Bat Survey & Management Report

All Saints Church, Low Catton, York

November 2020

MAB Environment & Ecology Ltd

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Status	**Date**	**Checked by:**
First draft	2-12-2020	Ione Bareau MCIEEM

Site:

All Saints Church,
Low Catton,
York

Dates:

Surveys from January 2020 to October 2020

Client:

Natural England / PCC of All Saints Church

Client's agent:

Andrew Boyce (architect),
Ferry & Mennim,
York

Our ref:

2020/881

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1 Summary

All Saints, Low Catton has a long standing Natterer's bat maternity roost, documented as one of the largest in the North East of England. There is a long history of damage to the internal fabric of the church caused by bat urine and droppings. The Bats in Churches project has taken on this case in order to find a solution to the problems while maintaining the conservation status of the bats. The Bats in Churches Class Licence (BiCCL) registered consultant Giles Manners was asked to make an assessment and deploy the BiCCL licence as required in order to resolve the issues.

A range of surveys have been carried out in 2020, including DNA analysis, thermal imaging, unmanned bat recording, infrared camera surveys, and traditional bat emergence / re-entry surveys.

The 2020 results have been referenced against extensive background information and previous attempts to exclude bats. Current issues are caused by bats accessing two internal roosts within the nave via the tower, with a large amount of internal flight being carried out as a consequence.

A management plan has been developed whereby an attempt will be made to exclude bats from the interior of the church in 2022 while maintaining 2 roost locations which can be accessed from the exterior; access to the interior of the church from these roost will be prevented by sealing gaps in roof timbers. The 2 roosts which can only be accessed via internal flight will be excluded. An additional 2 heated roost boxes are to be installed in the tower during 2021.

Some additional assessment is required through 2021 to confirm the appropriateness of the plan. Internal and external monitoring is proposed through 2022. Faculty consent and BiCCL site registration will be applied for in spring 2021.

2 Introduction

Giles Manners of MAB Environment and Ecology Ltd was commissioned by the Bats in Churches project to undertake a series of bat surveys and obtain a Bats in Churches Class Licence (BiCCL) registration for All Saints Church at Low Catton, York. The church is known to have a long-standing resident population of breeding bats.

The licence application has two principle objectives: firstly, the lead of the roof has been stolen, and the installation of a replacement roof (when funds permit the works) may require a licence to disturb bats and / or bat access; secondly, the interior of the church has been damaged by urine and droppings and cause constant cleaning requirements, and the PCC are very keen to mitigate the impact of the bats on the usage of the church by parishioners and church wardens.

The objective of the surveys is to discover roost location, access points, species, numbers and roost types – this will inform the licence application, because the licence requires that the "Favourable Conservation Status" of the species must be maintained (the "FCS" test).

The assessment also needs to look at the issues currently facing the management of the church; again, this is due to the requirements of the licence, whereby there must be no satisfactory alternative (the "NSA" test). Therefore the problems faced by the PCC and how they can be overcome with minimal impact on bats must be assessed.

Finally, a further objective of the assessment is to work with "stakeholders" (PCC, Church of England, Natural England, parishioners, the local bat group, and architects, to name a few of the most important) so that, as much as is possible, the outcomes can incorporate the aspirations and concerns of stakeholders. The legal protection of bats (see Section 10), which covers the species, individuals, and their habitat, is a pre-requisite underpinning the whole assessment process.

A temporary roof cover was installed during the surveys in May 2020; this replaced tarpaulins that were present, but not effective, at the start of the surveys.

Photo 1 Temporary roof cover being fitted over nave May 2020

3 Methodology

3.1 Desktop Study

3.1.1 Bat roost records for a 2km radius around the site were commissioned from the North Yorkshire Bat Group (NYBG), East Yorkshire Bat Group (EYBG) (the site being on the boundary between East and North Yorkshire) and from North and East Yorkshire Ecological Data Centre (NEYEDC).

3.1.2 Relevant documents were obtained from Natural England, Ferrey & Menim, EYBG, and Bats in Churches.

3.2 Field Survey

3.2.1 The site was surveyed by Giles Manners CEnv MCIEEM, a director of MAB Environment & Ecology Ltd. Mr Manners has been a professional bat ecologist since 2004, and has a Class Survey Licence WML CL20 (Bat Survey Level 4) registration number 2015-10306-CLS-CLS and also holds a Class Licence WML CL16 (Volunteer Bat Roost Visitor Level 2) – Natural England trainer license 2015-10305-CLS-CLS. Giles is also licensed by NE to survey for GCN's - Class Licence WML-CL08 (Great Crested Newt Class 1) registration number 2014-5604-CLS-CLS. Giles is a registered consultant for the Bat Low Impact Class Licence, registration ref RC039. He is also a zoologist of over 20 years' experience, a full member of the Institute of Ecology and Environmental Management and a Chartered Environmentalist. The surveys were carried out in accordance with the Bat Conservation Trust, Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn).

3.2.2 Emergence surveys were carried out using professional recording ultra-sound detectors (Pettersson D240x, Pettersson D230, Elekon Batlogger). The D240x detector was set to 10x expansion with manual triggering with an Edirol R09 WAV solid state recording device for the time expansion channel, with heterodyne output through the other channel. The D230 and Duet used heterodyne detection were set

to 50 kHz. Time expansion recordings were manually analysed with BatSound software. Batlogger recordings were analysed with BatExplorer software.

3.2.3 Infra-red cameras (Sony Ax100) were used as static devices with 12v floodlights, as well as in mobile configuration using shoe-mounted 850NM IR torches. Infrared footage was studied with VLC media player using motion detect.

3.2.4 A T1020 FLIR thermal imaging camera was used on a tripod within the church, with wide angle lens, and recordings made in CSQ format. These were analysed using FLIR Tools software.

3.2.5 Unmanned bat recorder sessions were made using a Pettersson D500x professional full spectrum recorder run in 2 locations witin the church – one facing into the nave and one facing into the chancel. The units were was set at c 1m height and the internal microphone was used, angled upwards to capture as much of the void as possible. The D500x settings were as follows:

Recording Setting	Level
Input gain	40
Trigger level	28
Interval	OFF
Sample frequency	500kHz
Pre-trigger	OFF
Record length	1
High pass filter	ON
Auto record	ON
Trigger sensitivity	Mediu

3.2.6 The D500x recordings were analysed using SonoBat software.

3.2.7 DNA analysis of collected bat droppings was carried out by Ecotype Laboratories using pQCR methodology.

4 Constraints

The surveys were not significantly constrained. Several bat emergence points were difficult to observe, particularly the tower and rear of organ, due to the habit of this species of carrying out a considerable period of internal flight before emergence, meaning that it was often fully dark at the time of emergence.

The Natterer's bats continuously leave and re-enter the roost locations, and fly between various area of the interior, sometimes just touching the roost and dropping off again, often entering and seemingly not reappearing. It is evident that there are interconnected roosts, and that many parts of the interior of the church are being used, which all adds up to make it more or less impossible to get an accurate roost count.

Heavy rain between dusk and dawn survey 30/6/2020 may have led bats to return to roost before survey started.

The covid-19 pandemic led to the cancellation of earlier surveys in 2020.

5 Results

5.1 Background information

The primary sources of background information are as follows, most recent first:

- East Yorkshire Bat Group (EYBG) roost monitoring study, ongoing since 2000. No results available, but email summary provided of results in 2020 provided by Barry Wright (Appendix 1).
- Bats in Churches (BiC) Heritage Lottery Fund Heritage Grant Bat Roost Visit Report. August 2017 (Appendix 2).
- Bat Roost Visit Return Form (RRF). August 2012. Local bat roost visitor (Tony Lane). Plus NE advice letter in response, and email clarification from Tony Lane (Appendix 3)
- European Protected Species Licence (EPSL) 2010 for roof repairs. Original application and monitoring results have been "destroyed" by Natural England (NE). However, the Method Statement prepared by Wold Ecology has been made available, as has the licence return form (Appendix 4).
- Low Catton Bat Survey 2010, May to June 2010. Precedes EPSL. Appendix 5.
- Natterer's bat maternity roost records from within 5km of site from North Yorkshire Bat group (NYBG), North & East Yorkshire Ecological Data Centre (NEYEDC) and EYBG.
- Google Maps aerial imagery.

Summary of background info

This is a long-standing maternity roost of Natterer's bats, one of the largest in the county. The local bat group counted 69 individuals emerging in 2020.

The 2017 Bats in Churches (ref. BiC 2017) report noted large amounts of damage by urine staining, but could not propose a realistic solution, noting the previous failure of efforts to relocate the roost. BiC 2017 did not regard internal flight as high level, but assumed that an internal flight void was 'preferred' by the bats. The suggested mitigation in BiC 2017 was deep cleaning, coating artifacts (constraints of Grade 2 listing were noted); suggested permanent solutions were limited to establishing a bat roost building in the churchyard (obvious funding and practical constraints noted).

The situation with the bat roost visits of 2012 is rather complicated and difficult to unpick in retrospect; it appears that an attempt was made to prevent bat access to the interior of the church, which was identified as being via a plasterwork ceiling in the chancel, the main roost being in the chancel roof, which was repaired under an EPSL. So the referenced "exclusion" would appear to have been carried out under the EPSL, rather than under the NE advice letter which followed the RRF. The RRF states that it was following up on the failure of the exclusion to keep bats out of the chancel and nave. Bats had simply responded by changing access points. The subsequent advice letter from NE (addressed to the architect Andrew Boyce of Ferry & Menim) gives authorisation for the remaining access around the eaves to be sealed during the autumn of 2012. It is not clear what safeguards were included in this consent to ensure that the favourable conservation status (FCS) of the bats would be maintained following exclusion, if any. Neither can I find any reference to the work having been carried out. Tony Lane (who carried out the RRF) spoke of the "saga" continuing, but there is no evidence of any concerns being raised to the proposed bat exclusion (which may seem surprising given the controversy ignited by a similar proposed exclusion in North Yorkshire, at Ellerburn Church).

There is some evidence of previous attempts to prevent access to the interior visible at the west end of the nave (see photos below). This work does not appear to be referenced in either the EPSL or the NE advice letter.

Photo 2 Location of wire mesh west end of nave

Photo 3 Detail of wire mesh at west end of nave

The EPSL of 2010 permits: " Capture. Disturb. Damage or Destroy Breeding Place. Damage or Destroy Resting Place" of 116 Natterer's bats and 15 common pipistrelles between the dates of 17/01/2011 and 31/08/2012. The work which is authorised to cause the roost destruction / damage, and disturbance / capture of bats, is described as "Relaying of tiles to chancel and vestry roofs, localised repairs to leadwork on nave & aisle roofs, renewal of lightning conductor system, localised tower repairs, including re-leading of roof and stone repairs". A separate method statement (MS) is referenced within the licence, a copy of which is appended. The MS, prepared by Wold Ecology, specifically describes all works to roosts as temporary (with the exception of one small common pipistrelle roost), and that bats are to be allowed to return to all of the identified breeding roost locations. In this way the MS ensures that the FCS of the Natterer's bats will be maintained. There is no mention within the MS of any objective of excluding bats from the interior of the church, neither by design nor by accident; this appears to conflict with the subsequent RRF and NE advisory letter.

The 2010 Wold Ecology survey (referenced as Wold 2010) found two "separate" maternity roosts of Natterer's bats within the church: one in the north elevation of the North Aisle (63 bats), and one in the north elevation of the Chancel (52 bats). The report following the surveys states that the North Aisle roost will be disturbed by repairs, and that the Chancel roost will be damaged by re-roofing. There is no mention of any objective of excluding bats from any maternity roosts, nor of the EPSL covering any work affecting bats designed to mitigate the internal impact caused by bat droppings and urine.

The North Yorkshire Bat Group have no records of Natterer's bat maternity roosts within 5km of the site. NEYEDC's data revealed a recorded maternity roost of Natterer's bats at Derwent Farm, grid ref SE7200749777. This is around 4.5km south of the site but is connected via the River Derwent (see Figure 1 below). EYBG's records have a recorded Natterer's bat "summer roost" at West Farm, 500m to the south of the church (see Figure 2 below), which, when queried, was found to have

been recorded by Wold Ecology in 2014 during a commercial survey, but there is no further information on the nature of the roost. MAB Ecology have surveyed a range of farm buildings at West Farm in 2017 and 2020, with only non-breeding common pipistrelles found, though without further information about the 2014 survey, we cannot say if the records relate to the same buildings. The MAB surveys were to support a barn conversion project; it is unlikely that a maternity roost, even if abandoned, would not have been picked up in the course of the survey.

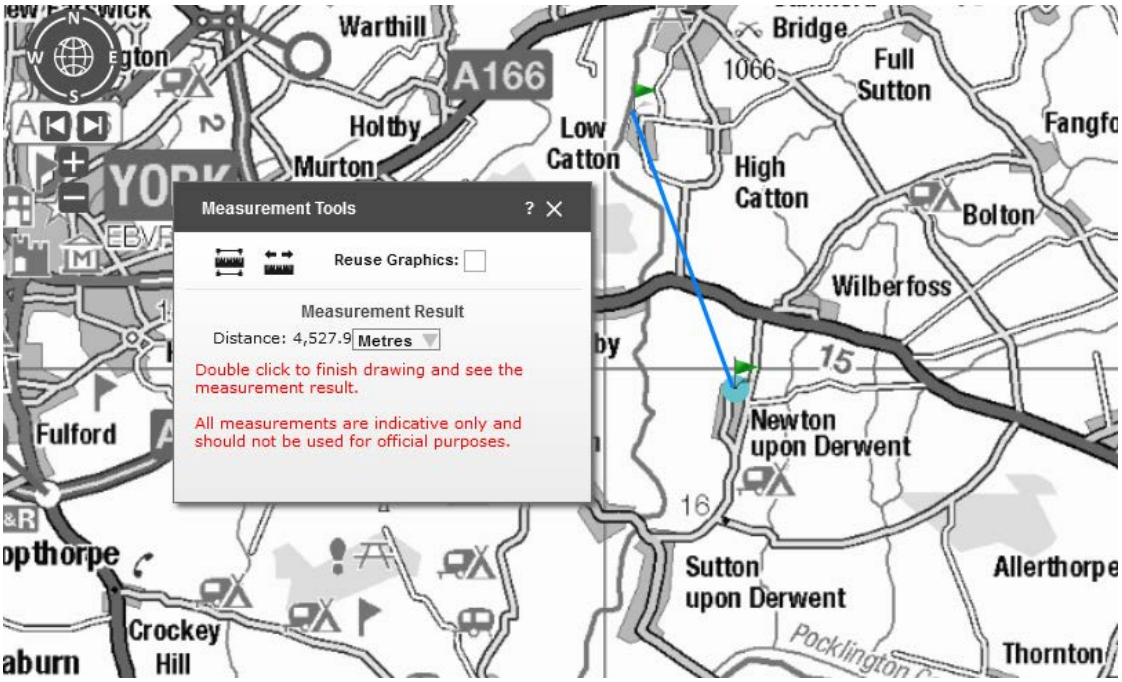


Figure 1 Location of next nearest known Natterer's bat maternity roost in relation to Low Catton.

