

THE CHURCH OF ALL SAINTS, THORNHAM, NORFOLK



BAT SURVEY AND MITIGATION PROPOSALS IN RESPECT OF THE HLF BATS IN CHURCHES PROJECT

2ND DRAFT

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ALL SAINTS CHURCH – THORNHAM, NORFOLK

BAT SURVEY AND MITIGATION PROPOSALS IN RESPECT OF THE HLF BATS IN CHURCHES PROJECT

1.0 INTRODUCTION

1.1 Philip Parker Associates have been instructed to undertake bat surveys and provide advice as to bat mitigation/management options at the Church of All Saints, Thornham as part of the Heritage Lottery project (HLF). This report provides details of the surveys undertaken and mitigation options to be considered.

1.2 The church of All Saints, Thornham, is located at OS Map grid reference; TF 73368 43441.



Figure 1 – Location plan
 Crown Copyright and database rights 2015
 Ordnance Survey



Figure 2 - Aerial photograph
 Imagery © 2015 GeoEye, Getmapping plc,
 Infoterra Ltd & Bluesky

1.3 History of bat use at Thornham Church

Philip Parker Associates undertook survey work at the church in 2014 and 2015 in respect of proposed repair works to the south aisle, north aisle and the parvise. The results of the surveys are presented below – note that it was not possible to positively identify every pipistrelle emerging from the missing pane in the north-west clerestory window (figure 21), but it is assumed that almost all were soprano pipistrelles.

Table 1 A summary of previous surveys undertaken at the Church of All Saints, Thornham

Date	Emergence/re-entry	Coverage	Species	Number and location
June 2014	Emergence	North-west clerestory window	Common pipistrelle	Present in nave
			Soprano pipistrelle	203
			Brown long eared	2 (chancel)

Date	Emergence/re-entry	Coverage	Species	Number and location
July 2014	Emergence	North-west clerestory window	Common pipistrelle	Present in nave
			Soprano pipistrelle	230
			Brown long eared	2 (chancel)
10 th June 2015	Emergence	Whole church	Common pipistrelle	9 emerged from over the south-west window 2 emerged from the south-east corner window
			Soprano pipistrelle	148 emerged from the north-west clerestory window 1 emerged from over the south-west window
			Brown long eared	2 recorded in the chancel
10 th July 2015	Emergence	Whole church	Common pipistrelle	23 emerged from over the south-west window
			Soprano pipistrelle	3 emerged from over the south-west window 214 emerged from the north-west clerestory window
			Brown long eared	6 recorded in the chancel
10 th August 2015	Emergence (Bat night)	North-west clerestory window	Soprano pipistrelle	162 emerged from the north-west clerestory window
19 th August 2015	Emergence	Whole church	Common pipistrelle	17 emerged from over the south-west window
			Soprano pipistrelle	5 emerged from over the south-west window 146 emerged from the north-west clerestory window 2 re-entered via the north-west clerestory window
			Brown long eared	3 recorded in the chancel
21 st September 2015	Emergence	Whole church	Common pipistrelle	1 emerged from over the south-west window
			Soprano pipistrelle	73 emerged from the north-west clerestory window and 13 re-entered
			Brown long eared	4 were recorded in the chancel

1.4 **Previous bat enhancement works at the church**

Bat enhancement works were carried out as part of the repair works to the south aisle in 2016. 6 no Kent bat boxes were erected on 2 trees to the east of the church and 2 no soffit boxes were created by attaching oak boards to the underside of the exposed rafters on the south aisle (see Fig 30).

1.5 **Historical significance of the church**

A Statement of Significance of the Church was prepared by Richard Hasley following a visit on the 18th September 2019.

1.6 All Saints Thornham is described as a major substantially medieval church on an ancient site that has **high archaeological, architectural, and historic significance**. The building contains three well-preserved fifteenth century furnishings: the dado of the chancel screen, the partly painted font and many interesting bench ends. The 1905 Arts & Crafts iron lectern is a fine example of the local Thornham Art Ironworks. The church therefore has **high artistic significance**. As the centrepiece of the Thornham Conservation Area and visible from the former port that created the wealth of this village, it also has **moderate-high townscape significance**.

- The **font, chancel screen dado and bench ends** are of **high significance**
- The **1905 lectern, 1631 pulpit and Miller family brass inscriptions** are of **moderate-high significance**
- The **chancel furniture and tiled floor, 1837 Royal Arms, marble brass indents and black marble ledger stones** are of **moderate significance**
- The **nave pews, 1905 organ and fragmentary black letter painted panel** are of **low-moderate significance**.

1.7 Photographs of various features and damage by bats can be found in appendix A.

1.8 **Recommendations of the light Touch Survey**

The Light Touch Survey was undertaken on the 21st August 2017 by Philip Parker Associates. Using on site observations and data from previous surveys, this confirmed the presence of a soprano pipistrelle maternity roost in the church plus the presence of smaller numbers of common pipistrelle. Following discussions with the PCC as part of the Light Touch survey, an option for mitigating the impact of the bats on the church was put forwards for consideration during the Delivery Stage of the project, as follows:

- Installation of a bat box under the slope of the south aisle roof (close to the previously identified access points) and connected to the access once evidence of use has been proven.

2.0 2019 SURVEY METHODOLOGY

2.1 General

Surveys during 2019 have been carried out at the church by a team of experienced surveyors, on each occasion led by Philip Parker. Surveys were carried out as far as possible following the guidelines given in the Bats in Churches Class Licence.

2.2 This sets out the minimum number and timing of surveys required, as follows:

2.3 At least one dusk survey should be carried out in each of the survey periods identified below with each survey completed at least two weeks apart. In addition, one dawn survey should be carried out in the first period – this can be carried out immediately after the emergence survey.

- Survey 1 May to mid-June
- Survey 2 Mid-June to end July
- Survey 3 August to mid-September

2.4 Survey equipment

Surveys have been carried out through the use of the following equipment:

Table 2 Survey methodology for the 2019 surveys

Equipment Type	Equipment specifics	Notes	Analysis
Infra-red cameras	Canon XF-400 Canon XA-10 Canon XA-11 Canon XA-30	Attached to a rigid tripod for stability (various makes)	Files processed and saved in Photos for MAC and saved on 4TB external Western Digital Drives Videos analysed using Quick Time Player
Infra-red lights	A minimum of 2no infra-red lights per camera (140 led)	Set on brackets and attached to a rigid tripod (various makes)	
Additional lighting	Clulite CB2 (million candle power) with additional red filter	Used to provide additional illumination	
Hetrodyne detectors	Batbox Duet detector (mainly) Batbox griffin Elekon Bat Scanner	Each surveyor has been equipped with one or other of these detectors to enable audible monitoring of the bats during the course of the survey	

Equipment Type	Equipment specifics	Notes	Analysis
Static detectors	Anabat Express detector	Each surveyor was equipped within one or other of these devices to enable 1 call assessment later	Calls analysed using Analook or Insight
Thermometer	ETI- Hygro - Thermo Pocket sized hygrometer	Used to provide accurate temperature and humidity readings	

2.5 Survey methodology

Surveys have been undertaken on the following dates (see Table 3).

2.6 Surveyors who took part in the surveys are listed below. Where the surveyors are licensed, licence numbers are given.

- Philip Parker 2015-14467-CLS-CLS
- Karl Charters 2015-13353-CLS-CLS
- Kate Garner
- Lisa Gabriel
- Rebecca Easter
- Volunteers - Helen and Calvin Stanley on several occasions plus Megan Grief of the PCC

2.7 The results of the following surveys are presented in the following table, surveys carried out as part of the original tender are marked HLF, those as extra surveys are marked with an *. This survey effort is more than the minimum required under the Bats in Churches Class Licence.

