tel 01865 893346 www.ecologybydesign.co.uk

Registered in England and Wales No. 9318075.

| Project Code | Title | Date of Issue |
|--------------|---------------------|-----------------|
| EBD00751 | Bat Management Plan | 29 October 2021 |

| | Name | Date |
|-------------|----------------------------------|-----------------|
| Prepared by | Tristan Carlyle BSc (Hons), GDip | 29 October 2021 |
| Checked by | Laura Grant BSc (Hons), MCIEEM | 29 October 2021 |

Copyright Ecology by Design Ltd. All rights reserved.

No part of this report may be copied or reproduced by any means without prior written consent from Ecology by Design Ltd. If you have received this report in error please destroy all copies in your possession or control and notify Ecology by Design Ltd.

This report has been commissioned for the exclusive use of the commissioning party unless otherwise agreed in writing by Ecology by Design Ltd; no other party may use, make use of or rely on the contents of the report. No liability is accepted by Ecology by Design Ltd for any of this report, other than for the purposes for which it was originally prepared and provided.

Opinions and information provided in this report are on basis of Ecology by Design Ltd using due skill, care and diligence in the preparation of this report and no explicit warranty is provided as to its accuracy. It should be noted that no independent verification of any of the documents or information supplied to Ecology by Design Ltd has been made.

Under the Construction (Design & Management) Regulations (CDM, 2015) Ecology by Design employees may have designer duties. Ecology by Design staff do not take on the roles of Client, Principal Designer, Principal Contractor, Contractor or Worker. Our staff are appropriately experienced and briefed on health and safety matters. As far as is 'reasonably practical' we seek to eliminate risks and reduce hazards. This applies to all aspects of a development that we have control or influence over. It is the responsibility of the client, principal designer, principal contractor and/or contractor to ensure the specific design and implementation of ecological recommendations satisfy the CDM Regulations.

Contents

| | | |
|---|--|-----------|
| 1 | Executive Summary | 4 |
| 2 | Introduction..... | 5 |
| 2.1 | Background | 5 |
| 2.2 | Site Description..... | 5 |
| 2.3 | Aims of Report | 5 |
| 2.4 | Personnel | 5 |
| 3 | Methods | 6 |
| 3.1 | Preliminary roost assessment..... | 6 |
| 3.2 | Emergence and re-entry surveys..... | 6 |
| 3.3 | Fixed Point Automated Detector Surveys | 8 |
| 3.4 | Site/ Species Valuation for Roosting Bats..... | 8 |
| 3.5 | Limitations/Constraints | 8 |
| 4 | Overview of Results..... | 10 |
| 4.2 | Preliminary roost assessment..... | 10 |
| 4.3 | Emergence and re-entry surveys..... | 10 |
| 4.4 | Statement of Significance | 12 |
| 5 | Mitigation Strategy | 13 |
| 5.1 | Identified Solutions..... | 13 |
| 5.2 | Likely Impacts of the Solution on Bat Activity | 14 |
| 5.3 | Timing, Detailed Methods and Duration of Works | 14 |
| 5.4 | Personnel Required | 15 |
| 5.5 | Long-term Management of Mitigation..... | 15 |
| 5.6 | Cost | 16 |
| 5.7 | Means of finance | 16 |
| 5.8 | Faculty Consent | 16 |
| 6 | References | 17 |
| Appendix 1 - Full Survey Results | | 18 |
| Appendix 2 - Valuing Bat Roosts | | 23 |

