

Bat Survey of St Andrew's Church Grafham, 2021



Report dated 11 October 2021

by

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1 INTRODUCTION

1.1 Background

The Bats in Churches Project¹ was contacted by the Church of England in February 2021, regarding a major fabric project being proposed at St Andrew's Church, Horsham Road, Grafham, Surrey GU5 0LH (OS grid reference TQ 0229 4165). It was believed² that long-eared bats (*Plecotus* sp.) were roosting in the bell tower of the church and flying inside the nave and chancel at night, depositing droppings and urine which needed to be cleaned up frequently, especially during the spring-autumn period. Bat urine was also causing damage to the church fabric. The proposed work included the restoration of old wall paintings, but it was feared that these would also be damaged by bat urine. The Church was therefore seeking advice on how such damage could be avoided or limited, before deciding whether to apply for funding to carry out the work.

Surrey Bat Group offered to carry out bat surveys to establish exactly how bats were using the church, providing detailed information on which future restoration planning could be based.

1.2 Purpose of this report

This report details the results of bat surveys of the church conducted by Surrey Bat Group during April-September 2021, to try to confirm the species present, the status of any roosts found, and the roost locations and exit points used by bats.

It also provides incidental records of bat species recorded flying in the church grounds

2 METHODS

2.1 Scoping survey

A daytime inspection of the interior and exterior of the church from ground level was conducted on 13 April 2021, using binoculars and a powerful light source to search for clues as to bat roosting and exit points, such as droppings and urine staining, and to plan evening emergence surveys.

2.2 DNA analysis

During the internal survey, several bat droppings were collected from the floor of the nave and sent to Ecotype Genetics for DNA analysis, in order to identify the species using the church interior.

2.3 Emergence surveys

Three dusk emergence surveys of the church were carried out on 26 May 2021 (sunset time: 21.00), 28 June 2021 (sunset time: 21.21), and 9 September 2021 (sunset time: 19.31), from 30 minutes before to 1.5 hours after sunset, following best practice guidance³. The surveys were carried out in

¹ <https://batsinchurches.org.uk/>

² Jill Parrott, Parish Administrator, St Andrew's Church Grafham, personal communication. Jill reported seeing a live bat in the bell tower, and finding at least one dead bat at the west end of the nave.

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

weather conditions conducive to bat activity, i.e. without significant rain or strong wind, and temperatures above 10°C.

During each survey one surveyor was located inside the church, using one Canon XA10 and one Canon XA20 video camera set to record in infrared, with supplementary infrared illuminators, to identify roosting points inside the church. Between two and six surveyors equipped with a range of infrared (Canon XA10, Sony Handycam, Bushnell Equinox Digital Night vision binoculars) and thermal imaging (Pulsar Helion 2 XP50 with F28 lens, Pulsar Helion XP38, Pulsar Quantum HD19) cameras were employed outside the church on each occasion to watch potential bat exit points. Full-spectrum bat detectors (SonoBat Live running Pettersson M500-384, Elekon Batlogger M, SongMeter SM4Bat FS, Peersonic RPA3, BatBox Baton XD attached to Roland recorder, Anabat Scout) were also deployed inside and outside of the church throughout each survey. (See Appendix A for diagrams showing details of surveyor and equipment placement).

All video footage was reviewed following each survey, and bat call sequences recorded were analysed using Elekon Bat Explorer, Cool Edit, Sonobat or Anabat Insight software to check species identification. Note, however, that it is often not possible to separate some bat species, such as those in the genera *Myotis* and *Plecotus*, based on acoustic methods alone.

2.4 Personnel

The scoping inspection was carried out by Lynn Whitfield PhD, MCIEEM(rtd), who has 12 years' ecological consultancy experience and over 20 years' experience as a Natural England licensed bat worker and surveyor (current NE survey licence registration nos: 2015-13742-CLS-CLS (class 3) and 2015-13743-CLS-CLS (class 4)). Emergence surveys were carried out by Lynn along with the following other Surrey Bat Group members⁴.

