



**St Pega's Church, Peakirk**

**Final Report for Bats in Churches Project**

**October 2023**



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## Executive Summary

This report summarises the involvement of [B.A.T. Ecological](#) at St Pega's Church, Peakirk, Peterborough (hereafter referred to as 'the church') as part of the [Bats in Churches \(BiC\) Heritage Lottery Fund \(HLF\) Project](#) led by Natural England.

The central Ordnance Survey Grid Reference of the church is TF 16817 06701 and it is located [here](#). It is a Grade I listed building that dates to C11.

The church supports a soprano pipistrelle maternity colony within the chancel roof and droppings from this roost have fallen onto the reredos and altar below since at least 2013. Low numbers of brown long-eared bats also use the church interior for roosting and bats of both species occasionally fly inside the church. In November 2018 a significant amount of lead was stolen from the church roofs.

In the early summer of 2019 Matt Cook of B.A.T. Ecological was asked by the BiC Project to use his Bats in Churches Class Licence (BiCCL) to design and implement a bat mitigation strategy that would: facilitate the required repairs to the church roofs, reduce the impacts from the bats inside the church, ensure that no bats were harmed during the above, and ensure that the populations of the species concerned would be maintained at a Favourable Conservation Status (FCS) in their natural range afterwards. The BiCCL is a unique Natural England licence designed to help suitably qualified bat ecologists (Registered Consultants) manage bats and the impacts from them within places of worship.

The agreed bat management strategy principally involved the installation of a bespoke roost space – a bat compartment – for the soprano pipistrelles within the chancel roof. This compartment was initially constructed in October 2019 with modifications required in April 2021.

There were four desired outcomes in relation to the bats and renovation work at the church: the existing bat roosts will retain their ecological functionality, the FCS of the bats would be maintained, the roof re-covering and repair work would be successfully completed, and the extent of the bat droppings that accumulate within the chancel will be reduced.

Specifically in respect of the bats, thresholds were set within the BiCCL Site Registration documents in respect of the pre- and post- intervention numbers to facilitate an assessment of how successful the bat mitigation strategy had been, and whether the FCS of the local population of the species concerned had been maintained. Principally, the bat mitigation work would be deemed a success if, following the proposed works, at least 150 adult soprano pipistrelles were recorded using the maternity roost in the chancel roof in the pre-partum period of 2020 and / or 2021 as this was comparable to the baseline.

Based on these thresholds, when the initial monitoring results of 2020 were compared to the 2019 baseline counts the bat management measures were partially effective for the bats, however, continued impacts from bats on the church meant the strategy was ineffective overall at that stage.

Importantly, however, when the results of the second and final year of mandatory monitoring under the BiCCL in 2021 are compared to the 2019 baseline counts the numbers of soprano pipistrelles recorded during both the pre-partum and post-partum periods were very similar in both years. There were only 2-3 fewer bats recorded using the church in 2021, post-interventions, compared to 2019. The Church Wardens also reported that the impacts from bats inside the church were much reduced and manageable in 2021.

On the above basis it is reasonable to suggest that the BiCCL bat management strategy and BiC Project support provided to the church was successful.

The BiCCL Site Registration Period for the church ended on 30 September 2021 and summer roost counts by volunteers since then have shown declining numbers of soprano pipistrelles. The reason/s for these lower counts are currently unknown. Safe access for volunteers to monitor and clean the bat compartment was a problem highlighted by the BiCCL RC during the Site Registration Period and an agreeable way forward was not found. It is strongly recommended that as part of the legacy of the BiC Project a solution is pursued, to ensure that the bat compartment at the church remains fit for purpose.

# 1 Introduction

## 1.1 Background

- 1.1.1 This report summarises the involvement of [B.A.T. Ecological](#) at St Pega's Church, Peakirk, Peterborough (hereafter referred to as 'the church') as part of the [Bats in Churches \(BiC\) Heritage Lottery Fund \(HLF\) Project](#) led by Natural England.
- 1.1.2 The church supports a soprano pipistrelle *Pipistrellus pygmaeus* maternity colony within the chancel roof and droppings from this roost have fallen onto the reredos and altar below since at least 2013. Low numbers of brown long-eared bats *Plecotus auritus* also use the church interior for roosting and bats of both species occasionally fly inside the church.
- 1.1.3 In November 2018 a significant amount of lead was stolen from the church roofs. This included from the chancel roof although most of the lead where most of the bats roost was not taken.
- 1.1.4 In the early summer of 2019 Matt Cook of B.A.T. Ecological – see Section 8.2, Personnel - was asked by the BiC Project if he could use his Natural England Bats in Churches Class Licence (BiCCL) to design a and implement a bat mitigation strategy for the church that would:
- I. facilitate the required repairs to the roofs;
  - II. reduce the impacts from the bats inside;
  - III. ensure that no bats were harmed during the above; and,
  - IV. ensure that the population of the species concerned would be maintained at a Favourable Conservation Status (FCS) in their natural range, as required under all Natural England bat mitigation licenses - see Section 3 for more information.
- 1.1.5 The BiCCL is a unique Natural England licence designed to help suitably qualified bat ecologists (Registered Consultants) manage bats and the impacts from their activity within places of worship.
- 1.1.6 The bats at the church have been monitored by the local bat conservation group over several years and the church has previously received advice on bats from [Natural England Volunteer Bat Roost Visitors](#). Antony Mould has monitored the church and provided regular advice to the church in respect of bats since 2013. In 2013 Madelaine Ryan radio-tagged and radio-tracked some of the bats from the church as part of her Bristol University PhD studies.
- 1.1.7 The bat mitigation measures proposed by B.A.T. Ecological are described in Section 4. They were first implemented in October 2019.

## 1.2 Church Location

- 1.2.1 The central Ordnance Survey Grid Reference (OS GR) of the church is TF 16817 06701 and it is located [here](#).
- 1.2.2 The church is situated in a relatively secluded location to the west of Chestnut Close in Peakirk. Peakirk is a rural village and civil parish in the Peterborough district of Cambridgeshire. It is c.5 km to the south-east of Market Deeping and c.10 km to the north of Peterborough.

## 1.3 Church Description

- 1.3.1 The church can be seen in Photograph 1.2.1. It is a Grade I listed building that dates to C11. It consists of a nave (with clerestory), a chancel incorporating the altar, north and south aisles, and a south porch. The church has no spire but instead has a bell tower on the west end of the nave.



Photograph 1.2.1: View of the church (in 2015) from the south facing north. Photo taken by John Salmon, CC BY-SA 2.0: <https://commons.wikimedia.org/w/index.php?curid=40710741>.



- 1.3.2 More information on the church can be found on the Historic England website [here](#), and on the Peakirk Village Website [here](#).

## 1.4 Wider Habitat Description

- 1.4.1 The church is surrounded by a cemetery bordered by mature trees. Beyond the cemetery are various dwellings, some of notable size, and their established gardens. The landscape beyond the village is predominantly arable countryside, with the flooded gravel pits and associated habitats of Deeping Lakes Nature Reserve c.1.5 km to the north-east of the church.
- 1.4.2 There are several habitat types within the local area that are suitable for roosting, foraging, and commuting bats of several species, such as buildings, woodland, trees and hedgerows, and freshwater habitats. The soprano pipistrelles radio-tracked from the church in 2013 regularly commuted to / from and foraged at Deeping Lakes Nature Reserve, and this species is known to roost in buildings close to the church.