1 Executive Summary

| | |
|-----------------------------------|---|
| Report purpose | <p>This report is intended for use by the Parochial Church Council (PCC) to understand the status of bats within St Mary the Virgin, Clothall, and how they can work with the Bats in Churches Project to minimise the impacts of bats on the heritage features within the Church and congregation who make use of it.</p> |
| Date and methods of survey | <p>Surveys of the site were conducted throughout April-August 2021 including:</p> <ul style="list-style-type: none"> • A daytime building assessment for bats; and • Three emergence and one re-entry surveys for bats. |
| Key findings | <p>The Church is situated in the village of Clothall, in Hertfordshire. Five species have been identified as using the interior of the church, including common pipistrelle, brown long-eared, serotine, a myotis species and soprano pipistrelle. Of these, individual common pipistrelle, brown long eared and myotis have been recorded roosting internally.</p> <p>Most internal activity relates to common pipistrelle. A single potential access point into the church has been identified, in the form of cracked timber on the inside of the southern lady chapel wall. This appears to be connected to a cavity within the roost and eaves.</p> <p>Three common pipistrelle roosts have been recorded at the roof of the lady chapel including two day roosts at the eaves on the southern aspect, and one maternity roost under the roof on the eastern aspect. The roosts at the eaves are considered most likely to be accessing the interior of the church.</p> |
| Statement of Significance | <p>The interior of the Church has been subject to high levels of activity, resulting in droppings and staining in multiple areas. The droppings risk damaging historical artefacts and present a health and safety risk to users of the Church.</p> |
| Mitigation Strategy | <p>Identified solution: Create a boxed eave on the southern aspect of the lady chapel to prevent roosting bats at this location gaining access to the interior. In addition, investigate whether bats in the maternity roost on the eastern aspect of the lady chapel can access the interior and enclose it if so.</p> <p>Timing and duration of works: Works to exclude bats, construct the boxed eave, investigate the location of the maternity roost location and enclose the roost if necessary would need to be undertaken in October or March/April, outside of the hibernation and maternity periods.</p> <p>Long-term management: The proposed solutions have been designed to ensure minimal future monitoring or management.</p> <p>Cost: The costs would entail further investigatory works and the construction of new roosts under licence. Further detail is provided in Section 5.6.</p> <p>Means of finance: The Church typically secures funding via personal donations, work of a Friends group and the National Lottery Heritage Fund.</p> <p>Faculty consent: It is understood faculty consent is not required to progress with the proposed solutions as minimal modification to external features are required.</p> |

2 Introduction

2.1 Background

2.1.1 Evidence of bat activity was identified in the Quinquennial Report produced for the Church in April 2019, following an inspection in February. The presence of bat droppings was noted on the wall of the south aisle, in addition to potential entry points at the eaves of the nave (it is unclear on which elevation).

2.1.2 Most of the Church dates from the 14th and 15th centuries, with the oldest parts dating back further to the 13th century. The nave and chancel copper roof was stolen in 2018 and replaced with a stainless steel roof, according to the Quinquennial Report.

2.2 Site Description

2.2.1 St Mary the Virgin Church is a Grade 1 listed building approximately 22m in length and 12m wide. It is located on Ashanger Lane in Clothall, near Baldock, at OS national grid reference TL27103202. The grounds are largely surrounded by open green space and arable farmland, with areas of residential development to the east and south.

2.3 Aims of Report

2.3.1 This report is intended for use by the Parochial Church Council (PCC) to understand the status of bats within St Mary the Virgin, in Clothall, and how they can work with the Bats in Churches Project to minimise the impacts of bats on the heritage features within the Church and congregation who make use of it.

2.4 Personnel

2.4.1 The report was prepared by Senior Ecologist Tristan Carlyle BSc (Hons) GDip, who has been an ecological consultant for four-and-a-half years and has held a personal licence for bats since 2020.

2.4.2 Input and review of the report was provided by Bats in Churches licence holder Dr Merryl Gelling CEcol MCIEEM of Spires Ecology who has over 15 years' experience working with Natural England's European Protected Species Licences for bats.

2.4.3 The report was reviewed by Associate Ecologist Laura Grant BSc (Hons) MCIEEM who has been an ecological consultant for 14 years and has held a personal licence for bats since 2012. Laura routinely conducts surveys and assessments for large heritage buildings and designs mitigation measures to ensure the favourable conservation status of bats is maintained within a given site.

3 Methods

3.1 Preliminary roost assessment

- 3.1.1 An external and internal Preliminary Roost Assessment (PRA) was conducted of the church on 30th April 2021 by Ecology by Design. The assessment was based on the guidance in Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins, 2016) and government guidance (Gov.uk., 2015).
- 3.1.2 The survey was conducted by Laura Grant (Natural England Class Licence Level 2: 2015-10871-CLS-CLS), Merryll Gelling (Natural England Class Licence Level 3: 2015-13150-CLS-CLS and Level 4: 2015-13151-CLS-CLS, Bat Mitigation Class Licence RC0083 and Bats in Churches Class Licence B32RC011) and Tristan Carlyle (Natural England Class Licence Level 1 - 2020-46305-CLS-CLS). Conditions during the survey were cool and dry (10°C, cloud 3/8 oktas, wind Beaufort 1 and no rain) and preceding weather was optimal for bats.
- 3.1.3 The surveyors used a high-power torch (LEDLenser Lamp), 10x42mm close focusing binoculars and 3.8m telescopic ladder to inspect features of interest. All external areas of the buildings were inspected and most internal areas. Evidence searched for included the presence of free hanging bats and bats within gaps and crevices, bat droppings, urine stains, rub marks, scratch marks and feeding remains. Where bat droppings were found, a sample was collected to enable DNA analysis to identify the species at a future date, if required.
- 3.1.4 The interior of the belfry could not be accessed during this survey due to its height. An alternative ladder was sourced, and a visual inspection undertaken from the hatch of the belfry on 1st July 2021 by Merry Gelling and Tristan Carlyle. The belfry was not physically accessed due to health and safety concerns regarding the security of the floorboards.
- 3.1.5 The Church is regularly cleaned; however, sheets were left in situ between surveys and photographs were taken of the distribution of droppings prior to cleaning to inform the assessment.
- 3.1.6 Additional droppings were collected from the interior of the Church on 1st July and 18th August 2021 and sent for eDNA analysis.

