Church of St Michael

Loppington

Bat Management Plan 2021

Mortimer Environmental Ltd

PURE ECOLOGY

Project Information			
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Mortimer Environmental Ltd

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Church of St Michael, Loppington

Bat Management Plan

1. Summary Page

Objectives	• To engage with church users at St Michael, Loppington, to understand conflicts between bats and people. • To undertake a suite of bat activity surveys at St Michael, Loppington, to characterise bat populations. • To develop a bat management plan with a range of options to reduce bat impacts on church users and artefacts while safeguarding bat populations.
Findings	• Church users report that bat urine and faeces cause significant damage to church monuments, fixtures and fittings. There are additional cleaning requirements through the summer months, particularly before important events/services. There are concerns that newly restored funerary hatchments will be damaged by urine and faeces. • Church users wish to close gaps in the roof structure to improve heating in the church. • Three species of bat were using the church of St Michael in 2021. • Solitary common pipistrelles (*Pipistrellus pipistrellus*) used internal and external crevice features at the east end of the south aisle. Solitary soprano pipistrelles (*P. pygmaeus*) used internal crevice features at the north side of the nave and in the porch roof. • Natterer's bats (peak count 4) used day roosts in the south aisle. They access the church interior using a gap above the main door, with a second potential access point in the east wall of the south aisle. • Natterer's bat roost switching and social flying behaviours are the likely cause of droppings inside the church. • The bat roost at the church of St Michael is assessed to be important within the local (district) context.
Management Options	• <u>OPTION 1 Protection of funerary hatchments – coverings</u> Protective covers for funerary hatchments to be provided free of cost by the Bats in Churches Project. **Approx. cost: £0** • <u>OPTION 2 Protection of funerary hatchments – lighting</u> Directed lighting to be installed using an Ecologist's lighting plan. Lighting will highlight hatchments and deter bats from flying in their direct vicinity, without disturbance or negative impact on the bats or their roosts. **Approx. cost: £4500** • <u>OPTION 3 Close gaps under eaves (improve heating)</u> Gaps under the eaves of the roof that are not used as bat access points to be closed to reduce draughts and improve heating. Work to take place under an Ecologist's Working Method Statement to prevent disturbance or negative impact on the bats or their roosts. **Approx. cost: £6150** • <u>OPTION 4 Close gaps under eaves and above door (potential exclusion of bats from church interior)</u> Undertaken in conjunction with Option 3, gaps used by bats to access the church to be closed to reduce draughts and improve heating. Compensatory bat boxes to be installed in the church porch and exterior. Works to proceed with Faculty consent and using a Bat Mitigation Licence. **Approx. cost: £4080** (in addition to costs for Option 3)

2. Introduction

2.1. Background

This Bat Management Plan (BMP) has been produced for the church of St Michael, Loppington by Mortimer Environmental Ltd and Pure Ecology Ltd, for the Bats in Churches Project (BiC), on behalf of Natural England. This project seeks to safeguard the future of protected bat roosts inside churches, whilst reducing the negative impacts their presence may have on the fabric of these historic buildings and on the people who use them. Churches have become increasingly important roosting sites for bats as populations have declined due to habitat loss and loss of old buildings. However, due to the open structure of these buildings, the associated faeces and urine can cause smell, mess and damage to important historic artefacts. Partnered with the Church of England, the Bat Conservation Trust, the Churches Conservation trust and Historic England, bat ecologists aim to investigate and employ practical solutions to issues caused by bats. BiC is supported by the National Lottery Heritage Fund. For more information see https://batsinchurches.org.uk/.

On April 23rd, 2021, Mortimer Environmental Ltd and Pure Ecology Ltd undertook a 'Bat Roost Visit' at St Michael's in order to survey the church for the presence of bats and to speak to church users about issues caused by bats, the concerns raised and potential outcomes of their involvement in the BiC project (Bat Roost Visit Report Form, 2021).

2.2. Site Description

The church of St Michael, Loppington, Shropshire (Ordnance Survey grid reference SJ 47163 29277) is a Grade 1 listed historic building dating to C14 and late C15. Partly rebuilt mid-C17 and early C18 and restored in 1870, it is constructed of coursed and dressed yellow and red sandstone with a plain clay tiled roof with ornamental cresting. Consisting of a nave, chancel, west tower, south aisle and porch, the church has an elaborate mid-C17 arch-braced collar-beam roof to the nave, with carved pendant knobs, single tiers of ogee-curved windbraces and miniature hammerbeams with shields bearing arms of local families. There is a heavily restored C15 south doorway with nail studded double doors and a C18 royal coat-of-arms above (Historic England, British Listed Buildings, 1960). The church has four C18 funerary hatchments that have undergone recent restoration.

The church is located in the centre of the village of Loppington. Open countryside surrounding the village is represented by a mix of arable farmland and grazed pasture, with small, wooded copses in the wider area, mainly to the north. The river Roden lies approximately 2km to the east. A site location plan and aerial view are shown in Figure 1.

2.3. Bat-related Issues and Concerns

Damage to significant artefacts and/or monuments by bat urine or faeces is not listed as being of concern in the latest quinquennial review for St Michaels (St Michael & All Angels Loppington Quinquennial Inspection Report October 2015). However, church users report significant damage to monuments, fixtures and fittings,

with staining/urine spotting to fabric coverings/soft furnishings (e.g., Altar cloth, chairs, banners and panels), which must be covered at all times between spring and autumn (Bat Roost Visit Report Form, 2017). There is a considerable cleaning burden through the summer months, with additional cleaning being required before any special events such as weddings/funerals. There is additional concern that the newly restored funerary hatchments will become damaged by bat urine and faeces.

A number of formal bat access points have been made to ridge tiles at regular intervals during renovation works to the south aisle roof and at the request of Natural England. It has not been possible to obtain a copy of the bat report/licence that accompanied these works.

2.4. Legislation and Licensing

All species of bats and any place used by bats for shelter (i.e., a roost) are legally protected under the Wildlife and Countryside Act 1981 (as amended) and the Conservation of Habitats and Species Regulations 2017 (as amended) in England and Wales. When taken together this legislation makes it an offence to:

- Kill, injure or capture any wild species;
- Disturb any bat (mote that disturbance in this context refers to actions that could inhibit a bat's ability to survive, reproduce or rear their young, to hibernate or to significantly affect the local distribution or abundance of the species;
- Destroy, damage, obstruct or otherwise interfere with a bat roost, breeding site or resting place, whether the roost is occupied at the time or not; and,
- Sell, or offer for sale, a bat or any part thereof, live or dead.

The Conservation of Habitats and Species Regulations (2017) allows for licensing of activities that may impact upon bats or bat roosts for the purposes of preserving public health, public safety or other imperative reasons of overriding public interest (IROPI). A licence can be issued where the following requirements are satisfied:

- There is no satisfactory alternative; and,
- The action authorised will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range.

Licensing should be a last resort when repair work is required or when solutions to resolve the issues being caused by bats impact upon bat roosts. The purpose of licensing is to render lawful activities that would otherwise be illegal (under the legislation described above). There are several licences available under the licensing regime in England, which includes the following:

- Bat Mitigation Licence – apply to Natural England for an individual licence for a project if the building work to the church cannot avoid disturbing bats or damaging their (roost) habitats;
- Bats in Churches Class Licence (BiCCL) - licence permits the disturbance and capture of bats, damage and destruction of resting places and breeding sites using a range of management techniques to

reduce the negative impacts of bat populations using places of worship, and to carry out necessary repair works.

All necessary permissions and consents need to be in place prior to applying for an individual Bat Mitigation Licence or registering the church under the BiCCL.

An application to Natural England for the BiCCL to implement management techniques to reduce the negative impacts caused by the presence of bats will assess the level of damage caused to the church. This includes an assessment of damage to the monument and artefacts, disruption to church activities and functions, and the burden of cleaning the building. Impacts caused by the presence of bats must be significant and whilst there is not a prescribed threshold to evaluate damage, the National Heritage Protection Plan makes clear the importance of preventing damage to places of special architectural or historic interest. Users of this licence must implement management measures to safeguard bats and ensure the ecological function of the site is maintained.

2.5. Aims & Objectives

The BiC project aims to work closely with the church to gather ecological, built heritage and social information to support the development of a 'Bat Management Plan' (BMP) with approaches designed to support the church in reducing the impact of bats on historic artefacts and church users. The project also aims to produce a sustainable network of skilled volunteers to provide ongoing support to church communities with bats. As such, this project had the following objectives:

1. To hold an initial meeting with members of the Parochial Church Council (PCC) to provide information about the project and explain any constraints regarding possible solutions and to gain a strong understanding of the issues facing church users and their preferred outcomes;
2. To produce a Bat Roost Visit Report containing evidence for the presence of bats on site, the impacts of bats being present on site and the preferred outcomes of church users;
3. To undertake a suite of dusk emergence/dawn re-entry bat surveys during the bat activity period (May to September), in collaboration with Shropshire Bat Group volunteers and in line with BiCCL survey criteria. Surveys to be designed to identify the species and numbers of individuals present, to characterise the type of roost present, to locate main entry/exit points and roost locations and provide observations of bat behaviour inside the church;
4. To hold a progress meeting with members of the PCC to discuss the results of the bat activity surveys and present and discuss suggested solutions; and,
5. To produce a written BMP detailing possible mitigation/management options, licencing requirements and estimated costs.

