St Mary the Virgin Church, Greetham

Bat Management Plan

October 2021

B.A.T. ECOLOGICAL

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Contents

Executive Summary

This report presents the Bat Management Plan (BMP) for St Mary the Virgin Church, Greetham, Rutland.

As part of the Bats in Churches Project B.A.T. Ecological were commissioned by Natural England to produce this BMP following bat surveys of St Mary's in 2021. The strategy presented within this BMP is also based on consultation with key stakeholders regarding bat impacts on the church and possible ways to reduce these. In addition, it considers research into mitigating the impacts from bats on churches, and information on bat usage of the church provided by the local bat conservation group, the Natural England Volunteer Bat Roost Visitor (VBRV) service, and from a 2016 suite of professional bat surveys.

St Mary's principally supports a maternity colony of *c*.20 adult female Natterer's bats, which predominantly roost within the south aisle and egress and access the church via an aperture above the south door. Natterer's bats have used the church in this way since at least 2011. This BMP primarily considers and prescribes bespoke measures in respect of the Natterer's bats inside this church because the droppings and urine deposited by this colony cause the most significant issues for the congregation.

Based on the information gathered to inform this report five options to reduce the impacts from bats inside St Mary's were presented and discussed in September 2021. The chosen bat management option comprises the creation of a bat loft for the Natterer's bats within the roof void of the south porch. This approach is to be brought forward for costing, Faculty consent, fundraising, and then licensing by Natural England. The overall aim of this approach is to prevent impacts from Natterer's bats inside the main areas of the church while maintaining the local population of this species at a Favourable Conservation Status (FCS), which is required according to the legislation that protects bats.

There are three key objectives for the chosen approach to bat mitigation at St Mary's. The success (or otherwise) of the bat management strategy can then be measured against these. Objective one is to provide long-term, suitable alternative roosts for the bats at the church, to comprise the bat loft in the south porch for the Natterer's bat colony, and bat boxes outside of the church for the other two non-breeding species (common pipistrelles and a brown long-eared bat). Objective two is to prevent bats using the church interior while facilitating usage of the new bat loft in the porch by the Natterer's bats. Objective three is to monitor the status of the Natterer's bat roosts within the church, and to respond appropriately to ensure that the FCS of the local population of this species is maintained. Actions are recommended in section 6 to achieve these objectives, including a recommended programme, and indicative costings for the proposed bat management strategy are provided in section 7.

The appendices of this report - section 9 – comprise an annotated plan of the church with the results of the 2021 bat surveys and the location of the proposed bat loft (appendix 9.1), additional photographs (appendix 9.2), and the bat survey methods employed in 2021 (appendix 9.3).

1 Introduction

1.1 Background

1.1.1 This report presents the Bat Management Plan (BMP) for St Mary the Virgin Church, Greetham, Rutland, LE15 7NF, which is referred to hereafter as 'St Mary's' or 'the church'.

1.1.2 This BMP is based on the findings of a detailed suite of bat surveys of St Mary's completed by B.A.T. Ecological in 2021. B.A.T. Ecological were commissioned by Natural England to undertake the 2021 bat surveys of St Mary's and produce this subsequent BMP as part of the Bats in Churches (BiC) Project.

1.1.3 The strategy presented within this BMP is also based on consultation with key stakeholders regarding the bat impacts on the church, and options to reduce these. In addition, it considers recent research into mitigating the impacts from bats on churches, and information on bat usage of the church provided by the local bat conservation group, Natural England via the Volunteer Bat Roost Visitor (VBRV) service, and from a professional survey undertaken in 2016 by BJ Collins Protected Species Surveyors (PSS).

1.1.4 St Mary's principally supports a maternity colony of *c*.20 adult female Natterer's bats *Myotis nattereri*, which predominantly roost within the south aisle and egress and access the church via an aperture above the door in the south porch. Based on VBRV reports, Natterer's bats have used the church in this way since at least 2011.

1.1.5 This BMP primarily considers and prescribes bespoke measures in respect of the Natterer's bats inside this church because the droppings and urine deposited by this colony cause the most significant issues for the congregation.

1.1.6 Any measures recommended within this BMP that will affect bats as European Protected Species (EPS) must be licensed appropriately by Natural England. Any bat management measures adopted at the church must ensure that there is no harm to any bats, and that the FCS of the local bat populations of the species concerned will be maintained.

1.1.7 The law pertaining to bats is described in section 2. The full findings of the bat surveys undertaken at St Mary's in 2021 are provided in section 3. Section 4 evaluates the bat survey effort and stakeholder consultation, and the bat management options for St Mary's are then considered in section 5. Section 6 presents the objectives of the agreed approach and outline costings for this are presented in section 7. Section 8 comprises references.

1.2 Church Location and Description

1.2.1 The central Ordnance Survey Grid Reference (OSGR) of St Mary's is SK 92458 14651 and it is located here: https://goo.gl/maps/yomM6wRBUcYV8uki9.

1.2.2 St Mary's is situated on Church Lane in Greetham. Greetham is a rural village in Rutland, England. It is *c*.6 km to the north of Rutland Water and *c*.8 km to the north-east of the market town of Oakham. St Mary's is within the Church of England Cottesmore Benefice of North Rutland, and the Diocese of Peterborough.

1.2.3 Photograph 1.2.1 shows St Mary's viewed facing north-west from Church Lane.

Photograph 1.2.1: St Mary the Virgin Church, Greetham, viewed facing north-west from Church Lane.

1.2.4 St Mary's comprises a nave with a clerestory; a tower (with a spire) adjoining the western end of the nave; a chancel adjoining the eastern end of the nave; a north aisle; a north vestry; a south aisle with a south porch; and a small south transept at the eastern end of the south aisle. Inside the church there is a toilet and servery at the western end of the north aisle. The organ is located within the south transept.

1.2.5 Most of St Mary's is constructed from coursed and squared stone and ashlar although the tower is constructed from ashlar only.

1.2.6 The shallow-pitched roof of the church nave, and the pent roofs of the aisles, are covered with lead or terne-coated steel. The roofs of the nave and the north aisle are finished with a plain parapet wall, whereas the lead roof of the south aisle overhangs the eaves on protruding rafters.

1.2.7 The roofs of the south porch, the north vestry, and the chancel are covered with Collyweston tiles finished with coping stones. The rafters of the north vestry are exposed at the eaves.

1.2.8 Inside St Mary's the walls are plastered and the floors are paved with stone flags and ledger slabs. The heavy timber roof of the nave comprises tie-beams with curved braces resting on stone corbels. The roof of the chancel has tie-beams and collars, and joggled purlins. Both aisles have plain timber pent roofs. The south transept roof is integrated into the south aisle roof.

1.2.9 The church is situated within a small graveyard which supports several trees, including two conifers near the south porch. There are two lights attached to the exterior chancel walls. The graveyard is surrounded by residential dwellings.

1.3 Statement of Heritage Significance

1.3.1 St Mary's is a Grade I listed building dating back to the Norman period in C12, although most of what stands today is as it was when it was rebuilt from C13 to C15. The church was then

restored late in C19. The nave and south aisle roofs were repaired in 2016-17.

1.3.2 As part of the initial phases of the BiC Project a Statement of Significance (SoS) was prepared in respect of the heritage importance of each project church and the impact upon it from bat activity. The following comprises the executive summary from the BiC SoS for St Mary's (authored by Neil Burton) in June 2020:

> "*The church is of high historical, archaeological and architectural significance and is listed Grade I, the highest rank of listing. This is mainly for its medieval fabric and architectural design (including a fine spire), rather than for its internal fitting out, which (notwithstanding some earlier furnishings of note) dates largely from the nineteenth century*.
>
> *It is understood that bats roost throughout the building, and the impact of droppings and urine is widespread, with staining on the timber furniture and tiled floors and pitting on exposed metalwork, despite the fact that many of the fittings are covered overnight. To provide more long-term protection, and to enable wider use of the building, consideration should be given to the blocking of bat entry points and the provision of alternative roosting sites outside the church. In the first instance a survey is required to confirm species, roost locations and access points*".