3.2 Emergence and re-entry surveys

- 3.2.1 Dusk emergence and pre-dawn re-entry surveys were conducted of the church to confirm presence or likely absence of roosting bats, and where present, enable characterisation of the roosts. The surveys undertaken within the site are detailed in Table 3.1 and 3.2.

- 3.2.2 The surveys were based on the guidance included in the Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins, 2016). Bat detectors utilised included Elekon Batlogger M detectors to record any bats emerging from or re-entering the buildings.
- 3.2.3 The emergence surveys commenced approximately 15 minutes before sunset and lasted until 1.5 hours after sunset. The pre-dawn re-entry surveys commenced 2 hours before sunrise and finished at sunrise.
- 3.2.4 Surveyors were located on each aspect of the church, focused on features identified during the preliminary roost assessment as being suitable for roosting bats. During the surveys emergence and/or re-entry points were mapped, species were identified (where possible) and flight lines were noted. The results of the survey are detailed in Figure 1 in Appendix 1.

Table 3.1: Dusk emergence survey methods

| Date | Start and end times; time of sunset | Structure reference / location | Equipment used | Weather |
|--|-------------------------------------|--------------------------------|--|---|
| 03/06/21 | 21:00-22:45; 21:15 | Church | Batlogger M IR camera (x1) Thermal camera (x1) | Start: 20°C, Cloud 6/8 ¹ , Wind 1 ² End: 19°C, Cloud 6/8, Wind 0 |
| Comments: Five surveyors, Locations 1-5. Suitable weather conditions. | | | | |
| 01/07/21 | 21:09-22:54; 21:23 | Church | Batlogger M IR camera (x1) Thermal camera (x1) | Start: 17°C, Cloud 2/8, Wind 1 End: 14°C, Cloud 1/8, Wind 1 |
| Comments: Five surveyors (L1-5). Suitable weather conditions. | | | | |
| 18/08/21 | 20:05-21:50; 20:20 | Church | Batlogger M IR camera (x1) Thermal camera (x1) | Start: 22°C, Cloud 4/8, Wind 1 End: 20°C, Cloud 6/8, Wind 1 |
| Comments: Three surveyors (L1, 2 and 5). Infrared cameras at L3 and L4. Suitable weather conditions. | | | | |

3.2.5 Surveyor names and Class licence registration numbers:

Tristan Carlyle, Class Licence Level 1: 2020-46305-CLS-CLS.

Merryl Gelling, Class Licence Level 3: 2015-13150-CLS-CLS and Level 4: 2015-13151-CLS-CLS, Bat Mitigation Class Licence RC0083 and Bats in Churches Class Licence B32RC011.

Stacey Waring, Class Licence Level 2: 2015-6768-CLS-CLS.

Tony Wells

Olyvia Hall

¹ Cloud cover is measured using the system called oktas. The visible sky is divided into eight and cloud presence is determined within each section. A value of one to eight is then assigned (1 okta being cloudless to 8 oktas being total cloud cover).

² The Beaufort scale is an empirical measure from 0-12 which relates wind speed to observed conditions. . 0- Calm, 1- Light air, 2- Light breeze, 3- Gentle breeze, 4- Moderate breeze, 5- Fresh breeze, 6- Strong breeze, 7- Moderate gale, 8- Fresh gale, 9- Strong gale, 10- Whole gale, 11- Storm, 12- Hurricane force.