Table 3 Bat activity survey dates

Date	Emergence/ Re-entry	Surveyor	Start and finish time	Weather
29 th May 2019 HLF	Physical Survey	Philip Parker	18:00 – 20:00	N/A
29 th May 2019*	Emergence (both surveyors inside)	Philip Parker Lisa Gabriel	20:55 – 22:55	<p>Start – Ext – Temp = 12.7 C Ext – Humidity = 91% Int – Temp = 15.8 C Int – Humidity = 68%</p> <p>Finish – Ext – Temp = 13.2 C Ext – Humidity = 97% Int – Temp = 15.7 C Int – Humidity = 70%</p> <p>Weather – Breezy, light rain at start</p>

Date	Emergence/ Re-entry	Surveyor	Start and finish time	Weather
13 th June 2019 HLF	Emergence	Philip Parker Karl Charters Lisa Gabriel Kate Garner Rebecca Easter Volunteers Helen and Calvin Stanley, Megan Greif	21:09 – 23:15	Start – Ext – Temp =14. 7 C Ext – Humidity = 95% Int – Temp = 16.7 C Int – Humidity = 70% Finish – Ext – Temp =13.2 C Ext – Humidity = 97% Int – Temp = 15.7 C Int – Humidity = 70% Weather – Light rain at start
14 th June 2019*	Re-entry	Philip Parker	02:25 – 03:55	Start – Ext – Temp =14. 1 C Ext – Humidity = 76% Int – Temp = 15.0 C Int – Humidity = 92% Finish – Ext – Temp = 11.2 Ext – Humidity = 80% Int – Temp = 13.0 C Int – Humidity = 85% Weather – Light rain at commence
1 st July 2019 HLF	Emergence	Philip Parker Karl Charters Lisa Gabriel Kate Garner Rebecca Easter Volunteers- Helen and Calvin Stanley	21:11 – 23:11	Start – Ext – Temp = 16.8 C Ext – Humidity = 57% Int – Temp = 18.2 C Int – Humidity = 67% Finish – Ext – Temp = 15.3 C Ext – Humidity = 57% Int – Temp = 18.2 C Int – Humidity = 67% Weather – Warm, dry, 0% cloud cover
2 nd July 2019 HLF	Re-entry	Philip Parker Karl Charters Lisa Gabriel Kate Garner Rebecca Easter	02:35 – 04:35	Start – Ext – Temp =17. 5 C Ext – Humidity = 64% Int – Temp = 16.8 Int – Humidity = 66% Finish – Ext – Temp = 13.2 C Ext – Humidity = 80% Int – Temp = 18.2 Int – Humidity = 67% Weather – Warm, dry, with 100% cloud cover

10 th August 2019*	Bat night emergence	Philip Parker Kate Garner Volunteers - Helen and Calvin Stanley	20:30 – 22:00	Start – Ext – Temp = 18.0 C Finish – Ext – Temp = 15.0 C Weather – Warm, dry
3 rd September 2019 HLF	Emergence	Philip Parker Karl Charters Lisa Gabriel Kate Garner Rebecca Easter Volunteers - Helen and Calvin Stanley	19:25 – 21:45	Start – Ext – Temp = 19.8 C Ext – Humidity = 67% Int – Temp = 21.9C Int – Humidity = 55% Finish – Ext – Temp = 18.3 C Ext – Humidity = 72% Int – Temp = 21.0 Int – Humidity = 24% Weather – Dry, light breeze, cloudy
8 th September 2019 *	Emergence (Camera only clerestory window)	Philip Parker	19:15 – 21:15	Start Ext – Temp = 11 C Weather – Dry and clear
9 th September 2019 *	Re-entry (camera only clerestory window)	Philip Parker	04:15 – 06:15	Start Ext – Temp = 12 C Weather – Dry and 505 cloud
15 th September 2019 HLF	Emergence (light exclusion experiment)	Philip Parker Karl Charters Kate Garner	19:00 – 21:00	Start – Ext – Temp = 16.2 C Ext – Humidity = 73% Int – Temp = 16.0 C Int – Humidity = 58% Weather – Dry, clear
1 st October 2019 HLF	Emergence (blocking exclusion experiment)	Philip Parker Kate Garner	18:15 – 19:55	Start – Ext – Temp = 12.2 C Ext – Humidity = 54% Finish – Ext – Temp = 13.0 C Ext – Humidity = 53%

2.8 During the surveys, surveyors were located as follows:

- One internally utilising two infra-red cameras, one facing the north-west clerestory window access point and one covering the nave roof; volunteers when used were also located internally and assisted with the counting from the north-west clerestory window;

- One on the south-east side of the chancel covering the south side of the chancel, the south transept and the nave;
- One on the south-west, covering the southern access point, porch and the south of the tower;
- One on the north-west of the north transept covering the northern access point, the nave and the north aisle;
- One on the north-east covering the north aisle, and the north and east of the chancel.
- 2 infra-red cameras and lights were also used externally at key locations.

2.9 Constraints

The survey on the 29th May 2019 was arranged but at a late stage the weather looked as though it might be unsuitable (too wet), so the overall survey was postponed. However, Philip Parker and one other surveyor (Lisa Gabriel) did in fact attend the church and carried out a partial survey using cameras etc. The weather conditions were wet at the start of the survey, but this did not appear to have an overall negative impact on bat use.

2.10 At the commencement of the second emergence survey on the 13th June 2019 there was light rain (despite the fact that the forecast suggested the weather would be fine). This did not impact on bat emergence. It was suitable for the following re-entry survey undertaken by Philip Parker on the 14th June 2019.

2.11 Weather conditions were fine for the remaining surveys.

2.12 The surveys on the 15th September 2019 and the 1st October 2019 focused on the north-west clerestory and south-western access points only, therefore any activity externally around the other elevations of the church will not have been recorded.

3.0 2019 SURVEY RESULTS

3.1 The results of the 2019 surveys are summarised in the following table and illustrated on Drawings D1 and D2. As with previous surveys, it is not possible to confirm the identification of every pipistrelle leaving the north-west clerestory window, as they do not always call or there may be several bats flying around at the same time. It is assumed however that they are almost all soprano pipistrelle unless otherwise stated. Where reference is made to the clerestory window, the bats emerge from a missing window pane (see Figure 21).

Table 4 Survey results

Date	Survey Type	Species	Number and location
29 th May 2019	Physical	Pipistrelle spp Serotine	<p>Refer to Drawing D1 for details of the physical survey</p> <p>INTERNAL</p> <p>Pipistrelle spp Droppings spread throughout the church with concentrations noted in the centre of the nave. Sheets were in place on the pews on the south side of the nave with good numbers of droppings present (last cleaned in the 1 week before).</p> <p>The position of the sheets was noted on each of the surveys. Generally, they were in a similar location (centre to centre-east side of the nave on each survey location apart from the survey on the 1st October when the roost appeared to have moved to the east end of the south aisle (north-east corner).</p> <p>Concentrations of droppings were particularly noticeable around the west end of the nave and near the north-west clerestory window. Lots of fresh urine noted on the ledger slabs close to the rood screen (one of the key areas of historical interest identified in the significance assessment)</p> <p>Long eared sp scattered droppings noted in the centre of the chancel</p> <p>Serotine Occasional droppings noted only</p>
29 th May 2019	Emergence (both surveyors inside)	Soprano pipistrelle Brown long eared Serotine Common pipistrelle	<p>INTERNAL</p> <p>Soprano pipistrelle Large numbers of soprano pipistrelles seen to leave the roost on the south side of the nave (first noted at 21:06). Mainly swarming around the north-west clerestory window but also smaller numbers flying in the rest of the nave and chancel. Only occasional bats seen in the south aisle.</p> <p>Brown long eared 1 brown long eared was recorded hanging up against the second principal rafter within the chancel (first noted at 22:05). It did not leave the church during the survey.</p>

Date	Survey Type	Species	Number and location
			<p>Serotine Single serotine emerged internally (location not seen) at 21:57.</p> <p>EMERGENCE</p> <p>Soprano pipistrelle 214 pipistrelle (almost all soprano pipistrelle) emerged from the north-west clerestory window.</p> <p>65 pipistrelle (mainly soprano pipistrelle) re-entered north-west clerestory window (the first re-entered at 22:11, 5 minutes after the first left).</p> <p>Serotine 1 serotine emerged from the missing windowpane in the north-west clerestory window and 1 re-entered.</p> <p>EXTERNAL The survey did not cover any bats emerging externally other than the north-west clerestory window.</p>
13 th June 2019 HLF	Emergence	Soprano pipistrelle Common pipistrelle	<p>INTERNAL</p> <p>The main roost was present on the south side of the nave, mid-way along, close to the principal rafter and purlin. The first bat emerged at 21.15. Bats mainly flying around the nave, limited activity in the south aisle or the chancel. When bats re-entered, they often did not call and went straight back into the roost.</p> <p>EMERGENCE</p> <p>Soprano pipistrelle 203 pipistrelle (mainly soprano) emerged from the north-west clerestory window (the first left at 2119).</p> <p>109 pipistrelle (mainly soprano pipistrelle) re-entered via the north-west clerestory window by the end of the survey.</p> <p>NOTE: No bats emerged from any other location</p>