## 1.5 Lead Theft

- 1.5.1 The extent of the lead theft in November 2018 can be seen in Photographs 1.5.1 to 1.5.3. Lead was stolen from the roofs of the nave, north aisle, and most of the chancel.

Photographs 1.5.1 to 1.5.3: The extent of the lead stolen from the church roofs can be seen in the photographs below, which left to right show the nave roof (facing west), the north aisle roof, and the roof of the chancel (facing east) including the area of lead that was not stolen where most bats roost.



## 2 Baseline Bat Usage and Impacts from Bats

### 2.1 Bat Usage Pre-2019

- 2.1.1 The BiC Project provided B.A.T. Ecological with several reports and advice letters regarding bats at the church dating to 2005, principally from Natural England VBRV visits. The church has received free advice in respect of bats and the following:
- various repairs to the stonework, gutters, and south roofs (2005)
  - roof timber treatment (2006)
  - restoration of wall paintings and issues with bat droppings and urine (2013 and 2014)
  - restoration of wall paintings, issues with bat droppings and urine, and new lighting (2015)
- 2.1.2 The BiC Project also provided B.A.T. Ecological with the Light Touch Survey (LTS) report from 2017. In August 2017 Scarborough Nixon Associates undertook an LTS of the church as part of the initial phases of the BiC Project. An LTS comprises a preliminary daytime assessment of bat usage of the church, as well as consultation with church representatives regarding impacts from bats on their usage of the church. Potential solutions to any issues caused by the bats are discussed and proposed, and the church Architect is also usually invited to input on these.
- 2.1.3 In addition to the above Antony Mould was consulted regarding bat activity and impacts at the church. Antony is a local VBRV and bat group member and has over 15 years' knowledge of the bats at this church.
- 2.1.4 In summary, it is apparent from the above documents that soprano pipistrelles and brown long-eared bats have roosted at the church since at least 2005, and some of these bats have also accessed the interior since at least then. It is also apparent that most of the bat droppings voided inside the church since at least 2005 have been deposited by soprano pipistrelles on the altar and reredos, indicating that most of these bats roost within the chancel roof.
- 2.1.5 The documents also report that the main bat access / egress feature for the soprano pipistrelle roost comprises an aperture in the stonework at the south-east corner of the building, although there are other features that low numbers of bats of both species have used to access and egress the church interior, such as above the south porch door, and along the gutter fascias at the eaves of the chancel and north aisle.
- 2.1.6 Photographs 2.1.1 to 2.1.6 from a VBRV report by Antony Mould depict the bat usage of and main impacts on the church in 2013.
- 2.1.7 Evidence of bats at the church from a 2014 VBRV report by Antony Mould is provided as Appendix 9.1. Evidence of bats at the church from the 2017 LTS is provided as Appendix 9.2.
- 2.1.8 Prior to 2019 there were two documented emergence counts of the soprano pipistrelle colony at the church. The results of these were as follows:
- 24 May 2012: 126 bats
  - 28 June 2012: 130 bats
- 2.1.9 Given the autecology of the species, and the timing of these counts - when female bats have congregated in maternity colonies but any young bats are not yet weaned or volant - it is assumed that these were all adult female bats.
- 2.1.10 The number of brown long-eared bats roosting at the church is not recorded in the above documents, however, it is likely that only low numbers of these bats roosted inside the church, and it is unlikely that they used it for breeding purposes.

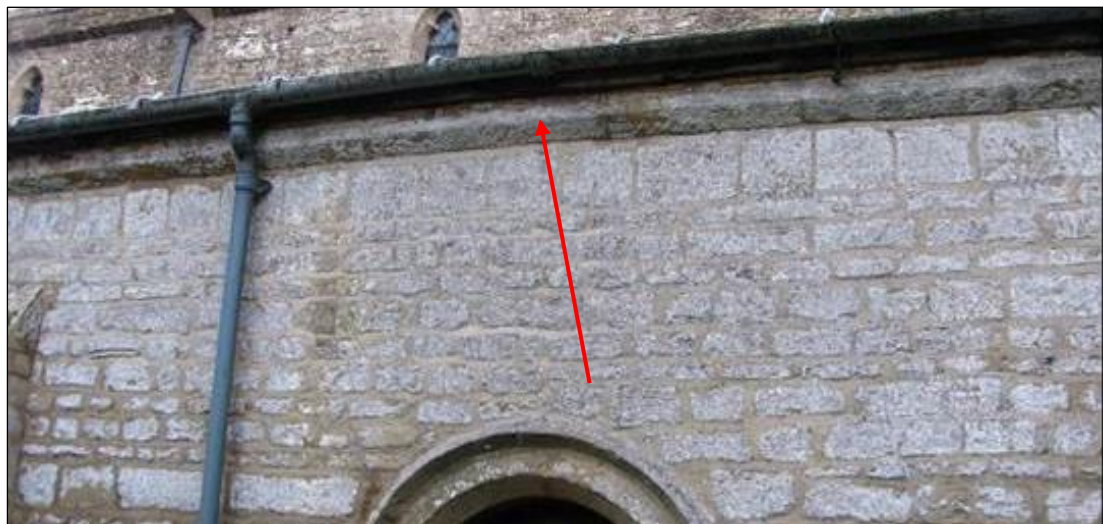
Photograph 2.1.1: The main features (on the south elevation of the chancel) used by the soprano pipistrelles to access and egress their roost in 2013 are shown by the arrows and text boxes.



Photograph 2.1.2: Close-up view of the main access / egress feature used by the soprano pipistrelles at the south-east corner of the chancel in 2013.



Photograph 2.1.3: There was an additional access / egress feature recorded in 2013 behind the gutter fascia above the door of the north aisle.





Photograph 2.1.4: It was reported in 2013 that most of the droppings inside the church fall from a gap between the end beam and wall above the window at the east end of the chancel, as shown here.



Photograph 2.1.5: A photograph of the droppings on the windowsill behind the reredos in 2013.



Photograph 2.1.6: A photograph of some of the droppings on the altar floor (near the reredos) in 2013.