All surveys

Ross Baker: Over 35 years' experience as a Natural England licensed bat worker and surveyor, NE survey licence registration nos: 2015-12883-CLS-CLS (class 3) and 2016-23650-CLS-CLS (class 4).

Patrick Smith: former Natural England Volunteer Bat Roost Visitor (VBRV) with many years' experience of conducting bat surveys.

26 May 2021

Martyn Cooke: former Natural England VBRV with many years' experience of conducting bat surveys and carrying out research on bat calls. NE survey licence registration nos: 2015-11436-CLS-CLS (class 3) and 2015-11437-CLS-CLS (class 4).

Simon Carroll: over 8 years' training and experience in carrying out bat surveys.

Nicky Power, Danielle Woolner: Surrey Bat Group members.

⁴ Less experienced surveyors were equipped with infrared cameras and the footage was reviewed carefully by a NE survey licence holder.

28 June 2021

Will Rees MSc, ACIEEM, Senior Ecological Consultant, with over 5 years of experience including carrying out bat emergence surveys.

Sheryl Bradley: Surrey Bat Group member.

3 RESULTS

3.1 Scoping survey

Photographs of the church illustrating the features described below are provided in Appendix B.

The main body of the church comprises a nave with adjoining chancel to the east, with a small vestry attached to the north side of the chancel, and a porch to the south of the nave. A narrow bell tower sits above the west end of the nave. The walls are constructed from a mixture of brick and stone.

The nave and chancel both have deep pitched roofs covered in clay tiles, with the chancel roof slightly lower than that of the nave and extending down to cover the vestry on the north side. The gable wall at the east end of the nave is covered in clay hanging tiles. The porch is separated from the nave by a solid wooden door and is open on the other three sides; it also has a pitched tiled roof. The cone-shaped roof of the bell tower is clad in wooden tiles.

The roof tiles appeared to be generally in good repair, with the most likely bat access points thought to be between lead flashings and tiles, between hanging tiles, and under the edges of the ridge tiles. No signs of bats such as droppings or urine stains could be seen on the exterior, but these would have been difficult to spot against the mottled roof and walls, especially given the height of the roofs.

Internally, there appears to be no separate roof void above the nave or vestry, with the ceiling following the roof line, and lined with lath and plaster. Angles between the nave ceiling and the roof supports offer a number of potential roosting sites for bats, especially if gaps exist between the supports and the ceiling, which is impossible to determine from ground level. The chancel ceiling is curved, so although there appears to be no loft space there is potentially some limited space between ceiling and roof tiles. The bell tower is separate from the nave, while the vestry is accessed from the chancel via an open door.

Scattered medium-sized bat droppings and spots indicative of bat urine were found throughout the nave, on both floor and walls, with relatively few droppings in the chancel and vestry. Slightly larger concentrations were noted at the east and west ends of the nave. That at the east end was immediately below a gap between one of the roof support beams and the nave wall: the gap had staining around it suggesting heavy use by bats.

It was not possible safely to enter the bell tower, but an inspection was made from the loft hatch at its base: no bats could be seen at the time. However, a few bat droppings were found; this and the presence of old bird nesting material indicated that bat access was possible.

Clusters of droppings were also found in the porch, indicating likely use as a night roost/feeding perch.

3.2 DNA analysis

This confirmed that the droppings collected inside the church were from brown long-eared bats (*Plecotus auritus*) (see Appendix C).

3.3 Emergence surveys

Full details and photographs of the emergence points identified are provided in Appendix D. Weather conditions during the surveys are summarised in Appendix E.