Date	Survey Type	Species	Number and location
14 th June 2019 *	Re-entry	Common pipistrelle Soprano pipistrelle	<p>INTERNAL</p> <p>Soprano pipistrelle Several bats flying around the nave and in and out of the roost for the duration of the re-entry survey.</p> <p>Common pipistrelle The occasional bat was also heard in the nave along with the soprano pipistrelles</p> <p>RE-ENTRY</p> <p>Soprano pipistrelle 61 pipistrelle (mainly soprano pipistrelle) emerged from the north-west clerestory window in the first hour of the re-entry survey. In the second hour 137 re-entered.</p> <p>Common Pipistrelle 1 re-entered via the north-west clerestory window.</p>
1 st July 2019 – HLF	Emergence	Common pipistrelle Soprano pipistrelle Brown long eared	<p>INTERNAL</p> <p>Soprano pipistrelle The main roost was present on the south side of the nave, mid-way along, close to the principal rafter and purlin. The first bat emerged at 21.32. Bats mainly flying around the nave, limited activity in the south aisle or the chancel.</p> <p>Brown long eared– 1 brown long eared was recorded hanging up in the chancel.</p> <p>EMERGENCE</p> <p>Soprano pipistrelle 220 pipistrelle (mainly soprano pipistrelle) emerged from the north-west clerestory window.</p> <p>14 pipistrelle (mainly soprano) re-entered via the north-west clerestory window.</p> <p>1 emerged from the gap over the window in the south aisle.</p> <p>Common pipistrelle 1 emerged from the gap over the window in the south aisle.</p>
2 nd July 2019 – HLF	Re-entry	Soprano pipistrelle Common pipistrelle	<p>INTERNAL</p> <p>Several bats flying around the nave and in and out of the roost for the duration of the re-entry survey.</p>

Date	Survey Type	Species	Number and location
			<p>RE-ENTRY Several bats flying around the nave and in and out of the roost for the duration of the re-entry survey.</p> <p>Soprano pipistrelle 83 pipistrelle (mainly soprano) emerged from the north-west clerestory window in the first hour of the survey</p> <p>Re-entry – 204 pipistrelle (mainly soprano) re-entered via the north-west clerestory window in the second hour of the survey.</p>
10 th August 2019	Bat Night Emergence	Soprano pipistrelle	<p>EMERGENCE</p> <p>Soprano pipistrelle First emerged in the church at 20.27, 226 had left by 21.33.</p>
3 rd September 2019	Emergence	Common pipistrelle Soprano pipistrelle Brown long eared	<p>INTERNAL</p> <p>Soprano pipistrelle The main roost was present on the south side of the nave, mid-way along, close to the principal rafter and purlin. The first bat emerged at 19.42. Bats mainly flying around the nave, limited activity in the south aisle or the chancel.</p> <p>Common pipistrelle Occasional calls noted. It was difficult to identify the bats</p> <p>Brown long eared 1 brown long eared was seen to emerge from the chancel roof at 21.31</p> <p>EMERGENCE</p> <p>Soprano pipistrelle 111 emerged from the north-west clerestory window, the first out at 19.47. The first returned at 21.01 and straight back into the roost. 19 had returned by the end of the survey.</p> <p>Common pipistrelle 1 common pipistrelle emerged from the north-west clerestory window at 20.36.</p> <p>1 common pipistrelle emerged from the gap over the window on the south aisle at 20.08.</p>

Date	Survey Type	Species	Number and location
			Brown long eared Left via the missing windowpane in the north-west clerestory window at 20.31.
8 th September 2019	Emergence	Soprano pipistrelle	EMERGENCE Soprano pipistrelle 135 emerged from the church in the first hour via the north-west clerestory window, 134 had returned by the end of the 2 hour survey window.
9 th September 2019	Re-entry	Soprano pipistrelle	RE-ENTRY Soprano pipistrelle Only 1 bat entered in the final two hours of the survey, the remainder of the bats entered during the night and did not re-emerge
15 th September 2019	Emergence	Common pipistrelle Soprano pipistrelle	INTERNAL Bats roosting south side of the nave similar to the usual location EMERGENCE Soprano pipistrelle The first bat emerged at 19:07 from the roost before leaving the church at 19:09 via the north-west clerestory window. A total of 20 emerged over the period. Common pipistrelle 2 common pipistrelle emerged from the gap over the window in the south aisle.
1 st October 2019	Emergence	Soprano pipistrelle	EMERGENCE Soprano pipistrelle During the hour the north-west clerestory window was blocked no emergence was recorded on any elevation. Once the window was unblocked 11 soprano pipistrelle emerged and 1 re-entered.

- 3.2 The two experiments to try and encourage the bats to switch to the south-west south aisle access were undertaken on the 15th September 2019 by light and on the 1st October 2019 by physical obstruction. These experiments were agreed by e-mail with Madeleine Ryan of Natural England.
- 3.3 On the first date (15th September 2019), bats were deterred by exiting the church from this location by shining 3 x 1 million candle power lights on the clerestory window. This delayed bats from exiting by approximately 15 minutes when they circled the lit area, after which the bats

emerged as normal. Bats re-entering the church have typically been 1 hour after the first emergence. The pattern was repeated even with the light in place and once the first bat had re-entered, several quickly followed. It was however notable that as soon as the lights were turned off, several bats immediately re-entered suggesting that this must have had of some deterrent effect. This was not however enough to make the bats switch the access location. Two common pipistrelles were noted to emerge from the south aisle access during the survey (small numbers of bats have been noted using this location on most surveys).

3.4 On the second date (1st October 2019), the north-west clerestory access was physically blocked with a piece of thin plastic from an external cherry picker (being used externally for a roof inspection). A long piece of rope was attached to the plastic which dropped to the inside of the church. This allowed for the plastic to be easily and safely removed following completion of the experiment by pulling the rope from the inside. At emergence, bats were landing on the obstruction with much social calling taking place between the bats. The bats continued to swarm around the window for the next hour. There was clearly no attempt by the bats to switch access. After 1 hour, the obstruction was removed. For 10 minutes, the bats continued to swarm around the open window exhibiting the same behaviour as when the obstruction was in place. Finally, one of the soprano pipistrelles emerged and this was quickly followed by 10 others.

3.5 **Summary of 2019 surveys**

A summary of the 2019 surveys is as follows;

- **Soprano pipistrelle** – The roost was in the nave, on the south side, various locations but always at the junction of the purlin and principal rafters. On the 1st October 2019, they were also roosting in the south-east corner of the south aisle. Nearly all of the soprano pipistrelles appeared to access via the north-west clerestory window, peak numbers of pipistrelle were on the 1st July 2019 when almost all were considered to be soprano pipistrelles. Occasional common pipistrelle access via this location was noted and other common pipistrelles cannot be discounted as it is impossible to tell the bats apart when several are flying around.
- **Common pipistrelle** – Small numbers roosting in the nave but the precise location is uncertain. The common pipistrelles were mainly noted to emerge over the south-west south aisle window but the occasional access via the north-west clerestory widow was noted. The numbers of common pipistrelle in the church appeared to be far less than that on surveys in 2015/16.
- **Serotine** – The only record in 2019 was a single bat on the first survey, emergence was from the north-west clerestory window.

- **Brown long eared** – maximum of 1 bat was recorded in 2019, down from 6 on the 10th July 2015. Only one bat was seen to emerge via the north-west clerestory window on the survey of the survey on the 3rd September 2019.

3.6 The change in bats emerging from the north-west clerestory window over the course of the summer is shown on the following Graph.