3. Summary of Results & Survey Findings

3.1. Bat Related Issues and Preferred Outcomes

The Bat Roost Visit Report and initial meeting identified that church users are tolerant of the bats that use the church, but not of the issues they cause. Bat faeces and urine falling inside the church cause damage to fabrics (such as the altar cloth, chairs, banners and panels) and artefacts such as wall hatchments. These are of particular concern as they have undergone recent refurbishment. Levels of droppings falling inside the church mean that additional cleaning is required during the summer months, especially prior to special events such as weddings and funerals. This creates an unsustainable cleaning burden on volunteers (Bat Roost Visit Report Form, 2021).

Church users would like to minimise the impact of bats by reducing the number of droppings occurring inside the church and/or prevent them from falling on fabrics and the recently restored hatchments. The church users also note that they would like to improve heating inside the church by closing gaps in the roof structure to reduce draughts. They note that additional bat access points were incorporated into the roof during roof repairs (under licence from Natural England) and the church would like to identify those that are not used by bats and block them.

3.2. Bat Activity Surveys

A detailed report of the methods used for bat activity surveys and the results obtained are included in Section 8 (Technical Appendix – Bat Activity Surveys).

Three species of bat were recorded in St. Michael's Church between June and September 2021. The dawn re-entry and dusk emergence surveys recorded day roosts of common and soprano pipistrelle bats (*Pipistrellus pipistrellus* and *P. pygmaeus*) and Natterer's bat (*Myotis nattereri*) within the church, but there was no evidence of breeding or mating at the site.

Soprano and common pipistrelle bat roosts were mostly occupied by solitary bats. Pipistrelle bats are exploiting internal and external crevice features at the edge of the church roof. A common pipistrelle bat was recorded using one internal crevice feature and one external crevice feature at the eastern end of the South Aisle. Soprano pipistrelle bats used an internal crevice feature on the north side of the nave and a gap under the porch roof.

A small gathering of Natterer's bats was recorded, with a peak count of four bats in August forming a day roost in the South Aisle. The main Natterer's roost locations occupied in 2021 were gaps between end trusses and walls of the South Aisle (i.e., at the east and west end of the South Aisle). Natterer's bats are gaining access to the church via a gap at the top of the main entrance door, with bats able to access the porch via gaps at the eaves of the porch roof. There is also a potential building access point from the east wall of the South Aisle that leads directly to a confirmed crevice roost feature. Natterer's bats are using the church interior as a flight

area, with social activity and roost switching behaviour recorded during dusk surveys. This internal roost activity is likely to be the main cause of bat droppings in the church.

The bat roost resource at the church of St. Michael is evaluated as being important within the **local (district)** context. The church supports three bat species, including Natterer's bat, a species that is scarce in Shropshire. The church of St. Michael provides diverse opportunities for bats to shelter in crevices and voids within the roof and walls. The presence of Natterer's bats at the church is significant, because the species is reliant on historic buildings and they are gathering at the church of St. Michael in small numbers to socialise, as well as to roost.

4. Conclusions and Recommendations

The PCC and other church users experienced significant disruption to church activities and functions caused by the presence of bats prior to 2021 and reported significant damage to monuments, fixtures and fittings, with staining/urine spotting to fabric coverings/soft furnishings (e.g., Altar cloth, chairs, banners and panels). This incurred a considerable additional cleaning burden with artifacts having to be covered at all times during the bat activity season (spring to autumn). Following review of the issues caused by bats during a progress meeting on the 23rd of September 2021 for the Bat Management Plan (BMP), the PCC reported a significant reduction in the problem in this year. This was consistent with the bat roost assessment survey findings recorded by Mortimer Environmental Ltd and Pure Ecology Ltd in 2021.

The real and perceived issues experienced at the church of St. Michael due to the presence of bats have alleviated in 2021. The exact cause of the change is unknown, but may be a consequence of a change in the status of the bat roosts in the church (e.g., there was no breeding activity in the church in 2021). Given this decrease, a BiCCL to implement management techniques to reduce the negative impacts caused by the presence of bats is not considered appropriate at this time. The requirement for a BiCCL can however be reviewed annually and a BMP can be implemented if the issues relating to bats intensify.

Although at BiCCL BMP is not required at this time, bat management options may be necessary to protect hatchments and undertake building renovations to reduce draughts and improve the energy efficiency of the church. The four management options in Section 5 provide advice for:

- Two alternative measures to protect hatchments that do not require a bat mitigation licence;
- One option for draught proofing the church that retains bat roost access and avoids the need for a bat mitigation licence;
- One option for draught proofing by blocking all gaps at the eaves and doorway of the church that will require a bat mitigation licence because it will potentially exclude roosting bats from the building.

5. Bat Management Options & Costings

Bat Management Options	Indicative Costs*
OPTION 1 – PROTECTION OF HATCHMENTS USING COVERINGS Funerary hatchments to be angled away from the wall at the top to reduce damage from bat faeces and urine deposited during flying and socialisation behaviours. It is anticipated this could be done by a member of the church community at no cost to the church. Protective covers could also be provided to the church by the Bats in Churches Project at no cost to the church. Advice from Jennifer Chambers, Church Architect (Chambers Conservation Ltd): Care must be taken to ensure any moisture naturally present in the wall does get trapped between the hatchment cover and the panel and cause damage to the paint. *Further details of funerary hatchment protective covers will be supplied separately by the Bats in Churches Project* **Contact Rachel Arnold for more information (rarnold@thecct.org.uk)**	
OPTION 2 – PROTECTION OF HATCHMENTS USING LIGHTING Directed lighting to be installed for each hatchment. Lighting of the hatchments would deter bats from flying in the area directly around them and therefore reduce the impact of droppings and urine on the hatchments themselves. Lighting would have the benefit of highlighting these important monuments, but consideration will need to be made to ongoing running costs. No bat mitigation licence would be needed for this work. However, the church will need to instruct an ecologist to prepare a method statement and lighting plan to ensure it will not cause any direct or indirect disturbance to bats in line with Bat Conservation Trust and Institute for Lighting Professionals (2018) *Guidance note 8. Bats and Artificial Lighting*. Advice from Jennifer Chambers, Church Architect (Chambers Conservation Ltd): The lighting could be achieved with simple discreet (e.g., small and black) LED light fittings fixed either just above on the wall plate or on the wall opposite. There is likely to be cable runs in these locations although a separate circuit would be needed as these would need to be left on out of usual opening hours. It would be important for the church to be made aware of the running costs associated with this.	

Preparation of an Ecologists lighting plan	*£1,500.00*
Installation of directed lighting and timing switches for hatchments	*£2,000.00*
Scaffolding	*£1000.00*
	£4500.00
OPTION 3 – CLOSURE OF GAPS UNDER EAVES TO IMPROVE HEATING ONLY 2021 bat activity survey data show that bats access the church interior by using gaps at the east end of the south aisle and above the door. Blocking of other gaps under the eaves and in the roof structure to improve heating in the church could proceed under an ecologist's Working Method Statement with advice on timing of works and gaps to be left open to prevent disturbance to bats and/or their roosts. **Note, this option would allow the church to fulfil their objective of reducing draughts to improve heating in the church but will not reduce the impact of bats on the church interior.** Advice from Jennifer Chambers, Church Architect (Chambers Conservation Ltd): Small holes would be best filled with lime mortar (without cement). Larger holes (say over 50mm) could either be filled with stone (preferred - to match the existing) or durable timber fitted slightly recessed from the facade where it would not be visible. The body of the church is likely to remain adequately ventilated as the eaves are never likely to be able to be fully sealed and there will be some leakage through the non-covered windows (although the church should remain more cautious whilst covid remains a threat). I am presuming that the roof is still traditionally tiled, without felt or insulation.	
Preparation of Ecologist's Working Method Statement	*£500.00*
Toolbox talk and site visit for Ecological Clerk of Works	*£650.00*
Closure of gaps under eaves on north side of nave and south side of south aisle. Note, an assessment of the number/size of gaps to be closed has not been made as part of this BMP. Therefore, the costs specified here are likely to change. Materials used to be agreed in consultation with the church architect.	*£4000.00*
Provision of mobile tower scaffold/cherry picker as appropriate	*£1000.00*
	£6150.00

OPTION 4 – CLOSURE OF GAPS UNDER EAVES, POTENTIAL EXCLUSION OF BATS FROM CHURCH & COMPENSATORY BAT ROOSTS

This option should be implemented in conjunction with Option 3 above. Known bat access points in the east end of the south aisle and above the church door would be blocked to reduce draughts and improve heating in the church. This would prevent bats from accessing the church interior and would therefore need to proceed under a bat mitigation licence. To meet the conditions of the mitigation licence ('Imperative Reasons of Overriding Public Interest' and 'No Satisfactory Alternative') it is recommended that Faculty consent and/or a quinquennial report should accompany the application to provide evidence that closure of bat access points is necessary. To mitigate for the impacts of bats no longer being able to access the church interior in the usual manner for roosting, compensatory bat boxes would need to be installed in the south porch and exterior of the church to provide alternative roosting opportunities. An example of the type of crevice roosting box required is shown in Plate 1. The gap above the interior south porch door is shown in Plate 2. **Note, bats can access the interior of buildings through very small crevices and gaps. Closure of known bat access points does not guarantee that bats will no longer be able to access the church interior.**

Carpenter/contractor to block gap above door (1/2 day) plus materials. — *£500.00*

Ecologist's preparation of bat mitigation licence — *£800.00*

Ecologists monitoring of works (includes Toolbox talk, two days site supervision and compliance check and licence return form). Additional site supervision would be charged at £50/hr plus mileage at 45p/mile.