26 May 2021

Although swarming of bats inside the church made accurate counting difficult, it appeared that 14 brown long-eared bats emerged from various points in the ceiling and end walls of the nave, starting at 21.06. They spent some time flying within the church, perching occasionally on the ceiling, especially near roosting points. They then exited the church via the top of the double doors at the west end, via a small gap between the tops of the doors, after flying over the rail of the curtain in front of the doors. Unfortunately, as the gap was not obvious, the external camera at that end was initially focused on the bell tower rather than the door so that only a partial exit count was obtained. However, a count from one of the internal cameras indicated that between 12 and 15 bats exited via the door between 21.15 and 21.36.

Two brown long-eareds⁵ also emerged from the ridge of the chancel roof at 21.25 and 21.32 respectively, and one soprano pipistrelle (*Pipistrellus pygmaeus*) emerged from the south edge of the nave roof at 21.31. After the end of the survey a few brown long-eareds were also observed clustered in the porch roof.

Other species recorded on bat detectors outside the church were common pipistrelle (*Pipistrellus pipistrellus*), serotine (*Eptesicus serotinus*) and *Myotis* species.

28 June 2021

On this occasion 21 brown long-eareds were recorded emerging from the ceiling and walls of the nave into the church, starting at 21.26. A video camera was trained on the western doorway this time, and 21 bats were counted emerging between 21.36 and 22.32.

In addition, 10 brown long-eareds emerged from the base of the roof ridge above the chancel between 21.55 and 22.22, nine from the south side and one from the north.

Other species recorded outside the church were common pipistrelle and noctule (*Nyctalus noctula*).

⁵ Identified from their ultrasonic calls: although these are difficult to separate from those of grey long-eared bat (*P. austriacus*), the latter are very rare and have not been recorded in Surrey to date.

9 September 2021

Around 28 brown long-eareds were recorded emerging into the church, this time from just two points in the east wall of the nave, starting at 19.37. However, bats often re-entered the same gaps, and once or twice appeared to enter gaps from the other side of the wall (i.e. from the chancel), which probably resulted in some double-counting. Only 24 bats were counted out of the west doors of the nave, between 19.56 and 20.28.

A total of 14 brown long-eareds also emerged from the base of the roof ridge above the chancel, 12 from the south side and two from the north side, between 19.58 and 20.24. Two common pipistrelles also emerged, one from the west end of the nave roof, near the tower, at 19.40, and one from under hanging tiles on the east end of the nave (north side) at 19.41. A soprano pipistrelle entered a gap in the hanging tiles (south side) at 20.51.

Serotine and *Myotis* species were also recorded in the churchyard.

4 CONCLUSIONS

The survey reported above has demonstrated that brown long-eared bats use a number of roost crevices throughout the ceiling and walls of the nave, rather than roosting in the bell tower as originally suspected, emerging to “socialise” by flying and perching in the church interior at dusk prior to exiting to feed. Bats are also likely to repeat this behaviour when returning to roost occasionally during the night and prior to sunrise. This is when faeces and urine are deposited throughout the church, and especially below the most well used roosting points.

Note, incidentally, that bats of this species do not always use the same routes for entry and exit: in one roost, for example⁶, all bats exited via the eaves of the house but re-entered via gaps under various roof tiles. Dawn surveys would be required to establish whether this is the case with the Grafham church roosts.

Groups of brown long-eared bats gather during late spring to form a maternity or nursery roost, which in Britain typically comprise between five and 50 individuals⁷, including breeding females, non-breeding females and often males in varying proportions. Here the breeding females give birth to (usually) a single pup in late June or early July. The young bats are weaned and flying with a few weeks, and additional males often join the group as the season progresses. Time spent by bats inside the church is likely to increase during this period as females return to feed their pups during the night, and the pups practise flying inside the church.

The number of brown long-eared bats recorded roosting within the church during the 2021 surveys, and the increase in numbers seen between June and September, therefore, strongly suggest that this is a maternity colony.

⁶ Howard, R.W. (1995). *Auritus: a natural history of the brown long-eared bat*. Sessions of York.