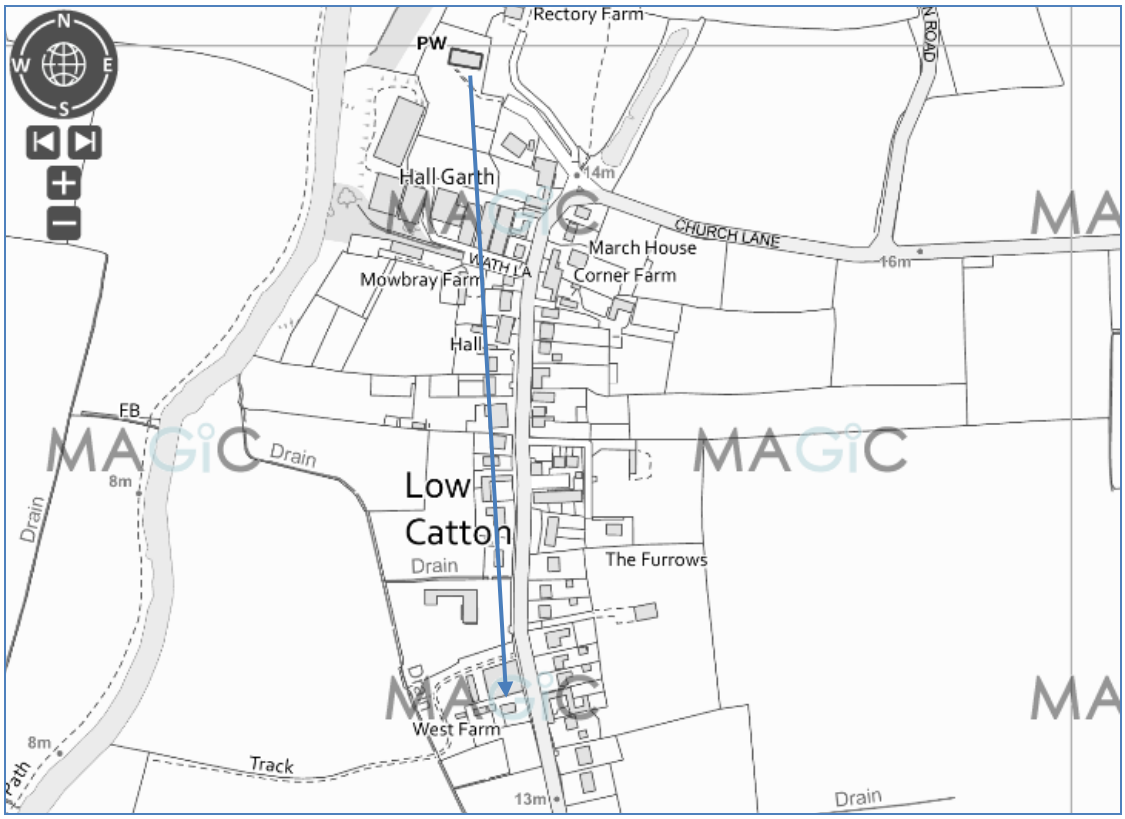


Figure 2 Location of "summer roosts" at West Farm 2014 in relation to Low Catton church

Aerial imagery shows that the site is in a lowland arable landscape with patches of woodland. The landscape looks relatively unattractive for foraging bats; drainage and woodland / hedgerow clearance for agriculture is likely to have significantly depleted the habitat value over the last 50 years or more. The most valuable habitat feature remaining is the River Derwent; Natterer's bats are known to make use of river corridors for moving between habitats through the season, and it is likely that the proximity to the river is the main factor in supporting this colony's survival. The failure of agri-environment schemes to effect any landscape scale habitat improvement, or even to stem the rate of decline of UK lowland farmland biodiversity, is a major concern for the conservation of bat colonies such as this.

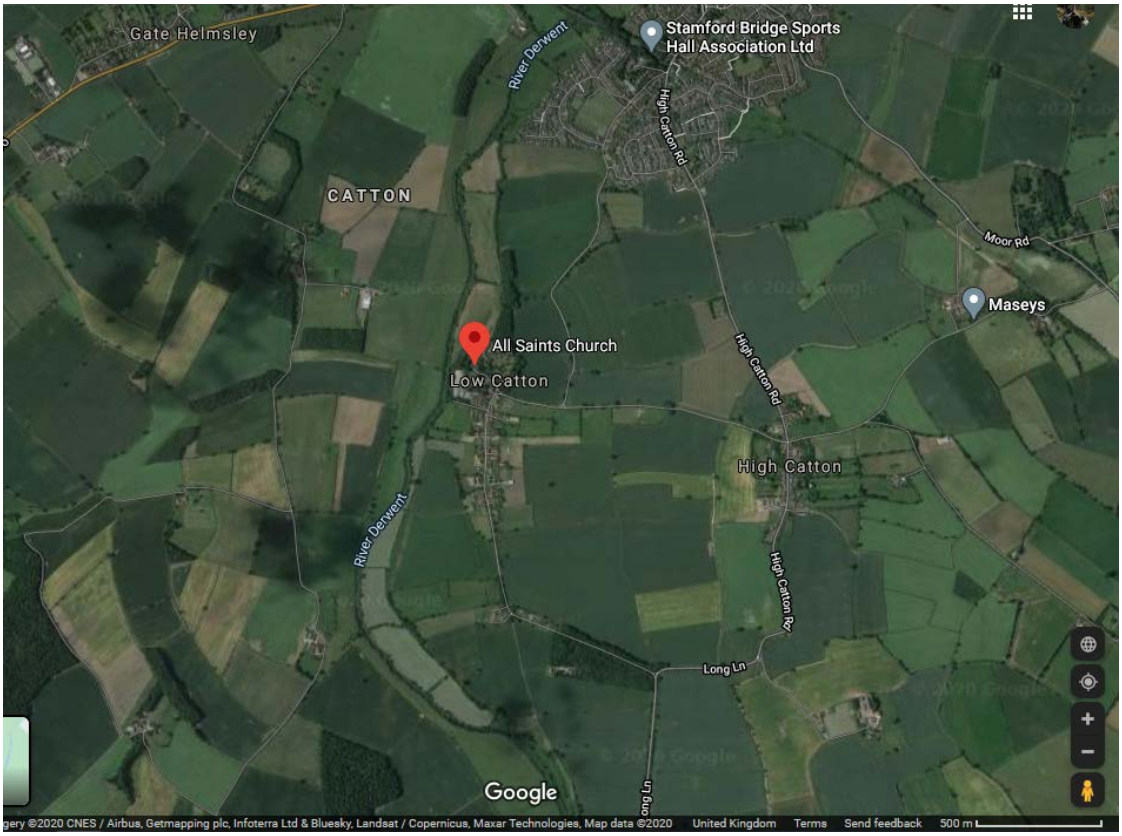


Figure 3 Aerial imagery of landscape around the church

5.2 Visual Inspections

The first visual inspection was made on 13th Jan 2020. The roof was leaking badly due to lead theft. Significant urine damage to features (particularly timbers and brass artifacts) was noted. Bat droppings were present throughout – higher densities were mainly visible on the walls, as well as in the centre of the nave.

Subsequent bat activity surveys included visual inspections which will be included in the results.

Photo 4 Urine damage to wooden hand rail

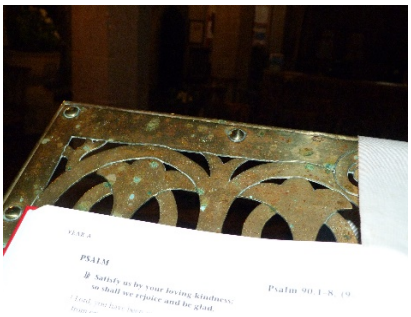
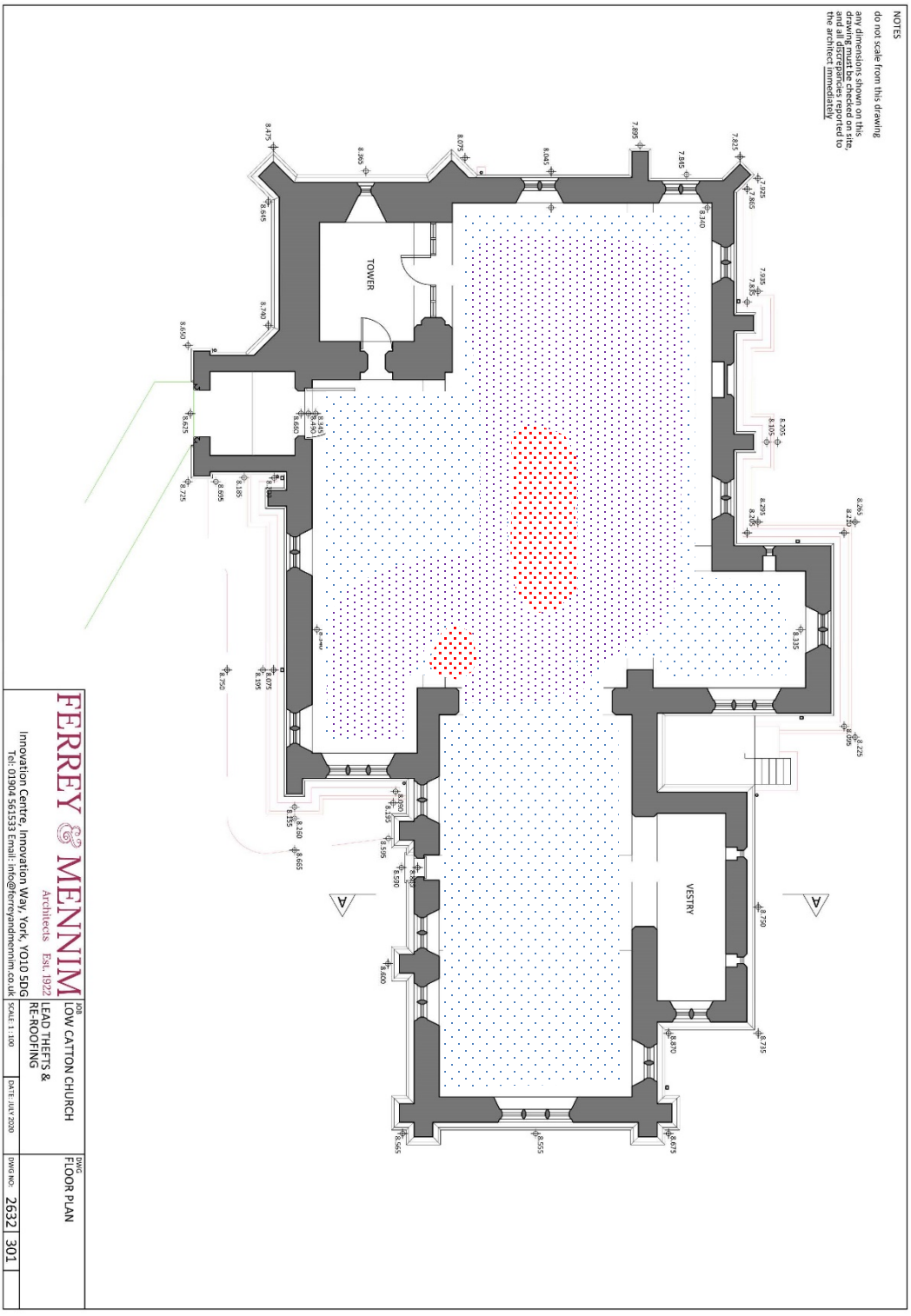


Photo 5 Urine damage to lectern

Photo 6 Droppings on radiator

Photo 7 Showing combined droppings and urine damage on furniture



Key:

5-20 droppings per m^2

20-50 droppings per m^2

>50 droppings per m

5.3 Bat activity Surveys

Dawn / Dusk Internal Survey June 2020

Date: 30th to 31st June 2020
Start times: 21.00pm and 3.30am **End times:** 23.15 and 4.30am
Sunset / Sunrise: 21.39 and 04.36
Conditions: 16°C start, 14°C end. Dry at start with 100% cloud cover, heavy rain started around 2am, finished at 3.35am. Slight breeze throughout (BF2).

Surveyors: Giles Manners (GM); Ione Bareau (IB)

Equipment used: 1x Pettersson D230; 1x Elekon Batlogger M; 3x Sony Camcorders Ax100 with Ludicrous Lumens IR torches.