Supply and install four crevice bat boxes in porch and church exterior — *£2500.00*

£280.00

Plate 1: An example of a compensatory bat roost box to be provided in the south porch

 **Plate 2**: Gap above the south porch interior door through which bats access the interior of the church (photograph taken from the church interior).	**£4080.00**
ADDITIONAL INFORMATION Option 4 above is based on survey information obtained during the 2021 bat activity season. Church users report that higher number of bats have used the church in the past, causing impacts upon the church interior that were more severe than that observed in 2021. We note here that should bats begin to use the church in higher numbers in the future, Option 4 above may no longer be suitable. Under this scenario, further surveys would be needed to re-evaluate the conservation status of the roost. Should the church be found to be a high conservation status roost (e.g., a maternity roost) then a different management strategy would be needed to achieve the outcome proposed under Option 4. This alternative option would include further activity surveys, the application of a Bats in Churches Class Licence (BiCCL), closure of bat access points as above and provision of internal bat roost boxes. This would need to proceed under Faculty and in collaboration with the church architect. We have not provided a full breakdown of works needed and associated costs as this work is not currently justified based on the survey data we have obtained for St Michael's in 2021. However, indicative costs are provided for information. A photograph of a similar internal bat roost created under the eaves under a BiCCL is shown in Plate 3. *Pre-works bat activity surveys* *BiCCL Application*	*£4800.00* *£800.00*

Ecologists monitoring of works (includes Toolbox talk, two days site supervision and compliance check and licence return form). Additional site supervision would be charged at £50/hr plus mileage at 45p/mile.	*£2500.00*
Post-works bat activity monitoring -	*£4800.00*
Construction of internal bat box (including contractor's daily rate, provision of materials and tower scaffolding)	*£4000.00*
Architect's plans, obtaining quotations, liaison with contractors, PCC and ecologists & sign off	*£1000.00*
 **Plate 3**: An example of an internal bat roost box constructed under the eaves of a church roof.	**£17900.00**

*Please note, costs provided for works other than ecological works are approximate and have been estimated in line with costs for similar works undertaken for the Bats in Churches Project at other project churches.

6. References

1. Bat Roost Visit Report Form, 2021, St Michael & All Angels, Loppington.
2. Historic England, British Listed Buildings, 1960. https://britishlistedbuildings.co.uk/101056050-church-of-st-michael-loppington#.YWA4S5rMJPY
3. Bat Roost Visit Report Form, 2017, St Michael & All Angels, Loppington.
4. St Michael & All Angels Loppington Quinquennial Inspection Report October 2015.
5. Bat Conservation Trust and Institute for Lighting Professionals (2018) *Guidance note 8. Bats and Artificial Lighting*. https://www.theilp.org.uk/documents/guidance-note-8-bats-and-artificial-lighting/

7. Figure 1

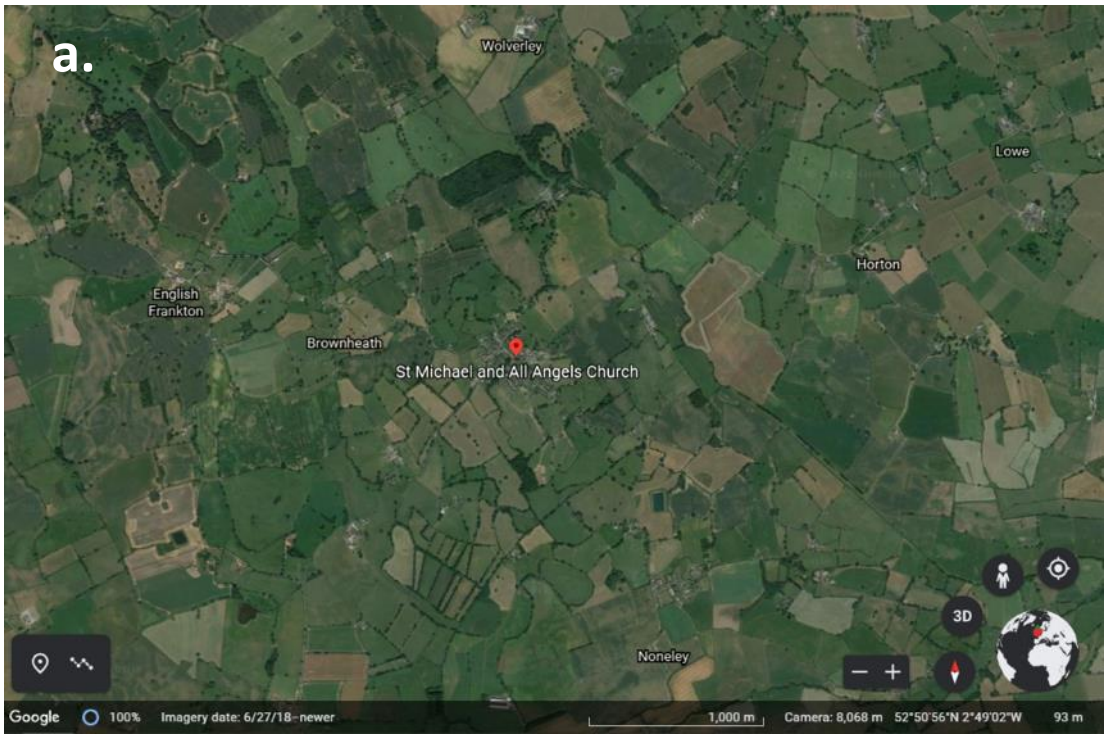


Figure 1 *Site location plan of the church of St Michael, Loppington (a) and aerial view (b).*

8. Technical Appendix – Bat Activity Surveys

Bat Activity Surveys, St Michael & All Angels, Loppington 2021

8.1 Introduction

The bat roost assessment at the church of St. Michael, Loppington in 2021 has been undertaken in accordance with survey standards for professional bat surveys published by the Bat Conservation Trust (Collins, 2016). Following the award of the contract for the supply of the Bats in Churches Management Plan, a Bat Roost Visit Report Form was completed for the Bats in Churches' Heritage Lottery Fund Heritage Grant 'Light Touch Survey'. This was based on an initial site visit conducted on the 23rd April 2021, and review of the previous Bat Roost Visit Report Form dated 3rd August 2017 (Bat Roost Visit Report Form 2017). Previous survey of the church reported a possible maternity roost of Natterer's bats (*Myotis nattereri*) and pipistrelle bat (*Pipistrellus sp.*) in the roof apex and gaps in roof beams. Evidence of a brown long-eared bat (*Plecotus auritus*) day roost was also reported in gaps in the roof timbers. This initial assessment of bat roost activity was based on field signs from droppings in the church.

Roost characterisation surveys to evaluate the conservation status of the bat roosts at the church of St. Michael were undertaken in 2021 by a team of six professional ecologists from Mortimer Environmental and Pure Ecology, with the assistance of volunteers from Shropshire Bat Group. A programme of one dawn re-entry and three dusk emergence surveys between May and August 2021, plus an additional internal dusk emergence watch in September 2021 was undertaken to monitor the church during the bat breeding season. A requirement of the study is to obtain sufficient baseline information to prepare a mitigation strategy and licence application to Natural England under the provisions of the Conservation of Habitats and Species Regulations 2017. The survey programme complies with the Site Registration requirements for Natural England's Bats in Churches Class Licence (BiCCL), WML-CL32.

8.2 Aims and Objectives

The aims of the study in 2021 are to:

- Undertake an initial assessment of the existing or previous use of the church by bats to understand the real and perceived issues being experienced by church stakeholders. (i.e., current presence of droppings/bats at the time of initial survey);

- Complete a full season of bat activity surveys to establish a baseline that can identify the main cause/s of the real and/or perceived conflicting issues in the church from roosting bats;
- Evaluate the conservation significance of the bat roost/s;
- Develop management measures to reduce the negative impacts caused by roosting bats that are the causes for concern raised by the church stakeholders;
- Provide advice and guidance on licensing under the provisions of the Conservation of Habitats and Species Regulations 2017 and Natural England's BiCCL;
- Develop a project plan with a mitigation strategy that follows the hierarchy of avoid, mitigate or compensate impacts on bat roosts and is capable of meeting the 'Favourable Conservation Status' legal test under The Conservation of Habitats and Species Regulations 2017.