⁷ Dietz, C. & Kiefer, A. (2016). *Bats of Britain and Europe*. London: Bloomsbury.

The brown long-eared bats emerging from the chancel roof appear to be completely segregated from those roosting inside the church. At least one previous study⁸ has shown that colonies of brown long-eareds in very close proximity can in fact be completely separate, with little or no exchange of individuals between them. The group using the chancel roof could therefore represent another maternity colony – again, the number of bats and that fact that there was an increase in numbers between June and September would support this. However, it is also possible that it is part of the same colony, and it could even be an all-male group⁹.

The presence of such a large group in the chancel roof was unexpected, as larger brown long-eared bat roosts tend to occur in buildings with a large volume of interior space, where the bats fly together prior to emerging – as those roosting inside the church do. The bats roosting in the chancel appear not to have access to such a space, albeit there may be a small gap between the chancel roof and ceiling. However, colonies occupying buildings with no apparent roof void have been reported before – indeed we have seen one such instance ourselves - and brown long-eareds also commonly roost in tree holes/crevices and bat boxes, emerging directly from the roost into the open. Unfortunately, it is often difficult to investigate the makeup of such roosts as, unlike roosts in lofts for example, it is difficult to capture bats to determine their age and sex.

Brown long-eared bats were also noted to use the porch as a night roost, likely for a combination of resting between foraging bouts, socialising, and dismembering large prey.

A few single common and soprano pipistrelles were also recorded using exterior features on the church. These were likely transitional roosts, although the fact that a soprano pipistrelle entered the hanging tiles during the autumn survey, which was during the peak mating season for UK bats, early in the evening may mean that this was a mating roost, with the male hoping to attract females to it using social calls.