Set-up:

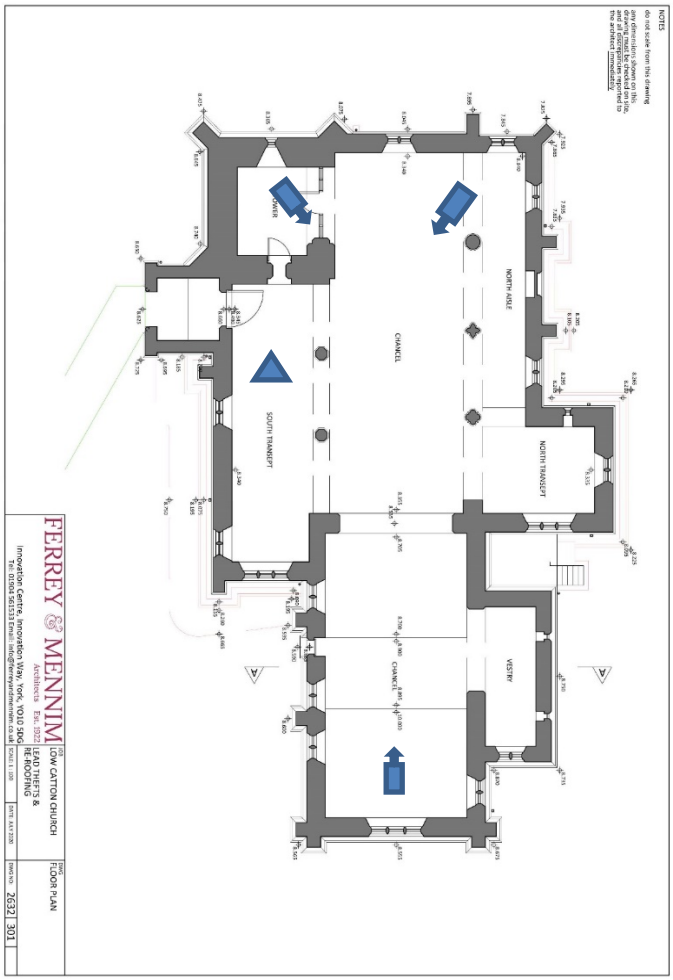


Figure 4 Set-up for internal dawn / dusk survey June 2020: arrow boxes = IR cameras; BL= batlogger.

Results summary:

Dusk:

Camera #2

21.48 Natterer's bat (Mnat) emerged from central beam of nave, and went back in. At 22.06 Mnats observed with IR camera #2 in nave and recorded 47x Mnat emerging from centre nave, flying within nave, mostly, some into chancel; high numbers in flight within church (c 20 at any one time). A large amount of exit / re-entry continued throughout the survey, making a roost count impossible. Flight within the church had significantly reduced by 23.10.
IR camera #3 in tower picked up exit point, but was initially pointed away from that point, so numbers using the tower could not be confirmed.

Camera #3

Bats active within tower at 20.58. Exit location (between joist and floorboard) detected at 21.10, out of sight of camera. Camera re-orientated; bat seen re-entering church at 21.19. From 21.20 approximately 35 Mnat were seen to exit via this route, though number likely to be higher.

Camera #1

This camera added nothing to the above – bat flight too high and indeterminate to detect whether bats were leaving via chancel.

Batlogger

1x common pipistrelle (Ppip) flying within church (ID confirmed by ultrasound) from 22.03 to 22.08, and again at 23.15. All other identified bat calls were Mnat.

Photo 8 Still image of 2x Mnat on central beam in nave, at dusk.

Photo 9 Mnat entering church from tower at 21.19.

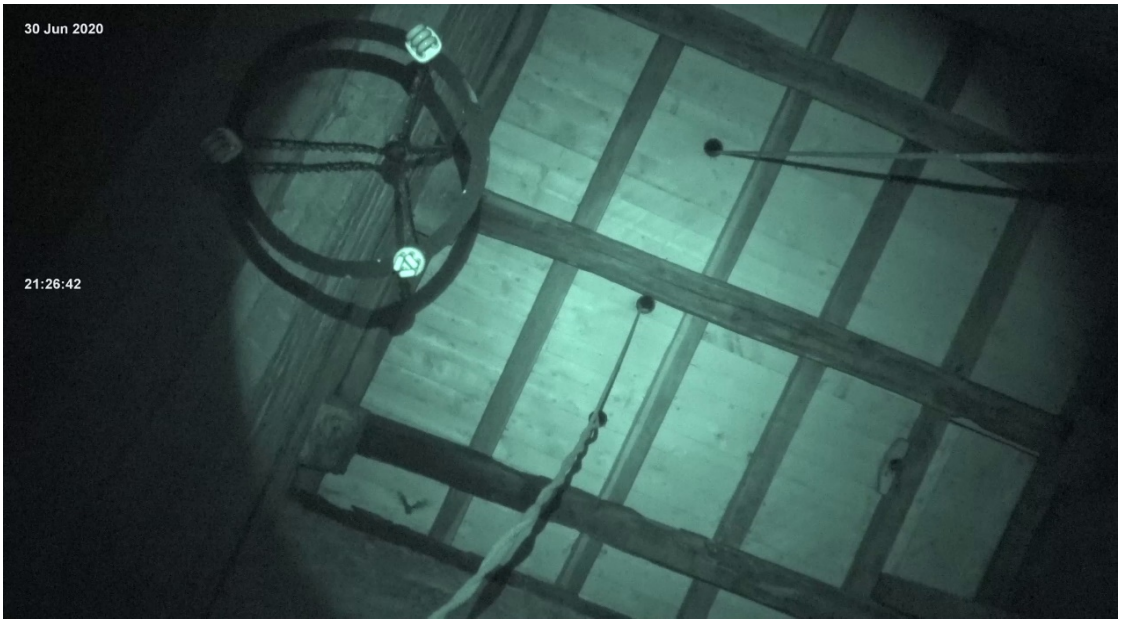


Photo 10 Mnat exiting church into tower at 21.26

Dawn

Camera #2 Nave

At 3.45, 5 Mnat in flight within nave, re-entry location not observed.

Camera #1 Chancel

At 3.41, 1x Mnat in flight, entered previous unknown roost location south east corner of nave.

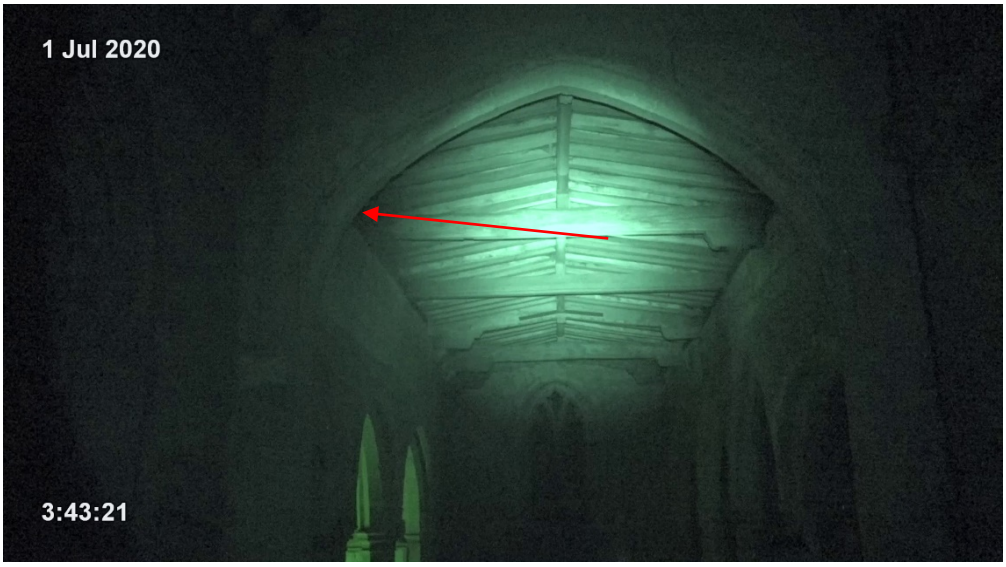


Photo 11 Re-entry location (south east corner of nave)

Photo 12 IR recording in nave

Photo 13 IR recording at base of tower

Dusk emergence survey and internal FLIR Survey 15/7/2020

Start times: 21.00pm **End times:** 23.15 **Sunset / Sunrise:** 21.27
Conditions: 14°C start, 13°C end. Dry, 100% cloud cover, light rain at 23.00. Still.

Surveyors: Giles Manners (GM); Ione Bareau (IB); Keira Manners (KM)

Equipment used: 1x Pettersson D220; 1x Elekon Batlogger M; 1x BatBox duet. T1020 FLIR Thermal Imaging camera; 2x AX100 IR cameras (internal).

Set-up:

Figure 5 Survey 2. 1 = T1020 FLIR; BL = Batlogger; 2= IB; 3= KM; a&b = IR cameras

Results summary:

Surveyor 2 noted 18x Natterer's bats emerging from tower louvres, starting at 21.49 and continuing until 23.00 after which time it was too dark to see - she noted that initial emergences may have been missed as they came from the west facing louvres which were hard to cover.

Surveyor 3 noted 2x common pipistrelles emerging from masonry crevice by drainpipe, one at 21.33, the second at 21.40 (Figure 6). Following which, at around 21.55 Mnat were seen to emerge from the rear of the organ (Figure 7), but by this time it was very dark at that side of the church and a count was not possible – 15 were estimated to have exited.

The FLIR camera operator noted first internal bats at 21.49; by 23.10 there were still 5 bats flying inside when the survey ended. The maternity roost was identified as central nave (Figure 8). The bats were very inquisitive, and repeatedly landed on various roof timbers, flying in and out of the tower. There were around 9 bats in flight at one time.

The IR cameras did not detect any bats flying from the nave roost to the organ area, so we could not confirm that the bats leaving the church from behind the vestry were from the same roost.

Figure 6 Common pipistrelle emergence location

Figure 7 Mnat emergence location north of vestry

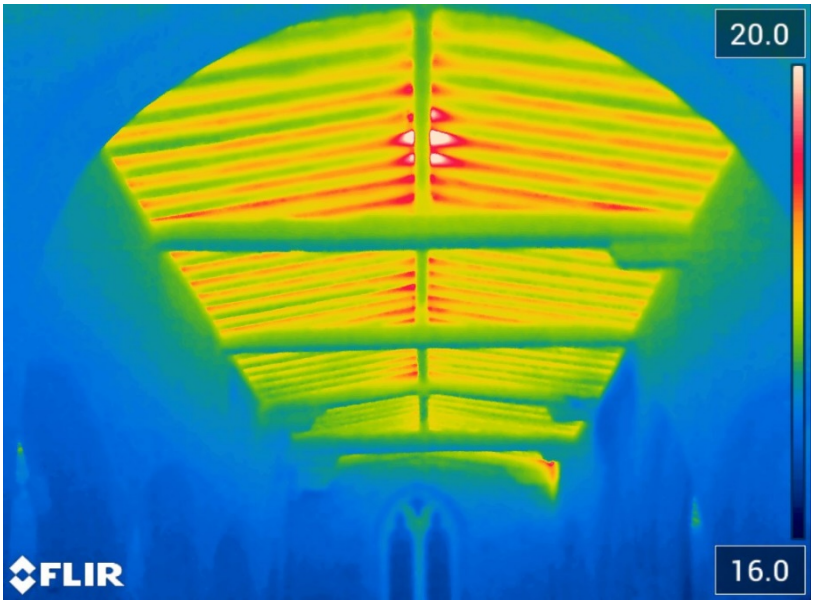


Figure 8 FLIR imagery of nave roost (visible by heat radiation)