## 2.2 Impacts from Bats on the Church

- 2.2.1 According to VBRV reports the church has been concerned about the impacts from bat droppings and urine on unique C14 wall paintings and church artefacts since at least 2013. Since then, the congregation have also been unhappy about the amount of bat droppings that aggregate in the altar, particularly on and behind the reredos. The church has been seeking solutions to these issues since 2013.
- 2.2.2 From 2013 to 2015 the church reported (to the VBRV, Antony Mould) that the level of bat activity inside the church increased, and that several dead and grounded bats had been found within the altar. The VBRV reports from this period concur that bat activity and impacts inside the church did seem to have increased, potentially for two reasons: (a) since an ideal bat roosting space was created within the chancel roof during previous roof renovations, and (b) since an attempt to exclude a soprano pipistrelle colony from a nearby building.
- 2.2.3 For the 2017 LTS the representative/s from the church provided their perspective on the impacts from the bats and their preferred solutions to any issues caused by them.
- 2.2.4 The LTS reported that bats have caused problems at the church for over five years and that they damage the fabric of the church as well as its monuments, and fixtures and fittings. On a scale of '1' (tolerable) to '4' (severe) the church representative/s rated the impacts from bats on these features as '3'. The LTS also reported that the church had to be cleaned daily because of bats.
- 2.2.5 The LTS reported that bats did not disrupt or stop worship, or events such as weddings, funerals, or community activities.
- 2.2.6 Overall, the LTS reported that most (although not all) of the Parochial Church Council (PCC) had a negative attitude towards the bats, and that the preferred solution at the church in respect of bats would be to prevent them flying inside, and to reduce the extent of their droppings falling from the chancel roof.

## 2.3 Bat Usage in 2019

- 2.3.1 Bat usage of and impacts on the church in 2019 were largely as they were previously reported from 2013 to 2015 i.e., a soprano pipistrelle maternity colony continued to roost within a void between the internal ceiling boards and external roof coverings of the chancel roof, and droppings from this roost fell onto the altar below, mainly onto the reredos.
- 2.3.2 Appendix 9.3 provides a plan of bat activity and the main impacts from bats on the church in 2019.
- 2.3.3 Three evening roost emergence surveys were undertaken at the church in 2019, the first of which was completed by Natural England representatives during a training visit, and the latter two were undertaken by B.A.T. Ecological. The total number of soprano pipistrelles recorded emerging from the church on these surveys was as follows:
- 21 May 2019: 12
  - 30 June 2019: 167
  - 2 August 2019: 310
- 2.3.4 There were more soprano pipistrelles (167) recorded emerging from the church on the late June pre-partum roost emergence count in 2019 compared to the one in 2012 (130), which suggests that the size of the colony may have increased during this seven-year period. The two counts may not be entirely comparable, however, because it is unclear whether the northern elevations of the church were surveyed in 2012 as they were in 2019, and so some bats may not have been counted in 2012.

- 2.3.5 On the June 2019 survey 144 soprano pipistrelles were recorded emerging from the known roost access / egress feature at the south-east corner of the church – see Photographs 2.1.1 and 2.1.2 – with 23 soprano pipistrelles recorded emerging from northern elevations: four from behind the gutter fascia along the eaves of the north aisle and 19 from the eaves of the chancel.
- 2.3.6 On the August 2019 survey 310 soprano pipistrelles were recorded emerging from the known roost access / egress feature at the south-east corner of the church, with 11 soprano pipistrelles recorded emerging from northern elevations: two from behind the gutter fascia along the eaves of the north aisle and nine from the eaves of the chancel.
- 2.3.7 Significantly more soprano pipistrelles were recorded at the church on the August 2019 count than had been recorded there before; however, because there are no results from any previous surveys within this annual post-partum period - when young bats within the colony are volant as well as adults – it is possible that similar numbers of bats may have been roosting in the church at this time of year previously but this had not been documented.
- 2.3.8 Detail of the Natural England training visit to the church on 21 May 2019 is scant. The low count of emerging bats may have been because the emergence survey undertaken as part of this training was not comprehensive or conclusive and / or it may have been because the soprano pipistrelle maternity colony had not gathered at that time.
- 2.3.9 Very few bats were recorded flying inside the church on the 2019 surveys undertaken by B.A.T. Ecological: two soprano pipistrelles were recorded flying inside on the evening emergence surveys on 30 June and 2 August, with one soprano pipistrelle recorded flying inside on the dawn re-entry survey on 3 August.
- 2.3.10 There were no brown long-eared bats recorded on the 2019 nocturnal surveys, however, it was apparent from a small aggregation of relatively 'fresh' droppings (typical of those voided by this species) on the June and August survey visits that 1-2 brown long-eared bats do occasionally roost among the roof timbers of the nave. Scattered droppings typical of this species elsewhere indicated that they also flew inside the church sometimes.

## 3 Relevant Wildlife Legislation

### 3.1 General

3.1.1 The following is intended only as a guide to the relevant wildlife legislation and planning policy. This report does not purport to give legal advice and the relevant Acts and policies should be referred to directly for the precise wording.

### 3.2 Legislation - Bats

3.2.1 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.

3.2.2 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.

3.2.3 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.

3.2.4 *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.

3.2.5 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.

3.2.6 In determining whether to grant any licence for an activity affecting a legally protected species 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 (i.e., Natural England) 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”*.

3.2.7 These three tests are often referred to as the ‘purpose test’, the ‘NSA test’ and the ‘FCS test’ respectively.

3.2.8 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 may continue to be referred to as EPS despite the UK’s withdrawal from the EU.

## 4 Bat Mitigation

### 4.1 Strategy Rationale

- 4.1.1 The bat management option considered most likely to be successful and cost-effective in reducing the impacts from the bats inside the church, while retaining the maternity roost, comprised the creation of a bespoke maternity roost space – a bat compartment – within the chancel roof.
- 4.1.2 The bat compartment would be installed where the existing roost is located outside of the bat summer bat breeding period, and the existing main bat access / egress feature would be incorporated. The bats would be able to enter the building as previously, however, their roost space (in the void between the chancel ceiling and sarking) would be sealed and they would not be able to move beyond this to other areas of the roof space or inside the church.
- 4.1.3 The discreet compartment would be appropriately sized, aerated, and warm enough for several hundred breeding soprano pipistrelles. It was also designed so that droppings would not fall from it, and an access hatch would allow periodic inspections and cleaning.
- 4.1.4 The concept of the bat compartment is provided in Appendix 9.4. This was agreed with the Architect responsible for the re-roofing (William Assheton of GSS Architecture), the church, and with the BiCCL Project. It was also discussed with Natural England in July 2019, prior to the submission of the BiCCL Site Registration documents, and there was agreement in principle on this approach.
- 4.1.5 This concept has been referred to as 'boxing-in' at churches where it has been used before. Several studies had previously demonstrated and proposed this approach as a potentially favourable solution to reduce the impacts of soprano pipistrelles and Natterer's bats *Myotis nattereri* inside churches. Packman *et al.* (2015, 2016), for example, found that 'boxing-in' roosting areas around bats' entry points into a church provided a promising solution whereby roosting spaces were retained while the bats were prevented from accessing the rest of the church interior, and therefore the deposition of droppings and urine inside was reduced.
- 4.1.6 Similarly, Zeale *et al.* (2016) recorded the frequent use of a bespoke bat compartment that resulted in fewer Natterer's bats roosting within a church, and therefore a considerable associated reduction in the extents of deposited droppings and urine. Indeed Zeale *et al.* (2016) concluded that "*encompassing major access points into a church within bespoke boxes fitted internally within churches is likely to prove more useful [than installing bat boxes], as bats entering churches will enter the boxes directly. This approach will be useful in allowing bats to continue to roost within the fabric of the building while preventing access to the internal spaces, where conflict between bats and humans is typically most acute*".