1.3.3 Refer to the Statement of Significance (BiC Project, June 2020) for more detail on any items of particular heritage importance at the church.

2 Relevant Legislation

2.1.1 The following is intended only as a guide to the legislation relating to bats. It does not purport to give legal advice and the Acts should be referred to directly for the precise legal wording.

2.1.2 All bats and their roosts are protected in England and Wales via the Conservation of Habitats and Species Regulations 2017 (as amended, including by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019) which are commonly referred to as the 'Habitats Regulations'. Bats and their roosts are also protected in the UK under the Wildlife and Countryside Act 1981 (as amended), which was reinforced in England and Wales by the Countryside and Rights of Way Act 2000.

2.1.3 In combination, the above legislation makes it an offence to:

- Deliberately capture, injure, or kill a bat.
- Deliberately disturb any bat; in particular, any disturbance which is likely to (i) impair a bats' ability to survive, breed, reproduce or to rear or nurture their young; or in the case of hibernating or migratory species, to hibernate or migrate; or (ii) to affect significantly the local distribution or abundance of the species to which they belong.
- To be in possession or control of any live or dead bat or any part of, or anything derived from a bat.
- Damage or destroy a breeding site or resting place of a bat.
- Intentionally or recklessly obstruct access to any place that a bat uses for shelter or protection.
- Intentionally or recklessly disturb a bat while it is occupying a structure or place that it uses for shelter or protection.

2.1.4 The term 'roost' is not used in the above legislation, however, a site that a bat uses for breeding, resting, shelter or protection is called a roost in ecological terms. Bats tend to re-use the same roost sites and sometimes over many years but may not always be in residence. Current legal opinion is that a roost is protected irrespective of whether the bats are present.

2.1.5 *Damaging or destroying* a place used by a bat for breeding or resting anywhere in the UK is an *absolute offence* carrying *strict liability* under the Habitats Regulations. This means that no element of intent, reckless, or deliberate action needs to be evidenced to establish guilt; the prosecution only needs to demonstrate that the accused performed the prohibited act.

2.1.6 Where an activity will result in any destruction, damage, or obstruction of any bat roost, whether occupied or not, or it risks harming or disturbing bats, then a licence is required from the Statutory Nature Conservation Body (e.g., Natural England) to derogate the law to facilitate this activity.

2.1.7 In determining whether to grant a licence for an activity affecting a European Protected Species (EPS) Natural England must apply the requirements of Regulation 53 of the Habitats Regulations, and, in particular, the following three tests set out in sub-paragraphs (2)(e), (9)(a) and (9)(b):

1. Regulation 53(2)(e) states that: a licence can [only] be granted for the purposes of "*preserving public health or public safety or other imperative reasons of overriding*

public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment".

2. Regulation 53(9)(a) states that the appropriate authority shall not grant a licence unless they are satisfied "*that there is no satisfactory alternative*" to the proposed actions; and,
3. Regulation 53(9)(b) states that the appropriate authority shall not grant a licence unless they are satisfied "*that 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*".

2.1.8 These three tests are commonly referred to as the 'purpose test', the 'NSA test' and the 'FCS test' respectively.

2.1.9 Note that the original legislation which provides the framework for licensing in respect of bats was transposed from European Union (EU) directives, and as such bats continue to be referred to EPS despite the UK's withdrawal from the EU.

2.1.10 There are two approaches to licensing work in places of worship that will affect bats and would otherwise be illegal: a 'normal' EPS Mitigation Licence (EPSML) or the Bats in Churches Class Licence (BiCCL).

2.1.11 The BiCCL is a unique licence designed to help suitably qualified, experienced, and trained bat ecologists (Registered Consultants) to manage the adverse effects of bat activity on places of worship (only). Issued under the Habitats Regulations, this licence permits Registered Consultants (only) to disturb and capture bats, and damage and destroy 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. The use of the licence is subject to:

- Surveying to required standards to inform baseline information about bat populations using the registered site, including species, numbers, roost types, times of year the roost is in use and access points, and to inform long-term monitoring requirements;
- All necessary permissions and consents being in place prior to applying to register a site unless exceptional circumstances apply;
- Registration of the site and written confirmation from Natural England that works may proceed; and,
- Submission of annual reports of licensed activities and monitoring by 15 January each year, and submission of records to the relevant Local Records Centre annually.

2.1.12 Registered Consultants must implement management measures to safeguard bats and ensure that the ecological function of the site is maintained for the registration period. Natural England make an assessment of each annual report to ensure compliance with the ecological approach set out in the authorised site registration form, and, where necessary, Registered Consultants must adapt management and monitoring measures.

3 Bat Usage of the Church

3.1 Previous Information

3.1.1 A bat survey report was prepared by BJ Collins PSS in October 2016 for Freeland Rees Roberts Architects on behalf of St Mary's. This report was provided to inform proposed repairs of the nave and south aisle roofs. It was based on a suite of professional bat surveys completed at the church in the summer of 2016.

3.1.2 BJ Collins PSS concluded that "*the church supports a maternity colony of Natterer's bats which are focused upon the south aisle. There was also small numbers, no greater than 4 individuals, of common pipistrelles roosting within the church and utilising the interior of the chancel. The Natterer's bat colony comprised approximately 20 individual females*".

3.1.3 The above report also referenced bat roost assessment and advisory visits to St Mary's by Natural England VBRV's (previously referred to as Volunteer Bat Wardens) in 2011 and 2015. It is understood that these VBRV's had previously reported that a Natterer's bat maternity colony used the church, accessing and egressing it via an aperture above the south door.

3.2 2021 Bat Surveys

3.2.1 Appendix 9.1 provides a plan of the key findings from the suite of professional bat surveys undertaken by B.A.T. Ecological at St Mary's in 2021.

3.2.2 The 2021 bat surveys concluded that the church principally supports a maternity colony of *c*.20 adult female Natterer's bats which predominantly roost in the south aisle roof. The bats access and egress their roost/s in the south aisle roof via small gaps where the structural roof timbers meet the tops of the walls, either in the two opposing corners of the south aisle, or in two locations above the south arcade. Photographs 3.2.1 to 3.2.3 show the locations of the main roost access / egress features.

Photograph 3.2.1: Location of one of the main Natterer's roost access / egress features – blue arrow - at the west end of the south aisle near the south arcade. A peak count of 29 Natterer's bats emerged from here on 1 Sept.

Photograph 3.2.2: Location of the other two main Natterer's roost access / egress features – red and yellow arrows - at the opposite eastern end of the south aisle (where it joins the south transept) near the south arcade.

Photograph 3.2.3: Close-up view of the area shown in photograph 3.2.1. The blue arrow shows where the Natterer's bats egress and access their roost, between the roof timbers and wall top at the western end of the south aisle. There are bat droppings visible on the wall below.

3.2.3 Breeding Natterer's bats also occasionally roost within the nave at St Mary's. On the 5 June pre-dawn survey, for example, at least seven Natterer's bats were recorded returning to a roost above the central purlin within the nave roof, near the chancel arch, in the location shown in photograph 3.2.4. In addition, on the 5 August dusk emergence survey at least six Natterer's bats emerged from a roost above this same purlin but in a different location, as shown in photographs 3.2.5 and 3.2.6.

Photograph 3.2.4: The red arrow shows where at least seven Natterer's bats returned to a roost shortly before dawn on 5 June 2021.

Photographs 3.2.5 and 3.2.6: The red arrows shows where at least six Natterer's bats emerged from after dark on 5 August 2021, above the date inscription in the western half of the nave roof.