Anna Kogioni
Deqa Mohamed

Table 3.1: Pre-dawn re-entry survey methods

| Date | Start and end times; time of sunrise | Structure reference / location | Equipment used | Weather |
|--|--------------------------------------|--------------------------------|--|--|
| 04/06/21 | 02:45-05:00; 04:45 | Church | Batlogger M IR camera (x1) Thermal camera (x1) | Start: 11°C, Cloud 1/8, Wind 1 End: 11°C, Cloud 1/8, Wind 1 |
| Comments: Six surveyors, Locations 1-6. Suitable weather conditions. | | | | |

Surveyor names and Class licence registration numbers:

Ben Gardner, Class Licence Level 2: 2015-17038-CLS-CLS.
Stacey Waring, Class Licence Level 2: 2015-6768-CLS-CLS.
Tony Wells

3.2.6 The data were automatically identified using Kaleidoscope Pro classifiers. All calls identified to contain a bat that was not a common pipistrelle or soprano pipistrelle was manually checked.

3.3 Fixed Point Automated Detector Surveys

3.3.1 Automated detectors were used to remotely record bat activity for a period of seven nights in the lady chapel and belfry between July 1st and July 8th 2021.

3.3.2 The detectors were set to record from 30 minutes before sunset until 30 minutes after sunrise. The data were automatically identified using Kaleidoscope Pro classifiers. All calls identified to contain a bat that was not a common pipistrelle or soprano pipistrelle was manually checked.

3.4 Site/ Species Valuation for Roosting Bats

3.4.1 Based upon the framework for valuing bats in Ecological Impact Assessment designed by Wray *et al.* (2010), the site's roosts are categorised and valued from District Level to International. These different bat roosts can be assigned to a geographic frame of reference as detailed in Appendix 2. The valuation of roosts reflects the importance of bats.

3.5 Limitations/Constraints

3.5.1 There were no constraints to the surveys or assessments; however, it should be recognised that bat activity fluctuates at a given site throughout the year as bats change their roost locations to select optimal conditions such as temperature, humidity and feature size or to

avoid accumulations of parasites. Bat activity also varies between years as the weather influences mortality of bats over winter (with wet autumns, mild winters or cold or wet springs being likely to result in increased mortality).

- 3.5.2 The winter of 2020 to 2021 was particularly mild and there was a prolonged cold and wet spell in spring 2021. This may have caused mortality over winter and/or pregnant mothers to abort embryos and therefore not establish maternity colonies. Across the board, ecological consultants have reported many long-established significant roosts have not been present throughout the maternity season in 2021. Anecdotally, Ecology by Design has also noted many roosts comprising individual (non-breeding bats) but generally far lower bat activity than one we would typically expect at suitable sites in 2021.
- 3.5.3 Bat activity at the Church was lower than anticipated given the site's location. Furthermore, the congregation have reported fewer droppings within the Church than in previous years. It is therefore considered likely that the findings of the 2021 surveys are not representative of the historical use of the Church which was previously higher. As a result, it is possible that in future years a greater number of roosting bats may re-occupy historical roosts of the Church.

4 Overview of Results

4.1.1 Full survey results are detailed in Appendix 1.

4.2 Preliminary roost assessment

4.2.1 The church is comprised of a single-storey stone building, with a second-storey belfry above the south-western corner of the building. The building is open plan, with the nave extending east into the transepts and chancel, and south into the lady chapel. There is a small discrete room to the north of the transepts (referred to in this document as the 'northern extension').

4.2.2 The nave and chancel has a stainless steel roof installed in 2018, while the lady chapel and northern extension have mono pitched roofs with slate tiles.

4.2.3 A single common pipistrelle was observed roosting within the church during the PRA, located on the underside of the roof towards the east of the nave, on the side of a timber beam.

4.2.4 Droppings were present at several points within the church. Key locations include:

- The walls in the north-western and south-western corners of the nave;
- Several pews within the nave;
- The walls in the north-eastern and south-eastern corners of the chancel;
- The walls on the western and southern aspect of the lady chapel.

4.2.5 Throughout the surveys DNA analysis of droppings have confirmed presence of common pipistrelle (*Pipistrellus pipistrellus*), brown long-eared bat (*Plecotus auritus*) and serotine (*Eptesicus serotinus*).

4.2.6 Two potential access/egress points were recorded internally:

- A cracked timber running horizontally along the base of the roof on the southern aspect of the lady chapel. The wood at the base of the cracks is worn and chipped, indicating potential use by bats;
- Gaps at the edge of the 13th Century entrance door into the nave, located on the southern aspect, as well as a hole in the (possibly defunct) locking mechanism.