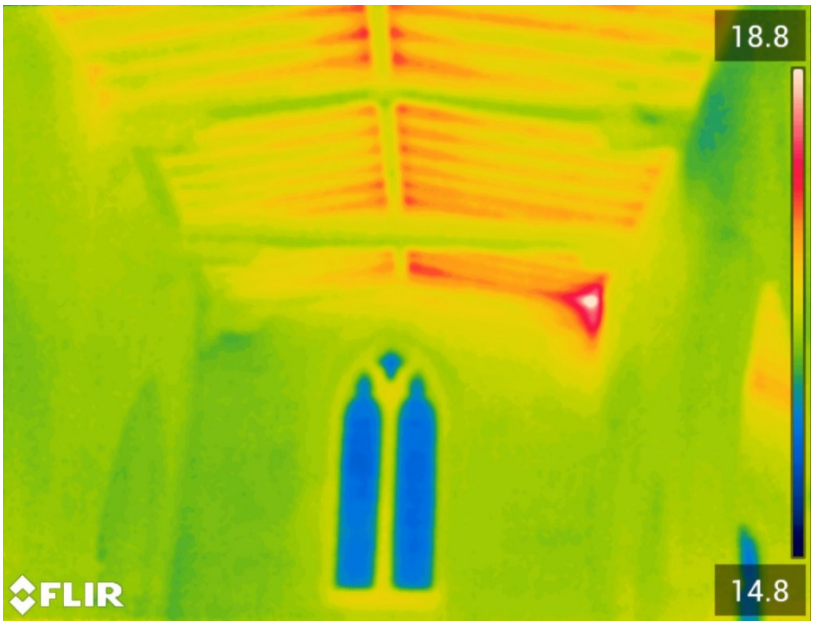


Figure 9 Southwest end of nave – similar hotspot to nave roost but, no bats seen

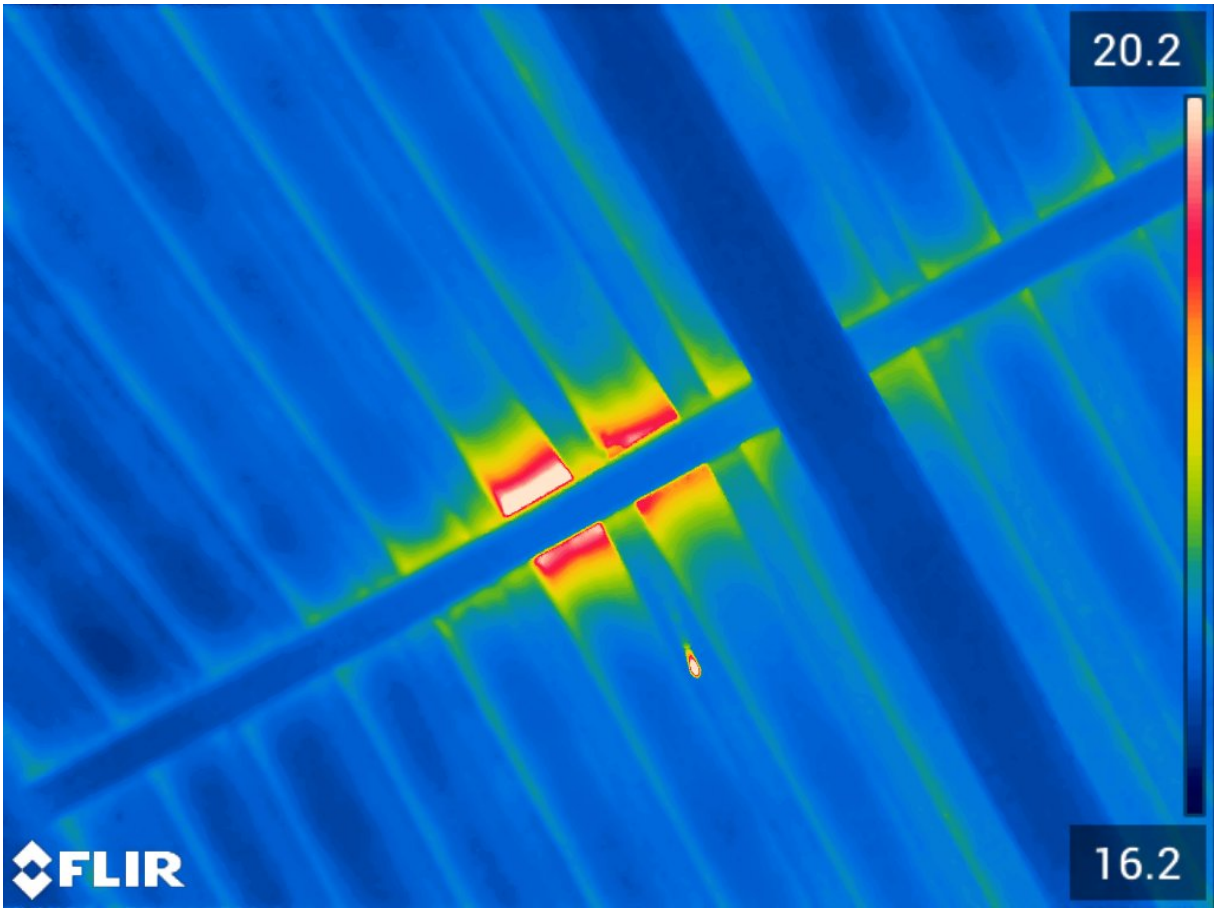


Figure 10 Bat exiting the central nave roost

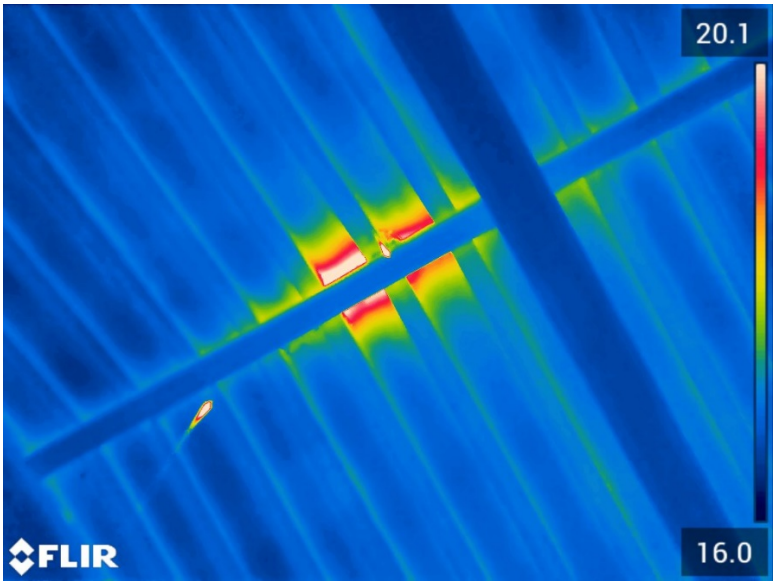


Figure 11 Re-entry and emergence – nave roost

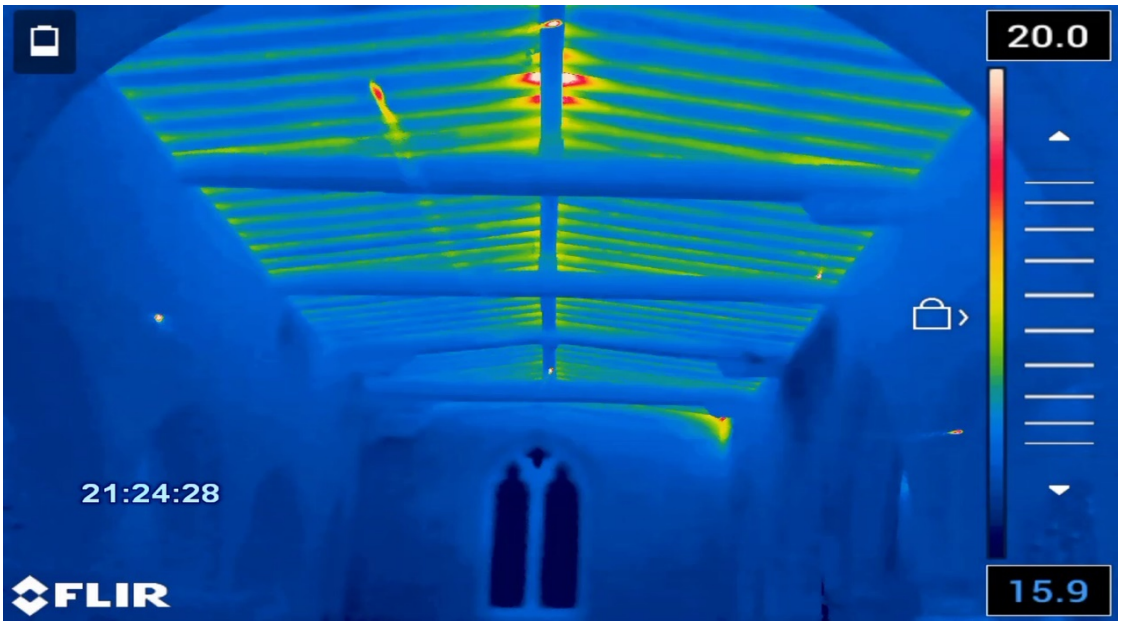
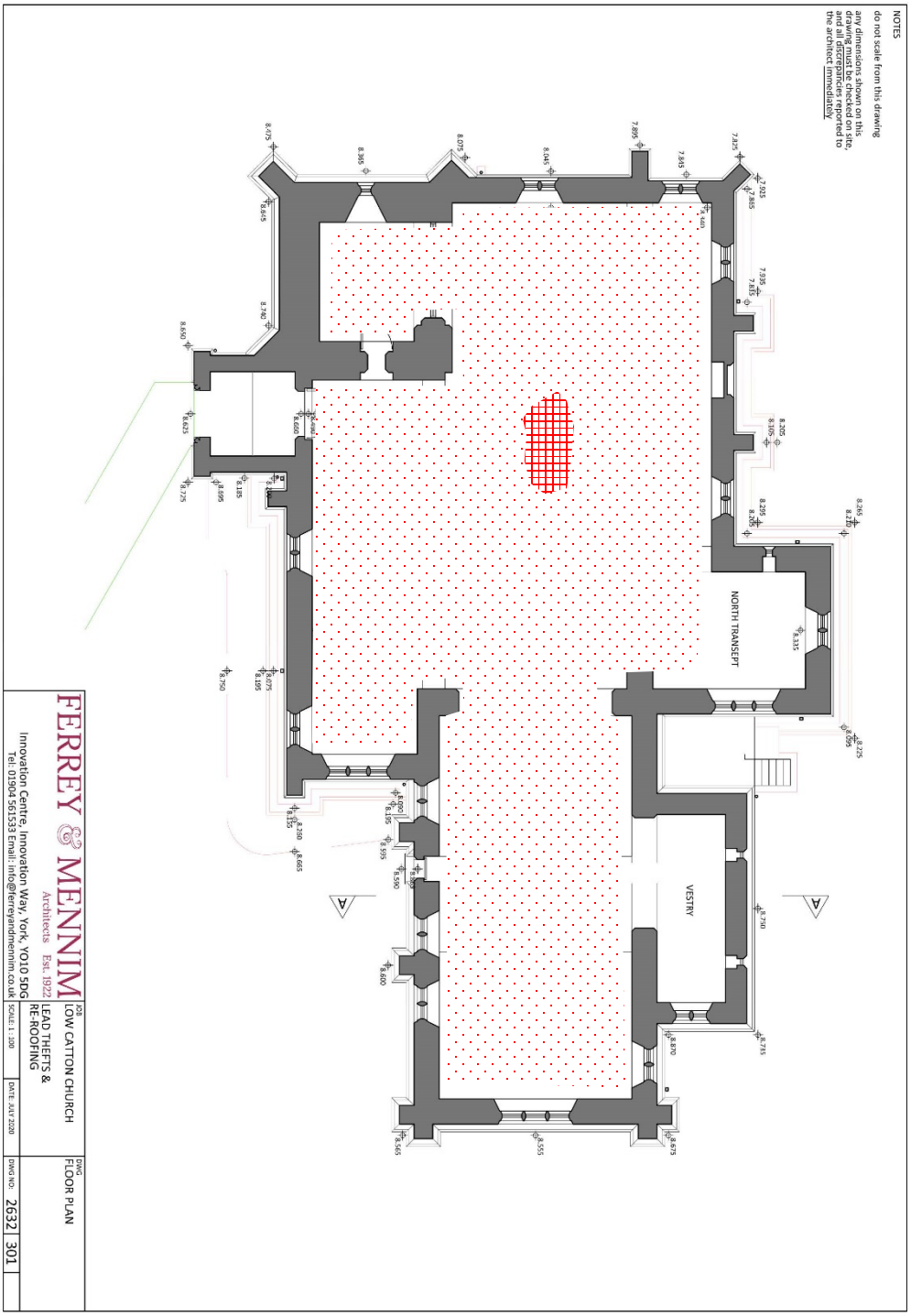


Figure 12 Typical flight activity within church - six bats in flight in this FLIR screen capture

Internal conditions had changed – large amounts of droppings in central aisle. I think this needs more explanation


NOTES
do not scale from this drawing
any dimensions shown on this drawing must be checked on site, and all discrepancies reported to the architect immediately
NORTH TRANSEPT
VESTRY
A
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FERREY & MENNIM
Architects Est. 1922
Innovation Centre, Innovation Way, York, YO10 5DG
Tel: 01904 561533 Email: info@ferreyandmennim.co.uk
JOB LOW CATTON CHURCH
LEAD THEFTS & RE-ROOFING
SCALE: 1 : 100
DATE: JULY 2020
DWG FLOOR PLAN
DWG NO: 2632 301

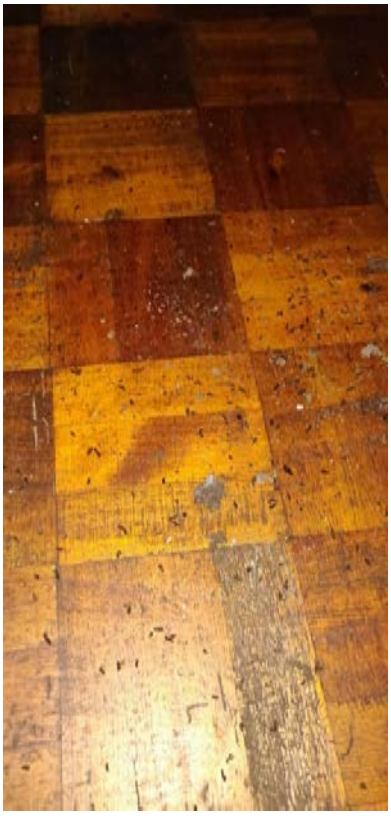

Photo 14

Dusk emergence survey and dawn re-entry / internal FLIR survey 11/08/2020

Start times: 20.30pm and 04.00 **End times:** 22.30 and 05.30 **Sunset / Sunrise:** 21.27
Conditions: 20°C start, 18°C end of dusk. Dry, 100% clear. Dawn - 100% cloud, dry, 15C.

Surveyors: Giles Manners (GM); Ione Bareau (IB); Keira Manners (KM); Daniel Henderson (DH); Jake Walker (JW)

Equipment used: 1x Pettersson D220; 1x Elekon Batlogger M; 1x BatBox duet.

T1020 FLIR Thermal Imaging camera (internal).