8.3 Methodology

8.3.1 Literature Review

Background information gathered by Natural England for the Bats in Churches project was reviewed prior to the initial site survey in April 2021. This included:

- Bats in Churches Heritage Grant: Bat Roost Visit Form (dated 03/08/2017);
- Bats in Churches: Church Project Plan (version date 20/11/2020).

8.3.2 Building Inspection

A daytime inspection of the church of St. Michael was undertaken on the 23rd April 2021 to review the background information on bat roosts against the current site conditions. A site meeting with the Reverend Adam Clayton provided a review of the issues associated with roosting bats being experienced at the church. The 'light touch' survey recorded evidence of current use of the church from field signs and examined known and potential bat roost features in the church. The survey adheres to professional survey standards published by the Bat Conservation Trust (Collins, 2016).

Binoculars were used to identify possible roost sites in the roof and upper levels of the church walls. A search for characteristic field signs of bats, such as accumulations of droppings, urine staining, scratch/wear marks around holes or carcasses/ skeletal remains, was undertaken to identify current and previous use of the building by bats.

The church exterior was examined to identify roost access points and possible entry/ egress for bats to the church interior. Field signs such as bat droppings on the wall under roost entrances was recorded. Potential crevice roost features in the building fabric on the church exterior were also examined for signs of use.

The survey was undertaken by Anton Kattan MCIEEM (Pure Ecology Ltd), a licensed ecologist registration number 2015-12201-CLS-CLS on Natural England's CL18 (level 2) class licence. Mr. Kattan was assisted by Dr Alison Barnett (Mortimer Environmental Ltd).

8.3.3 Dusk Emergence and Dawn Re-entry Bat Activity Surveys

The survey protocol follows the "Minimum survey standards for site registration" under WML-CL32 Annex B, which required three dusk and one dawn bat roost survey during the optimum period for bats, and a study that adheres to the Bat Conservation Trust (BCT) Good Practice Bat Survey Guidelines (Collins 2016). The survey schedule, weather conditions and personnel engaged during each site visit are detailed in Table 1.

Table 1. Timings and Weather Conditions for Bat Activity Surveys

Date (2021)	Survey Period (hrs)	Sunset/ Sunrise Times (hrs)	Weather Conditions	Surveyor Positions
14 May	Dawn 03:15 – 05:30	05:14	Temperature range 8^{0}C Clear (0/8 cloud) Dry (no PPT) Light wind (BF1)	S1-S5 S7-S9
08 June	Dusk 21:15-23:30	21:30	Temperature range 16-17^{0}C Mostly Clear (2/8 cloud) Dry (no PPT) Light wind (BF1)	S1-S5 S7-S9
14 July	Dusk 21:15-23:30	21:29	Temperature range 17-19^{0}C Clear (1/8 cloud) Dry (no PPT) Light wind (BF1)	S1-S3 S5-S9
10 August	Dusk 20:30-22:45	20:44	Temperature range 17^{0}C Overcast (7/8 cloud) Dry (no PPT) Light wind (BF1)	S1-S3 S5-S9
15 September	Dusk (internal survey) 19:10-21:25	19:25	Temperature range 16-17^{0}C Clear (1/8 cloud) Dry (no PPT) Light wind (BF1)	S8-S9

The dawn and dusk surveys May to August 2021 were undertaken by a team of six professional ecologists and between two and four Shropshire Bat Group volunteers. Surveyors positioned outside the church monitored potential roost access points. Surveyor positions are shown on Figure A with coverage during each survey listed in Table 1. Two surveyors were stationed inside the church to identify internal roost locations and monitor levels of bat activity within the building during the survey period. The surveyors moved around inside the church as required, in response to bat activity and a Canon XA11 camcorder equipped with infrared (IR) lamp and set to IR shooting mode was used to monitor the internal roof structure.

The dusk survey on the 15th September 2021 monitored the church interior. The specific aim of the survey was to record any increase in the number of bats and levels of bat activity inside the church that may indicate a mating roost is present.

The lead surveyors were Anton Kattan MCIEEM and Oliver Barnett MCIEEM CEnv both of whom hold level 2 Natural England bat survey licences (CL18). The survey team of professional consultant ecologists were all experienced and appropriately licenced bat ecologists.

The professional surveyors were equipped with Elekon BatloggerM and Wildlife Acoustic Echometer Touch2 bat detectors that record bat echolocation calls in full spectrum output. The recorded bat calls can be analysed with Kaleidoscope and BatExplorer software to aide species identification.

8.3.4 Ecological Evaluation

The church has been assigned an ecological value based on the approach described in 'Guidelines for Ecological Impact Assessment in the UK & Ireland' published by the Institute of Ecology and Environmental Management (2018) which defines the resource (in this case the bat roost resource within the church) within a geographical context using the following criteria:

- International (Europe);
- National (England);
- Regional (West Midlands);
- County (Shropshire);
- Local or (Parish);
- Local (site level only).

The bat roost assessment categorises roosts according to the definitions described in Table 2. The significance of the bat roost resource in the church of St. Michael has also been classified in accordance with the site assessment recommended in the Bat Mitigation Guidelines (Mitchell-Jones, 2004), which provides guidance on proportional mitigation requirements based on the conservation significance of roosts. The Bat Mitigation Guidelines categorises the conservation significance of bat roosts from 'low' to 'high' according to the status of the roost (e.g., breeding, mating or hibernation) and rarity of the bat species present. The level of mitigation required depends on the size and type of impact, and the importance of the bat population affected. This is a

complex site and species-specific issue, but the table in Annex 1 provides the broad principles that guide the process.

Table 2. Bat Roost Definitions

Definition	Description
Day roost	A place where individual bats, or small groups of males, rest or shelter in the day but are rarely found by night in the summer.
Night Roost	A place where bats rest or shelter in the night but are rarely found in the day. May be used by a single individual on occasion or it could be used regularly by the whole colony.
Feeding Roost	A place where individual bats or a few individuals rest or feed during the night but are rarely present by day.
Transitional / occasional roost	Used by a few individuals or occasionally small groups for generally short periods of time on waking from hibernation or in the period prior to hibernation.
Swarming site	A site where large numbers of males and females gather during late summer to autumn. Appear to be important mating sites.
Mating sites	Where mating takes place from later summer and can continue through winter.
Maternity roost	Where female bats give birth and raise their young to independence.
Hibernation roost	Where bats may be found individually or together during winter. They have a constant cool temperature and high humidity.
Satellite roost	An alternative roost found in close proximity to the main nursery colony used by a few individual breeding females to small groups of breeding females throughout the breeding season.

8.4 Results

8.4.1 Building Description

The church of St. Michael dates from the 14th and late 15th Century, with records showing that it was partly rebuilt mid-17th Century and early 18th Century. The nave roof was burnt off in 1643 during the Civil War and renewed in elaborate style and the arcade was renewed when the church was restored in 1869.

The church has regularly coursed and dressed yellow and red sandstone walls, plain tile roofs with coped verges and ornamental cresting. The interior walls are bare stone. Most of the fittings are 19th Century (although the panelled pulpit is probably early 18th Century). There are four 18th Century funerary hatchments in the chancel (north wall) and aisle (south wall) and 18th and 19th Century wall memorials to local families throughout the church. Nave, chancel, west tower, south aisle and porch.

8.4.2 Literature Review

The Bats in Churches Bat Roost Visit Form (dated 03/08/2017) concluded there was a good range of roosting opportunities for bats externally on the church with gaps in the ridges or between tiles/lining. There is also an enclosed loft above the Chancel. This initial Light Touch survey suggests:

- There is a roost of Natterer's bats roosting internally in roof timbers within the South Aisle;
- Pipistrelle bats are active within the Chancel, but there were no concentrations of droppings. This suggests that any pipistrelle colony roosts are either roosting externally or in the enclosed loft above the Chancel, with droppings inside the church likely to be from occasional internal forays. Alternatively, it may be that individual pipistrelle bats are roosting internally (rather than a maternity group).
- Brown long-eared bats are present in the Tower and may use the interior of the church for roosting too.

These conclusions are based on field signs from droppings, further details of which are given in Annex 2.

Surveys in 2009, prior to repairs to the South Aisle and Nave roof confirmed that common pipistrelle and Natterer's bat were roosting in the church at that time, but they concluded that neither species was breeding there.

8.4.3 Building Inspection

The initial building inspection on the 23rd April 2021 recorded evidence of bats from droppings in the church. The distribution of droppings is described in Table 3 with Target Notes (TN) shown on Figure B.