3.2.4 Low numbers of Natterer's bats also make use of secondary roosts in the north aisle in the locations shown in photograph 3.2.7, accessing and egressing these roosts where the roof timbers meet the wall tops above the north arcade.

Photograph 3.2.7: Locations of secondary roosts at the eastern end of the north aisle, shown by the two red arrows.

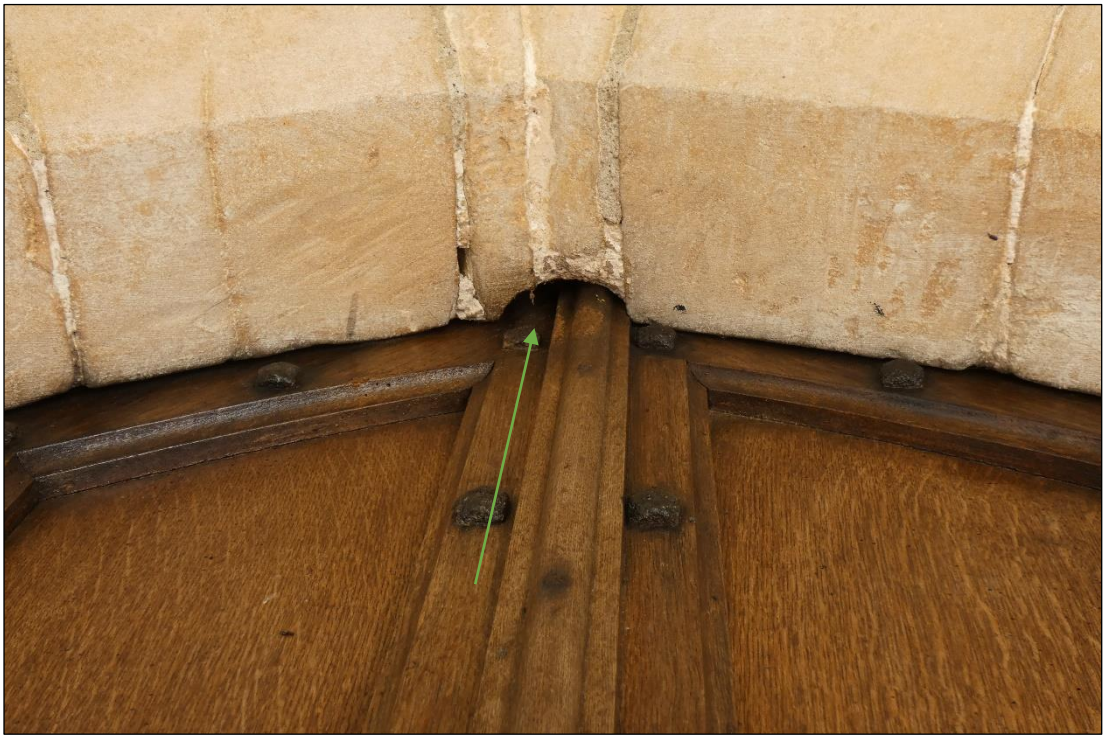
Photograph 3.2.8: View of the south porch door from outside the church. The yellow arrow shows where the bats egress and access the church.

3.2.5 The 2021 surveys also confirmed that up to four common pipistrelles occupied non-breeding day roosts inside St Mary's, most of which were in the chancel or above the chancel arch. The common pipistrelles used the same egress / access feature as the Natterer's bats.

3.2.6 All of the Natterer's bats and common pipistrelles egress and access the church via an aperture in the stonework at the apex of the south door within the south porch. This opening can be seen in context in photograph 3.2.8 and up close in photograph 3.2.9.

3.2.7 In addition to the above, a brown long-eared bat was recorded roosting among the internal roof timbers of the chancel on each of the 2021 nocturnal surveys.

Photographs 3.2.9: The aperture in the stonework at the apex of the south door – green arrow - which is used by the Natterer's bats and common pipistrelles to egress and access St Mary's church.



3.2.8 Table 3.2.1 shows the numbers of bats recorded emerging from St Mary's on the 2021 dusk emergence surveys. The June count will not include any juvenile bats whereas the September count will include recently volant animals.

Table 3.2.1: Numbers of bats recorded on the 2021 emergence surveys of St Mary's.

Date	Peak Count of Natterer's Bats	Peak Count of Common Pipistrelles	Peak Count of Brown Long-Eared Bats
4 June	20	4	1
5 August	≥ 9*	≥ 2*	1
1 Sept	29	2	1

**The emergence count on 5 August was disrupted by a heavy, unexpected downpour, which meant that some bats did not emerge from the church, and some returned early. The numbers shown for this date are the numbers of bats that could be confirmed*.

3.2.9 In addition to the features that are known to be used by bats from surveys at the church there are likely to be several other building features of importance to roosting or hibernating individuals, principally those associated with the wall tops and roof timbers.

4 Evaluation

4.1 Bat Survey Effort and Expertise

4.1.1 The suite of bat surveys undertaken by B.A.T. Ecological at St Mary's in 2021 was completed in accordance with current best practice guidance in respect of professional bat surveys generally – see Collins (ed.) 2016 - and those of churches – see BiCCL Annex B '*Minimum Survey Standards for Site Registration*'.

4.1.2 This BMP has been authored by Matt Cook BSc (Hons) MSc MCIEEM, who also led the 2021 bat surveys of St Mary's. Matt is a BiCCL Registered Consultant (RC) with Natural England – licence reference B32RC004. See appendix 9.3 for more information on Matt's experience.

4.2 Stakeholder Consultation

4.2.1 The following provides a timeline of St Mary's involvement with the BiC Project.

- 15 November 2019 – Initial church visit by BiC Project Engagement Officer Rose Riddell (RR).
- 19 November 2019 – St Mary's formally invited to join the project by Michael Costello, Natural England BiC Project Manager.
- 7 January 2020 - BiC Bat Roost Report Form completed with input from Churchwardens Helen Macleod (HM) and Jackie Gauntley (JG).
- 18 June 2020 – Statement of Heritage Significance visit by Neil Burton.
- 4 September 2010 – Church visit by RR and BiC Heritage Advisor Rachel Arnold (RA).
- 16 December 2020 – Church Project Plan produced by RR and RA.
- 25 January to 16 February 2021 – Natural England tender period for bat survey and consultancy work at St Mary's and 24 other BiC churches.
- 2 March 2021 – B.A.T. Ecological awarded contract to undertake bat surveys and produce BMP for St Mary's. Contract award accepted 4 March.
- 14 April 2021 - Initial meeting between B.A.T. Ecological (Matt Cook, MC), Churchwardens HM and JG, church architect (Adrian Ringrose, AR) and RR. The achieved objectives of this meeting were for the bat ecologist to acquire a good understanding of the church heritage, the preferences of the church representatives and architect in respect of bat mitigation measures, and to provide information about the next steps and overall aims including any likely constraints. RR also explained what support would be available from the BiC Project.
- April to September 2021 – Suite of bat surveys undertaken by B.A.T. Ecological.
- 22 September 2021 – Meeting between the same persons as above (plus RA) at the church. Based on the findings of the bat surveys, the architecture of the church, and recent research and experience of mitigating the impacts of bats in churches while retaining their favourable conservation status, MC presented four possible approaches to reduce the impacts from the Natterer's bats inside St Mary's. Each of these strategies was considered and discussed in detail, and a decision was reached to bring one forward within this BMP (with input from AR) for Faculty approval.

4.2.2 In addition to the above, informal discussions regarding the bat interest at St Mary's have been ongoing (via email and onsite) with Jenny Harris of Leicestershire and Rutland Bat Group, who has been very helpful in providing information on bat usage of the church.

4.3 Overall Evaluation

4.3.1 Overall, it is considered that the level of bat survey effort and expertise, stakeholder consultation, and reference to relevant research involved at St Mary's provides a robust platform for the recommendations contained within this report. Every effort has been made to provide a comprehensive ecological appraisal and appropriate recommendations in the context of the commissioned scope of works and the overall aims of the BiC Project.