2x IR cameras

Set-up:

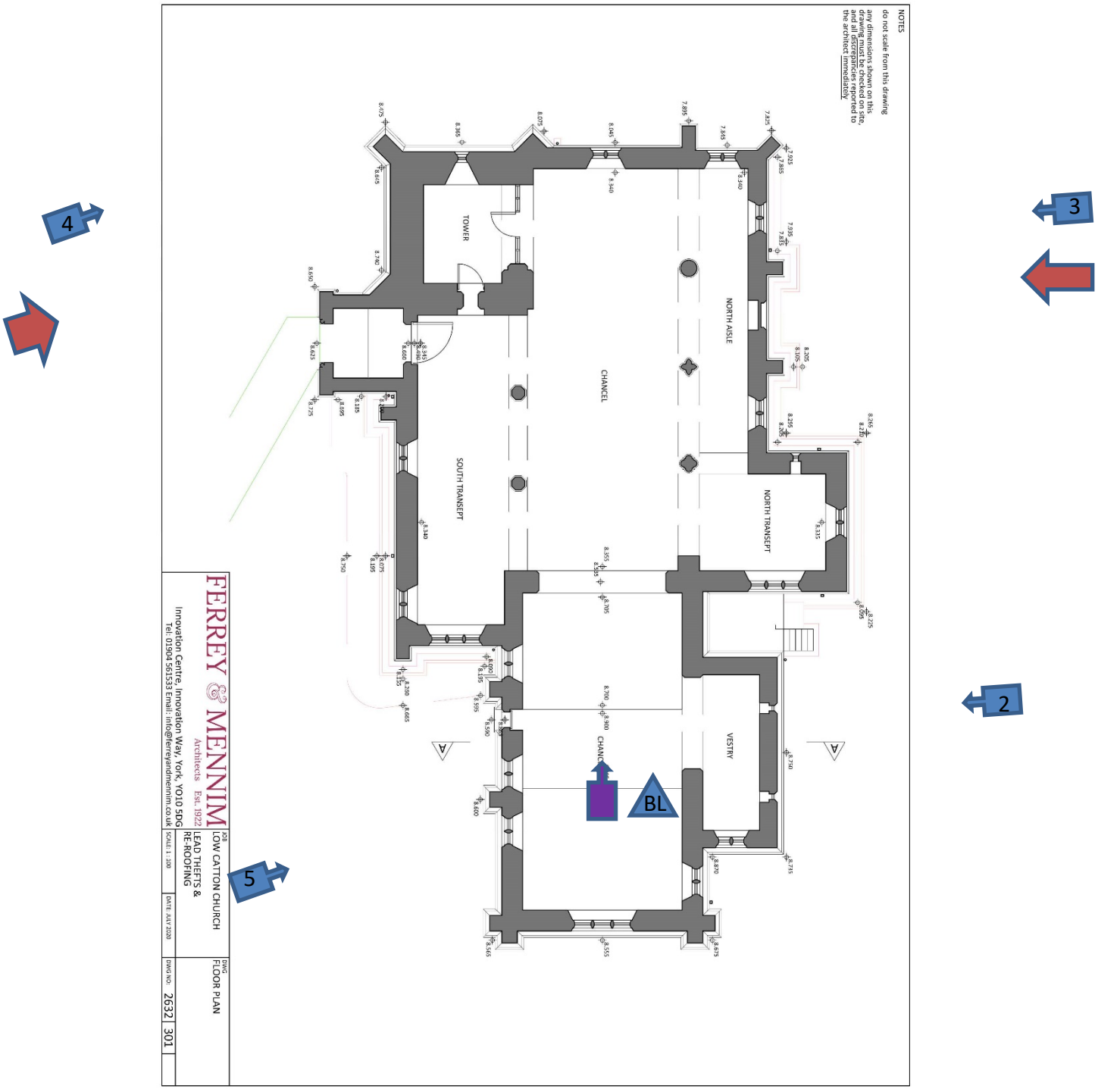

Figure 13 Internal equipment survey: 1 = GM+ T1020 FLIR; BL = Batlogger; 2= IB; 3= KM; 4=JW; 5=DH. IR cameras = red arrows; purple = FLIR

Results summary:

Surveyor 3 noted 11x Natterer's bats emerging from tower louvres.

Surveyor 2 noted Natterer's bat emergences from under eaves, not possible to count, too dark. Started at 21.18.

The FLIR camera operator noted first internal bats at 21.30.

Dawn results:
North vestry access point swarming began around the access point at 435am - c.16 bats maximum at any time. Re-entry analysis ongoing.

Tower louvre access – swarming in progress at 420am. Re-entry analysis ongoing.

Figure 14 Natterer's bat emergence north vestry

Photo 15 Close up view of vestry access location

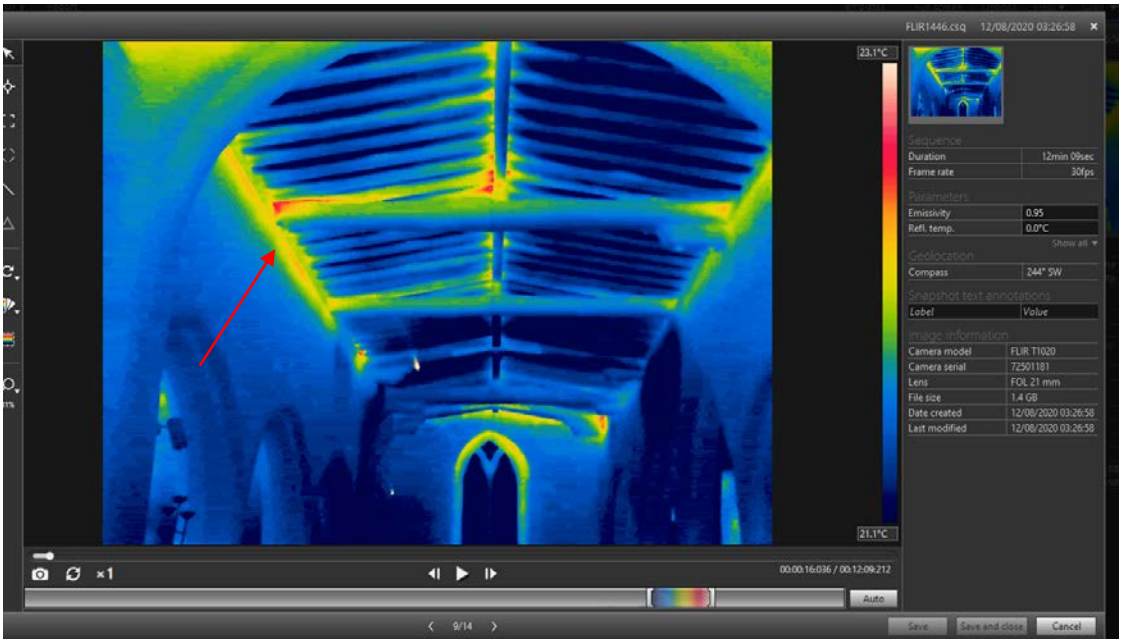

Figure 15 New roost on left (south) of nave.

Photo 16 Dawn swarming (re-entry) location, and emergence location, south tower louvre.

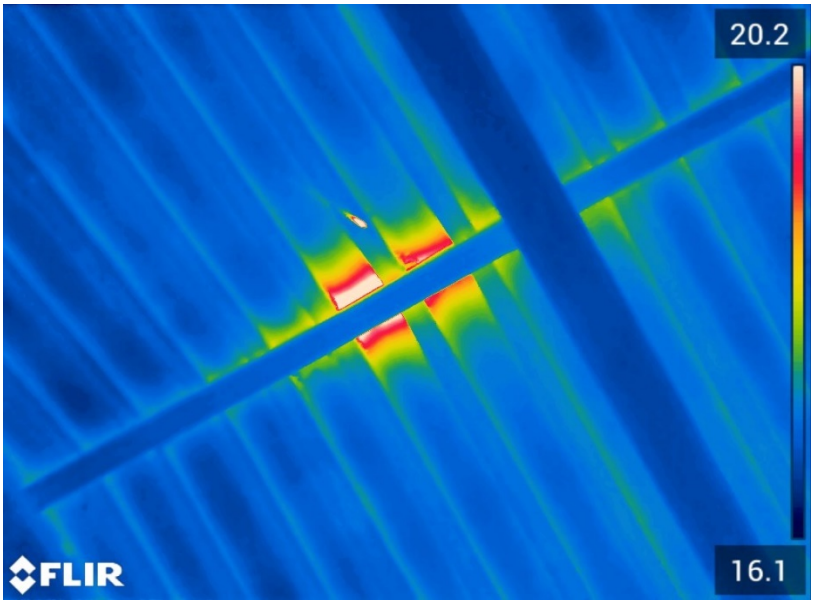

Figure 16 Roost in central nave roof (with bat in flight)

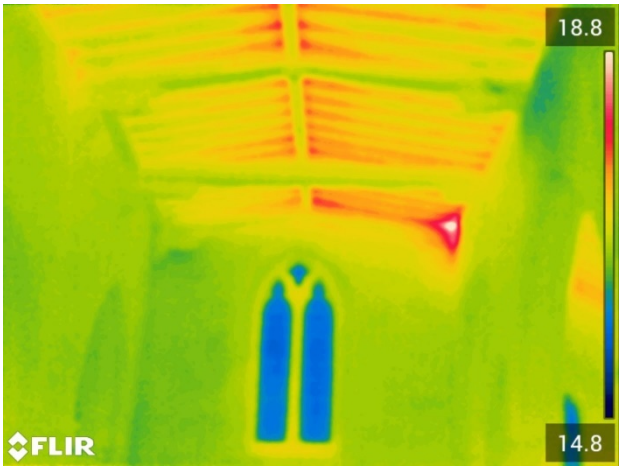

Figure 17 Hot spot to north west of nave

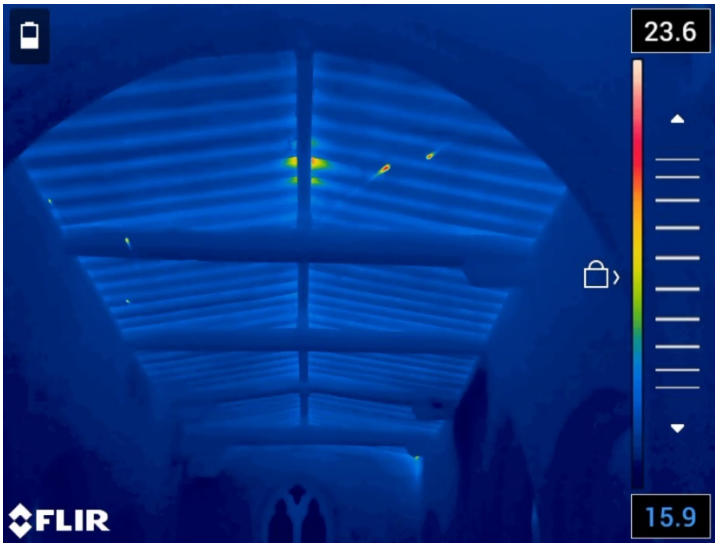

Figure 18 Five bats in flight around nave

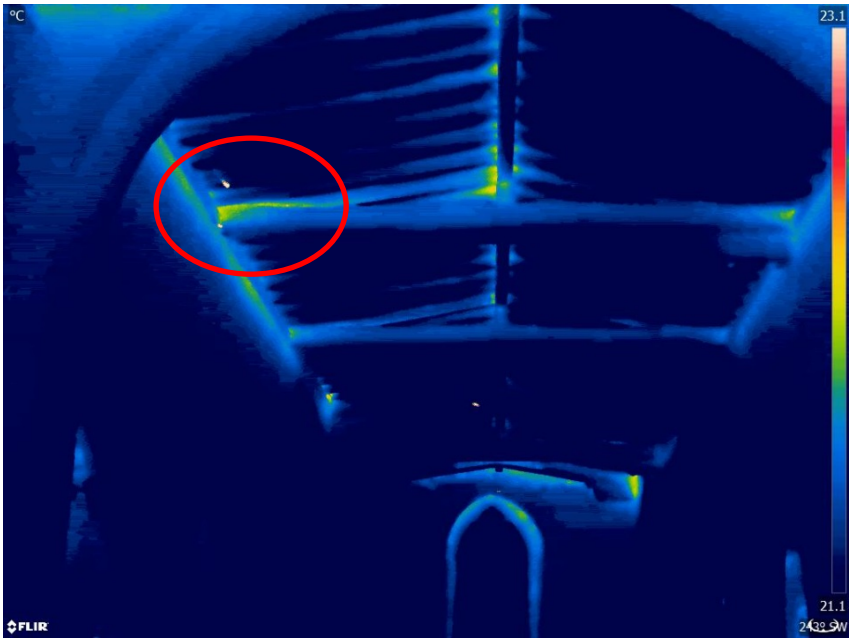

Figure 19 Two Mnat bats entering roost south east of nave roof.

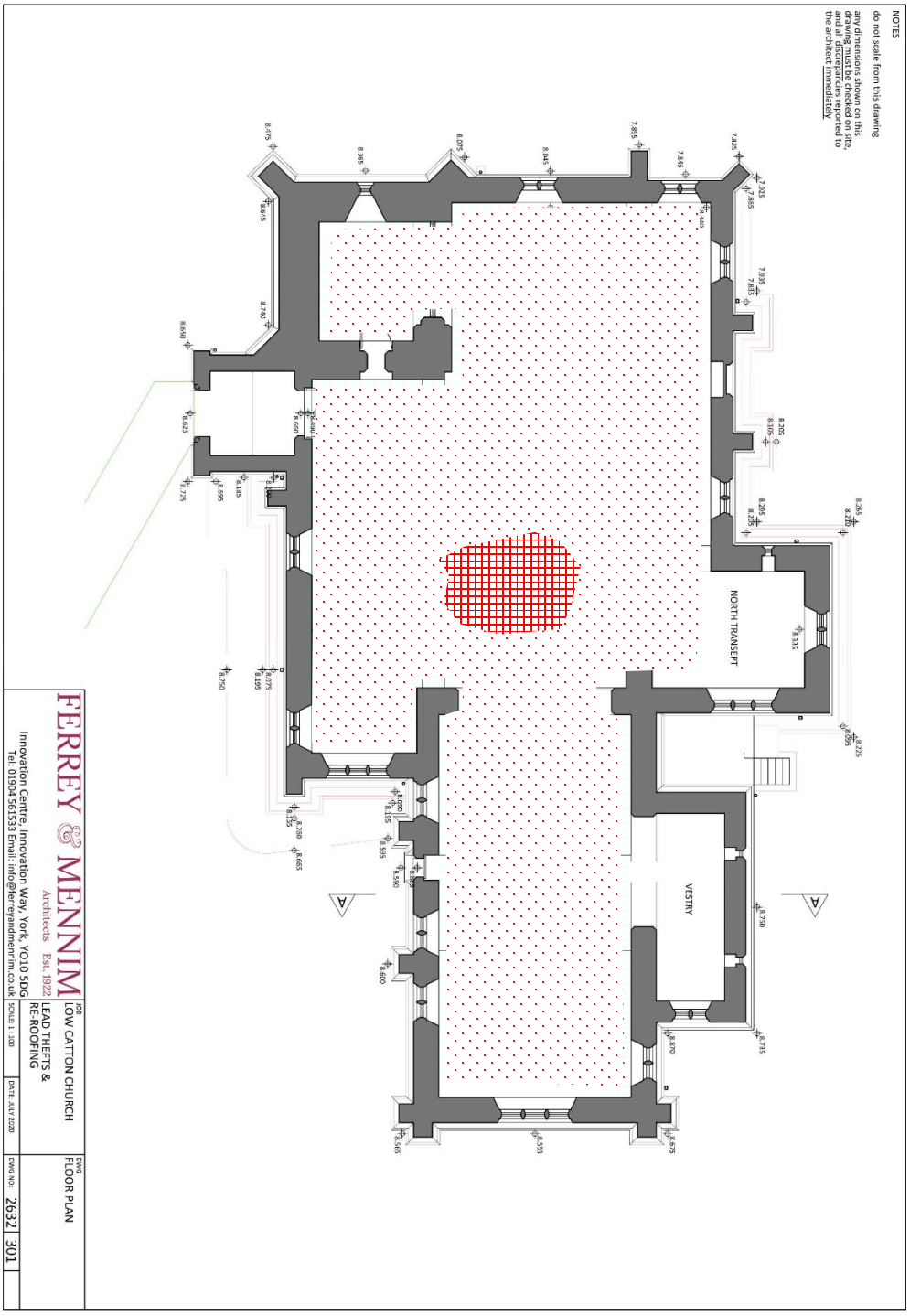

Figure 20 Droppings distribution: red hatch = >100m^{-2}; red dots = <5m^{-2}.