Table 3. Distribution of Bat Droppings Recorded in the Church on the 23 April 2021

TN	Location	Number of Droppings	Descriptions
A	South Aisle	20	Natterer's droppings within a 2sqm area by the pillar. Relatively recent accumulation but no fresh droppings that would indicate current roost occupancy.
B	South Aisle	30-40	Natterer's droppings scattered around the altar, over an area of around 4sqm. Most appear to be old

			(possibly from last season) and were in areas that may not be as regularly cleaned, such as on the wall or behind the alter.
C	Vestry	6	Natterer's droppings stuck to the wall. The droppings have an older appearance (age unknown) and do not appear to be from the current activity season.
D	Nave	10	Light scattering of droppings near the hatchment wall hanging. The droppings were widely distributed (not in an accumulation) indicating this may be from a bat in flight. Seven fresh droppings counted.
E	Vestry	15	Small droppings (probable pipistrelle bat) on the tabletop. Relatively recent accumulation but no fresh droppings that would indicate current roost occupancy.
F	Chancel	4	Small droppings (probable pipistrelle bat) on the wall and edge of the floor (below a gap at the edge of the wooden roof). These appear to be older droppings and are unlikely to be from the current bat activity season.
G	Porch	6	Brown long-eared size, or possible Natterer's bat droppings stuck to the internal timber wall. The droppings may be over a year old (i.e., possibly not from the current or most recent bat activity seasons).
H	Tower	-	Light, sparce scattered old brown long-eared size droppings throughout the tower floors and stairwell. No count made, and most droppings noted appeared old (i.e., not from the current or most recent bat activity seasons).

There were no obvious large accumulations of bat droppings during subsequent visits to the church between May and September for the dawn and dusk surveys. Small accumulations and scattered fresh droppings were recorded in the South Aisle and Nave, with c10-15 droppings found at locations A-D during visits in June - September. This was consistent with the bat activity recorded during the dusk surveys.

Photographs of the church and a plan showing potential roost external features and access points are shown in Annex 3.

8.3.4 Dusk Emergence and Dawn Re-entry Bat Activity Surveys

Three species of bat were recorded in the church of St. Michael between June and September 2021. The dawn and dusk surveys recorded day roosts within the building, but there was no evidence of breeding or mating at the site. The seasonal surveys recorded the following roost activity:

- May – No evidence of bat roosts in the church at the beginning of the survey season.
- June – Two common pipistrelle day roosts and one Natterer's day roost.
  - One common pipistrelle roost within the church interior and one external crevice roost.
  - One Natterer's day roost within the church interior roof structure.
- July – One Natterer's day roost and one common pipistrelle day roost.
  - Natterer's bat emerged to church interior before exiting building via a gap in the east wall of the South Aisle.
  - Common pipistrelle occupied an external crevice roost.
- August – One Natterer's day roost and two soprano day roosts.
  - Four Natterer's bats were recorded in the church, with activity concentrated in the South Aisle. The bats exited the building via a gap above the door to the porch.
  - One soprano pipistrelle day roost was recorded in the nave and one in the porch.
- September – One Natterer's day roost.
  - The internal dusk survey recorded two bats roosting at the western end of the South Aisle.

The results of the dusk and dawn activity surveys are detailed in Table 4 and have been annotated on Figure C. The surveyor positions (S1-S9) referred to in Table 4 are shown on Figure A.

Table 4. Results of Dusk Emergence and Dawn Re-entry Bat Activity Surveys

Date (2021)	Surveyor Position (Fig A)	Roost Access Point (Fig C)	Bat Species	Roost Count	Observation Notes
14 May	n/a	n/a	n/a	0	No bats were recorded returning to roost at the church at dawn. Bat activity in the immediate vicinity of the church was very low.
08 June	S8	1	Common pipistrelle	1	Bat flying in South Aisle at 22:08. Emerged from the east wall of the aisle
		2	Common pipistrelle	1	Possible building emergence at 22:11 from eaves of south aisle
	S7	3	Natterer's	1	Bat flying in nave at 22:30. Exact roost location unconfirmed, but bat appeared to emerge from the roof timbers.

Date (2021)	Surveyor Position (Fig A)	Roost Access Point (Fig C)	Bat Species	Roost Count	Observation Notes
14 July	S8	4	Natterer's	2	Emerged from eastern end of South Aisle. The bats remained in the church and were observed landing on roof beams.
	S8	5	Natterer's	1	At 22:10 one bat returned to east wall roost. The bat entered a cavity in the wall that leads to an external access point, but the bat was not seen to emerge from the building.
	S3	2	Common pipistrelle	1	Building emergence at 22:15 from eaves of south aisle
10 Aug	S3	6	Soprano pipistrelle	1	Emerged from porch
	S7	7	Soprano pipistrelle	1	Emerged from roof, on north side of nave at 21:00
	S8	8	Natterer's	4	Internal roost location not confirmed, but the bats were recorded in South Aisle and were landing on roof beams before exiting the church via a gap above the door.
15 Sept	S7	9	Natterer's	2	Two bats emerged from the south-west corner of the South Aisle. The bats were socialising in the church and did not exit the building.

8.4 Interpretation of Results

The church of St. Michael supports three species of bat with several day roosts recorded during summer 2021 within the Nave, South Aisle and external walls of the church. There is no evidence of breeding or mating

activity at the site. Natterer's, soprano pipistrelle and common pipistrelle bats were recorded between June and September 2021.

Soprano and common pipistrelle bat roosts were mostly occupied by solitary bats. Pipistrelle bats are exploiting internal and external crevice features at the edge of the church roof. A common pipistrelle bat was recorded using one internal crevice feature and one external crevice feature at the eastern end of the South Aisle. Soprano pipistrelle bats used an internal crevice feature on the north side of the nave and a gap under the porch roof.

A small gathering of Natterer's bats was recorded with a peak count of four bats in August forming a small day roost in the South Aisle. The main Natterer's roost locations occupied in 2021 were gaps between end trusses and walls of the South Aisle (i.e., at the east and west end of the South Aisle). There are likely to be other gaps in the roof structure of the Nave and South Aisle that Natterer's bats will use, as this species will switch between crevice roost locations throughout the bat activity season. Natterer's bats are gaining access to the church via a gap at the top of the main entrance door, with bats able to access the porch via gaps at the eaves of the porch roof. There is also a potential access point for Natterer's bats in the east wall of the South Aisle. Natterer's bats are using the church interior as a flight area and the bats are remaining within the church for a considerable amount of time following emergence from their crevice roosts. Frequent switching between roost locations in the internal roof structure and social activity is likely to be the main cause of bat droppings in the church.

The location of the common and soprano pipistrelle and Natterer's bat day roosts and the Natterer's bat building exit point are shown on Figure D. The roost features are also illustrated on photos below.