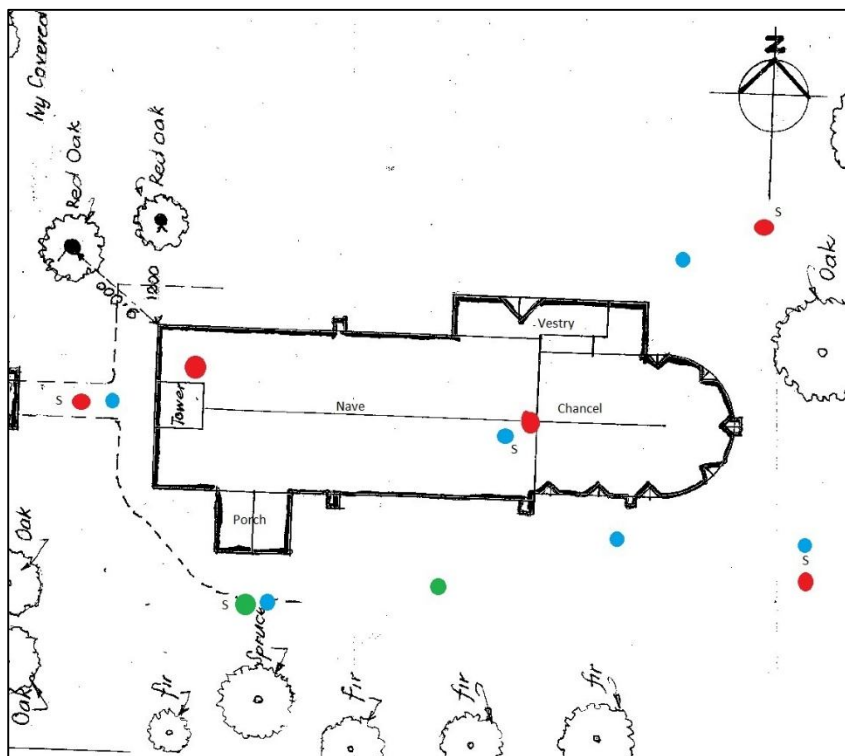
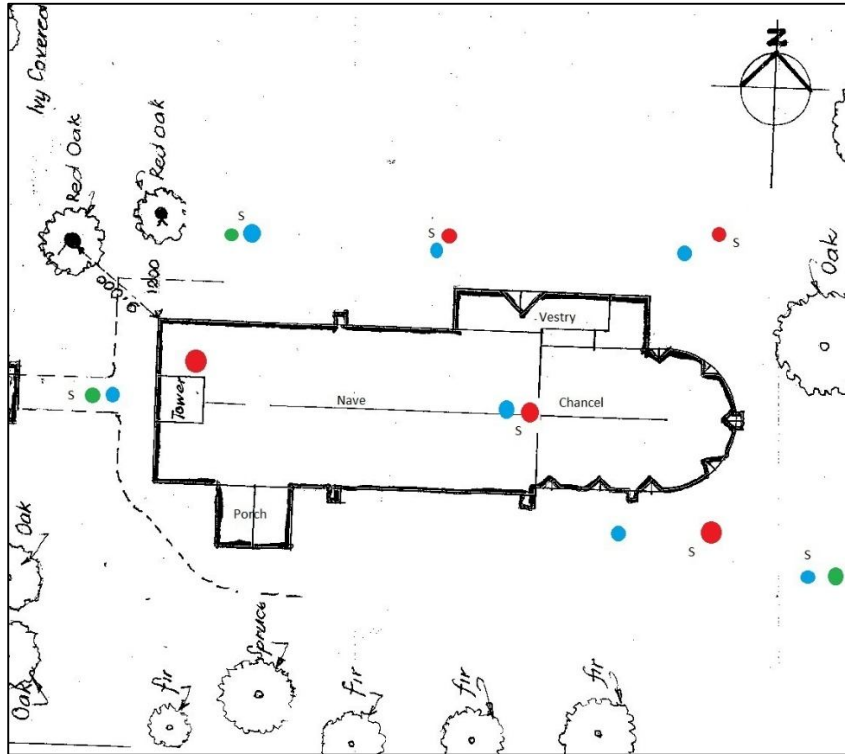
⁸ Entwistle, A.C. et al. (2000). Social and population structure of a gleaner bat, *Plecotus auritus*. *Journal of Zoology, London* **252**, 11-17.

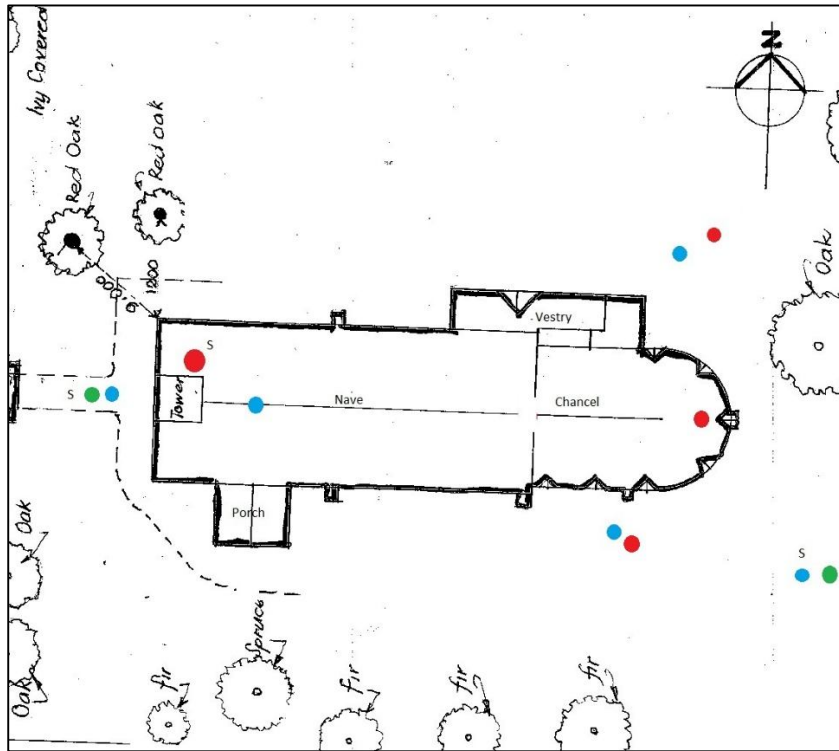
⁹ Swift, S.M. (1998). *Long-eared bats*. London: Poyser Natural History.