### 4.2 Installation of Bat Compartment (2019)

- 4.2.1 Faculty permission for the bat compartment and re-roofing of the church was provided by the Diocese of Peterborough Diocesan Advisory Committee on 19 September 2019.
- 4.2.2 The BiCCL Site Registration documents were subsequently submitted by the RC (Matt Cook – see Section 5.5, Personnel) to Natural England on 23 September 2019 and Confirmation of Site Registration was received on 26 September 2019 (ref B32RC004-4A), which allowed impacts on the bat roosts subject to the proposed mitigation / compensation measures. Prior consultation with Natural England (Dr Madelaine Ryan) had facilitated speedy processing of the licence documents.
- 4.2.3 Three bat boxes were installed on trees in the cemetery prior to any work on the roofs commencing, to re-home any uncovered bats but also to provide nearby additional long-term roost habitat.

- 4.2.4 The work to install the bat compartment and re-roof the church was undertaken by [CEL Group](#). The lead that remained on the chancel roof was removed week commencing 30 September 2019 with the RC in attendance. Six soprano pipistrelles were uncovered during this initial phase of the work. These bats were re-homed by the RC to the bat boxes.
- 4.2.5 Installation of the bat compartment commenced following the removal of the lead. Progress was monitored by the RC and Architect. The bat compartment was completed by CEL week commencing 21 October 2019.
- 4.2.6 Photographs of the bat compartment are shown in Photographs 4.2.1 and 4.2.2.

Photograph 4.2.1: View of the area where the bat compartment is located within the chancel roof, as well as the access hatch. The red arrow shows the main roost access / egress feature.



Photograph 4.2.2: View inside the access hatch, showing the internal space around it available to the soprano pipistrelle maternity colony.



### 4.3 Remedial Work on Bat Compartment (2021)

- 4.3.1 Adjustments to the bat compartment were required in April 2021 to ensure that it was fit-for-purpose. These adjustments were required because some bats continued to access the church

interior in 2020, but moreover lots of bat droppings continued to fall from the chancel roof on to the altar and reredos, along with debris from the new roof – see Photograph 4.3.1.

4.3.2 The church also reported that a white dust was falling from the chancel roof onto the chancel floor and furniture in 2020, and queried whether this was being disturbed by bats moving inside the new roost space.

4.3.3 Overall, therefore, although the bats had returned to the church (see Section 6) the main issues caused by them had not been resolved by 2020.

Photograph 4.3.1: View of the debris on the windowsill behind the reredos in August 2020. This includes some bat droppings.



4.3.4 The remedial work in April 2021 was undertaken by CEL again. It intended to fill the space between the easternmost roof timber and the chancel east wall – see Photograph 2.1.4 - where the droppings and debris fell from and where bats could find their way into the church.



## 5 Methods and Personnel

### 5.1 General

- 5.1.1 The surveys and monitoring undertaken at the church by B.A.T. Ecological from 2019 to 2021 were completed in accordance with best practice guidance in respect of professional bat surveys – see Collins (ed.) 2016.
- 5.1.2 The baseline surveys undertaken at the church in 2019 aligned with the minimum survey effort required to enable the registration of a place of worship for the BiCCL (WML-CL32) – see Appendix 9.5.
- 5.1.3 The monitoring effort undertaken at the church by B.A.T. Ecological in 2020 and 2021 reflected the minimum requirement for monitoring under the BiCCL as set out by Natural England in the 2018 BiC Project tender documents (ITT Annex 2).
- 5.1.4 Information on personnel and equipment is provided in Sections 5.5 and 5.6 respectively.

### 5.2 2019 Baseline Surveys

- 5.2.1 Baseline bat surveys undertaken in 2019 were as follows:
- 21 May – Natural England training followed by an evening emergence survey.
  - 30 June - daytime roost inspection / assessment followed by an evening emergence survey undertaken by B.A.T. Ecological.
  - 2/3 August - daytime roost inspection / assessment followed by a 'back-to-back' evening emergence survey and pre-dawn re-entry survey undertaken by B.A.T. Ecological.

### 5.3 2020-21 Professional Monitoring

- 5.3.1 Following completion of the roofing works four monitoring visits were required in accordance with the BiCCL Site Registration documents as follows:
- A daytime assessment of the mitigation followed by a pre-partum roost emergence count in mid-late June 2020.
  - A daytime assessment of the mitigation followed by a post-partum roost emergence count in early August 2020.
  - A daytime assessment of the mitigation followed by a pre-partum roost emergence count in mid-late June 2021.
  - A daytime assessment of the mitigation followed by a post-partum roost emergence count in early August 2021.
- 5.3.2 These roost counts were timed to align with the most recent (2019) pre- and post- partum baseline surveys and roost counts, to hopefully provide a framework for assessing the success or otherwise of the measures implemented under the BiCCL.
- 5.3.3 The monitoring in 2021 also included an assessment of the amount of bat droppings accumulating inside the bat compartment via a Mobile Elevated Working Platform (MEWP).
- 5.3.4 In addition to the above, in consultation with the Licensee (Sheila Lever) and other church representatives, monitoring would also record if the licensed activities have led to a reduction of the physical and social impacts caused by bats.

## 5.4 2022-23 Voluntary Monitoring

- 5.4.1 The BiCCL Site Registration period for the church ended on 30 September 2021. Since then, however, Antony Mould, has visited the church on occasion to check that the bat mitigation is still functioning and to provide any other feedback.
- 5.4.2 Antony Mould also undertook two NBMP roost counts at the church in June of 2022 and 2023, with an additional voluntary roost count undertaken on 21 July 2023.

## 5.5 Personnel

- 5.5.1 All professional bat surveys and monitoring undertaken at the church by B.A.T. Ecological have been led by Matt Cook BSc (Hons) MSc MCIEEM, who has authored this document and who was the BiCCL RC for the church until 30 September 2021.
- 5.5.2 Matt has been a BiCCL RC with Natural England since 2017 – licence reference B32RC004. He has been the BiCCL RC for two other BiC Project churches and is currently the RC for a further non-project church. He has also managed the surveys and provided the bat mitigation plan for a further three BiC Project churches.
- 5.5.3 Matt has been a professional ecologist for >15 years and has been licensed by Natural England to undertake bat surveys since 2011, and to an advanced level since 2013. Since 2013 Matt has been the Named Ecologist or RC on various bat mitigation licences covering a range of bat species and roost types.
- 5.5.1 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](#).