4.3 Emergence and re-entry surveys

4.3.1 On 03 June 2021 28 common pipistrelle bats emerged from six different features:

- under the barge boarding on the western aspect of the church
- from the southern aspect of the belfry roof (under a tile and from the eaves)
- under the eaves on the southern aspect of the lady chapel

- a gap under the roof on the eastern aspect of the lady chapel
- separate gaps in the stonework of the wall on the eastern aspect of the lady chapel

4.3.2 During the pre-dawn re-entry survey the following morning:

- 26 common pipistrelles returned to roost.
- Two silent bats returned to roost on the western aspect of the belfry, including one in the tower window and one under a tile.
- A myotis and a silent bat considered likely to be a myotis or a brown long-eared bat was active and considered likely to be roosting within the church.

4.3.3 During the dusk on 01 July 2021 14 common pipistrelle emerged from previous roost locations.

4.3.4 During the dusk on 18 August 2021 five common pipistrelle emerged from previous roost locations.

Figure 1: Surveyor locations (S) and indicative roost locations



4.3.5 General bat activity outside the Church predominantly comprised common pipistrelle with low numbers of soprano pipistrelle, serotine, barbastelle, a *Nyctalus* species (potentially noctule or Leisler's bat) and a *Myotis* species.

4.3.6 Automated detectors deployed in Church recorded high common pipistrelle activity and low activity by soprano pipistrelle and serotine.

4.4 Statement of Significance

- 4.4.1 The interior of the Church has been subject to high levels of activity, resulting in droppings and staining in multiple areas. The droppings risk damaging historical artefacts and present a health and safety risk to users of the Church.
- 4.4.2 In accordance with the criteria detailed in Appendix 2, the roosts present within the Church in 2021 have been categorised and the results are presented in Table 4.1 below. The most likely access point is the split timber at the top of the internal wall on the southern aspect of the lady chapel. This is considered likely to lead into the roof structure and connect with the common pipistrelle roosts recorded at the eaves.
- 4.4.3 There is also the possibility that a gap extends across the roof and connects with the common pipistrelle maternity roost identified above the timber at the top of the external wall on the eastern aspect of the lady chapel.
- 4.4.4 Whilst soprano pipistrelle has not been confirmed roosting, an individual is assumed to be present due to sound files being recorded within the Church.

Table 4.1: Status of bat roosts within St Mary the Virgin Church, Clothall

| Species | Geographic distribution | Roost Types | Number | Value |
|---------------------|------------------------------|---|--------|--------|
| Common pipistrelle | Common and widespread | Maternity / day / transitional / occasional | 24-26 | County |
| Brown long-eared | Common and widespread | Day / transitional / occasional / hibernation | 1-3 | Parish |
| Serotine | Frequent | Day / transitional / occasional | 1 | Parish |
| Myotis sp. | Various (depends on species) | Day / transitional / occasional | 1 | Parish |
| Soprano pipistrelle | Common and widespread | Day / transitional / occasional | 1 | Parish |

5 Mitigation Strategy

5.1 Identified Solutions

5.1.1 The proposed solutions have been designed to minimise impacts on the historical appearance and internal aesthetics of the Church. The needs of the building have been considered to ensure breathability, ventilation, use of traditional materials, minimising visibility of the intervention, using appropriate materials and considering reversibility of the solution. Solutions A and B are consistently referred to within the remainder of the mitigation strategy.

A) Boxed Eave

5.1.2 Bats will be excluded from the two roosting locations at the eaves on the southern aspect of the lady chapel, and all gaps providing access into the roof structure blocked permanently.

5.1.3 A boxed eave will be installed on this aspect, taking the form of a wooden plank extending from the tip of the eave to the wall, creating an enclosed space in which bats can roost. Internally, several wooden blocks will be incorporated that create multiple crevices of different sizes to provide a variety of roosting opportunities. The feature will be suitable for use by all species recorded within the Church.

5.1.4 Access will be provided by creating crenelations at the base of the eave, where it meets the wall. These will be created as close as possible to the existing roosting locations.

5.1.5 The wooden plank will slope downward to provide a means for droppings to exit the roosting space and prevent a build-up over time. Several additional crenelations/slits will be included along its length to provide numerous dropping exit points.

B) Bat Box in Roof Structure

5.1.6 An additional solution may be required to address the maternity roost on the eastern aspect of the lady chapel.

5.1.7 Initially, bats will be excluded from the roost, and the slate tiles will be sensitively lifted above the roost location to determine the extent of the roost and whether it is possible for bats in the roost to move across the roof.

5.1.8 If the roost is contained, and such movement is not possible, the tiles will be replaced and no further works will be required as this will establish that bats in the maternity roost are not accessing the interior of the Church.