4.3.2 Notwithstanding the above however, it remains important to note that it is impossible to completely characterise or predict the natural environment as wild animals are inherently unpredictable, all habitats are subject to change, and species may colonise or vacate areas for a variety of reasons after surveys have taken place or mitigation has been implemented.

5 Consideration of Bat Management Options

5.1.1 This BMP primarily considers and prescribes bespoke measures intended to reduce the impacts from the Natterer's bats inside St Mary's because the droppings and urine deposited by the maternity colony of these bats cause the most significant issues for the church.

5.1.2 All of the bat management options considered for St Mary's propose to retain the Natterer's bat maternity colony at the church. Excluding these bats from the church is not a viable option for several ethical, legal, and practical reasons.

5.1.3 Zeale *et al*. (2014, 2016) used population modelling to predict the impacts of exclusion on colonies of Natterer's bats when researching strategies to mitigate the impacts on churches from this species. This research concluded that exclusion is likely to have a negative impact on the welfare and FCS of Natterer's bats, principally because they may struggle to relocate to new roosts and establish new foraging areas quickly, which could then reduce productivity and affect survival, and so have a negative impact on population growth.

5.1.4 There is only one known study to have examined the demographic consequence of roost exclusion on any bat species – the big brown bat *Eptesicus fuscus* in Canada. Brigham & Fenton (1986) showed that despite individuals of this species relocating to roosts nearby, mean litter size was significantly lower (56% reduction) following exclusion (0.86 ± 0.30 at control sites; 0.38 ± 0.30 following exclusion). Zeale *et al.* (2014, 2016) concluded that a change of similar magnitude could have profound consequences for Natterer's bat populations in England.

5.1.5 The church representatives of St Mary's have no desire to exclude the bats, having stated in the 2020 Bat Roost Report Form that "*We would like to live in harmony with our bats and are happy they roost in our roof, but we would like to exclude them from flying in the church thus removing the droppings*".

5.1.6 Exclusion would also be against the spirit of the BIC Project and its principal aim "to *transform support for church communities with nationally important historic churches with protected bat roosts …… to create a sustainable partnership that will safeguard a future for bats, historic places of worship and for the people who use them*".

5.1.7 From a legal perspective Natural England cannot issue a licence to exclude the Natterer's bats from St Mary's because the NSA and FCS tests of Regulation 53 of the Habitats Regulations could not be satisfied by such an action – see section 2.

5.1.8 In practical terms it is very difficult to exclude bats from a large old church where there are many apertures that provide potential roost and roost access opportunities. Less harmful and potentially more effective options than exclusion are also available at St Mary's. The following - sections 5.2 to 5.6 - were considered as potential approaches to mitigate and reduce the impacts from the bats, while allowing the Natterer's bat colony to continue to reside and breed at the church.

5.2 Option 1: Do Nothing

5.2.1 Balancing the need to protect churches and bats - our cultural and our natural heritage - is very challenging. Conserving the bat colonies that occupy churches is important because the bats may not have any alternative suitable roost sites and the loss of an important roost could significantly harm bat populations that are already threatened. At the same time, however, churches are often very important buildings historically and culturally, and they can suffer significant negative effects from colonies of bats. St Mary's is an important community hub within Greetham but church activities are constrained by the mess deposited by the bats. The

upkeep of an old church without bats is already difficult, and the mess left by bats places an added burden on those that clean and use it. In the 2020 Bat Roost Report Form the Churchwardens stated that "*We are not anti bat; we are anti bat droppings in our precious and beloved House of God. Many residents of Greetham are highly pro nature*".

5.2.2 The 2020 BiC SoS (Neil Burton) for St Mary's made the following statement regarding the impacts from bats on this building:

"…. e*vidence of the impact of droppings and urine is widespread, with staining on the timber furniture and tiled floors and pitting on exposed metalwork, despite the fact that many of the fittings are covered overnight. The parish would like to hold more community events and concerts in the church, which has good acoustics and is provided with a WC and kitchen, but the mess created by bats is hindering these efforts*".

5.2.3 In addition, the principal recommendation provided within the main text of that SoS report (Burton, 2020) is as follows:

"*It is evident that bats are having an impact on fabric and furnishings, although the relatively small number of items of high significance has resulted in a fairly low impact score. Bat activity is also inhibiting wider use of the building. At present the most vulnerable items are kept covered as a short-term remedial measure, but in the longer-term consideration should be given to the blocking of entry points and the provision of alternative roosting sites outside the church. In the first instance, a survey is required to confirm species, roost locations and access points, and to inform plans for mitigation*".

5.2.4 Based on the above, and the wider context and principle aim of the BiC Project, the representatives of St Mary's feel that it is not appropriate to 'do nothing' at the church in respect of the impacts from the bats. As such, this option was presumably rejected prior to B.A.T. Ecological being instructed by Natural England.

5.3 Option 2: Catch-Boards

5.3.1 'Catch-boards' are essentially bespoke shelves or deep trays which are fixed or suspended beneath roost exit features within the church interior, to catch the bat droppings that cascade down. They are intended to prevent significant and unsightly aggregations of droppings below roosts inside the church, especially in the summer period when roosts are most active.

5.3.2 The catch-boards can be as basic or ornate as the church specifies and Faculty permission allows. Photographs 5.3.1 and 5.3.2 show two examples from other BiC Churches. A pulley system can be incorporated so that the boards can be lowered for cleaning.

Photograph 5.3.1: Catch-boards installed within the aisle of another BiC Project church, in Leicestershire.

Photograph 5.3.2: Catch-boards (with droppings) installed within the porch of another BiC Project church, in Essex.

5.3.3 Based on the 2021 survey findings at least three catch-boards would be needed in the south aisle at St Mary's, under the existing main roost locations – shown as target note 1 in appendix 9.1. It may also be pertinent to install some further boards beneath the secondary roost locations in the aisles – shown as target note 2 in appendix 9.2.

5.3.4 In principle, because catch-boards should not have any direct impact on the bats, only their droppings, they can potentially be installed without the need for a licence from Natural England, unlike the other interventions discussed in this BMP. Instead, catch-boards could potentially be installed in consultation with a suitably experienced bat ecologist via a Precautionary Method of Working (PMoW).

5.3.5 Depending on the nature of the catch-boards they can be a relatively inexpensive approach to mitigating impacts from bat droppings inside churches, and largely unintrusive in respect of the church aesthetics and any heritage considerations.

5.3.6 Catch-boards could reduce the accumulation of droppings below the roost egress and access features inside the aisles of St Mary's, however, they would not be suitable for the nave. The extra height of the roof and roosts in the nave means that any boards installed could not be accessed easily for cleaning, and so droppings would eventually spill over the shelf and accumulate on the nave floor again.

5.3.7 Despite some merits this option was rejected by the church representatives. The primary objection to this approach is that it does not solve the main issue of droppings and urine being deposited throughout the nave and aisles by bats in flight, which is the main problem for the church.

5.4 Option 3: Acoustic Deterrents

5.4.1 Research by Zeale *et al*. (2014, 2016) into mitigating the impacts of Natterer's bats on churches demonstrated that acoustic deterrents can be an effective way of moving bat roosting sites away from sensitive areas within churches at certain times of year, and that they may be particularly useful for moving Natterer's bat roosts. Zeale *et al*. (2014, 2016) concluded that "*acoustic deterrence has considerable value as a tool for moving bats humanely from specific locations inside churches to prevent accumulations of droppings and urine below roosts*".

5.4.2 The judicious use of high intensity ultrasound, under licence from Natural England, could potentially help mitigate and reduce some of the problems caused by the Natterer's bats at St Mary's. It may also be feasible to move roosting bats to locations where droppings can accumulate on catch-boards, and therefore options 2 and 3 can be used in combination. Within St Mary's, for example, it could be possible to deter bats from roosting in the nave, where deflector boards are unlikely to be effective, in anticipation that the bats would then only roost within the aisles, where droppings *can* accumulate on strategically located catch-boards.