## 5.6 Equipment

- 5.6.1 Equipment used by B.A.T. Ecological for daytime surveillance and monitoring comprised a 1000 lumen Cluson Clu-Briter torch and / or a 450 lumen Lenser P7 LED hand-torch, close-focusing German Precision Optics or Pentax binoculars, a Ridgid Seesnake CA-300 inspection camera, a Panasonic Lumix DC-FZ82 digital camera or Apple iPad for photographs, and ladders for access at height.
- 5.6.2 Multiple Night Vision Aids (NVAs) were used by B.A.T. Ecological on all surveys or monitoring visits. These have been critical to survey effectiveness. NVAs comprised high-specification infra-red (IR) or thermal imaging (TI) equipment capable of recording, namely: a FLIR Scion OTM266 TI monocular, Canon XA-30 or XA-11 IR capable camcorders, and a Panasonic HC-VX980 IR capable camcorder. Where these units were watched live they were paired with Lilliput A7s 1920x1200 HD 4K HDMI capable field monitors.
- 5.6.3 Infrared illumination was provided alongside the camcorders by Dedolight DLOBML-BI-IR iRedzilla on-board LED light heads (860 to 960 nm) and generic multi-LED 850 nm floodlights.
- 5.6.4 Bat detecting equipment used by B.A.T. Ecological comprised Elekon Batlogger M or Anabat Scout auto-triggering Full Spectrum (FS) units, with an Anabat Swift auto-triggering FS unit deployed remotely inside the church in 2021.
- 5.6.5 Bat call analysis software used by B.A.T. Ecological comprised the current versions of Wildlife Acoustics' Kaleidoscope Pro, Titley's Anabat Insight, Elekon BatExplorer, and / or Pettersson BatSound.

## 6 Bat Monitoring Results

- 6.1.1. Table 6.1.1 provides the numbers of soprano pipistrelles recorded emerging from the church on the 2019 pre-intervention baseline nocturnal surveys, and on the post-intervention nocturnal monitoring surveys undertaken since 2020.
- 6.1.2. Monitoring in 2020 and 2021 was mandatory under the BiCCL site registration documents for the church. The mandatory visits comprised one professional emergence survey / roost count of the entire church in the pre-partum period (late May to late June) and one in the post-partum period (late July to mid-August). The timing of the two mandatory monitoring surveys aimed to replicate the timing of the 2019 baseline surveys as far as was reasonably practicable. The mandatory monitoring in 2020 and 2021 was completed by B.A.T Ecological.
- 6.1.3. Monitoring since 2021 has also involved voluntary counts of the number of soprano pipistrelles exiting the main roost access / egress feature at the south-east corner of the church for the BCT National Bat Monitoring Programme. These were arranged with and undertaken by Antony Mould each June.

Table 6.1.1: Numbers of soprano pipistrelles recorded emerging from the church on the 2019 pre-intervention baseline nocturnal surveys versus the post-intervention nocturnal monitoring surveys.

Pre-Intervention 2019	Post-Intervention			
	2020	2021	2022	2023
-	-	2 June: 44	-	-
30 June: 167	14 June: 106	11 June*: 117 25 June*: 165	9 June*: 102 22 June*: 89	9 June*: 72 25 June*: 24
2 August: 310	12 August: 105	27 July: 307	-	21 July*: 39
* Indicates volunteer NBMP counts of main roost emergence feature only				

- 6.1.4. When the pre-partum baseline count is compared to the first pre-partum count following the interventions there were 63 fewer bats (-37%) in the roost on 14 June 2020 (post-intervention) compared to on 30 June 2019 (pre-intervention).
- 6.1.5. When the first post-partum baseline count is compared to the first post-partum count following the interventions there were 205 fewer bats (-66%) in the roost on 12 August 2020 (post-intervention) compared to on 2 August 2019 (pre-intervention).
- 6.1.6. When the baseline counts are compared to the counts in the second year of monitoring (2021) the numbers of soprano pipistrelles recorded during the pre-partum and post-partum periods are very similar in both years: 167 bats were recorded on 30 June 2019 versus 165 on 25 June 2021 (-2%), and 310 bats were recorded on 2 August 2019 versus 307 on 27 July 2021 (-1%).
- 6.1.7. Since 2022 the annual NBMP counts in June have recorded fewer soprano pipistrelles emerging from the main roost access / egress feature than during most other pre-partum counts, and the counts in 2023 were lower than any previously.
- 6.1.8. In addition to the above, monitoring in 2020 and 2021 showed that the number of bats recorded flying inside the church remained low, including during monitoring visits within the post-partum period when juvenile bats sometimes explore or accidentally frequent the interior of buildings.
- 6.1.9. The monitoring in 2021 included an assessment of the amount of bat droppings that had accumulated inside the bat compartment since late 2019 via a MEWP. This revealed that ample space remained inside the roost compartment for bats and droppings, as evidenced by Photograph 6.1.1.

Photograph 6.1.1: Indicative view of the amount of bat droppings inside the bat compartment in December 2021, after two summers of usage by the maternity colony.



- 6.1.10. Monitoring in 2021, following the remediations of the bat compartment in April of that year, showed that the number of bat droppings falling from the chancel roof onto the altar and the reredos had now significantly reduced to a level that the church found acceptable and manageable. There was also very little dust falling from the chancel roof by that time.
- 6.1.11. There was no evidence of bats inside the three bat boxes on the trees in the church cemetery in 2020 or 2021.



## 7 Evaluation

- 7.1.1. Four summer roost counts undertaken at St Pega's prior to the licensed work identified that the maternity roost within the church supports approximately 125 to 170 adult soprano pipistrelles in the early summer, prepartum, and once juveniles are volant the number of bats in the roost can peak at over 300, prior to the roost dispersing.
- 7.1.2. There were four desired outcomes in relation to the bats and renovation work at the church: the existing bat roosts would retain their ecological functionality, the FCS of the bats would be maintained, the roof re-covering and repair work would be successfully completed, and the extent of the bat droppings that accumulate within the chancel would be reduced.
- 7.1.3. Specifically in respect of the bats, thresholds were set within the BiCCL Site Registration documents for the pre- and post- intervention numbers, to facilitate an assessment of how successful the bat mitigation strategy had been, and whether the FCS of the local population of the species concerned had been maintained.
- 7.1.4. The bat mitigation work at the church would be deemed a success if, following the proposed works, at least 150 adult soprano pipistrelles were recorded using the maternity roost in the chancel roof in the pre-partum period of 2020 and / or 2021. This is comparable to the baseline pre-partum count of 163 adult soprano pipistrelles in June 2019.
- 7.1.5. Beyond the above, the proposed mitigation would be considered partially effective if over 100 soprano pipistrelles returned to use the maternity roost in the prepartum period of 2020 and / or 2021. This figure would represent a decline in the roost size of up to 40%, however, at least some of this could be attributed to natural changes within the colony, such as bats not surviving the winter months and / or a potential increase in the bats' usage of alternative maternity roosts in the summer, which the species is known to do (e.g., Zeale *et al.*, 2014).
- 7.1.6. Following on, the bat mitigation measures at the church would be considered largely unsuccessful if fewer than 50 adult bats were using the roost in June 2020 and / or 2021. Such an outcome would represent an approximate 70% decline in usage of the roost.
- 7.1.7. This latter scenario would not necessarily result in an adverse effect on the FCS of the local population of soprano pipistrelles because the bats are likely to have access to alternative maternity roost sites (Zeale *et al.*, 2014) and day roost sites (Ryan, 2016), and they will continue to have access to the foraging habitats that they are known to use locally (Ryan, 2016). However, this would be an unsatisfactory outcome given the aims of the BiC Project and such an outcome may trigger investigations to understand more about alternative roost sites (e.g., by radio-tracking).
- 7.1.8. Based on the above thresholds, when the initial monitoring results of 2020 were compared to the 2019 baseline counts – see Section 6 - the bat management measures at the church were partially effective for the bats, however, given the continued impacts from bats on the church – see Section 4.3 - they were ineffective overall.
- 7.1.9. Importantly, however, when the results of the second and final year of mandatory monitoring in 2021 are compared to the 2019 baseline counts the numbers of soprano pipistrelles recorded during both the pre-partum and post-partum periods were very similar in both years, with only 2-3 fewer bats recorded using the church in 2021 compared to 2019.
- 7.1.10. In summer 2021 the church representative/s also reported that the impacts from bats inside the church were now much reduced and manageable.
- 7.1.11. Alongside the above, success was also to be measured in terms of harm to, or the death of, individual bats during the works conducted under the BiCCL and in this regard the proposed mitigation may be considered unsuccessful if such an event occurred, but it did not.