Unmanned bat detector surveys

In January 2020, 2 recorders were installed in the church, one in the nave and one in the chancel, from 12th to 26th Jan. Only one night of activity was detected (24th Jan) in which 37 pipistrelle calls were identified, and 1 Mnat.

Recorders were installed again in May and left running until the end of October, with data removed / batteries changed on 3 occasions. The combined results are shown in figures below see Figure 21. These results only show calls identified to species at more than 0.9 degree of confidence, the actual number of bat calls extracted are much higher, by a factor of around ten. Species other than Mnat and Ppip have been excluded due to very low numbers (<100) see Figure 22; these are likely to be mis-identified.

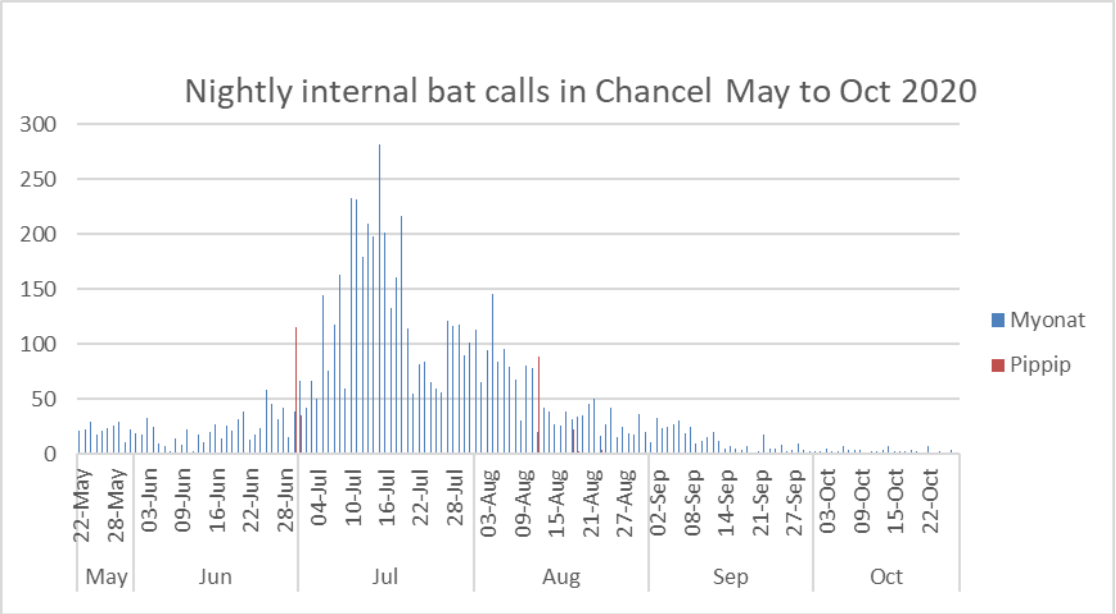

Figure 21 Nightly internal bat calls in Chancel May to Oct 2020

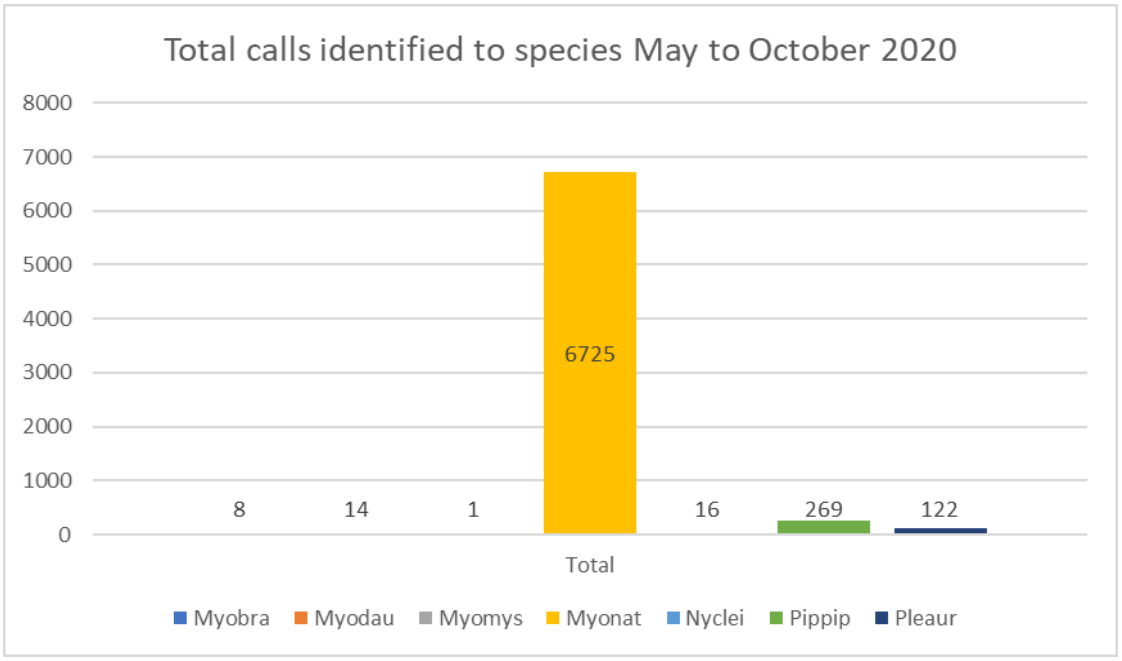

Figure 22 Total calls identified to species May to October 2020

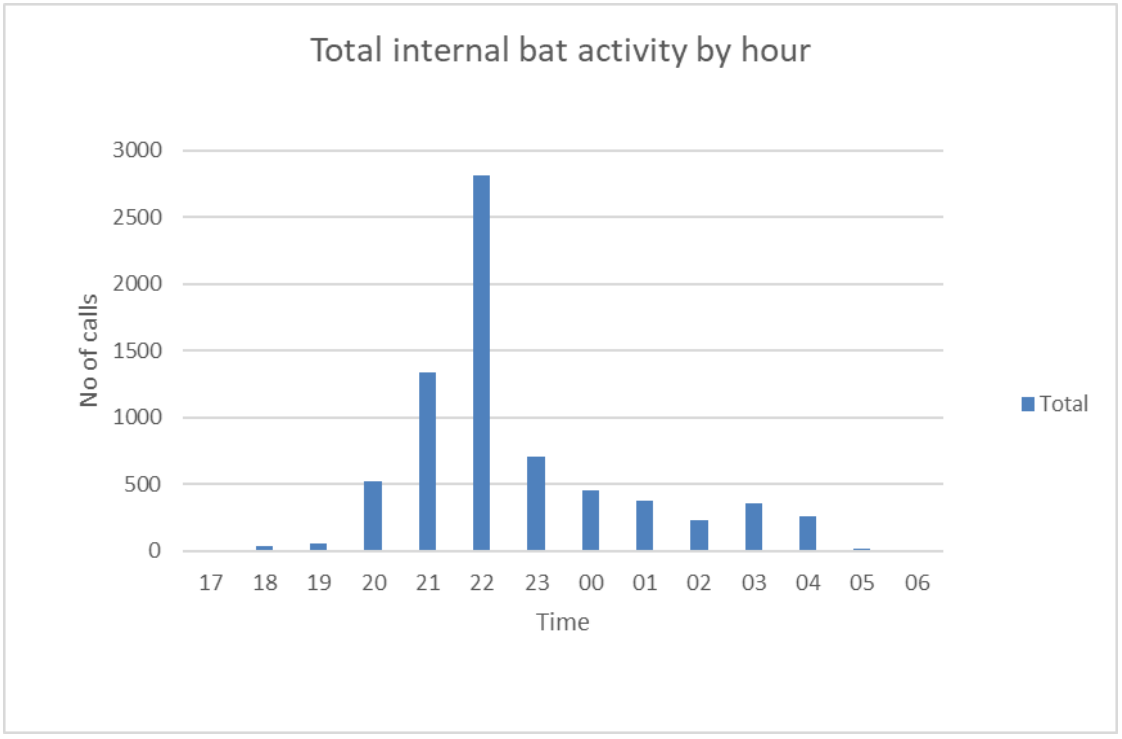

Figure 23 Total internal bat activity by hour

5.4 DNA Analysis

A selection of around 30 intact bat droppings taken from the nave and chancel in February 2020 were sent for a multiple species pQCR test at Ecotype Laboratories Ltd; only one species DNA was extracted, and that was Natterer's bat *Myotis nattereri* .

5.5 Results Summary

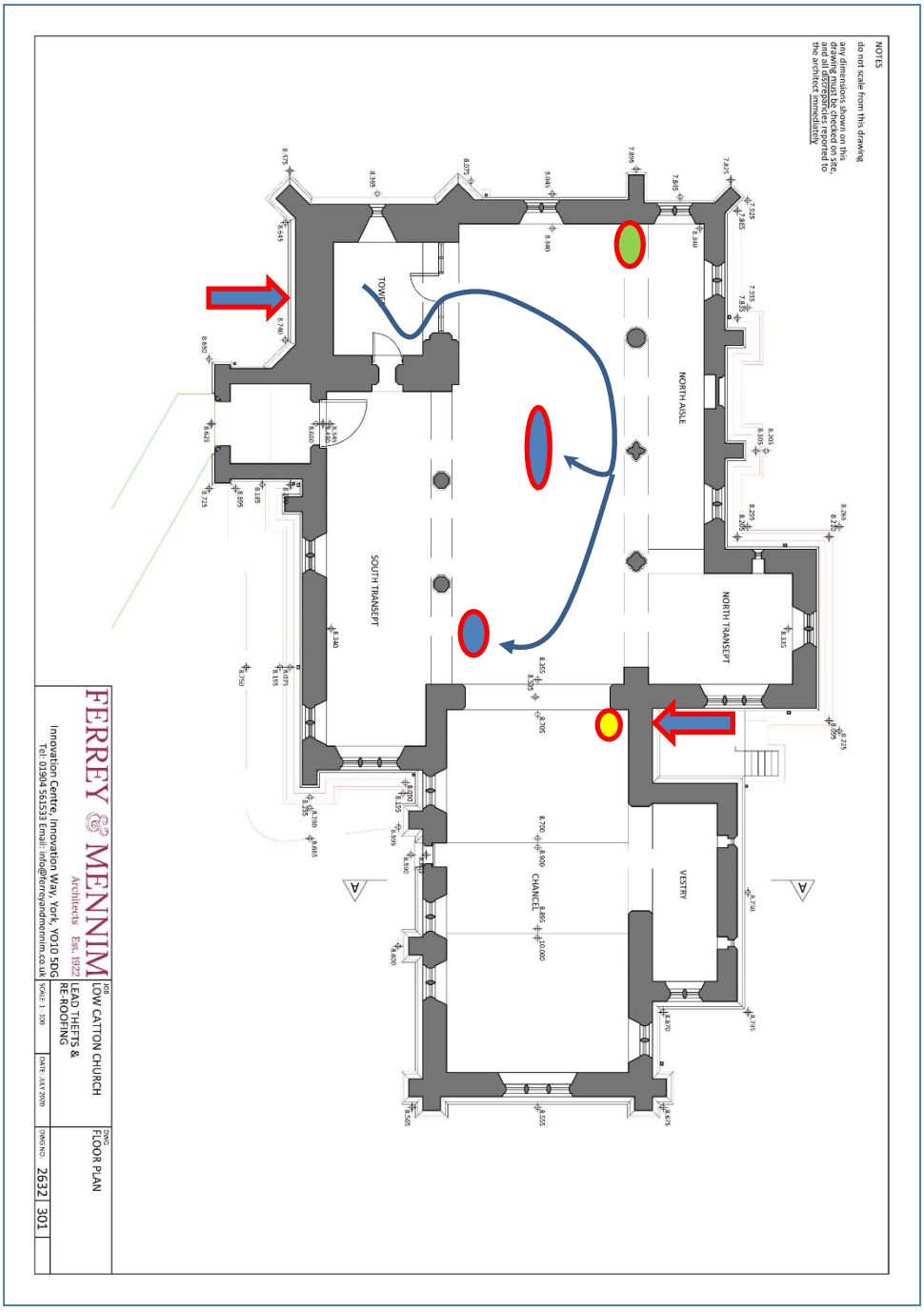

Figure 24 2020 Surveys summary

Key	
	Identified maternity roost locations
	Identified main access points
	Hot spot detected with FLIR, possible roost
	Suspected roost location in chancel

The nave roosts lie in-between the lead / timber roof, as shown in the roof strip photographs in the introduction, and the timber ceiling. A cross section supplied by the architects show that there is a reasonable void in this location.