5.4.3 It is important to note, however, that acoustic deterrents are not intended (and would not be licensed by Natural England) to evict bats from churches entirely, and therefore irrespective of where the acoustic deterrents move the bat roost/s to within the church the bats are likely to continue to fly within its interior if they did previously. The use of acoustic deterrents would not, therefore, help reduce the significant impacts from the urine and droppings voided by bats in flight at St Mary's. Furthermore, the bats may also habitualise to the acoustic deterrents in the long-term and return to roost in areas of the church where they are unwanted. Effective and suitable acoustic deterrents are also difficult to source.

5.4.4 On the above basis the use of acoustic deterrents to help mitigate the bat impacts at St Mary's was rejected during consultation.

5.5 Option 4: Partitioning the South Aisle

5.5.1 The most important Natterer's bat maternity roosts at St Mary's are located within the south aisle and they have been for many years. The only feature used by these bats (and the common pipistrelles) to egress and access the church is also accessible from the south aisle. Furthermore, the Natterer's bats at St Mary's spend more time flying within the south aisle than elsewhere inside the church.

5.5.2 On the above basis option four proposed to restrict Natterer's bat activity inside the church to the interior of the south aisle only by installing a partition along the south arcade. The nature of this partition would be determined by the church in consultation with the PCC, architect, and heritage consultees, however potential options might comprise a set of bespoke wooden doors or washable curtains within each archway.

5.5.3 The primary purpose of the partition, to be installed under a licence from Natural England, would be to prevent bats from accessing the nave, chancel, north aisle and north vestry from the south aisle and south transept. Any other apertures that might provide bats with access into these areas from outside would also be blocked simultaneously.

5.5.4 The merits of this approach for the Natterer's bats are principally threefold: it retains their most important natural roosting sites on the southern elevation of the church, it retains their only existing egress / access feature, and it continues to provide a sufficiently large open space inside the church for flight and socialising. On this basis it is anticipated that this approach should ensure that the FCS of the Natterer's bat colony could be maintained in the long-term.

5.5.5 The merits of this solution for the church are that it prevents any bat activity within most of the church; there would no longer be any bat droppings and urine deposited by bats in the nave, chancel, north aisle, or north vestry.

5.5.6 The main drawback of this approach is that it would have a very significant visual and physical impact on this Grade I listed ancient church, and as such the advice of the architect and heritage advisor is that Faculty and Historic England consent for it is unlikely. Furthermore, the cost of a bespoke and effective partition could be significant, and the bat mess in the south aisle could still be difficult to manage. After consideration this approach was rejected.

5.6 Option 5: Bat Loft in the Porch

5.6.1 The final bat management option considered for St Mary's comprises the installation of a bespoke new roost space – a bat loft – within the void of the pitched south porch roof. A false ceiling would be installed at around the height of the south doorway arch and tops of the interior walls inside the south porch, as depicted in photographs 5.6.1 and 5.6.2.

5.6.2 The approximate dimensions of this roof space would be xxxx. It would be large enough for the colony of Natterer's bats and thermal conditions suitable for these bats to breed and nurse pups would be created. One or two partitions and a bat box could be installed within the void to create different internal microclimates and provide different roosting opportunities.

5.6.3 The existing roof timbers could also be retained for roosting 'perches' or some could be removed to facilitate a more open void for bats to fly within. At least two suitably located access / egress features would be created; for example, one along the porch ridge and one along the eaves. A small hatch would also be installed within the ceiling to allow for inspection and cleaning.

5.6.4 Initially, this alternative roost would be provided where the bats will encounter it as they egress and access the church in the way they do currently, in anticipation that they might occupy it naturally. The bat loft should therefore be readied ahead of April in any given year,

and the bats should then be allowed to continue to use the church as they do currently through at least one summer, possibly two. Once the sensitive summer breeding period is complete and there are fewer bats roosting within the church (i.e., in the autumn) the bats would then be excluded from the main areas of the church in favour of the new bat loft.

Photographs 5.6.1 (below) and 5.6.2 (right): The area shaded green shows where the new bat loft would be created for the Natterer's bats at St Mary's, in the void of the south porch. The green arrow shows the aperture used by these bats to egress and access the church.

5.6.5 This approach has several advantages. The bats would be 'contained' within the porch and bat activity inside the main parts of the church would be prevented, which therefore means that there will be no further issues with the deposition of bat droppings and urine inside. It is also anticipated that the capital cost of creating this bat loft would be low (<£5k).

5.6.6 This approach should also have a minimal impact on the visual appearance of the church and its entrance because the false ceiling would be integrated within the porch interior. It is also anticipated that this approach would not have a significant impact on the church's heritage.

5.6.7 The merits of this approach in respect of the bats are that the new bat loft would be created in immediate proximity to the existing egress / access feature, it is of a suitable volume and attic-shape for Natterer's bats, and it is south-facing so that it will be naturally warm and will not require an artificial heat source. Favourable conditions would also be incorporated as described above.

5.6.8 A licence from Natural England would be required to implement this approach, which would need to be monitored over several years. Any licensed actions would need to be reversible in case the FCS of the Natterer's bats was not maintained.

5.7 The Preferred BMP Strategy – Bat Loft in the Porch (Option 5)

5.7.1 After detailed consultation and consideration of the above options the bat loft in the south porch – option 5 - was deemed the most suitable to mitigate the impacts from the bats at St Mary's. This approach was also approved by the Parochial Church Council (PCC) in October 2021. As such, the creation of a bat loft in the south porch is to be brought forward for costing, Faculty consent, fundraising, and then licensing by Natural England.

6 BMP Objectives

6.1 Objectives

6.1.1 Based on the information that has been gathered at St Mary's there are three key bat management objectives for the chosen approach – the bat loft - which are provided below. The success (or otherwise) of the bat management strategy can then be measured against these objectives.

Objective 1

6.1.2 To provide long-term, suitable alternative roosts for the bats at St Mary's - to comprise the bat loft in the south porch for the Natterer's bat colony, and bat boxes outside the church for the two non-breeding species.

Objective 2

6.1.3 To prevent bats using the church interior while facilitating usage of the new bat loft in the porch by the Natterer's bats.

Objective 3

6.1.4 To monitor the status of the Natterer's bat roosts within the church, and to respond appropriately to ensure that the FCS of the local population of this species is maintained.

6.2 Achieving the Objectives – Recommended Actions for St Mary's

Objective 1

6.2.1 It is understood that Adrian Ringrose, appointed Architect from Stimpson, Walton, Bond (https://stimpsonwaltonbond.com/) will provide outline costings for the capital work and professional fees associated with installing the new bat loft in the south porch. These costs will be appended to this report in due course.

6.2.2 Upon agreement of these costs with the church and PCC, Faculty consent for the bat loft in the south porch will then be sought from the Diocesan Advisory Committee (DAC) for the Care of Churches (in Peterborough).

6.2.3 Upon receipt of Faculty and confirmation of funds the bat loft at St Mary's can be installed by an appointed contractor under the guidance of the architect and appointed bat ecologist. Given the location of the new bat loft – away from any existing roosts or hibernacula - it is anticipated that its installation is highly unlikely to have an impact on roosting or hibernating bats, provided it is completed within the period of December to March (incl., any year) when bats are unlikely to be using the south porch door. As such, this phase of the bat mitigation strategy could, if required, commence under the scope of a PMoW in lieu of the licence required from Natural England for later phases of the strategy.

6.2.4 If the new bat loft cannot be installed within the period of December to March (incl.) then a licence should be sought from Natural England ahead of any of the work detailed here because of the potential risk of disturbing bats using the south door from April to November.