- 5.1.9 However, if the roost space runs into the wider roof, and bats can move freely across it between the tiles and wooden boarding, then additional mitigation will be required to prevent bats in this roost from accessing the interior of the Church.
- 5.1.10 Most of the activity in the interior of the church relates to common pipistrelle, and this addresses the most likely source of that activity, as the roosts at this location are immediately adjacent to the cracked timber recorded internally (and the best candidate we have for an access point).
- 5.1.11 In this scenario, a bespoke bat box will be installed at the roosting location, retaining the existing access but limiting the ability for bats to move across the roof and preventing them from accessing the church.
- 5.1.12 This box will run along the eastern edge of the roof, with the base connecting with another existing gap above the timber. The box will slope downward, towards this gap, to funnel droppings out of the box.
- 5.1.13 All other gaps between the roof tiles and timber will be closed using an appropriate material to prevent alternative access into the roof space. This could be achieved with lime mortar, but the final material will be agreed with the architect.

5.2 Likely Impacts of the Solution on Bat Activity

- 5.2.1 The proposed mitigation solutions (A and B) are likely to reduce internal use of the Church by bats and provide enhanced roosting opportunities for bats within the boxed eave.
- 5.2.2 It is considered likely some bat activity will still occur within the Church, as access may be possible from other apparently external roost locations. However, the proposed mitigation addresses the potential access point considered to be used most frequently.

5.3 Timing, Detailed Methods and Duration of Works

- 5.3.1 The works will be undertaken under licence in October or March/April, to avoid the maternity and hibernation seasons. Hibernating bats have not been recorded within the Church but their presence cannot be excluded. Works could be undertaken concurrently to minimise costs.

A) Boxed Eave

- A scaffold platform will be installed alongside the southern aspect of the lady chapel to enable access to the eaves.
- Exclusion devices, comprising plastic flaps and/or pipes will be installed to cover the gaps at the eaves to enable bats to exit but not re-enter the features.

- The exclusion devices will be in situ for a minimum of five nights during suitable weather conditions.
- Access points should be blocked (e.g. with a stainless-steel mesh with a small gauge such as a 6.35mm Aperture³ or a greenhouse mesh (a solid fine mesh plastic which is available from garden centres)) to prevent bats gaining internal access to the Church but to avoid impacts to ventilation within the Church.
- The boxed eave will be created in situ along with the dividers to make separate chambers.

B) Bat Box in Roof Structure

- The Lady Chapel roof is slated with single or double boarded closeboarded timbers over the rafters. It is assumed that the slate battens are fixed to the closeboarded timbers. There may be a membrane beneath, due to the condition of the roof, likely a Bitumen 1F felt.
- If the roost is not contained, a bespoke bat box will be installed at the roosting location, running along the eastern edge of the roof, with the base connecting with another existing gap above the timber. The box will slope downward, towards this gap, to funnel droppings out of the box.
- All other gaps between the roof tiles and timber will be closed using an appropriate material to prevent alternative access into the roof space. This could be achieved with lime mortar, but the final material will be agreed with the architect.

5.4 Personnel Required

5.4.1 The project will be a collaboration between the BiC licence holder, building contractors and the Quinquennial Architect, as detailed below (all indicative prices are exclusive of VAT).

- Building contractors = £400 / day
- BiC Licence Holder Ecologist (Merryl Gelling) = £500 / day
- Architect (Barker Associates) = £600 / day

5.5 Long-term Management of Mitigation

5.5.1 Solutions A and B should enable droppings to fall from the structures therefore no long-term management is required. It may be that the congregation chooses to sweep the walls and/or wash the windows below if droppings are visible.

³ https://www.amazon.co.uk/RatMesh-Rodent-Proofing-Metal-Mesh/dp/B07KXXS87T/ref=asc_df_B07KXYG2BT/?tag=&linkCode=df0&hvadid=394361800700&hvpos=&hvnetw=g&hvrnd=8939617957047702707&hvpone=&hvptwo=&hvgmt=&hvdev=c&hvdvcmidl=&hvlocint=&hvlocphy=1006457&hvtargid=pla-838644779478&ref=&adgrpid=90322565188&th=1

5.6 Cost

5.6.1 The cost of the above solutions has been estimated through consultation with the project's architect and reviewing the costs of similar project work.

5.6.2 The budget has been defined as **Low** = under £5,000, **Medium** = £5,001 - £20,000 or **High** = Over £20,001 as it was not possible to secure detailed quotations for the work.

A) Boxed Eave

5.6.3 The cost of creating the boxed eave is likely to be **Medium**.

B) Bat Box in Roof Structure

5.6.4 The cost of creating the bat box structure will depend on the status and condition of the roof. It is considered likely to be **Medium**.