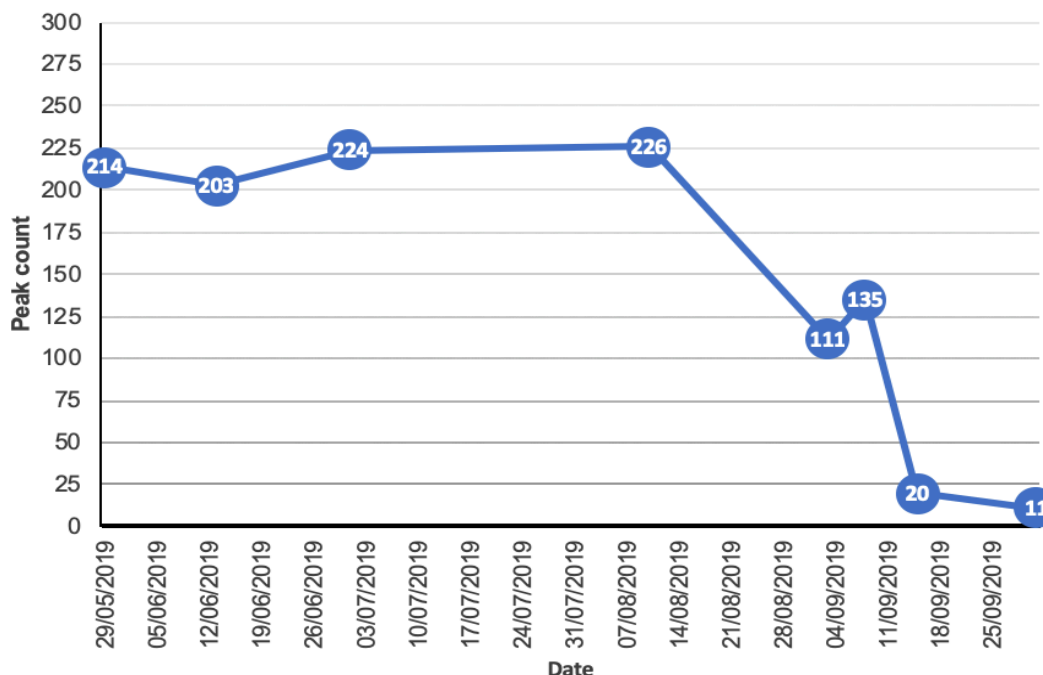


Chart 1 Counts of soprano pipistrelle numbers through the north-west clerestory window

3.7 On the 13th/14th June 2019, the camera was left running on the north-west clerestory access for the course of the night. Counts were made of emergences and re-entries though the window on 15-minute intervals from dusk to dawn. The following graph show the changes in numbers of bats in the church over this time. This information indicates that there is continual access in and out of the roost and the church during the course of the night with the numbers of bats re-entering at dawn being less than those that emerged at dusk.

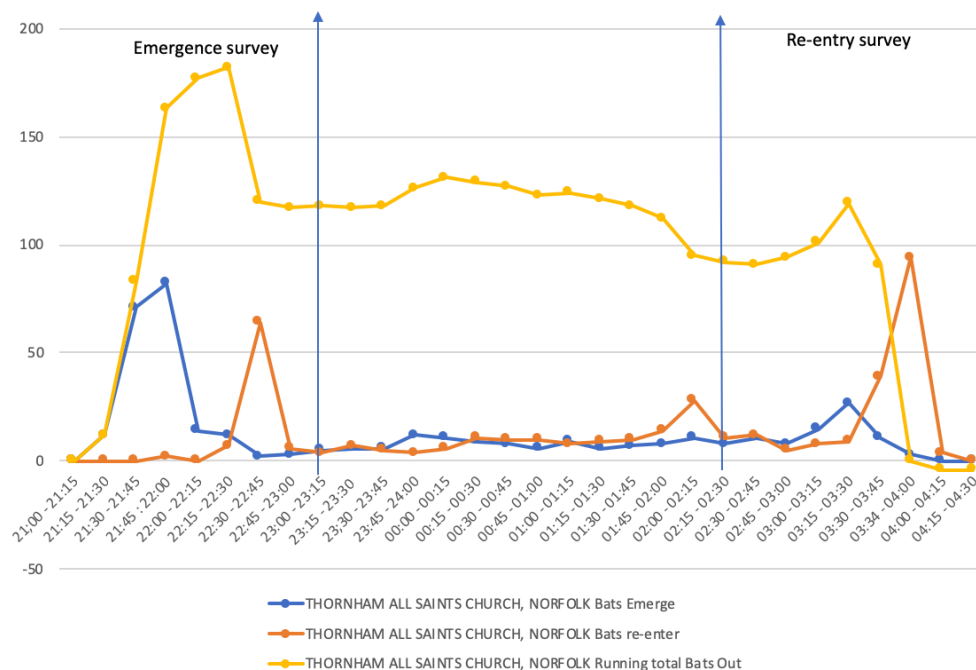


Chart 2 Soprano pipistrelle movements through the north-west clerestory window 13.6.19 – 14.4.19

3.5 SUMMARY

The survey data has been assessed against the categories used by the Norfolk Bats in Churches project. This confirms that the church supports a high level of bat roosting (the highest of the four categories). The soprano pipistrelle roost is considered to be of at least local importance although there are many larger soprano pipistrelle roosts in the county and therefore the roost is not considered exceptional.

4.0 MITIGATION/ MANAGEMENT RECOMMENDATIONS

- 4.1 As described in Section 3.3 above, the proposed mitigation (as set out in the 2017 Light Touch Survey) had been to build a bat box under the slope of the roof on the south aisle allow the bats to find and use this, before connecting directly to the south aisle access.
- 4.2 This approach would depend on the bats being excluded from the north-west clerestory window access and the bats that currently use that location as an access switching to the previously identified south-west south aisle access.
- 4.3 In 2015, up to 10% of the bats accessing the church did so via the south-west south aisle access. These were however almost all common pipistrelles.

- 4.4 In 2019, only small numbers of bats (both common and soprano pipistrelles) used this access.
- 4.5 It would appear therefore that there has been a decline in the common pipistrelle numbers using the church, but the soprano pipistrelle numbers appear at a similar level to the surveys in 2015. Following the initial survey on the 29th May 2019 when 214 soprano pipistrelles were observed emerging, and in May clearly all adults, it was expected that there would be an increase in bat numbers later in the summer (July and August) when juveniles were flying. This was however not the case. This is however a similar pattern to seen at other churches during 2019 surveys.
- 4.6 Although limited in timescale, the experiment to try and persuade the soprano pipistrelles to switch their access seemed to indicate that they would not do so readily. Therefore, it is possible that if the bats were excluded permanently, they would not readily switch to the new access and the roost would be lost. A longer term experiment may result in different results.

The reduction in use of the south aisle access (and numbers of common pipistrelles in the church) possibly relates to the increased lighting levels on the south side of the church and west side of the tower. A floodlight is normally in use on the south side of the tower during the hours of darkness (dusk to dawn). For the 2019 surveys, the floodlights were switched off two days before the survey took place. This was the same approach used during the 2015 surveys. It is notable however that even with the lights off, there was still a good level of lighting on the south aisle and the south/west side of the tower from the lighting on the adjacent pub (the Orange Tree) and adjacent accommodation associated with the Orange Tree. There was also a flood light on a property on the south side of the A149 shining on the south side of the nave.

4.7 **RECOMMENDED MITIGATION**

A two-pronged approach has therefore been proposed towards the mitigation.

4.8 **OPTION 1**

North-west clerestory Box

Firstly, build a bat box over the top part of the clerestory window tracery as shown in Figure 3 below. This would be bespoke and designed to be multi-chambered and sit tight within the window opening. In Years 1 and 2 from construction, the north-eastern part of the box would be removed which would allow the bats to continue to access into the church via the existing opening. The bats would also have direct access to the roosting access slots, and it is hoped over this time that they would start to use the box. Being on the northern side of the church, the box would need to be heated. They should also be fitted with a thermostat to prevent overheating (refer to Appendix B). The box would also be provided with a bird box type camera connected to a hard drive and monitor to allow the use of the boxes to be monitored (refer to Figure 5). A local electrician who specialises in church work has confirmed that there should

not be an issue with the incorporation of a heat mat into the box as long as the church is fitted with an RCD trip.

- 4.9 Ideally the bats should be given up to 2 years to find and use the box after which the north-east corner of the box could then be completed, and the bats excluded from the church.
- 4.10 The issue of providing this bat box over the window has been discussed with both the DAC and the PCC and they find it to be an acceptable solution. A meeting was held with the PCC on the 17th October 2019 a copy of an e-mail from the PCC is included in Appendix C. Comments from the PCC related to the decoration of the outside of the box (should this be a bat symbol so it was obvious what was happening or should it replicate the tracery of the window). Either seemed to be preferable to plain wood.
- 4.11 At a meeting on the 1st October 2019, the DAC Secretary had previously confirmed that the provision of a bat box does not require a faculty (bat boxes being list A) although this does need to be confirmed as the proposed Option 1 box is a significant structure. Even if the box itself does not need a faculty, the installation of wiring for the camera and heaters might be list B, again this needs further consideration.
- 4.12 Although the box would need to be be-spoke to the window opening, an example of an off the shelf heated box can be found in Appendix B. This gives an idea as to how such a box might be constructed.