6.2.5 In the first summer following installation of the bat loft in the south porch bat activity in relation to this should be monitored by the bat ecologist, to ascertain any usage of it by the Natterer's bats. This monitoring should comprise either three separate nocturnal survey visits (using infra-red cameras) preceded by a daytime inspection for droppings via the access hatch, or two nocturnal survey visits (preceded by an inspection for droppings) and a period of monitoring with a suitable motion-triggered infrared 'trailcam' deployed inside the loft.

6.2.6 If monitoring shows clear evidence that the Natterer's bats have roosted within the new bat loft during the first summer following its installation then a licence from Natural England will be sought

to exclude the bats from the church interior in the subsequent autumn, once the sensitive bat breeding period is complete and there are fewer bats roosting within the church, and prior to the winter bat hibernation period.

6.2.7 If, however, the above monitoring shows no clear evidence that the Natterer's bats have roosted within the new bat loft during the first summer following its installation, then measures to exclude the bats from the church interior will be postponed until the second autumn following installation of the bat loft, to allow the bats more time to adopt it naturally. The bat loft should be monitored for any usage by the Natterer's bats in the interim as determined by the bat ecologist. Measures to exclude the bats from the church interior and persuade them to occupy the bat loft will be implemented (under licence) in the second autumn following installation of the bat loft irrespective of any bat usage of it.

6.2.8 In addition to the above, the contracted bat ecologist will install three bat boxes within the grounds of St Mary's to provide alternative roost habitat for the non-breeding common pipistrelles and the brown long-eared bat that will eventually be excluded from the church interior (under licence). The bat management strategy at St Mary's will also ensure that no bats are harmed during the proposed interventions

6.2.9 Full detail of the proposed bat mitigation strategy will be set out in an application to Natural England for an EPSML or to register the site under a BiCCL.

Objective 2

6.2.10 The proposed bat loft comprises the principal strategy intended to achieve Objective 2. The simultaneous aims of this approach are to provide suitable alternative roosting habitat for the Natterer's bats at St Mary's, while preventing these bats from accessing and flying inside the church, which thereby prevents the negative impacts from their deposited droppings and urine.

6.2.11 The success or otherwise of the proposed bat mitigation strategy in meeting Objective 2 will be evaluated in consultation with the regular church users at the end of each summer following installation of the bat loft, for example, by revisiting and updating the previous Bat Roost Report Form findings.

Objective 3

6.2.12 In the first instance, effective monitoring is required during the early stages of implementing the bat management plan at St Mary's to establish any usage of the new bat loft, which will determine subsequent steps as described above.

6.2.13 Beyond this, robust monitoring at St Mary's is imperative to allow a comprehensive appraisal of the success or otherwise of the chosen bat mitigation strategy, and to establish whether the FCS of the local population of Natterer's bats is being maintained. Establishing this is essential because the law that usually protects the bats and their roosts will have been derogated under any licence on this basis.

6.2.14 The proposed bat mitigation measures at St Mary's must also ensure that the primary ecological function of this church for the local populations of Natterer's bats is maintained. The current primary ecological function of the church for this species is to provide suitable conditions for a maternity roost of *c*.20 adult female bats and their young. The adult female Natterer's bats congregate at St Mary's in noticeable numbers in May, after the hibernation and spring flux periods, presumably because the church is warm, sizeable, and sheltered enough to allow them to give birth mid-summer and to rear their pups largely undisturbed. Once the juvenile bats are weaned and volant most of the Natterer's bats probably then disperse from the church through September and October. It is likely that low numbers of Natterer's bats also roost in some areas of the church in the autumn and / or spring. Low numbers of bats will also hibernate in it during the colder winter months.

6.2.15 The recommended post-intervention monitoring strategy for the new bat loft at St Mary's should align with the survey effort of the baseline surveys – see appendix 9.3 – and annex B of the BiCCL i.e., one daytime inspection (by a licensed bat ecologist), three dusk emergence surveys, and one

pre-dawn re-entry survey should be completed in at least two summers post-intervention. This professional monitoring should be led by the bat ecologist and should commence in the first summer following exclusion of the bats from the church interior the previous autumn, and it should continue in at least one subsequent summer. Beyond this it may be appropriate to engage with the local bat conservation group to undertake voluntary monitoring.

6.2.16 Section 6.3 below provides the criteria for evaluating the success of the bat mitigation strategy. Note that if the bats are not adopting the new roost provision in sufficient numbers then additional monitoring may be required as part of an adaptive management plan to be agreed with Natural England.

6.3 Criteria for Assessing Success

6.3.1 An initial favourable outcome for the bat management strategy at St Mary's will comprise clear evidence of the usage of the bat loft by any Natterer's bats prior to any licensed exclusion from the main areas of the church.

6.3.2 Beyond this, using the findings of the 2016 and 2021 bat surveys as a baseline, the following criteria will be used to evaluate whether it is likely that the FCS of the local population of Natterer's bats has been maintained following the proposed interventions.

Success

6.3.3 The bat loft will be considered a success if the monitoring shows that 15 or more adult female Natterer's bats have occupied it simultaneously during the annual pre-partum period (i.e., before the end of June). This figure allows for a 25% reduction in the number of Natterer's bats using the church. In this scenario it could reasonably be assumed that the colony could recover to its original size (20 adult females) and that this initial reduction in the colony size was at least partly due to natural population changes, such as an inclement spring leading to the late formation of maternity roosts, some bats not surviving the winter months, or bats using alternative roosts (e.g., see Zeale et al., 2014 and Stone et al., 2015).

Partial Success

6.3.4 A sub-optimal but still acceptable outcome from the monitoring would comprise ten adult female Natterer's bats using the bat loft during the annual pre-partum period. This would comprise a noticeable 50% reduction in the size of the colony using St Mary's, however, based on recent research (Zeale et al., 2014 and Stone et al., 2015) it could reasonably be assumed that the FCS of the local Natterer's bat population was still being maintained because the bats from the church colony may have opted for alternative suitable roosts nearby.

Failure

6.3.5 The proposed bat loft would be considered unsuccessful if five or less Natterer's bats were recorded using it simultaneously during the licensed monitoring period. This would comprise at least a 75% reduction in the colony size. In such a scenario consultation with Natural England would be required, to agree whether an adaptive management strategy would be required. This may involve reversing some, or all, of the licensed interventions, and / or work to establish whether most of the colony had moved to a secure alternative nearby maternity roost, to determine whether FCS might have been maintained despite the apparent failure of the proposed bat management plan for the church.

6.3.6 Importantly, success or otherwise will also be measured in terms of bat welfare. Any harm to, or the death of, a bat could reasonably be deemed as the failure of the proposed bat mitigation strategy.

6.4 Recommended Programme

6.4.1 Table 6.4.1 provides a recommended programme for the bat mitigation work at St Mary's. Items 3 onwards would be dependent on Faculty consent and funding to create the bat loft. The timing (and costs – see section 7) of Phases 6a to 8 would be dependent on this and whether initial monitoring - item 5 - showed that there was clear evidence of Natterer's bats using the new bat loft in the first

summer following its installation. Items 6b and 7 would not be required should there be clear evidence of this.

Table 6.4.1: Recommended programme for the bat mitigation work at St Mary's.

Item / Order	Timescale	Description
1	November 2021	Provision of estimated costs (capital and professional consultancy fees)
2	November 2021	Application for Faculty
3	December 2021	Instruction to contractors
4	January to March 2022	Installation of bat loft (via PMoW) and bat boxes
5	April to August 2022	Monitoring of bat loft usage
6a	September to November 2022	Licence application and works to exclude bats from the church interior IF there is clear evidence of Natterer's bat usage of the bat loft.
6b	*September 2022 to August 2023*	*Further monitoring of bat loft usage IF there is NO clear evidence of Natterer's bat usage of the bat loft*
7	*September to November 2023*	Licence application and works to exclude bats from the church interior (if not already completed).
8	Two years, commencing the first summer following exclusion of the Natterer's bats.	Post-intervention monitoring (incl. licence returns)

6.4.2 It is recommended that the bat loft is ready before April 2022, however the programme can potentially be adapted should this not be feasible.