Appendix A – Surveyor, camera and detector locations during emergence surveys

The following plans show locations of surveyors (S), full-spectrum bat detectors (blue dots), infrared cameras (red spots) and thermal imaging cameras (green dots) during the emergence surveys.

Top: 26 May, middle: 28 June, next page: 9 September.





Appendix B – Photographs from inspection survey



Left: west end of church and open porch on south side of nave. Right: close-up of bell tower.



North side of church.



South side and east end showing difference in height between nave and chancel.



Close-up of hanging tiles on east end of nave gable. Note gap below the chancel apex, adjacent to the hanging tiles.



Chancel with vestry on the north side.



Nave ceiling.



Chancel ceiling.



Left: hatch to the bell tower. Right: interior of bell tower base.



Examples of urine staining and droppings on pews and framed hangings.



Part of one of the wall paintings which the church hopes to restore.

Appendix C – DNA analysis results

		Complete ALL solid blue boxes (shaded ones are optional). Green boxes are automatically generated			Standard Service	Ecotype Genetics		
CONTACT/PAYMENT INFORMATION		Ord No.	4736 M		Additional Copies of Report to:			
Name (sender)	Ross Baker	Company	Surrey Bat Group		Name			
Address	4 Locke King Close	Invoice Address	4 Locke King Close		Email			
	Weybridge	Address (overwrite if different)	Weybridge		Name			
Postcode	KT13 0TA		KT13 0TA		Email			
Date of dispatch	12/05/2021	Samples must be sent within 2 working days of this date			Payment Ref No.:	R0Ba110521		
				Total no. samples	1			
Sample Number	Single or multiple species sample	Type	Date collected	Was this sample a recognisable pellet/scat on collection?	Site postcode/post town/grid ref	Species Group (see tab 3)	Site description / comments (Optional)	Suspected identity of species (optional)
SEL4736 M-1	multiple	Faecal	13/04/21	Yes	TQ02294166	C. Bats.	St Andrews Church Grafham	
DISPATCH SAMPLES TO:		Ecotype Genetics Ltd, Sussex Innovation Centre, Science Park Square, Falmer, Brighton BN1 9SB						

		FOR LABORATORY USE ONLY				Ecotype Genetics				
Company	Surrey Bat Group		POSITIVE CONTROL SAMPLE		Report date to SEL	COMMENTS				
Date	110521				Author					
SAMPLES										
SAMPLE NUMBER	Group	Suspected identity of sample	DNA EXTRACT code	SPECIES	COMMENTS	qPCR primers	Sequencing primers	Ct	match%	bases
SEL4736 M-1	C. Bats.	0	EG-2021-0283	Plecotus aurtus (Brown long-eared bat)	All UK bat species screened for - only a single species detected in this sample	Paucyrb		14		

Appendix D – Photographs showing bat emergence points

26 May 2021



Brown long-eared bat internal roosting points, west end of nave. Number of bats emerging from each point: A-5, B-1, C-1.



Brown long-eared bat internal roosting points, east end of nave. Number of bats emerging from each point: A-4, B-1, C-2.



Video still showing a brown long-eared bat flying over the curtain at the west end of the nave prior to emerging via the doors behind.



Emergence points of one soprano pipistrelle (left circle) and two brown long-eared bats (right circle).