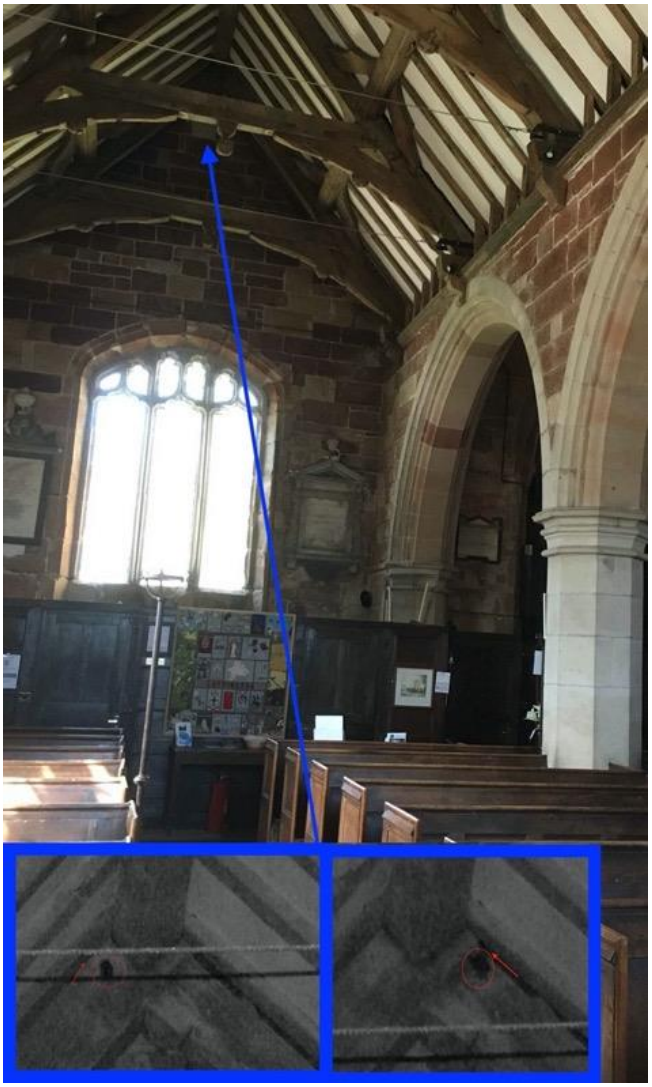
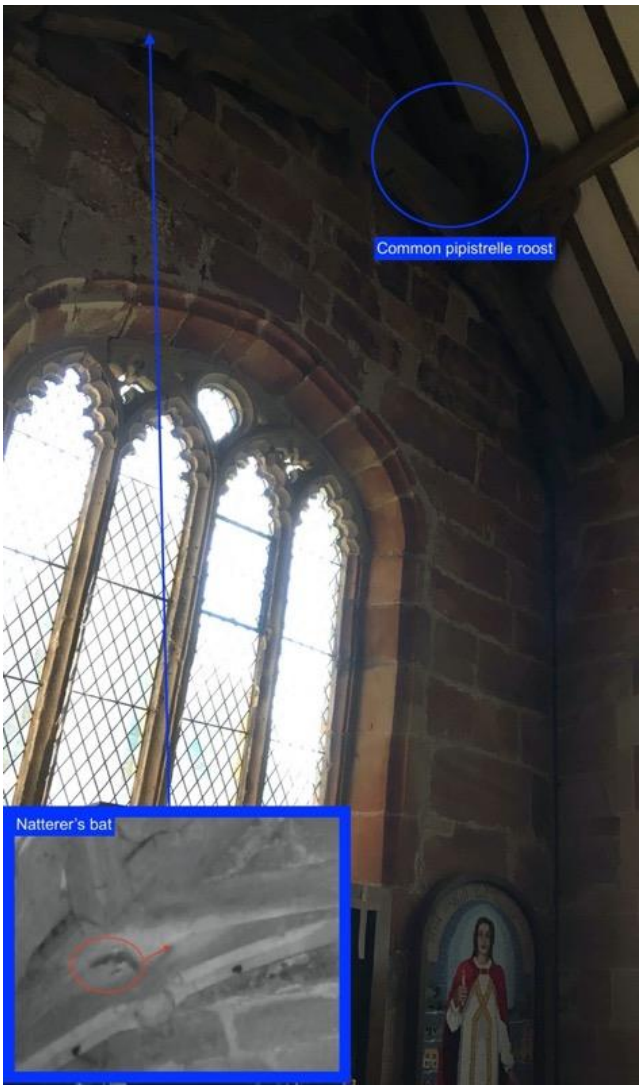
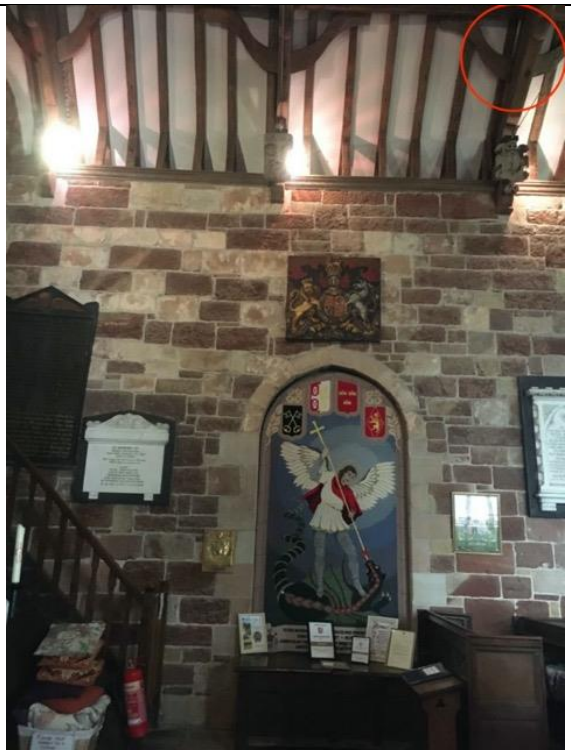
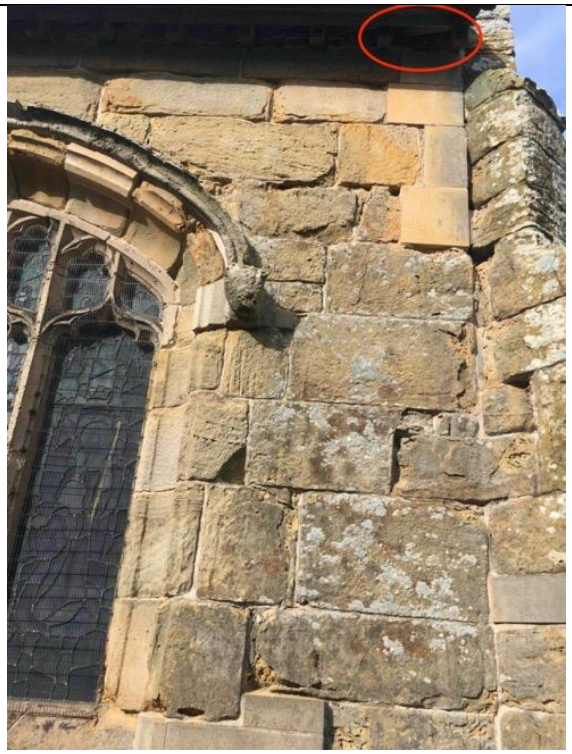
Photo 1. Natterer's roost above the Vestry at West End of South Aisle (Roost 9 on Figure C). The inset IR camera images show the bat (circled red) and the roost location (red arrow)	*Photo 2. Roosts above the Altar at East End of South Aisle (Roosts 1,4 & 5 on Figure C). The inset IR camera images show the bat (circled red) and the roost location (red arrow)*
	

Photo 3. Natterer's bat Building Access Point (Building Access Point 8, Figure C). The inset IR camera image shows the bat (circled red) and flight line (red arrow) recorded as the bat exited the building	*Photo 4. Hole in Ceiling near Roost 3, Figure C.*
	
Photo 5. Approximate Location of Soprano Pipistrelle Roost in Nave (Roost 7, Figure C)	*Photo 6. Common Pipistrelle Roost on Exterior of South Aisle (Building Access Point 2, Figure C)*
	

8.5 Evaluation and Impact Assessment

The conservation significance of the bat roosts at the church of St. Michael have been classified in accordance with the site assessment recommended in the Bat Mitigation Guidelines (Mitchell-Jones, 2004), which provides guidance on proportional mitigation requirements based on the conservation significance of roosts. Evaluation of the conservation significance of the roosts is:

- Common pipistrelle bat – **low** (day roosts for solitary bats and a common/widespread species)
- Soprano pipistrelle bat – **low** (day roosts for solitary bats and a common/widespread species)
- Natterer's bat – **moderate** (day roost for small numbers of a less abundant species in Shropshire).

The bat roost resource at the church of St. Michael is evaluated as being important within the **local (district)** context. The church supports three bat species, and the historic building provides diverse opportunities for bats to shelter in crevices and voids within the roof and walls. Bats use many different types of roost, and whilst the roosts at the church of St. Michael fall within the category of 'day roost', the level of importance in supporting a local population of bats varies between species. Natterer's bats are more reliant on historic buildings and are gathering at the church of St. Michael in small numbers to socialise, as well as roost. The presence of this species that is scarce in Shropshire and the UK (www.shropshirewildlifetrust.org.uk) is significant because Natterer's bats are sensitive to changes at their roost sites.

Parochial Church Council (PCC) members would like to reduce the damage to monuments, fixtures and fittings in the church of St. Michael caused by bat urine and faeces. There is additional concern that the newly restored funerary hatchments will become damaged. In previous years, there has been a considerable cleaning burden through the summer months for special events such as weddings/funerals.

The potential impacts on the bat species using the church of St. Michael caused by these actions would be:

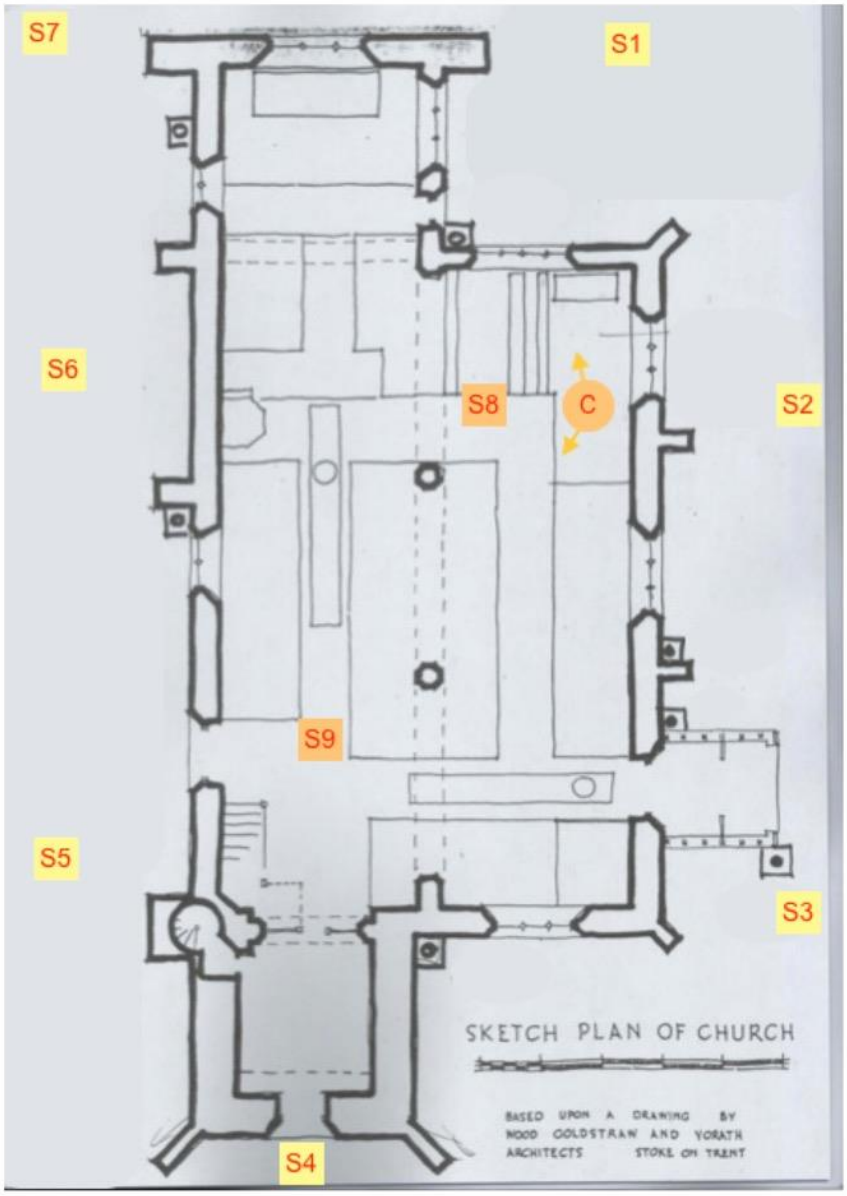
- Exclusion of Natterer's bats from the church interior to reduce the level of social activity associated with internal roosts occupied by a small group of bats;
- Exclusion of common and soprano pipistrelle bats from solitary day roosts inside the church.