7 Indicative Costings

7.1.1 The indicative costings provided in Table 7.1.1 for the bat mitigation work at St Mary's are based on the programme provided in Table 6.4.1. Costs provided are exclusive of VAT.

Table 7.1.1: Indicative costings for the bat mitigation work at St Mary's.

Item / Order	Capital Work	Materials	Architects Fees	Ecologists Fees
1	N/A	N/A	?	N/A
2	N/A	N/A	?	N/A
3	N/A	N/A	?	N/A
4	?	Bat boxes – *c.*£250	?	£800
5	N/A	N/A	N/A	£1,500
6a / 7	N/A	Exclusion devices – *c.*£500	?	£4,500
*6b**	*N/A*	*N/A*	*N/A*	*£900*
8	N/A	N/A	N/A	£4,000
Totals:	?	£750	?	£11,700

** Denotes items that may not be required, dependent on the outcome of initial monitoring (item 5).*

7.1.2 Note that the cost for the licence application for, and the exclusion of, the bats from the main areas of the church would only need to be incurred once and therefore items 6a and 7 are the same irrespective of when this occurs.

7.1.3 Also note that if initial monitoring (item 5) shows that there is clear evidence of the bat loft being used by Natterer's bats in the first summer following its installation then item 6b (further monitoring) would not be required.

7.1.4 The costings provided above are indicative and actual costs may be more or less than these figures. Final costs will be dependent on several factors including the success (or otherwise) of the proposed bat mitigation measures. On this basis it is suggested that a 20% contingency fund be set aside in addition to the costs above in case of unforeseen issues.

8 References

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

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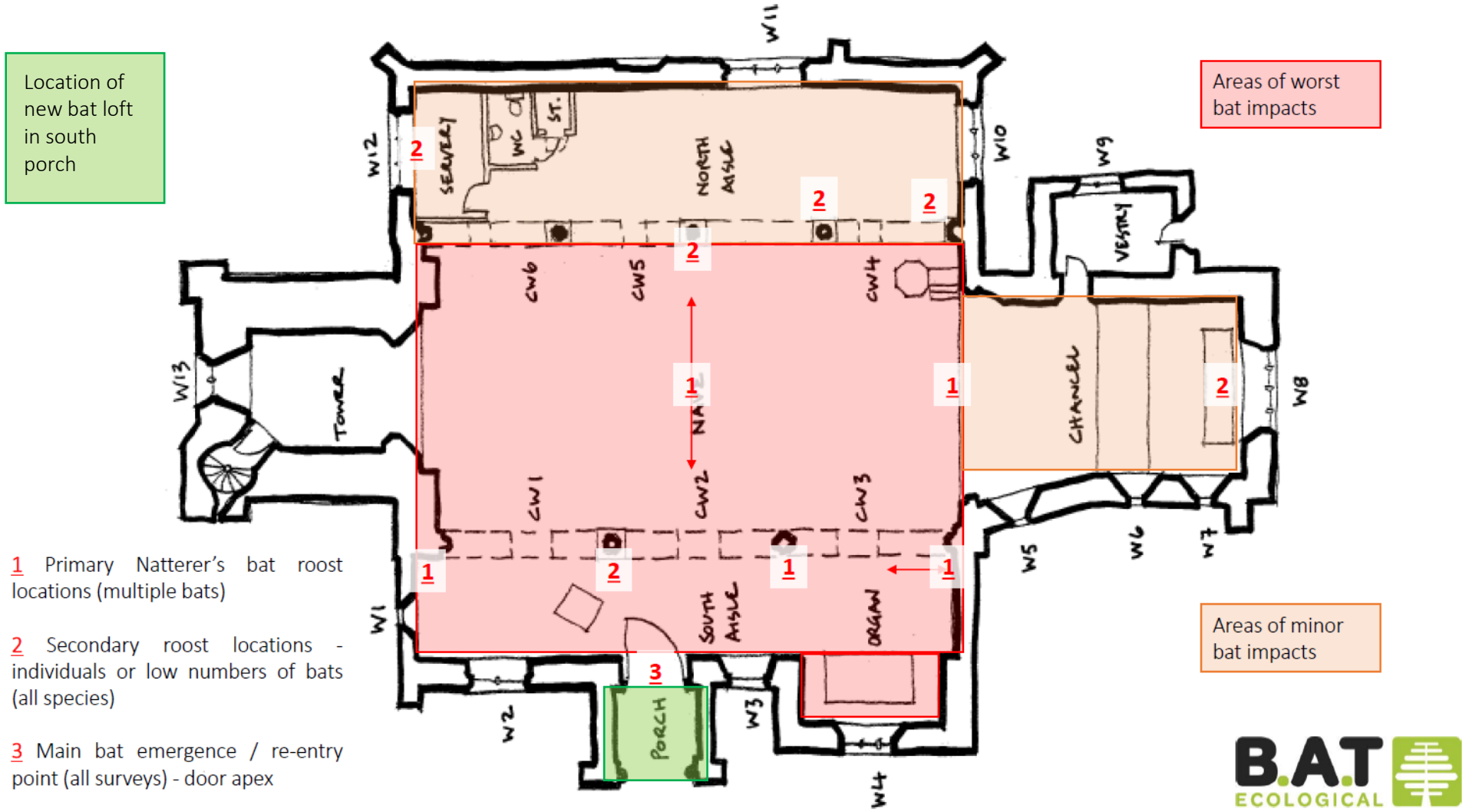
Stone, E., Zeale, M.R.K., Newson, S.E., Browne, W.J., Harris, S. and Jones, G. (2015) *Managing Conflict between Bats and Humans: the response of soprano pipistrelles (Pipistrellus pygmaeus) to exclusion from roosts in houses*. PLoS One 10(8).

Zeale, M.R., Stone, E., Bennitt, E., Newson, S., Parker, S., Haysom, K., Browne, W.J., Harris, S. and Jones, G. (2014) *Improving mitigation success where bats occupy houses and historic buildings, particularly churches.* Defra Research Project WM0322 Final Report.

Zeale, M.R.K., Bennitt, E., Newson, S.E., Packman, C.E., Browne, W.J., Harris, S., Jones, G. and Stone, E. (2016) *Mitigating the Impact of Bats in Historic Churches: the response of Natterer's bats Myotis nattereri to artificial roosts and deterrence.* PLoS ONE 11(1): e0146782.

9 Appendices

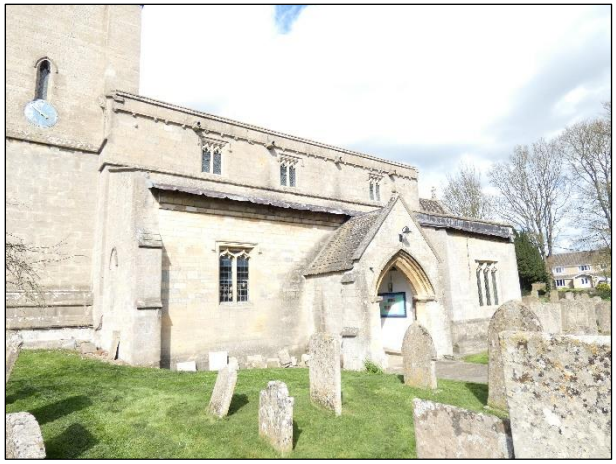
9.1 Plan of Bat Survey Results and Location of Proposed Bat Loft at St Mary's



9.2 Additional Photographs

Photograph 9.2.1: View of St Mary's from the north-east of the churchyard, facing south-west.

Photograph 9.2.2: View of the south aisle and south porch at St Mary's, with the clerestory and tower also shown.