- 7.1.12. On the above basis it is reasonable to suggest that the BiCCL bat management strategy and BiC Project support provided to the church was successful.
- 7.1.13. The BiCCL Site Registration Period for the church ended on 30 September 2021 and summer roost counts by volunteers since then have shown declining numbers of soprano pipistrelles – see Section 6. The reason/s for these lower counts are currently unknown.
- 7.1.14. Safe access for volunteers to monitor and clean the bat compartment was a problem repeatedly highlighted by the BiCCL RC during the Site Registration period and an agreeable way forward was not found. It is strongly recommended that as part of the legacy of the BiC Project a solution is pursued, to ensure that the bat compartment at the church remains fit for purpose.
- 7.1.15. B.A.T. Ecological and the BiC Project would like to thank Antony Mould for his voluntary input to the bat surveys, mitigation, and monitoring, and to Sheila Lever and Pauline Cooke (Church Wardens) for their patience with the bats and help onsite.

## 8 References

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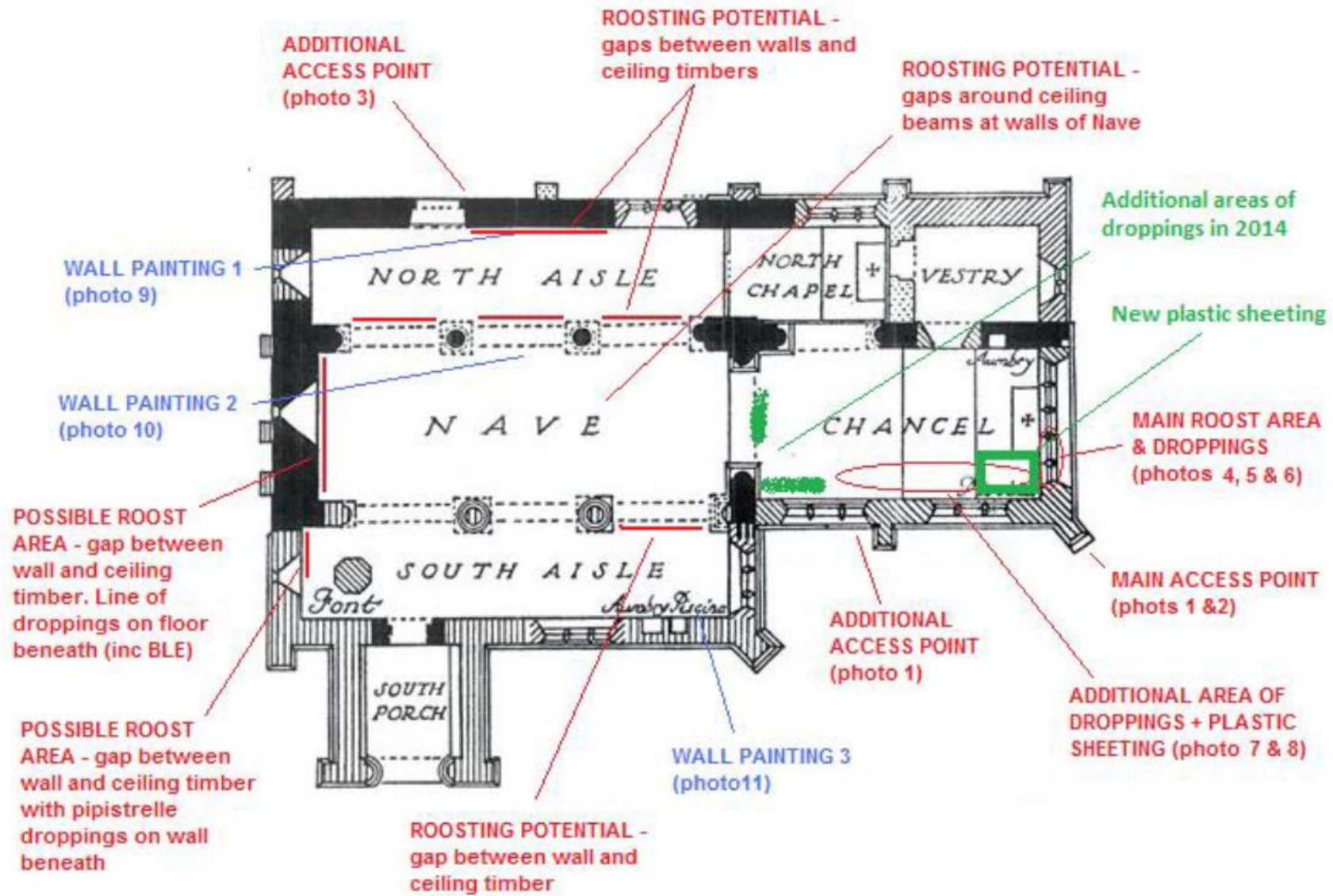
Zeale, M.R., Stone, E., Bennitt, E., Newson, S., Parker, S., Haysom, K., Browne, W.J., Harris, S. and Jones, G. (2014) *Improving mitigation success where bats occupy houses and historic buildings, particularly churches*. Defra Research Project WM0322 Final Report.