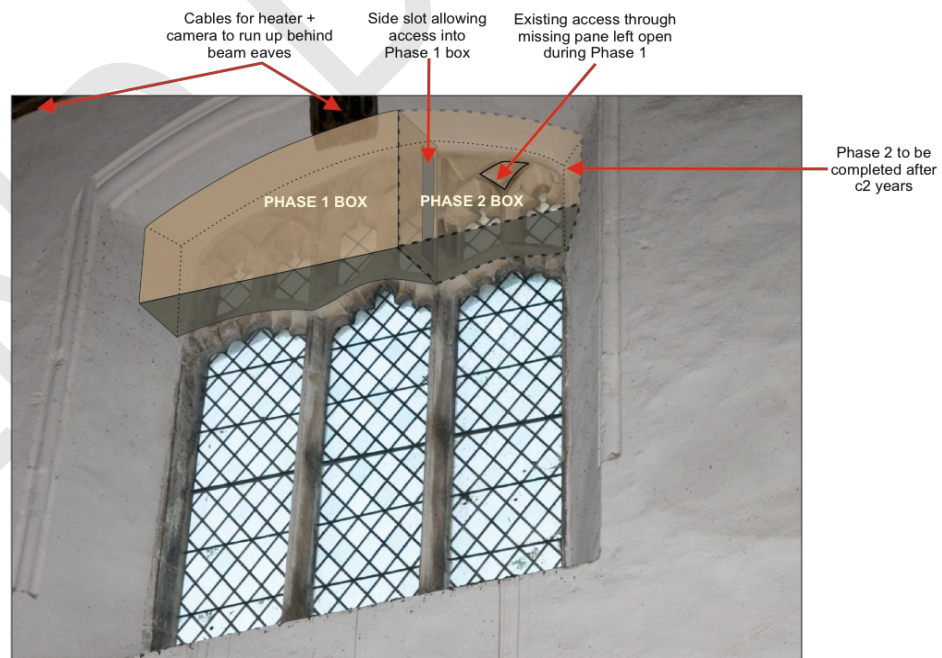


Figure 3 – Mitigation Option 1 – Access location shown red – potential heated bat box shown toned. Access through the box would be maintained for a minimum of the first season after construction to allow bats to find the new roost. The roost would have a heater and a camera installed to allow use to be monitored and ultimately allow images of use to be streamed to a monitor within the church. The completion of phase 2 of the box would effectively exclude the bats from the church at this location.

4.13 OPTION 2

South aisle box

As proposed in Section 4.8, a two-pronged approach is proposed and therefore a box under the south aisle roof is also recommended (Figure 4). Again, this will be fitted with a camera. Heating should not be required as this is under a south facing lead roof. The bats should be given up to 2 years for the bats to find and start to utilise it prior to being connected to the south aisle access. Although the surveys suggest limited use of this access in 2019, this could vary year to year. Consideration should be given to switching off the floodlights for longer periods and perhaps undertaking further short-term experiments on deterring the north-west clerestory access.

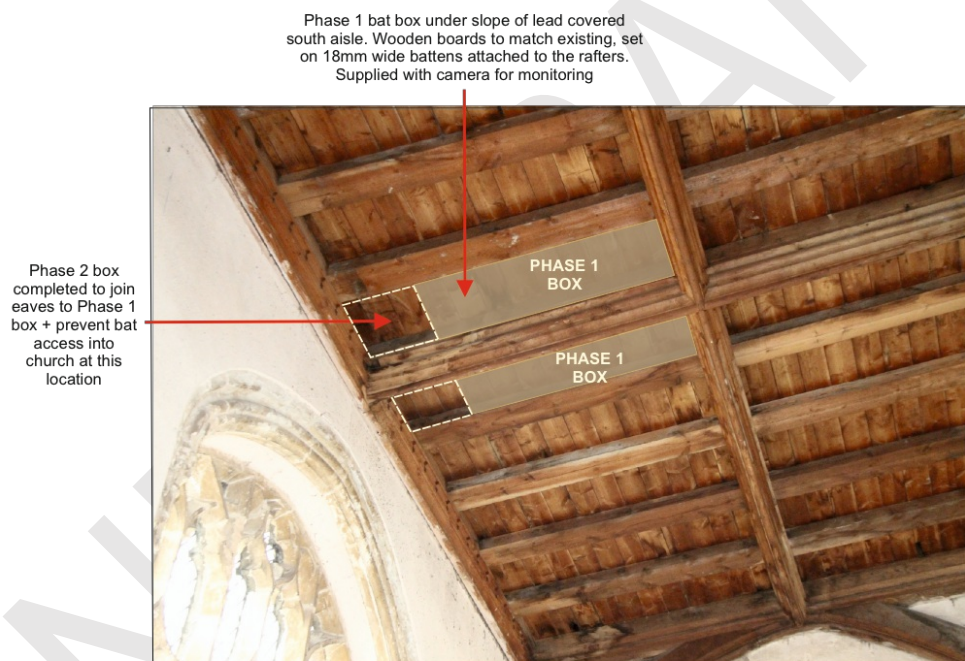


Figure 4 – Mitigation Option 2 - Potential bat box in the south aisle near secondary access point (using solar gain from the lead above to heat the box). Box would be provided with a camera to monitor use

4.14 Camera

It is proposed that infra-red cameras are incorporated into both boxes. These will enable the use of the boxes to be monitored. In addition, it is proposed that the cameras are connected to a monitor that can be located in the south-west corner of the south aisle where the seating area currently occurs. The visitor's book in the church documents the number of people that are concerned about the presence of bats in the church and those that welcome them (the latter out-numbers the former) with



Figure 5 – Bird box camera

people often commenting that they cannot see the bats. Therefore, the ability to see bats roosting but without any impact on the church would be much appreciated by many.

4.15 Bat Night

The bat night held on the 10th August 2019 attracted a record attendance of 154 people. This clearly illustrates the appetite for locals and visitors to come and see the bats at the church. The mitigation and management operations proposed should enable bat nights to continue into the future.

4.16 Maintenance

Long term maintenance may be required to the boxes. The boxes under the south aisle roof will be more readily accessible. That in the north-west clerestory window will be more difficult to reach and will require the use of a cherry picker or scaffolding tower (the latter is likely to be significantly cheaper).

4.17 The Bats in Churches HLF project have stated that they would cover the cost of the box maintenance to the end of the project. Thereafter, it is up to the church to fund the works. This could be achieved through the running of an annual bat night (although this would rely on seeing bat leaving the church rather than flying around unless the images from the bat box were projected onto the screen).

4.18 Exclusion of bats

The provision of the boxes in Options 1 and 2 will prevent access of bats into the church via the 2 access points identified in 2019. However, measures will also need to be taken to block the previously identified access in the south-east corner of the south aisle (not used in 2019). It should be noted however that there may be other locations where bats could potentially