These potential impacts would result in the loss of the three Natterer's bat day roosts, one common pipistrelle bat day roost and one soprano pipistrelle bat day roost and would prevent social activity for small numbers of Natterer's bats (c. 4 bats) that currently gather at the church. This would result in a permanent negative effect at the **local level**.

8.6 References

1. Bat Conservation Trust; Collins, J. (ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd Ed.) The Bat Conservation Trust, London.
2. Bat Roost Visit Report Form (2017) St Michael & All Angels, Loppington
3. Bat Roost Visit Report Form (2021) St Michael & All Angels, Loppington
4. Bats in Churches: Church Project Plan (2020)
5. CIEEM (2018) *Guidelines for Ecological Impact Assessment in the UK & Ireland: Terrestrial, Freshwater, Coastal and Marine.* Chartered Institute of Ecology and Environmental Management, Winchester.
6. Mitchell-Jones, A.J. (2004) *Bat Mitigation Guidelines* English Nature, Peterborough

8.7 Figures



Legend

S External surveyor positions [S1-S7]

S Internal surveyor poisitions [S8-S9]

C IR Camera location

Figure A Surveyor Positions During Dawn Re-Entry and Dusk Emergence Bat Activity Surveys

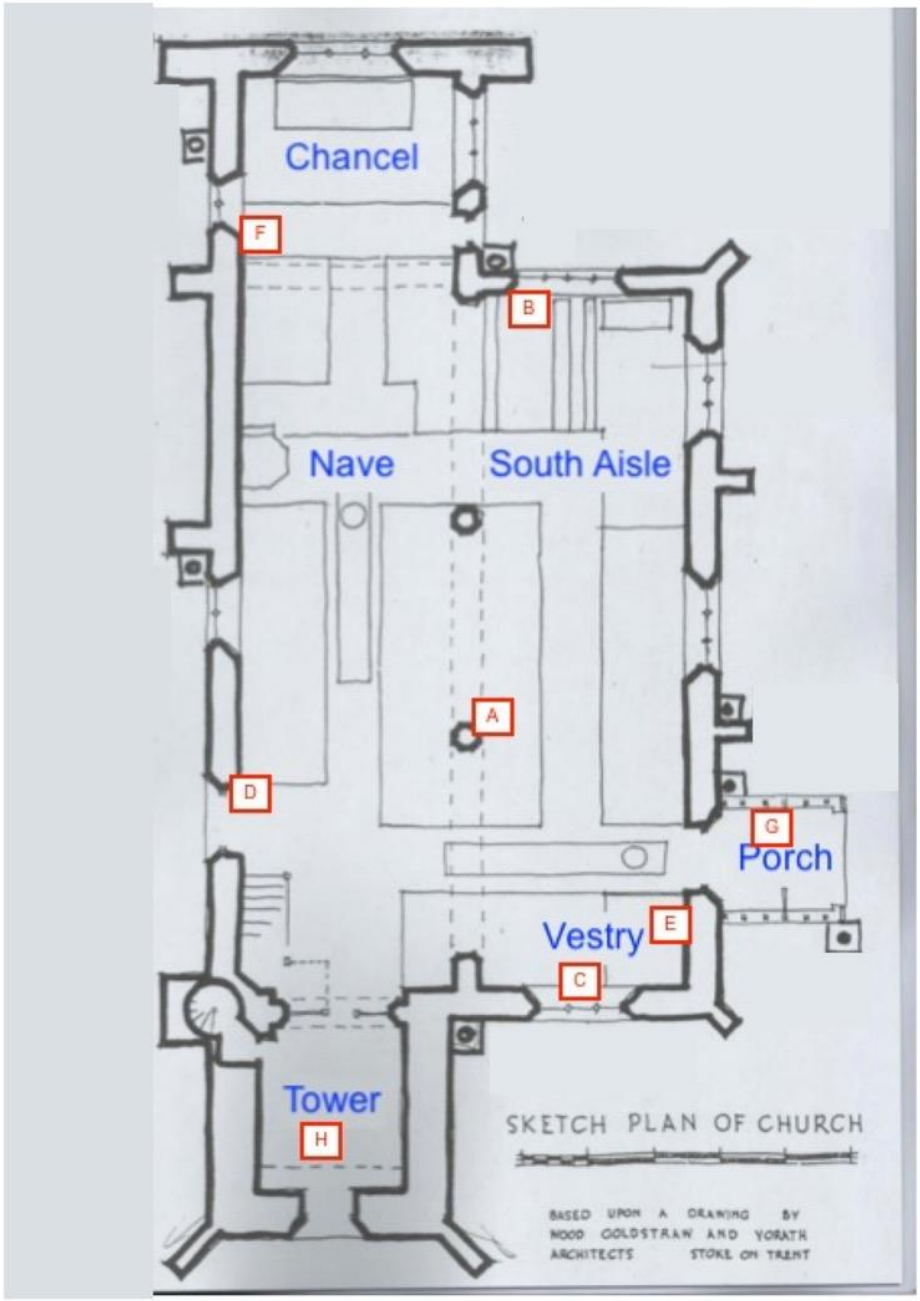


Figure B *Target Notes Relating to Distribution of Bat Droppings Recorded in the Church on the 23 April 2021 (see Table 3)*