28 June 2021



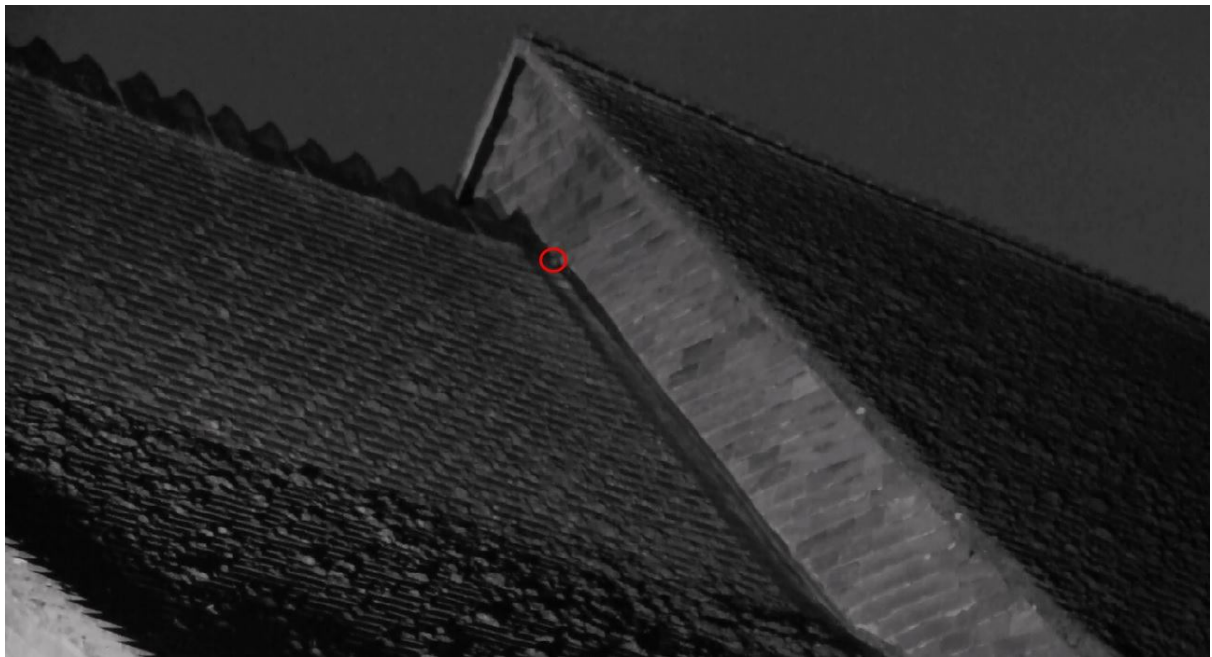
Brown long-eared bat internal roosting points, west end of nave. Number of bats emerging from each point: A-1, B-2, C-1, D-1.



Brown long-eared bat internal roosting points, east end of nave. Number of bats emerging from each point: A-10, B-1, C-4, D-1.



West door where bats emerged from church interior during all surveys (location arrowed).



Emergence points (circled) of brown long-eared bats from the chancel roof.

9 September 2021



Brown long-eared bat internal roosting points, east end of nave. Number of bats emerging from each point: A-19, B-9.



Two brown long-eared bats (circled) preparing to emerge from the south side of the chancel roof. Twelve bats emerged from this side and two from the north side (same location as for the June survey).



Common pipistrelle (circled) emerging from hanging tiles.



Soprano pipistrelle (circled) entering hanging tiles.

Appendix E – Weather conditions during emergence surveys

<i>Date</i>	26/05/2021	28/06/2021	09/09/2021
<i>Temperature start-end, °C</i>	14.5-10.9	18.4-17.5	18.8-15.2
<i>Relative humidity start-end, %</i>	65-87	91-88	83-94
<i>Rainfall</i>	Dry	Light rain until 16 min after sunset, then dry	Dry
<i>Cloud cover, %</i>	80	100	20
<i>Wind</i>	Calm	Calm	Calm