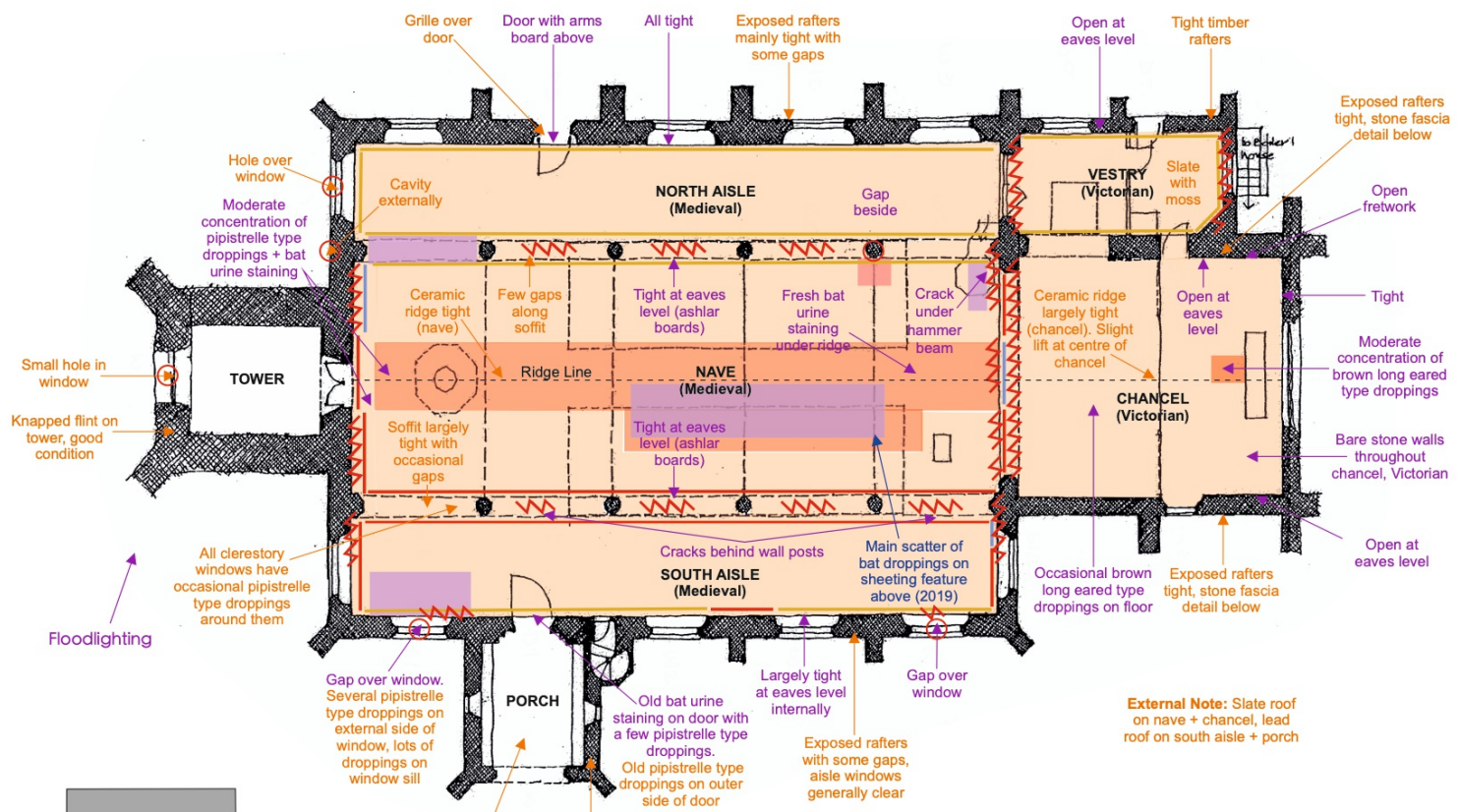
access but as yet unidentified. These may need to be excluded at a later stage if bats start to use them.

5.0 WORK SCHEDULE

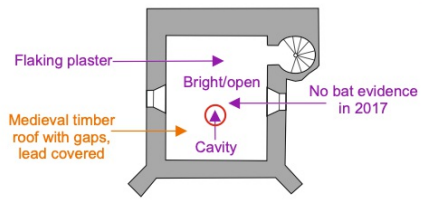
5.1 The timescales for the various mitigation operations, staffing and approximate costings are shown in the following table. As stated in 4.12, It is understood that the provision of bat boxes does not require a faculty. This issue does need confirmation from the DAC secretary as clearly the Option 1 box is a significant feature and will be visible. Provision of cameras and heating, whilst in themselves may not require a faculty, permanent wiring might. Again, this needs further discussion. Costs are approximate (including scaffolding where appropriate) and need confirmation from architects/contractors. This also excludes long term monitoring costs provided as part of the original tender.

Table 6 Draft Work Schedule

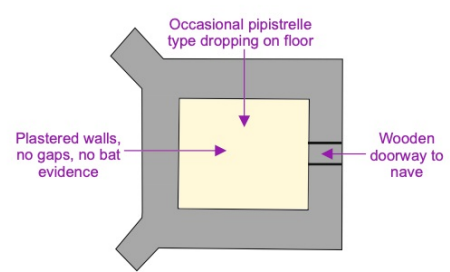
Mitigation Option	Description	Who	When	Cost (plus VAT)	Faculty	Planning permission	Long term maintenance requirements
General	Architect fees	Ruth Blackman	?	?	-	-	-
	NE Licence	PPA			-	-	-
	Monitoring	PPA			-	-	-
Roost option 1	Install Phase 1 of bat box over the clerestory window	PPA/ Contractor	April 2020	?	?	No	High
	Camera and heat mat plus installation	Electrical contractor	April 2020	£750	?	No	High
	Install Phase 2 bat box over clerestory window	PPA/ contractor	April 2022	?	?	No	High
Roost option 2	Install Phase 1 bat boxes in the south aisle	PPA/ Contractor	April 2020	£1000	No	No	Moderate
	Install Phase 2 connections to the south aisle eaves	PPA/ contractor	April 2022	£750	No	No	Low
	Install cameras	Electrical contractor	April 2020	£500	?	No	Moderate



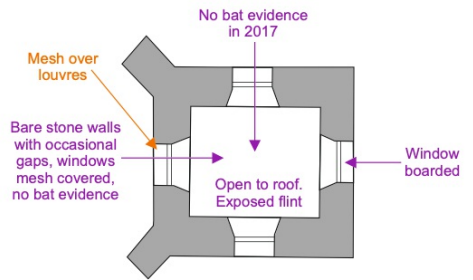
GROUND FLOOR PLAN (NTS)



PARVISE (NTS)



CLOCK CHAMBER (NTS)



BELFRY (NTS)



LOCATION PLAN (NTS)



SITE PLAN (NTS)

KEY

- Cavity with potential for bat roost
- Crack with potential for bat roost
- Bat dropping (Pipistrelle type)
- Bat dropping (Brown long eared type)
- Occasional pipistrelle type dropping on walls
- Light scatter of pipistrelle type droppings on walls
- Moderate scatter of pipistrelle type droppings on walls
- Occasional pipistrelle type dropping on floor
- Light scatter of pipistrelle type droppings on floor
- Moderate scatter of pipistrelle type droppings on floor
- High scatter of pipistrelle type droppings on floor

Note:
Information based on surveys undertaken in 2015, checked and updated on 21/08/17 (HLF Project)

2019 update surveys indicated little change to that noted previously

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CLIENT
 HLF BATS IN CHURCHES PROJECT

PROJECT
 ALL SAINTS CHURCH, THORNHAM,
 NORFOLK

DRAWING TITLE
 BAT SURVEY - PHYSICAL

SCALE NTS	DATE NOV 19	DWG NO P2019 - 38 D1	REV
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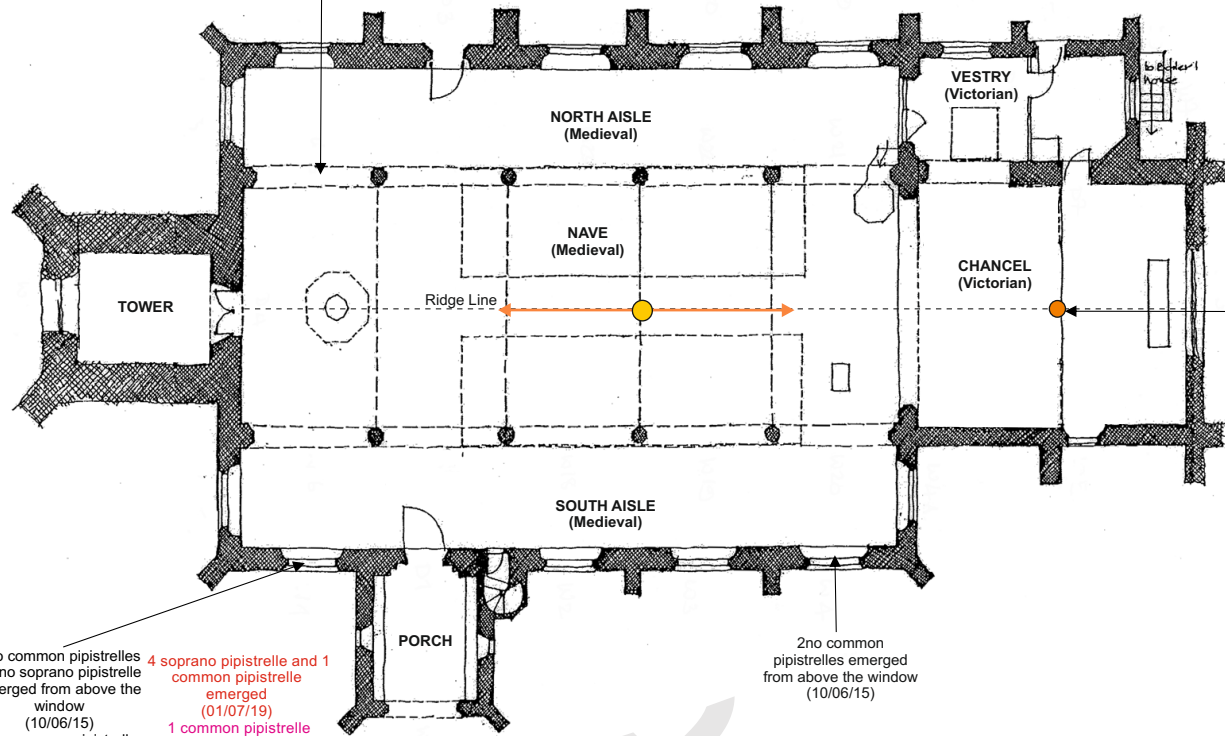
REV A	DATE NOV 2017	DETAILS Updated
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148no pipistrelle's emerged from the clerestory window then exited the church (10/06/15)
 214no pipistrelle's emerged (10/07/15)
 146no pipistrelle's emerged (19/08/15)
 73no pipistrelle's emerged (21/09/15)
 162no pipistrelle's emerged (10/08/16 - Bat night). Video for 2017 count not yet assessed