Photograph 9.2.3: View of St Mary's from the north-west of the churchyard, facing south-east.

Photograph 9.2.4: View from the western end of the nave inside St Mary's, facing the chancel.

Photograph 9.2.5: Bat urine and droppings on the south door of St Mary's.

Photograph 9.2.6: Bat urine on a brass memorial inside St Mary's.

9.3 B.A.T. Ecological 2021 Bat Survey Methods

Daytime Bat Roost Assessments and Inspections

9.3.1 An initial bat roost assessment and inspection of the church was completed on 14 April 2021. The principle aims of this initial site visit were to assess the suitability of the various building features within the church for roosting and hibernating bats, and to undertake a search for evidence of bat presence, typically indicated by bat droppings, the remains of prey (such as discarded moth wings), characteristic staining from urine or fur, or the presence of live or dead bats. This site visit was also intended to facilitate planning of the nocturnal surveys in the summer of 2021.

9.3.2 Following on from the initial daytime assessment and inspection, the church interior was assessed again for the above evidence of bat activity prior to the three dusk emergence surveys – see below for dates – to help establish whether the areas of bat activity change through the summer.

Nocturnal Bat Surveys

9.3.3 Four nocturnal bat surveys – three dusk emergence surveys and one pre-dawn re-entry survey - were undertaken at St Mary's in the summer of 2021. The main aims of these bat activity surveys were to determine the status of the bat roosts at the church and to identify the main areas of bat activity.

9.3.4 Each emergence and re-entry survey involved at least four suitably experienced surveyors watching and listening with bat detectors for any bats exiting from or entering the church, including at least one stationed inside the church on each survey. A minimum of four high-specification infrared cameras (and accompanying infrared illuminators) were used on each survey – see Equipment section for further detail.

9.3.5 Key information regarding possible bat roosts in the church were recorded by surveyors, such as any exit or entry points, roosting locations (suspected or confirmed), any notable flight-lines, times of bat activity, and the bat species concerned.

9.3.6 The nocturnal surveys were all undertaken within the optimum period for bat activity as stated in Collins (ed.) (2016), which is May through September. They were also undertaken within each of the required periods according to Natural England BiCCL criteria (Annex B).

9.3.7 Table 9.2.1 shows the dates and timings for each of the nocturnal surveys undertaken at St Mary's in the summer of 2021. To allow for any early bat activity the emergence surveys all commenced at least 15 minutes before dusk, and extended for at least two hours post-sunset to maximise the likelihood of recording relevant bat activity. Similarly, the re-entry survey commenced over two hours before dawn and extended until beyond sunrise to allow surveyors more opportunity to observe key bat activity.

Table 9.2.1: Survey dates and timings for each of the nocturnal surveys at St Mary's in 2021.

Date	Sunset / Sunrise Time	Civil Twilight Starts / Ends	Survey Start Time	Survey End Time
4 June	21:19	22:08	20:45	23:20
5 June	04:41	22:09	02:30	04:50
5 August	20:48	21:29	20:30	23:00
1 Sept	19:51	20:27	19:35	22:00

9.3.8 The weather was conducive for bat activity on all of the nocturnal surveys as demonstrated by multiple bats flying inside the church and emerging from and / or returning to it on each visit. A heavy, unexpected downpour shortly after sunset on 5 August disrupted the count of bats emerging

from the church south door as several bats returned to the church shortly after leaving. This survey still provided useful information however, as multiple bats were observed emerging from roosts inside the church and were flying internally for an extended period.

Bat Catching

9.3.9 On the nocturnal survey on 5 June a common pipistrelle was captured by Matt Cook in a static hand-held net as it returned to the building via the aperture above the south door. This bat was captured to confirm its sex and breeding status. The captured bat was released unharmed a few minutes after capture once this information had been acquired.

9.3.10 The captured bat was an adult male common pipistrelle. From this it can reasonably be inferred that this species does not breed within the church, and instead the low number of common pipistrelle roosts within the church are likely to be male summer day roosts or potentially mating roosts.

Equipment

9.3.11 Equipment used for the daytime assessments and inspections comprised a combination of the following: high-powered Cluson Clulite CB2 and Clu-Briter 1000 lumen torches, ≥450 lumen Lenser P7 LED hand-torches, close-focusing Nikon and Pentax binoculars, a Ridgid Seesnake CA-300 endoscope, an Apple iPad and Panasonic Lumix DC-FZ82 digital camera for photographs, and telescopic ladders for access at height.

9.3.12 High-specification infrared (IR) and thermal imaging (TI) equipment was used on all nocturnal surveys to support surveyor observations. These units comprised a FLIR Scion OTM266 thermal monocular, a Canon XA-30 camera illuminated by a Dedolight DLOBML-BI-IR Redzilla infrared on-board camera LED light head (860 to 960 nm), three Canon XA-11 cameras illuminated by the Dedolight DLOBML-BI-IR or Dedolight DLOBML-IR860 iRedzilla infrared on-board camera LED light heads, and a Panasonic HC-VX980 illuminated by an Evolva T20 infrared light and an infrared floodlight.

9.3.13 Bat detecting equipment used on the nocturnal bat activity surveys comprised a combination of the following FS or Time Expansion units (with Heterodyne audio): four Elekon Batlogger M's, an Anabat Scout, a Pettersson D240x, and two Wildlife Acoustics EMT Pro's.

9.3.14 Bat call analysis software used comprised the current versions of Wildlife Acoustics' Kaleidoscope Pro, Titley's Anabat Insight, Elekon BatExplorer, or Pettersson BatSound.

9.3.15 Two-way Baofeng radios were used by the surveyors on each survey to communicate relevant survey events.

9.3.16 The static hand-held nets comprised Watkins and Doncaster butterfly nets on telescopic poles.

Personnel

9.3.17 Matt Cook BSc (Hons) MSc MCIEEM led all of the 2021 bat surveys of St Mary's. Matt is a BiCCL Registered Consultant (RC) with Natural England.

9.3.18 Matt has been a professional bat ecologist and consultant for >13 years. He has been licensed by Natural England to undertake bat surveys for >10 years and he has held the advanced (Level 2) BiCCL since its inception in 2017. In 2017 Matt also acquired the Natural England Bat Low Impact / Mitigation Class Licence. Matt has been licensed to undertake professional bat surveys to an advanced level in England (Class licence levels 3 and 4) since 2014.

9.3.19 During his time as a professional bat ecologist Matt has led innumerable bat surveys and managed many complex bat projects. He has been the Named Ecologist or RC on over 30 mitigation licenses issued by Natural England for development and renovation work affecting bat roosts of different species and conservation importance in various buildings and structures, including several with heritage listed status. Matt has also been Licensed and Accredited to catch and radio-tag bats on

several major infrastructure schemes, and to act as a Lead Ecological Clerk of Works and Accredited Agent in respect of bats on these schemes.

9.3.1 Matt is a Full Member of the Chartered Institute of Ecology and Environmental Management (CIEEM) and is therefore bound by its professional Code of Conduct.

9.3.2 For the nocturnal surveys Matt was assisted by the following experienced bat surveyors:

- James Whiteford MSc CEcol - Natural England Level 2 Class Licence (2015-14621-CLS-CLS), *c*.12 years' relevant professional experience.
- Amy Trewick BSc ACIEEM - Natural England Level 2 Class Licence (2018-37960-CLS-CLS), *c*.9 years' relevant professional experience.
- Nikki Morton MSc ACIEEM - Natural England Level 1 Class Licence (2019-43123-CLS-CLS), *c*.5 years' relevant professional experience.
- Nick Clayton – Natural England Level 2 Class Licence (2020-49905-CLS-CLS), *c.*3 years' relevant professional experience.
- Chris Almond – *c.*4 years' relevant professional experience.
- Katrina Caine - *c.1* years' relevant professional experience.

END OF REPORT