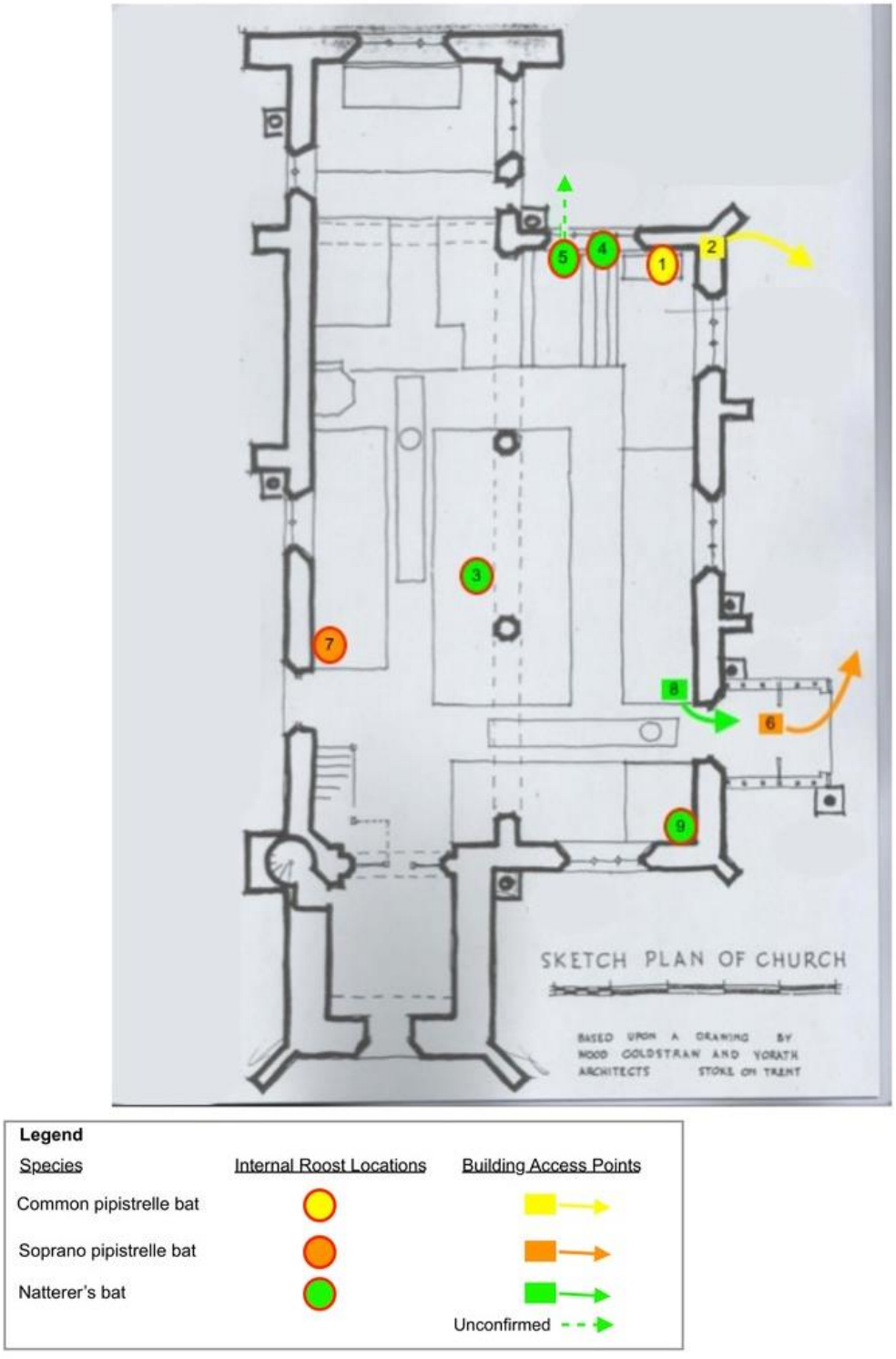
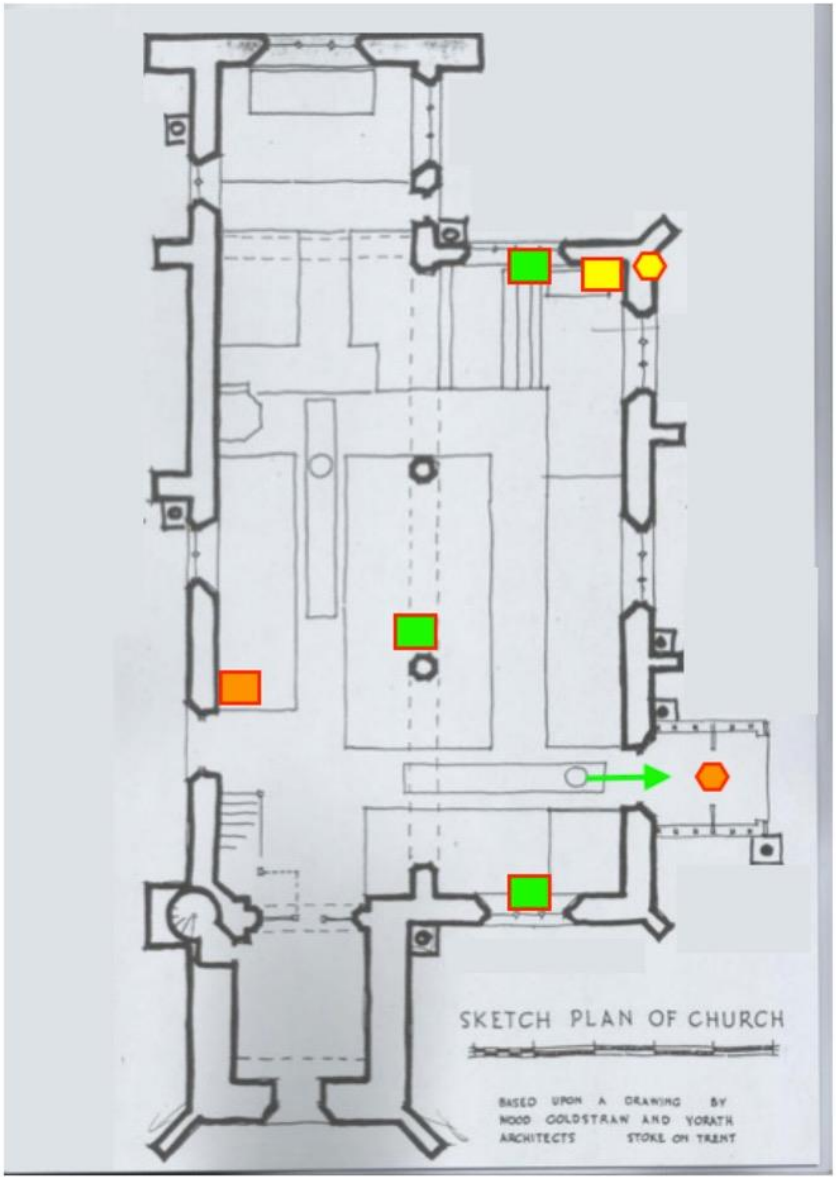


Figure C Results of Dusk Emergence and Dawn Re-entry Bat Activity Surveys (see Table 4)



Legend

Common pipistrelle bat

Day roost - church interior

Day roost - church exterior

Soprano pipistrelle bat

Day roost - church interior

Day roost - church exterior

Natterer's bat

Day roost - church interior

Building access point

Figure D *Locations of Bat Roosts and Exit Points at the Church of St Michael*

8.8 Annex 1. Guidelines for proportionate mitigation.

Taken from the Bat Mitigation Guidelines (Mitchell-Jones, 2004)

Low	**Roost status**	**Mitigation/compensation requirement (depending on impact)**
	Feeding perches of common/rarer species	Flexibility over provision of bat-boxes, access to new buildings etc. No conditions about timing or monitoring
	Individual bats of common species	
	Small numbers of common species. Not a maternity site	
	Feeding perches of Annex II species	Provision of new roost facilities where possible. Need not be exactly like-for-like, but should be suitable, based on species' requirements. Minimal timing constraints or monitoring requirements
	Small numbers of rarer species. Not a maternity site	
	Hibernation sites for small numbers of common/rarer species	Timing constraints. More or less like-for-like replacement. Bats not to be left without a roost and must be given time to find the replacement. Monitoring for 2 years preferred.
	Maternity sites of common species	
Conservation significance		
	Maternity sites of rarer species	Timing constraints. Like-for-like replacement as a minimum. No destruction of former roost until replacement completed and usage demonstrated. Monitoring for at least 2 years.
	Significant hibernation sites for rarer/rarest species or all species assemblages	
	Sites meeting SSSI guidelines	Oppose interference with existing roosts or seek improved roost provision. Timing constraints. No destruction of former roost until replacement completed and significant usage demonstrated. Monitoring for as long as possible.
	Maternity sites of rarest species	
High		

8.9 Annex 2. Bats in Churches Heritage Grant: Bat Roost Visit dated 03/08/2017

The Bats in Churches Light Touch Survey recorded the following droppings in the church on the 3rd August 2017:

- Up to 12 fresh *Pipistrellus* spp. droppings widely scattered throughout Chancel;
- Old droppings on wall (large, probably *Myotis nattereri*) in north-east corner of South Aisle;
- 1 fresh *Myotis nattereri* dropping amongst 20 or more older droppings cascading down inside of east gable wall to South Aisle;
- Droppings (mixed) on wall below hammer beam for roof truss on southern aspect of South Aisle;
- 12 fresh *Myotis nattereri* droppings amongst 20 or more old, crushed droppings below roof truss in centre South Aisle;
- 2 fresh *Myotis nattereri* droppings amongst 20 or more old, crushed droppings below roof truss in centre South Aisle;
- Up to 5 old *Plecotus auritus* droppings scattered on uppermost floor of tower.

8.10 Annex 3. Photographs

The following descriptions of potential roost features on the church should be read with reference to the accompanying plan which shows the referred Target Notes.

Target Notes of External Access Points

1. North aspect: possible access to interior under roof ridge adjacent to tower


2. North side: crack in mortar above doorway closest to the tower



3. North side: mortar fallen away under guttering closest to the tower



4. North side: mortar fallen away under guttering



5. Northern side: mortar fallen away under guttering


6. North aspect: possible access to interior under roof ridge down length of roof



7. North-western chancel corner: frame under gutter at the end of the building may have access



8. Western side: crack in brickwork above window of chancel provides external crevice feature

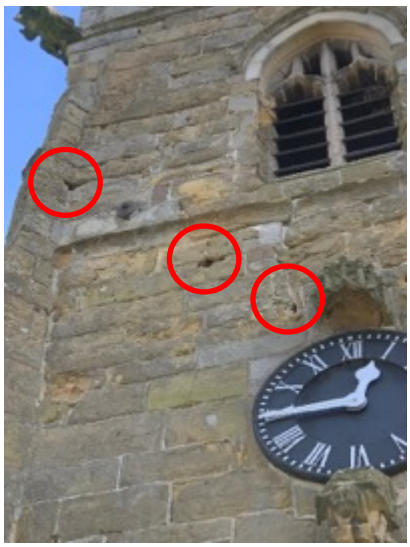


9. Southern side of chancel: crack in brickwork between guttering and window



10. Southern side of tower: Uncovered slit window.

11. Eastern side of tower: three cracks in brickwork above clock provide external crevices.



12. Roof of southern aisle: ridge tile at eastern end looks to have access and may have been purpose built.

- No photo

13. Roof of southern aisle above porch: gap under the ridge tile with the broken point

Plan with Target Notes for External Roost Access Points on the Church