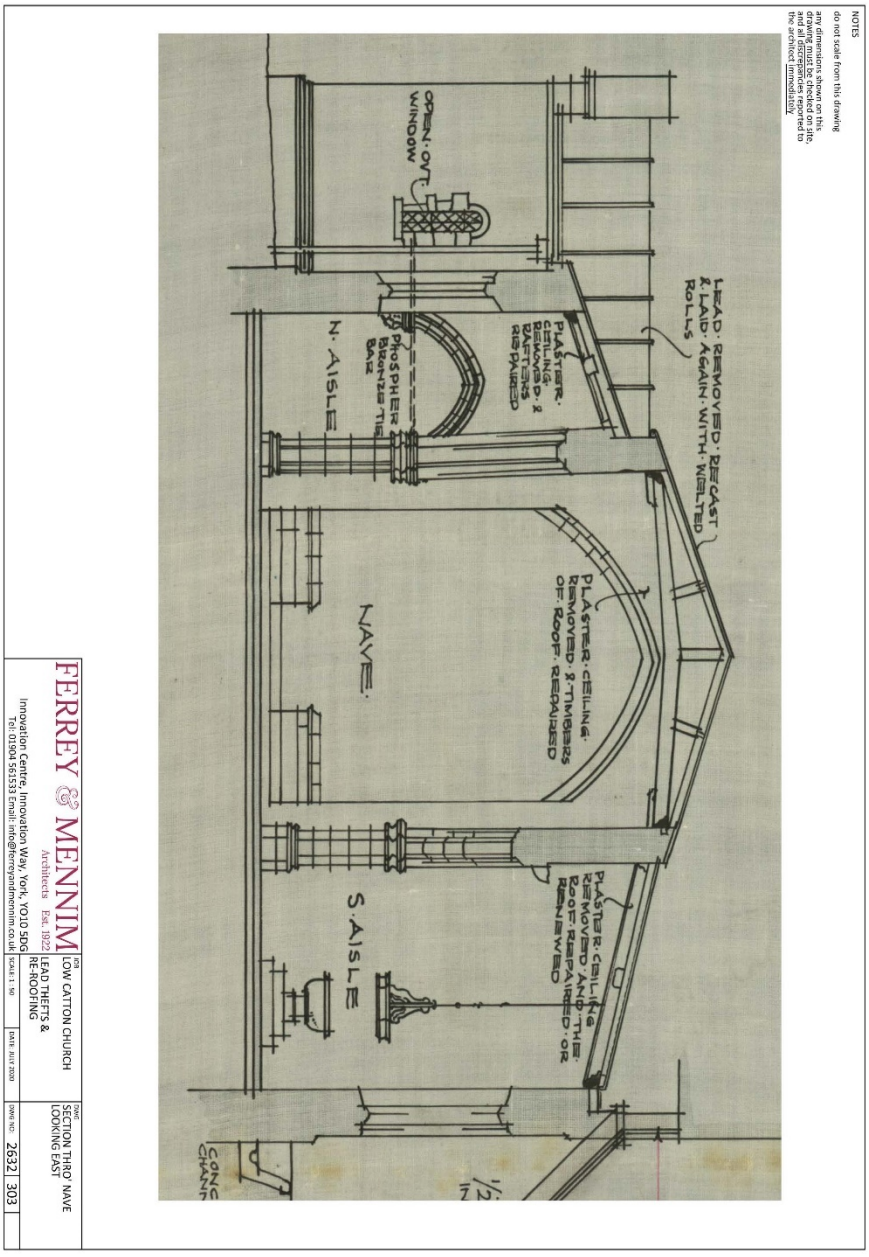

Figure 25 Cross section of nave roof showing small void

The chancel roof has no void but there is a cavity of sufficient dimensions for bats to roost.

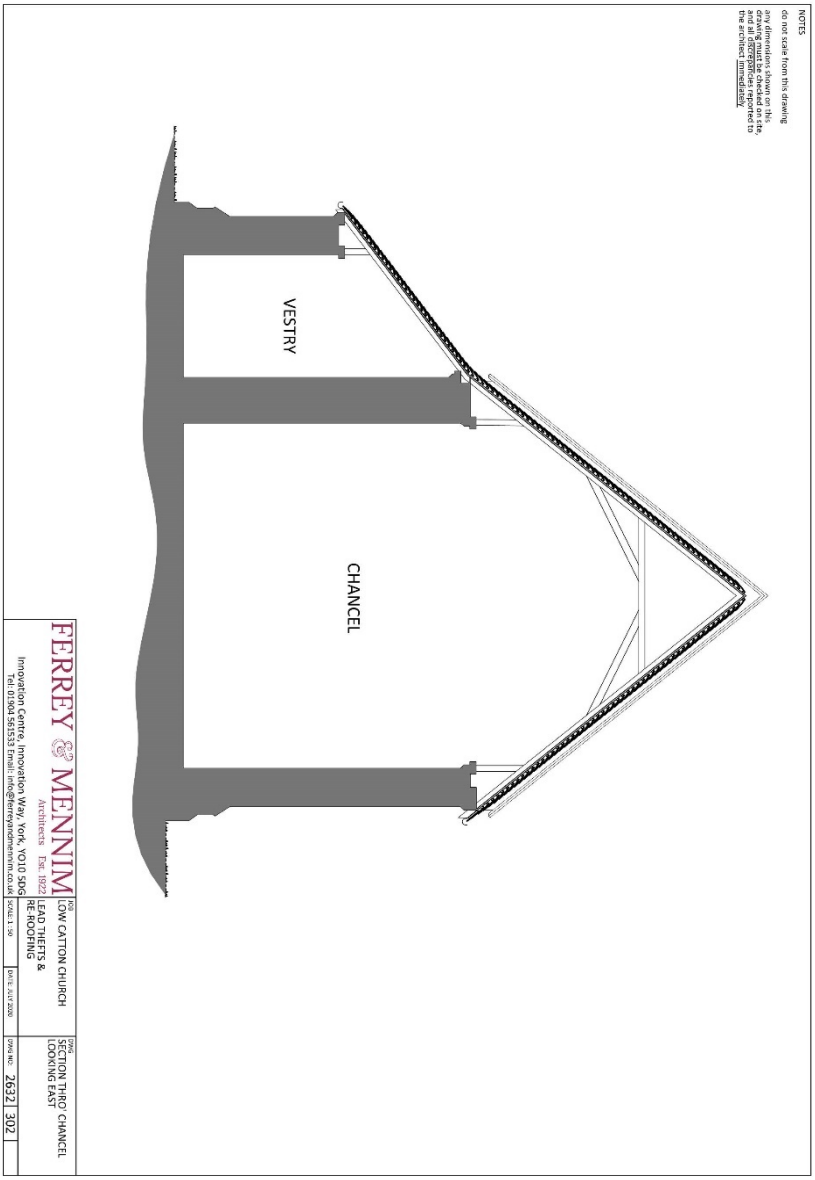

Figure 26 Cross section of chancel roof

Photo 17 Nave and chancel roofs

6 Discussion and Analysis

Our results demonstrate that the Natterer's bat maternity roost is active in at least 2 locations in the nave roof, with the actual roost being between the timber ceiling and the timber roof covering. Thermal imaging (FLIR) is able to detect the roost locations. The roosts are accessed from the interior of the church. Bats access the interior of the church via the tower louvre windows, then entering the church via a gap between the first floor boards / ceiling of ground floor. They are then flying into the nave, and throughout much of the church, before entering one or other of the roosts in the nave roof. Their activity, by repeatedly landing on various surfaces around the nave roof, indicates that there are a variety of potential roost locations around the nave. Neither of these identified roosts in the nave are directly accessible from the interior.

A third hot-spot was visible by FLIR in the north-west corner of the nave. No bats flying within the church showed any interest in this location. This area is directly

opposite an emergence point identified, which appears to be accessible from the outside. The Wold Ecology survey in 2010 detected a roost access point (roost 1) near to this location (see Figure 27 & Figure 28 below) – a major roost (63 bats) was detected nearby in the North Aisle. Although we found no evidence of emergence in these locations, the roost access points appear to be intact, and it is possible that numbers of bats had moved into the north west nave corner, as shown by the FLIR results. A repeated study of the external western wall of the church is recommended for 2020 to determine if this access is in use.

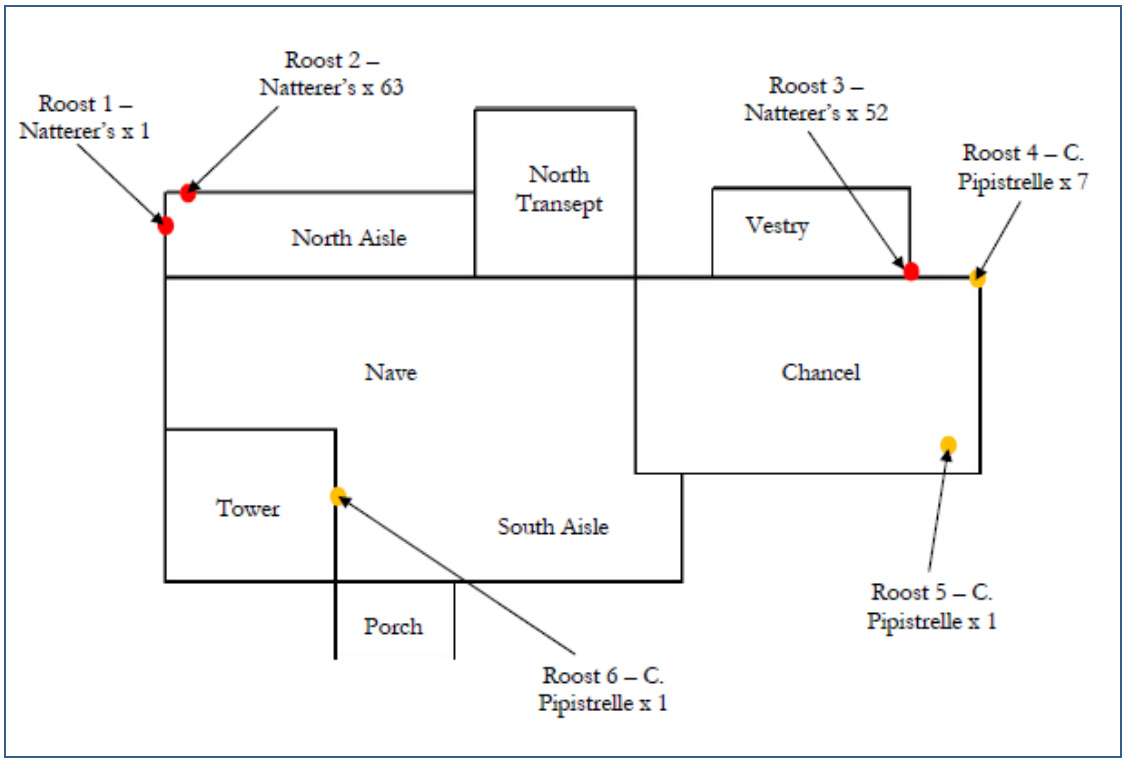

Figure 27 Wold ecology 2010 survey results

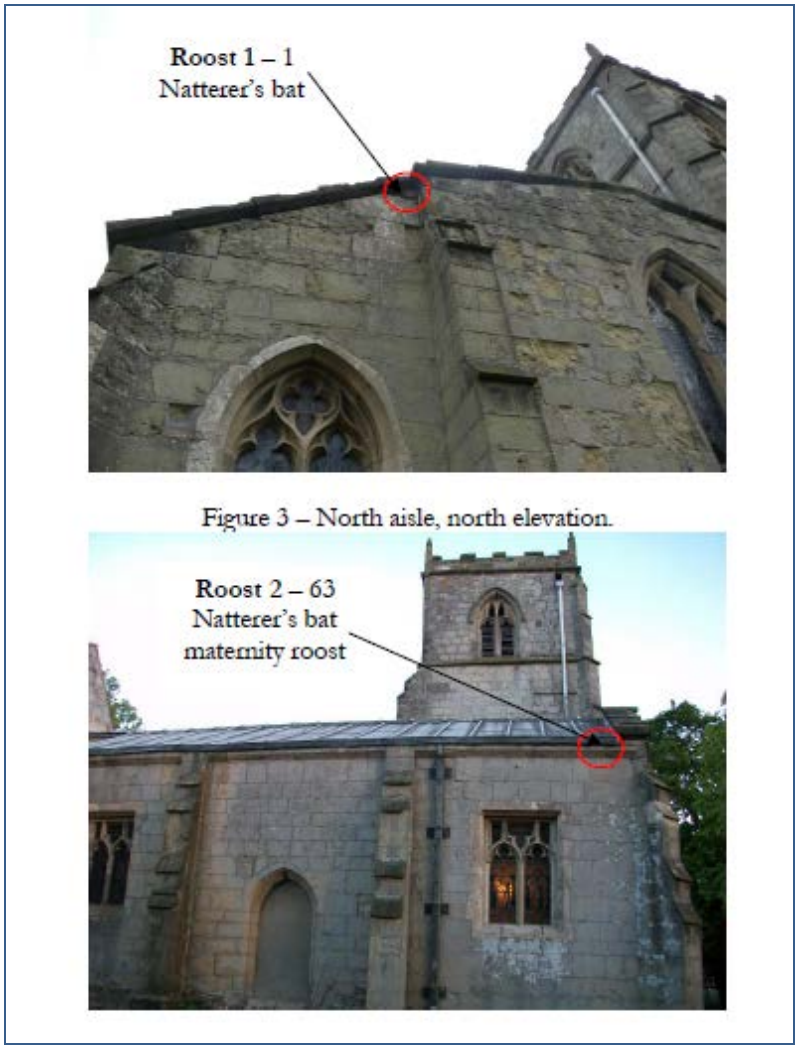

Figure 28 Roost access points identified in 2010 by Wold Ecology

There is also a major access point north of the vestry, behind the organ – a video camera placed facing the organ has not detected any bats leaving the interior of the church by that route, even when emergence times are matched precisely with the internal IR camera recordings. The FLIR detected a significant amount of flight from the nave into the chancel; even with the wide angle lens, the FLIR was not able to include the organ / vestry area and nave together. However, the absence of any accumulated droppings and the IR camera analysis strongly suggest that the north vestry access point does not link with the nave roost, but instead lead into the chancel roof gap which was left for them under the terms of the 2010 EPSL. I would recommend that this is confirmed by using a dedicated FLIR camera next summer,

which could detect the roost location and establish if there is any internal bat movement between the chancel roost and the nave roosts.