214 soprano pipistrelle and 1serotine emerged. 65 soprano pipistrelle re-entered (29/05/19)
 203 soprano pipistrelle emerged. 109 soprano pipistrelle re-entered (13/06/19)
 66 soprano pipistrelle emerged. 64 soprano pipistrelle and 1 common pipistrelle re-entered (14/06/19)

220 soprano pipistrelle emerged. 14 soprano pipistrelle re-entered (01/07/19)
 83 soprano pipistrelle emerged. 204 soprano pipistrelle re-entered (02/07/19)
 83 soprano pipistrelle, 1 common pipistrelle and 1 brown long eared emerged (03/09/19)



9no common pipistrelles + 1no soprano pipistrelle emerged from above the window (10/06/15)
 23no common pipistrelles + 3no soprano pipistrelles emerged (10/07/15)
 17no common pipistrelles + 5no soprano pipistrelles emerged (19/08/15)
 1no common pipistrelle emerged (21/09/15)
 No count 2016 or 2017

4 soprano pipistrelle and 1 common pipistrelle emerged (01/07/19)
 1 common pipistrelle emerged (03/09/19)
 2 soprano pipistrelle emerged (15/09/19)

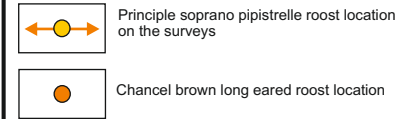
2no common pipistrelles emerged from above the window (10/06/15)

2no brown long eared internally (10/06/15)
 6no brown long eared internally (10/07/15)
 3no brown long eared internally (19/08/15)
 4no brown long eared internally (21/09/15)
 No count 2016 or 2017

1 brown long eared internally (29/05/19)
 1 brown long eared internally (01/07/19)
 1 brown long eared internally (03/09/19)

GROUND FLOOR PLAN (NTS)

KEY



Emergence Survey (10/06/15)
 Emergence Survey (10/07/15)
 Emergence Survey (19/08/15)
 Emergence Survey (21/09/15)
 Emergence Survey (10/08/16 - Bat night)

2019 Update

Blue text = Emergence Survey (29/05/19)
 Green text = Emergence Survey (13/06/19)
 Orange text = Re-entry Survey (14/06/19)
 Red text = Emergence Survey (01/07/19)
 Purple text = Re-entry Survey (02/07/19)
 Pink text = Emergence Survey (03/09/19)
 Grey text = Emergence survey (light experiment) (15/09/19)

Notes:

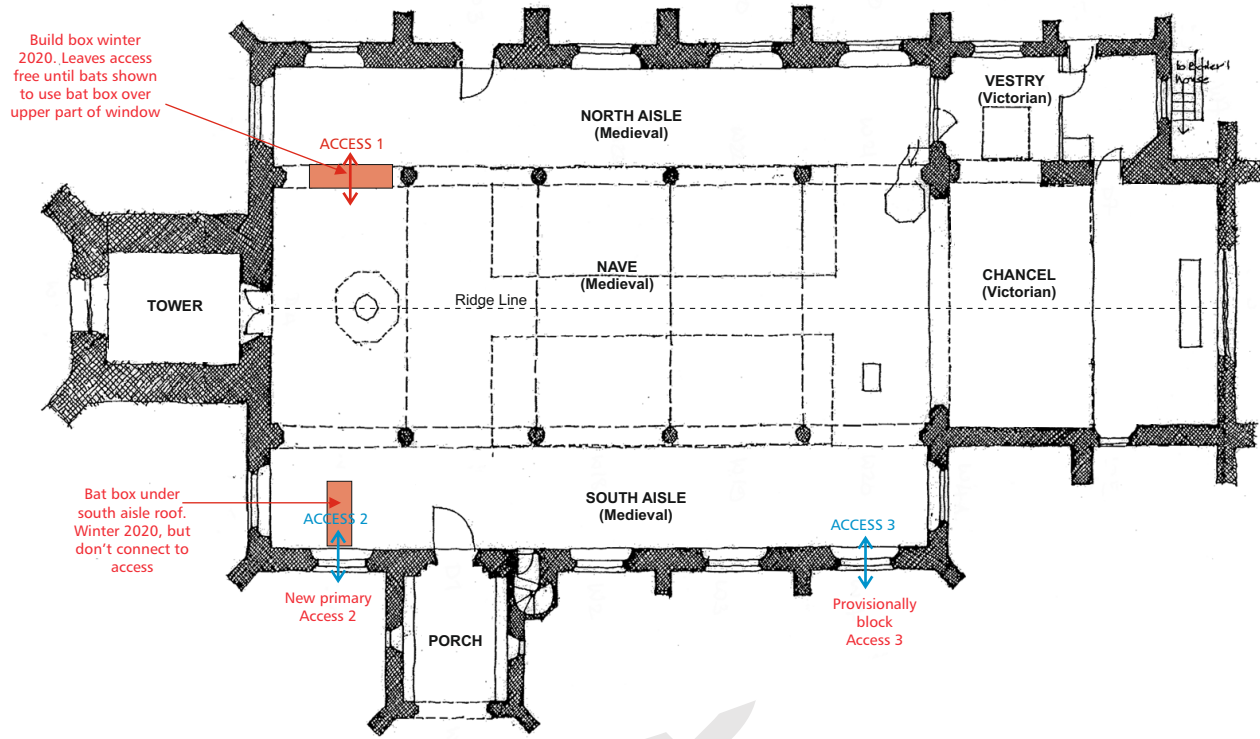
1. Pipistrelles emerging from northwest clerestory window on June/July/August surveys assumed to be largely soprano pipistrelle, although too high to get a positive ID. (2015)
2. Access point for brown long eared not determined. (2015)
3. 2016 count only relating to bats leaving the north-west clerestory window - assessed from video

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CLIENT			
HLF BATS IN CHURCHES PROJECT			
PROJECT			
ALL SAINTS CHURCH, THORNHAM, NORFOLK			
DRAWING TITLE			
BAT SURVEY - ACTIVITY (2019 UPDATE)			
SCALE	DATE	DWG NO	REV
NTS	NOV 19	P2019 - 38 D2	
REV	DATE	DETAILS	



GROUND FLOOR PLAN (NTS)

KEY

-  Bat access point - Principle
-  Bat access point - Secondary
-  Bat box

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CLIENT

HLF BATS IN CHURCHES PROJECT

PROJECT

ALL SAINTS CHURCH, THORNHAM,
 NORFOLK

DRAWING TITLE

BAT MITIGATION PLAN

SCALE NTS	DATE NOV 19	DWG NO P2019 - 27 D3	REV
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REV	DATE	DETAILS
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Appendix A ILLUSTRATIVE PHOTOGRAPHS



Figure 6 – General view of the church from the south-east



Figure 7 – Secondary access eaves detail on the south aisle showing the overhang and exposed rafters from which a small number of bats emerge