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**

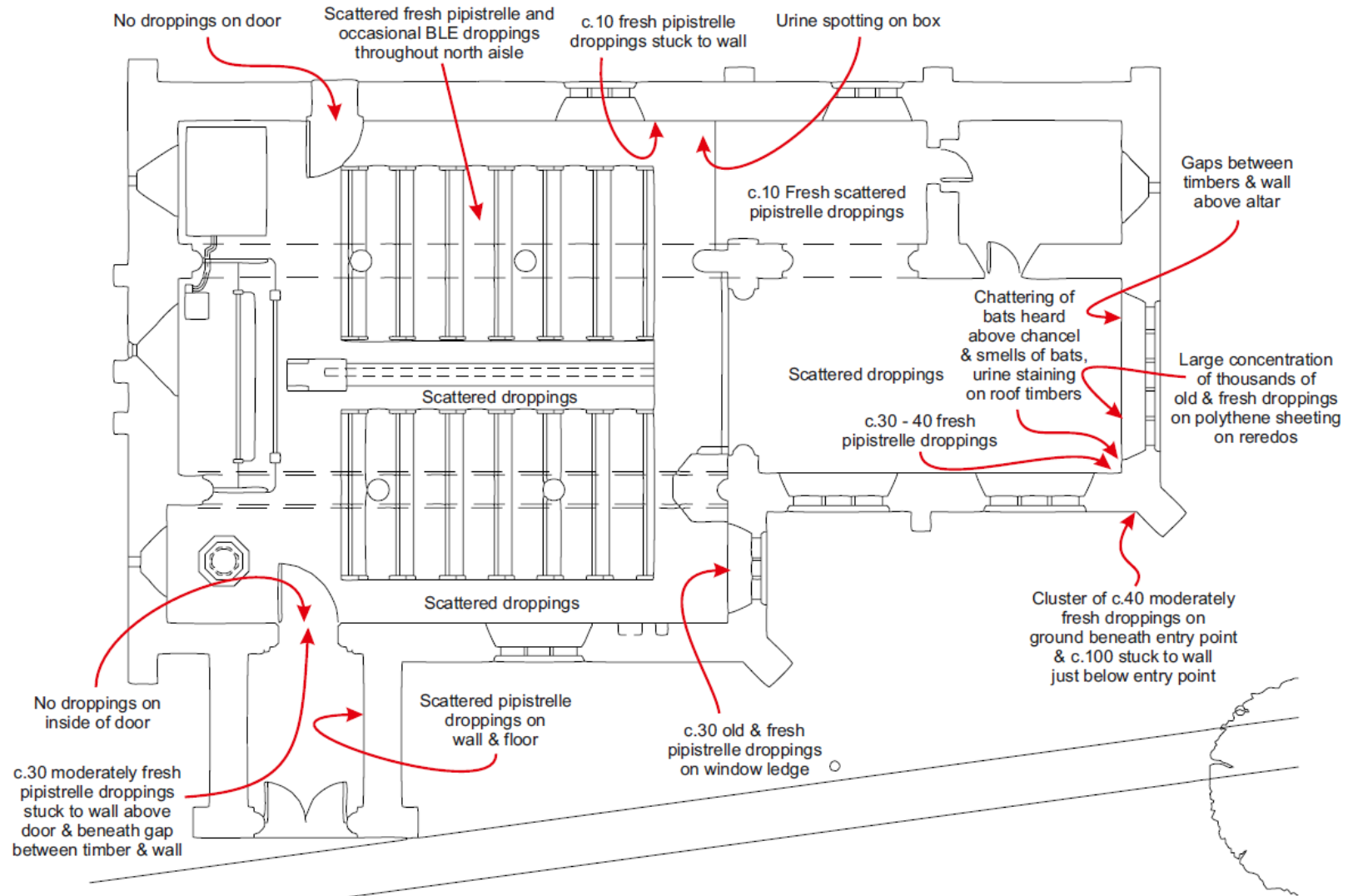


### 9.1 Evidence of Bats at St Pega's Church in 2014



From a VBRV roost report form provided by Antony Mould

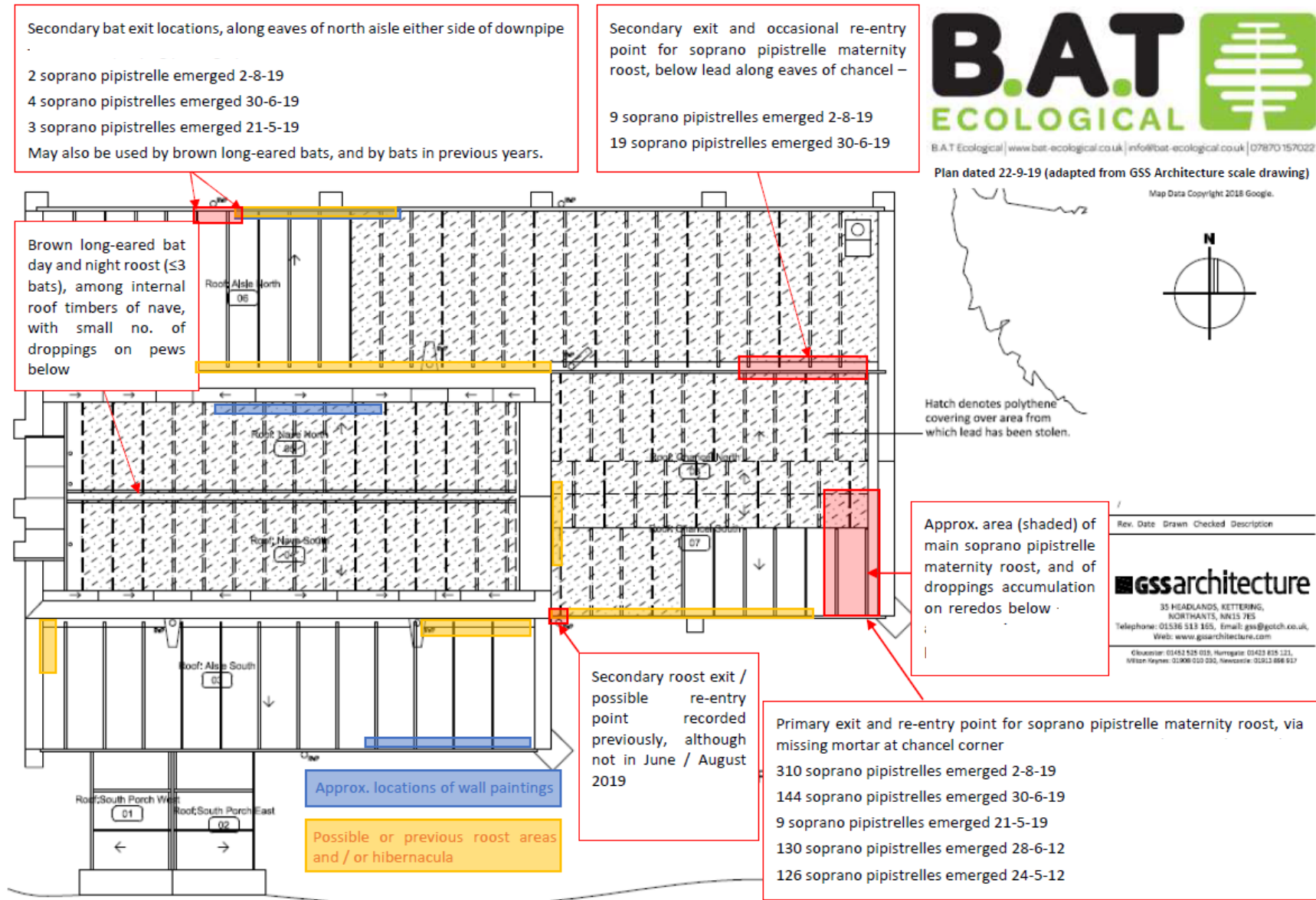
## 9.2 Evidence of Bats at St Pega's Church in 2017