The internal activity peaks start in May, peaks in mid-July to beginning of August, after which it stays at a low level until mid-September when it declines to a very low level. Monitoring in January showed occasional very low levels of activity. The vast majority of internal flight is Natterers (Mnat). Ppip calls are present, but it should be noted that pipistrelle calls are very loud, so the recorder will pick up almost every call, whereas myotis species such as Mnat are quiet and the bulk of the calls will not be recorded. Therefore, a peak of 150 Ppip calls may be just one bat, whereas the same number of Mnat calls could be 30 bats, for example. Activity peaks after dark, at 10pm, with relatively low levels through the night and at dawn.

Winter activity is extremely low, but the single night of calls (Mnat and Ppip on the same night) in January indicates that hibernating bats are present and will emerge on a warm night.

7 Assessment of impact of proposed works

The proposed re-roofing of the nave with lead will have no impact on the bat roosts – none of the access points we identified are in this expanse of lead. However, there are other areas of lead which do provide access (such as the north aisle roof), so this advice applies only to the nave.

I discussed the fixing of the temporary roof cover with the contractors and concluded that this would not disturb bats in any significant way. This will also be true of the lead fitting – minor disturbance may result from hammering, but this will below the level at which licensing is required.

If a steel roof were to be used instead of lead, there may be some change in thermal properties. Like most bat roosts, the heat source for these roosts is predominantly solar, the church heating is only turned on for services - anything that acts as a

shield between the sun and the roost is likely to lower the temperature in the small void. Therefore, if there were to be a gap between the steel and the wooden roofing boards, whether or not it were insulated, this could significantly lower the roost temperature. An insulated gap would have the most effect. It is not possible to accurately predict this impact, however it could be easily simulated by placing temperature loggers on the roof under a mock-up of the roof structure, with one covered by the proposed steel roof and one exposed to the sun as it is. In conclusion, a steel roof would require further assessment to determine impact on bats, whereas a lead roof could be installed without requirement for assessment or licensing.

No other works are currently proposed.

The impact of excluding bats from the interior of the church will be assessed in the following section.

8 Bat management proposals

The principle objective of bat management in this church is to bring an end to many years of negative impact to the fabric of the church caused by bat urine. The urine is causing major long term damage to timbers and brass and copper ornaments, and this cannot be successfully mitigated by cleaning or covering, given the large interior space and the very small level of resources available to the PCC. Slightly less important are the bat droppings – although these can be cleaned up, and do not permeate or damage the fabric of the church to such a degree, the daily effort required to clear them up throughout the summer is beyond the capacity of the two church wardens.

There are no reported problems caused by bat smell, the bats themselves, or by the noise of the roosts.

It is therefore reasonable to suggest that excluding bats from the interior of the church would be a complete solution – the bats do not need to excluded from their roosts, providing they can access their roosts without requiring internal flight.

At the moment, internal bat flight is extensive – this occurs primarily at dusk during July and August, as shown by the unmanned recorder results. Natterer's bats spend a considerable amount of time flying up to roost access points, often for around 10 minutes, before entering, and then often repeating the process over and over again by emerging and re-entering. The FLIR camera recordings revealed a large amount of social flight occurring at the same time – often bats would be in pairs, appearing to chase each other or fly in tandem – some bats were seen to repeatedly land on timber, crawl along, and then take off when another bat came close. In this way, much of the interior of the church becomes spattered with urine and dropping, which are released in flight. There is no known single reasons for this behaviour – there are likely to be imprinting functions (so that roost locations are imprinted in the sonar "map" that the bats have of their environment), social functions (establishing group bonds, for example), training flight for young bats (though adults also do this early in the summer before young can fly), and possibly as a way of reducing urine and faeces in the roost. It should be noted that this behaviour occurs in many species (as well as Natterer's bats) at the external roost access (here seen at the tower louvre and rear of vestry); however, Natterer's bats often roost at some distance away from the external access point, leading to two swarming areas, one internal and one external. This begs the question of whether the internal flight area is required for the success of the breeding roost. My impression is that it is not necessary, given that swarming also occurs in the open, but internal flight is likely to be beneficial given that it is less open to predation and less susceptible to weather conditions. So we would consider it ideal, but not essential, if some sort of covered flight area were available, post-exclusion.

The 2 nave roosts cannot be accessed without flying through the church, and there is no acceptable or available method to permit access to these roosts without allowing

free flight within the church. Ideas discussed and dismissed include installing a ceiling, and making a flight box to connect the tower to the roost; both of these would be unacceptable to the church due to impact on the aesthetics (the western stained-glass window would be half-hidden, for example, and the historic timber roof and beams would be enclosed), but they would also be prohibitively expensive. We have also looked at use of sonic deterrents, but this would only work to deter flight in the chancel, leaving the nave unaffected; in addition, effective sonic deterrents are not available to buy. It is, therefore, necessary to exclude these roosts completely in order to resolve the problems caused by internal flight.

Excluding these roosts requires that bat access from the tower is blocked - installing one-way devices on the roosts is not practical because the bats will simply find new gaps in the roof timbers, and the problems will persist. The gaps in the first floor tower floor can be quite easily closed, with the exception of the bell rope openings, which will effectively prevent access to the identified nave roosts.

The other nave roost, at the north west, which was identified as a main roost in 2010, with no identified emergence in 2020, but an evident hot-spot in FLIR, can be accessed from the external masonry. It should, therefore, be possible to retain this roost whilst prevent any bats using it from entering the church; this will require use of a scaffold tower or MEWP (such as 15m tracked spider lift) for initial investigation as well as for works. A mastic filler should be used which matches the existing surfaces. Faculty consent should not be needed. This work will constitute “roost modification” and will need to be carried out under the terms of a licence (whether EPSL or BICCL). Because bats may crawl some distance through the roof space, the area of work may be extensive, and will need to be confirmed by close up physical examination - for this reason a small MEWP will be preferable to a scaffold tower. The works should be relatively cheap to carry out but will require an element of ecological supervision.

Once access to the nave from the tower is blocked, the tower windows will still permit bats into the tower itself. While it may be theoretically possible to stop bats entering the tower by grilling the louvres, this will not be justified: bats may use the tower for cool roosting and for hibernation; droppings and urine do not cause any problems in the tower; their ability to use the tower rooms for internal flight may mitigate for loss of flight area in the nave and chancel. I therefore recommend that bat access to the tower is permitted, and that a notice is installed in the bell tower to the effect that louvres must not be netted or grilled. Furthermore, I recommend that warm roosting provision be made within the first floor area of the tower, so that a new alternative maternity roost could be established without requiring access to the nave roof at all; this may be useful if , for example, it was found in the future that bat urine / droppings within the roost itself were damaging the timers of the roof. Two heated bat boxes should be installed on the walls of the first floor; in order to find out if the bats use them, nest box cameras should be installed.

The roost access north of the vestry should be retained pending further information regarding the linkage of this roost with the interior.

Roost access closure should take place early in the spring (April), when bats are active but not yet in breeding colonies. Monitoring should be intensive between roost closure and breeding (June / July) so that further roost access closure can be carried out (if required) with minimal impact on breeding bats.

<u>Further survey assessment / monitoring work pre-exclusion (2021)</u>

The north west nave access should be monitored by external FLIR camera in summer 2021, and potential movement of bats from this roost to the nave interior checked by internal FLIR camera.

Connectivity between north vestry access and the interior of the chancel should be monitored by internal FLIR camera in summer 2021 (directed at altar area).

Monitoring surveys post-exclusion (2022)

Heated bat boxes to be monitored by nest box cameras and visual inspections – for c. 5 yrs.

Internal FLIR surveys will be needed immediately after closure of the tower access – this will ensure that no bats are stuck inside the church – the main door may need to be opened to allow any bats to fly out. If bats are reluctant to leave, an alternative option would be to use harp traps to catch and release bats from the interior. This may need to be repeated several times. Monitoring will also determine if bats are entering the church from other locations, which may lead to additional access point closures. It will be vital to achieve a full exclusion early in the first season, so that impacts can be assessed during the life of the project.

Long-term monitoring of internal bat usage by unmanned recorder combined with regular contact with church wardens.

Colony size monitoring

The local bat group monitors the size of the bat colony on an annual basis as part of the BCT monitoring programme. However, we do not necessarily have access to this data nor any way of verifying it. It also is likely that a condition of any licence granted by NE will include long-term monitoring, and that delivery of this data will be a legal requirement on the PCC. Therefore I expect that we will either need to engage the local bat group on an official basis to provide this data, or else to include it in the Bats in Churches management plan.

Safeguards / reversals

There needs to be a mechanism whereby if impact is perceived to be too high, either in terms of conservation status or bat welfare, closures can be reversed, and the situation reconsidered. It is hard to foresee what these circumstances may entail, examples would be: if bats are constantly within the church and failing to leave for foraging; if young unfledged bats are appearing within the church ; if bat behaviour is

observed to have markedly changed (e.g. bats appearing distressed); if the number of bats present reduces by more than 20% in the first year. This is not an exhaustive list, and the situation should be assessed in real time by comparing potential impacts (e.g. temporary disturbance or loss of breeding success) against gains (e.g. creating a problem-free long-term solution allowing bats and church to live in harmony).

8.1 Method Statement

2021

1. BiCCL (and Faculty consent, if required) applications (Jan).
2. Installation of heated bat boxes to tower (Jan to March).
3. FLIR survey of north west nave external roost access – 3 times spring summer and autumn (e.g. May / July / August).
4. FLIR survey of internal side of north west nave roost - 3 times spring summer and autumn (e.g. May / July / August).
5. FLIR survey of internal side of vestry roost - 3 times spring summer and autumn (e.g. May / July / August).
6. Peak roost count (August)

2022

1. Inspection and sealing of gaps in timbers around north west nave roost using MEWP / scaffold tower (Jan to March).
2. Closure of tower access to church interior (April).
3. Depending on results of item 3 of 2021 MS, possible closure of vestry roost access if bats shown to be able to enter church interior via this access point (April).
4. Monitoring of bat behaviour in nave / chancel using internal FLIR – capture & release of any bats in flight within church using open doors or harp traps (April).
5. Continued monitoring of internal bat flight, with further closure and capture / release using open doors or harp traps.

6. Monitoring of external bat activity to identify any new access points using FLIR.
7. Long-term monitoring of internal bats using unmanned recorder (Feb to Nov)
8. Peak roost count (August).
9. Assessment of success in meeting objectives.

2022-2024

1. Peak roost count (August).
2. Long-term monitoring of internal bats using unmanned recorder (Feb to Nov).

9 Stakeholder engagement

The PCC will be required to approve the method statement; faculty consent may be needed for heated bat boxes in the tower (tbc); the local bat group have not been consulted at this stage, my recommendation will be for us to agree a management plan in principle before beginning consultation with the bat group.

10 Information concerning bat protection

10.1 Relevant Legislation

All bat species are protected under the Wildlife and Countryside Act (WCA) 1981 (as amended), the Countryside and Rights of Way Act 2000 and the Conservation of Habitats and Species Regulations 2017 ('Habitat Regulations 2017').

Under the WCA it is an offence for any person to intentionally kill, injure or take any wild bat; to intentionally disturb any wild bat while it is occupying a structure or place that it uses for shelter or protection; to intentionally damage, destroy or obstruct access to any place that a wild bat uses for shelter or protection; to be in possession or control of any live or dead wild bat, or any part of, or anything derived from a wild bat; or to sell, offer or expose for sale, or possess or transport for the purpose of sale, any live or dead wild bat, or any part of, or anything derived from a wild bat.

Under the Habitat Regulations 2017, it is an offence to (a) deliberately capture, injure or kills any wild animal of a European protected species (EPS), (b) deliberately disturb wild animals of any such species, (c)deliberately take or destroy the eggs of such an animal, or (d)damages or destroys a breeding site or resting place of such an animal. Deliberate disturbance of animals of a European protected species (EPS) includes in particular any disturbance which is likely to impair their ability (i) to survive, to breed or reproduce, or to rear or nurture their young; or (ii) in the case of animals of a hibernating or migratory species, to hibernate or migrate; or to affect significantly the local distribution or abundance of the species to which they belong.

*Prosecution could result in imprisonment, fines of £5,000 per animal affected and confiscation of vehicles and equipment used***.** In order to minimise the risk of breaking the law it is essential to work with care to avoid harming bats, to be aware of the procedures to be followed if bats are found during works, and to commission surveys and expert advice as required to minimise the risk of reckless harm to bats.

10.2 Licences

Where it is proposed to carry out works which will damage / destroy a bat roost or disturb bats to a significant degree, an EPS licence must first be obtained from the Natural England (even if no bats are expected to be present when the work is carried out). The application for a license normally requires a full knowledge of the use of a site by bats, including species, numbers, and timings. Gathering this information usually involves surveying throughout the bat active season. The licence may require ongoing monitoring of the site following completion of the works.

Licences can only be issued if Natural England are satisfied that there is no satisfactory alternative to the development and that the action authorised will not be detrimental to the maintenance of the population of the species at a favourable conservation status in their natural range.

11 References

The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019

Appendix 1: email summary provided of East Yorkshire Bat Group roost monitoring study results in 2020 provided by Barry Wright

Appendix 2: Bats in Churches Heritage Lottery Fund Heritage Grant Bat Roost Visit Report. August 2017

Appendix 3: Natural England Roost visit return form 2012 with NE advice letter and email from Tony Lane

Appendix 4: EPSL Method Statement from Wold Ecology 2010.

Appendix 5: Low Catton Bat Survey 2010.

Appendix 6: Bat roost records from North and East Yorkshire Ecological Data Centre (NEYEDC), North Yorkshire Bat Group and East Yorkshire Bat Group.