5.7 Means of finance

5.7.1 The Church typically secures funding via personal donations, work of a Friends group and the National Lottery Heritage Fund.

5.8 Faculty Consent

5.8.1 It is understood faculty consent is not required to progress with the proposed solutions as minimal modification to external features are required.

6 References

BSI Standards Limited (2013). BS42020:2013 Biodiversity: Code of practice for planning and development
CIEEM (2017). *Guidelines for preliminary ecological appraisal, 2nd edition*. Chartered institute of Ecology and Environmental management, Winchester.

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

Gov.uk (2015). *Guidance. Bats: surveys and mitigation for development projects*. Natural England and Department for Environment, Food & Rural Affairs, Worcester.

Mitchell-Jones, A.J. (2004). *Bat Mitigation Guidelines*. English Nature, Peterborough.

Wray, S., Wells, D., Long, E. and Mitchell-Jones, T. (2010). Valuing bats in Ecological Impacts Assessment. *In Practice* **70**, 23-26

Appendix 1 - Full Survey Results

Preliminary roost assessment

Building description

The church is comprised of a single-storey stone building, with a second-storey belfry above the south-western corner of the building. The building is open plan, with the nave extending east into the transepts and chancel, and south into the lady chapel. There is a small discrete room to the north of the transepts (referred to in this document as the 'northern extension').

The nave and chancel has a stainless steel roof installed in 2018, while the lady chapel and northern extension have mono pitched roofs with slate tiles. The belfry roof is hipped and comprised of clay tiles. All roofs have wooden boards supported by timber internally.

External features

Numerous potential roosting features were identified on the church exterior. There are gaps at the eaves along most of the northern aspect of the building, potentially providing access into the roof structure.

Localised flint damage was recorded towards the north-eastern corner of the church, providing crevices potentially suitable for roosting bats. Similarly, gaps in the mortar were identified on the eastern aspect of the northern extension.

Metal barge boards overhang the western aspect of the building, with gaps across its length that mask potential access points into the roof structure.

Gaps are present at the eaves along the southern aspect of the lady chapel, potentially providing access into the roof structure. There are additional gaps between the slate tiles and supporting timber on the eastern aspect.

The belfry has wooden lattice windows, the gaps in which provide potential access into the belfry itself, which contains two church bells. The windows will also generate draughty and cool conditions. There are gaps at the eaves of the belfry roof, and under the clay tiles on every aspect of the roof.

A hole is present in the stonework on the southern aspect of the belfry. A starling (*Sturnus vulgaris*) was recorded nesting in the cavity during the PRA in April 2021.

Internal features

A single bat was observed roosting within the church during the PRA, located on the underside of the roof towards the east of the nave, on the side of a timber beam. The bat could not be viewed in sufficient detail from ground level to identify.

Droppings were present at several points within the church. Key locations include:

- The walls in the north-western and south-western corners of the nave;
- Several pews within the nave;
- The walls in the north-eastern and south-eastern corners of the chancel;
- The walls on the western and southern aspect of the lady chapel.

Samples of droppings was taken from underneath the location of the roosting bat, and a second sample from the droppings scattered through the church. These were sent for analysis by Swift Ecology. The droppings below the roosting bat were produced by a common pipistrelle, with the scattered droppings produced by both common pipistrelle (*Pipistrellus pipistrellus*) and brown long-eared bat (*Plecotus auritus*).

Two potential access/egress points were recorded internally:

- A cracked timber running horizontally along the base of the roof on the southern aspect of the lady chapel. The wood at the base of the cracks is worn and chipped, indicating potential use by bats;
- Gaps at the edge of the 13th Century entrance door into the nave, located on the southern aspect, as well as a hole in the (possibly defunct) locking mechanism.

Numerous small gaps and crevices are present across the internal surface of the roofs, in between the wooden boards and between the wooden boards and timber. These could potentially be utilised by roosting bats.

Additional Dropping Analysis

Additional collections of droppings were gathered from the pews in the nave on July 1st 2021 and sent for analysis by Swift Ecology. These were again identified as belonging to common pipistrelle.

A fourth collection was taken from a pillar at the corner of the nave and the chancel on 18th August 2021 as these were notably different in size and shape than others through the church. These were sent for analysis by Swift Ecology and were identified as belonging to serotine.

Emergence and re-entry surveys

Figure 1: Surveyor locations (S) and indicative roost locations



Dusk 03.06.21

An individual common pipistrelle was recorded emerging from under the barge boarding on the western aspect of the church at 21:35.