Church regularly cleaned especially for weddings etc can be everyday in summer

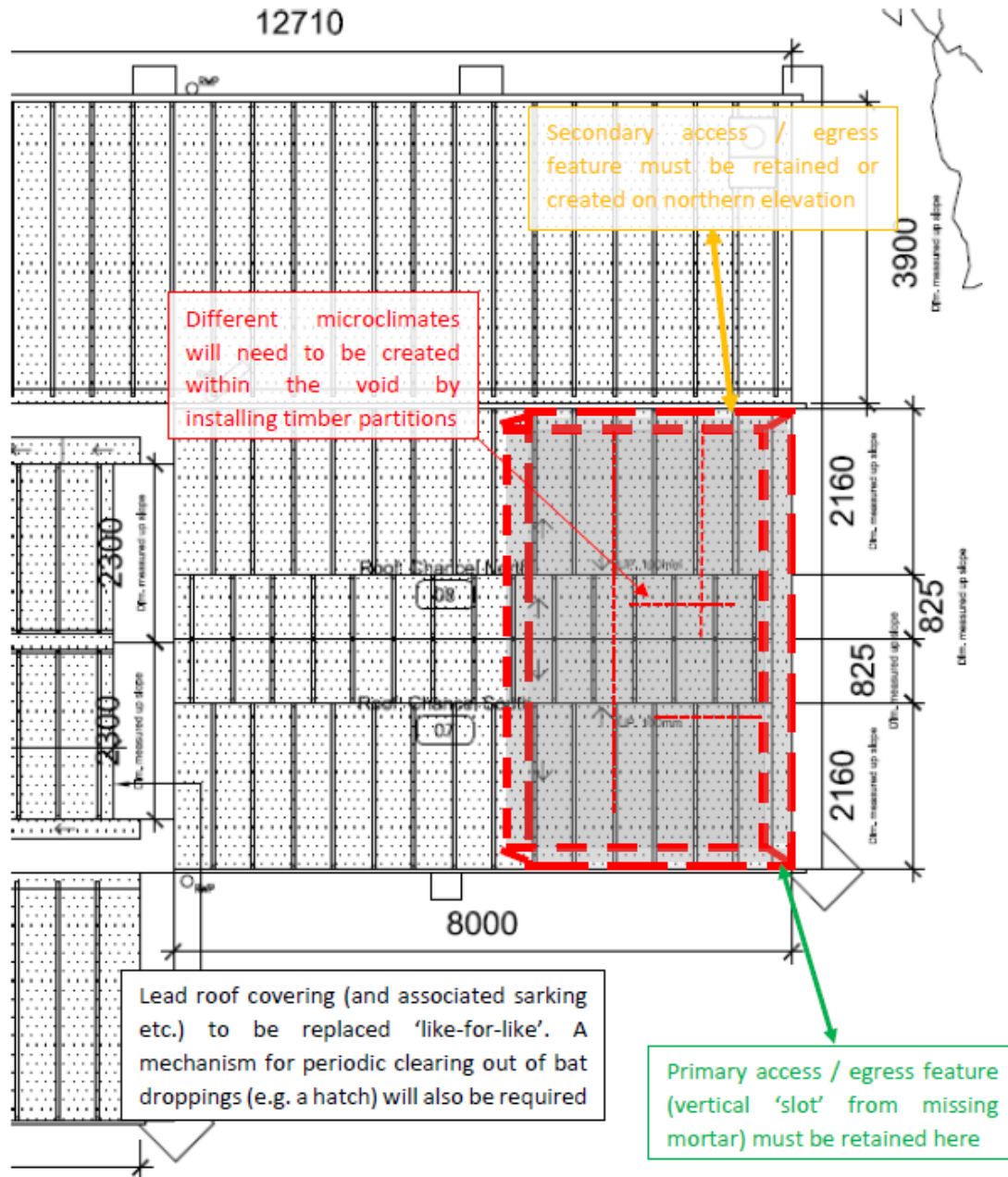
From the 2017 LTS undertaken by Scarborough Nixon Associates

### 9.3 Bat Activity at St Pega's Church in 2019



9.4 2019 Bat Mitigation Drawing #1

St Pega Church, Peakirk – Sketch of Proposed Bat Roost Provision in Chancel Roof – 4 July 2019



Prepared by: Matt Cook BSc (Hons) MSc MCIEEM, Natural England Bats in Churches Class Licence Reference RC004



## 9.5 Natural England BiCCL Annex B – Minimum Survey Standards for Site Registration

The following survey standard describes the minimum survey effort required to enable registration of a place of worship for the BiCCL (WML-CL32) in 2020.

1. High quality survey data, accurately reflecting the usage of the building by bats, must be presented representing at least one full active season.
2. Places of worship will vary considerably in size and structural complexity so methods, techniques and frequency of surveys used must be appropriate and adjusted to suit each situation. Survey methods chosen should maximise collection of information. Surveys should continue until the relevant level of information has been collected.
3. At least four surveys, comprising three dusk and one pre-dawn survey, and one thorough physical inspection, must have been completed for each place of worship applying to be registered in the season prior to starting licensable works. Larger and more complex buildings might require a greater survey effort both in terms of numbers of surveys and numbers of surveyors involved.
4. Surveys should be undertaken in the optimum period for bats (as stated in the BCT Good Practice Guidelines) between May-August. At least one dusk activity survey must be presented from each of the following periods and each survey must be conducted at least two weeks apart:
  - a. May to mid-June;
  - b. Mid-June to end July; and
  - c. August to mid-September.
5. Survey data must be presented from the most recent active season prior to the start of works. If licensed works are planned to begin post maternity period and before the following spring, and a full suite of surveys was conducted the previous year, an update survey will be required during early or mid-maternity period in the year that work is to commence.
6. If surveys meeting the requirements were not undertaken in the active season preceding the intended start of works, but were undertaken within 3 years, a reduced survey effort will be acceptable. In these cases a minimum of two update surveys (one of which must be a dusk survey) will be required. Update surveys should be undertaken between May and August but both may be undertaken earlier in the year i.e. pre or during the maternity period, to allow work to take place immediately prior to or after the maternity season.
7. The mandatory pre-dawn survey must be conducted during the early survey period between May and mid-June. It may be timed to take place directly after an emergence survey.
8. A surveyor must be present inside the building during a pre-dawn survey to identify internal access points.
9. If during the update surveys it is identified that usage of the building by bats has changed significantly, any pre-agreed approach to mitigation must be re-appraised.
10. All major entry and exit points for bats on the exterior of the building *must* be identified. Entry and exit points on the interior of the building *should* be identified.
11. Surveys must identify species of bat and approximate numbers of bats of each species using the building. If breeding roosts are present, this will include a clear understanding of where nursery clusters form and how these and all other roost sites within the building are accessed.
12. Special attention should be given to establishing if access to the interior void of the building is required to access roosting locations or if these locations can be accessed by bats directly from the exterior.
13. Where bats are present in the active season, it should usually be assumed that they also use the building or structure for hibernation, unless the Consultant provides evidence or reasoning to the contrary.

**END OF REPORT**