Figure 8 – Secondary access area in the south-west corner of the south aisle



Figure 9 – Eaves detail on the south side of the nave showing the soffit with gaps. Again, no bats were seen to emerge from these locations during the surveys



Figure 10 – Principal access from the church via the north-west clerestory window, viewed from the north side of the tower



Figure 11 – Loose and missing slates on nave giving potential bat roosting area although no bats were seen to emerge



Figure 12– General view of the church looking towards the chancel



Figure 13 – Nave roof where most bat roosting takes places, typical locations are at the junctions of the purlins/rafters on the south side and above the ridge

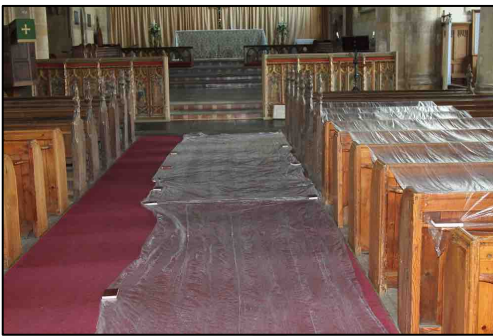


Figure 14 – Sheeting on the floor of the nave



Figure 15 – Droppings on sheeting on the pews under the main roost area



Figure 16 – One roost location by a purlin on the south side of the nave



Figure 17 – Urine staining eroding limestone floor slabs



Figure 18 – Timber gap in parvise re-leaded in 2015, no bat evidence in parvise

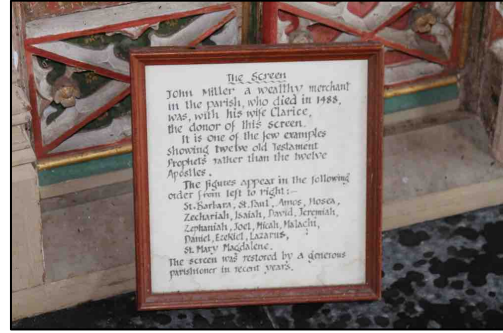


Figure 19 – Urine damage to the rood screen



Figure 20 – Medieval rood screen



Figure 21 – Principal bat access point in the north-west clerestory window



Figure 22 – Droppings on windowsill in the north aisle

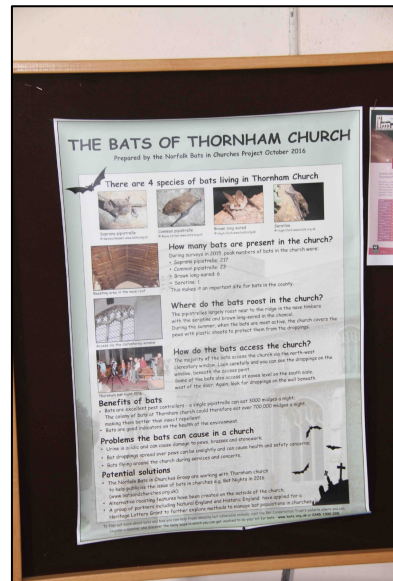


Figure 23 – Bat poster from the Norfolk Bats in Churches Project that has been in the church for the past 12 months



Figure 24– Roof structure close to principal access



Figure 25 – Roof structure close to the access in the south aisle, south access point



Figure 26 – High-level door access between clock chamber and nave



Figure 27 – General view of the bell chamber. A potential number of roosting areas but no evidence noted



Figure 28 – View of churchyard



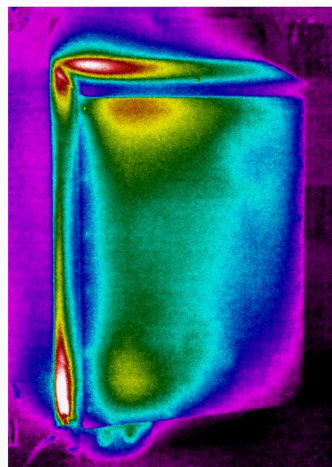
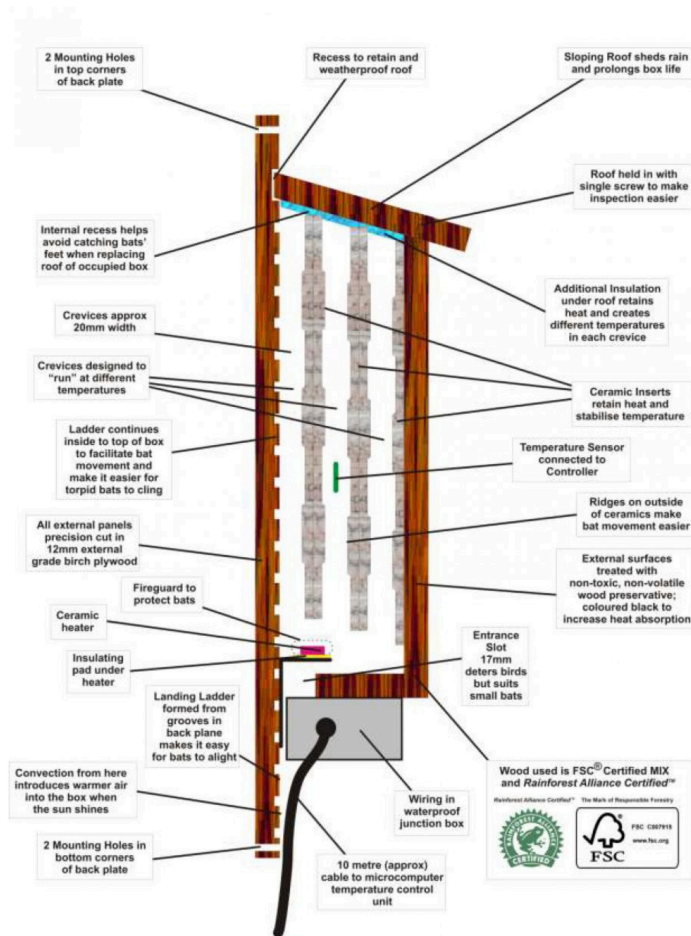
Figure 29 – Bat boxes on trees in the churchyard, providing enhancement as part of the south aisle roof works



Figure 30 – Timber boards under rafters on the south aisle. These were put in as part of the works to the south aisle to try and provide alternative external roost areas. There was no evidence of any bat access during the 2019 surveys

APPENDIX B

EXAMPLES OF A HEATED BAT BOX



**All Saints Church Thornham
PCC Minutes held on 17th October in Church
Special meeting with Phil Parker from 'Bats in Churches'**

Present

Mrs. Janet Needham, Warden (JN)

Mrs. Jane Long, Chair (JL)

Mrs. Sue Burland (SB), Mrs. Megan Greef (MG), Mrs. Mrs. Gillian Rix(GR),

Guest Mr. Phil Parker

Mr. Parker began by giving a brief history of Bat Surveys that he had done in the last 10 years in Thornham church. An average of 250 bats were counted in the church Maternity Roost each year with the maximum number being late July when the pups were flying alone. Unusually this year a count in June of 230-240 was the largest count and would have been all adults.

In previous years some mostly common Pipistrelles went out above the South window on the West side but this year they did not. One suggestion was that increased light mainly from 'The Orange Tree' pub was putting the Bats off flying on the South side.

Mr. Parkers initial plan was to build a bat box over the south exit, leave it open to the church with cameras in for a year or two and if the bats used it close it up. The south side is better as it would be warm from the sun and not need heating.

A couple of experiments were carried out during surveys this year, to try to deter the bats using the North exit and to see if they would use the South exit, by both using light and temporarily (for 1 hour) blocking the north exit. Neither were successful.

Mr. Parkers second and most likely to succeed plan is to build a bat box over the North exit, this would have to be heated, he would put a camera in to see if any bats roost in it, while leaving it open to the church for a year or two, if the bats use the box block the exit into church.

The problems with this solution are that it is very high and will need a scaffolding tower to build it and for any maintenance, it will need to be heated and has a slightly bigger visual impact. However, it could be made into an area of great interest if a camera connected to a screen in the church was fitted, to allow visitors to watch live action in the bat box.

Mr. Parker explained that all the work would be done by the Bats in Churches project at their expense over the 5 years of the project.

The proposal to fit a bat box as described to the North bat exit in the clerestory window and also to fit a bat box as described over the South exit was proposed by Janet Needham, seconded by Sue Burland and agreed unanimously.

Mr. Parker was thanked for his time and help, and all hoped that this would be a successful solution to our problem with bats in our church.

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