Three common pipistrelles were recorded emerging from the southern aspect of the belfry roof, including one from under a tile at 21:09 and two from the eaves at 21:34.

Four common pipistrelles emerged from under the eaves on the southern aspect of the lady chapel between 21:16 and 21:34. Seventeen common pipistrelles emerged from a gap under the roof on the eastern aspect of the lady chapel between 21:20 and 21:26.

Three common pipistrelles were also recorded emerging from separate gaps in the stonework of the wall on the eastern aspect of the lady chapel, at 21:14, 21:43 and 21:48. These gaps were not identified during the PRA.

During the dusk survey 452 passes were recorded across all locations, all relating to common pipistrelle except one call relating to soprano pipistrelle.

Dawn 04.06.21

Two common pipistrelles returned to roost at the eaves on the south-western aspect of the church at 03:16 and 04:07.

Two silent bats returned to roost on the western aspect of the belfry, including one in the tower window at 03:55 and one under a tile at 03:58. Two common pipistrelles returned to roost at the eaves on the southern aspect of the belfry at 04:05.

Four common pipistrelles returned to roost under the eaves on the southern aspect of the lady chapel; two at 03:55 and two at 04:10. Eighteen common pipistrelles returned to roost in the gap under the roof on the eastern aspect of the lady chapel between 03:40 and 03:55.

In the dawn survey an additional surveyor was deployed inside the church. A myotis was recorded entering the church at 03:10, and a silent bat considered likely to be a myotis or a brown long-eared bat entered in 03:34. No other bats were detected internally.

During the dawn survey 805 passes were recorded across all locations, relating mostly to common pipistrelle with low numbers of a barbastelle (six passes), a myotis species (five passes), serotine (two passes) and brown long-eared (one pass).

Dusk 01.07.21

Two common pipistrelles emerged from a single location at the eaves on the northern aspect of the church at 21:54.

Individual common pipistrelles were recorded emerging from under a tile on the western aspect of the belfry at 21:42 and under the eaves on the north-eastern aspect at 21:45 and southern aspect 21:50. One common pipistrelle was also recorded emerging from the stone surrounding the door into the porch, at the base of the belfry tower, at 21:52.

Eight common pipistrelles emerged from the eaves on the southern aspect of the lady chapel, including seven between 21:44 and 21:45 and one at 22:24. The bats emerged from multiple points across the eaves, which could not be precisely identified.

During the dusk survey 506 passes were recorded across all locations, relating mostly to common pipistrelle with low numbers of barbastelle (six passes), a nyctalus species (five passes) and a myotis species (one pass).

Dusk 18.08.21

Two common pipistrelles emerged from separate locations at the eaves on the southern aspect of the belfry at 20:26 and 20:42.

Three common pipistrelles emerged from the eaves at the south-western corner of the church at 20:45.

During the dusk survey 431 passes were recorded across all locations, relating mostly to common pipistrelle with low numbers of a nyctalus species (ten passes), a myotis species (two passes) and serotine (one pass).

In addition, an automated detector was deployed in the nave for the duration of the survey. It recorded an additional 13 passes, all relating to common pipistrelle between 20:33 and 20:38. No bats were recorded during that period.

Automated Surveys

01.07.21

The automated detector deployed in the lady chapel recorded 1,049 passes most of which relate to common pipistrelle, with low numbers of soprano pipistrelle (37 passes) and serotine (25 passes).

The automated detector deployed in the belfry recorded 405 passes most of which relate to common pipistrelle, with low numbers of serotine (37 passes) and soprano pipistrelle (one pass).

Appendix 2 - Valuing Bat Roosts

| Geographic Frame of Reference | Roost Types |
|-------------------------------|---|
| District, Local or Parish | <ul style="list-style-type: none"> - Feeding perches (common species) - Individual bats (common species) - Small numbers of non-breeding bats (common species) - Mating Sites (common species) |
| County | <ul style="list-style-type: none"> - Maternity sites (common species) - Small numbers of hibernating bats (common and rarer species) - Feeding perches (rarer/rarest species) - Individual bats (rarer/rarest species) - Small numbers of non-breeding bats (rarer/rarest species) |
| Regional | <ul style="list-style-type: none"> - Mating sites (rarer/rarest species) including well used swarming sites - Maternity sites (rarer species) - Hibernation sites (rarest species) - Significant hibernation sites for rarer/rarest species or all species assemblages |
| National/UK | <ul style="list-style-type: none"> - Maternity sites (rarest species) - Sites meeting SSSI guidelines |
| International | <ul style="list-style-type: none"> - SAC sites |