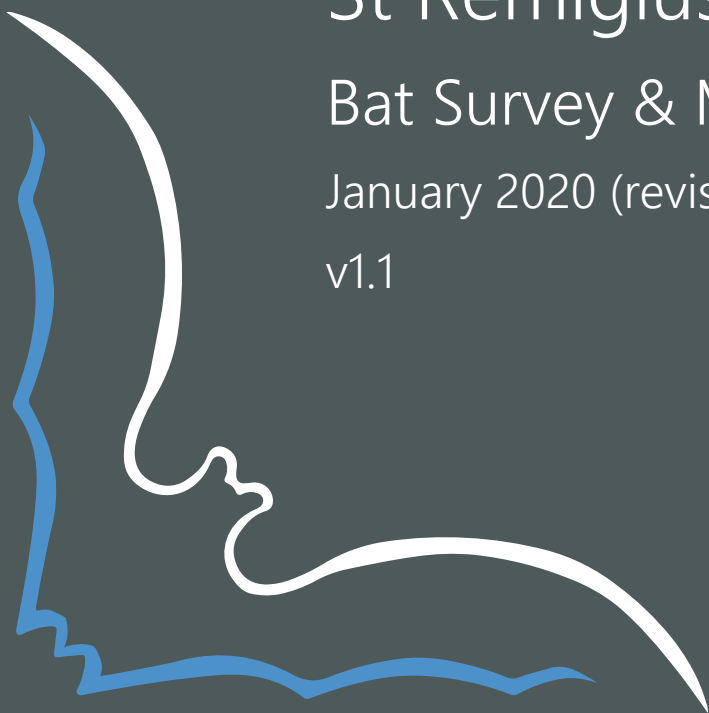


Wild Wings Ecology



Bats in Churches Project: St Remigius Church, Dunston Bat Survey & Management Plan Report January 2020 (revised v1.1 June 2020)

v1.1



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1. Summary

St Remigius Church, Dunston underwent bat surveys in summer 2019 to inform a proposal for managing the impacts of the bats on the church whilst protecting the church bat population. This work was undertaken as part of Natural England's Bats in Churches Project (funded by the Heritage Lottery Fund).

St Remigius is home to a modest-sized (probable maternity or satellite) colony of brown long-eared bats and small numbers of (day roosting) soprano and common pipistrelles. The church has experienced long-term negative impacts from the presence of the brown long-eared bats in the church interior, with staining (from droppings and urine) on floors, walls, pews, ledger stones and wall memorials. The bats also create a substantial cleaning burden.

Despite relatively low bat numbers, the impacts on this small church are significant and disproportionate to bat numbers, seemingly due to the bats spending a substantial amount of time active inside the church at night-time, as well as during the day. The church representatives are keen for the bats to be excluded from the church interior. However for this species, which is generally considered to require a large roof void space for roosting (in particular for maternity roosts), that would be difficult to achieve without potentially impacting the Favourable Conservation Status of the church bat population.

To date we have limited data on bat numbers and usage of the church (and no previous bat survey data are available); additional bat surveys would improve understanding of how bats are using the church. Furthermore, trapping and radio-tracking a small number of individuals would enable the roost status to be assessed and any linked/alternative roosts located, but this may be beyond the scope of the project.

In addition to the above recommendation for further bat surveys, exploratory works to investigate roost suitability and usage of the nave eaves voids (north and south sides) would be very beneficial. This could be achieved by a visual inspection of the voids and installation of infrared cameras at the east ends of the north and south side voids.

The tower (first floor) could be enhanced to provide improved and new roosting opportunities for bats. Bat boxes could be erected on the first floor section (attached to the wooden structure of the above floor). It may be necessary to reduce draughts and light from the window would need to be blocked. Bats should be able to access the first floor area via slits in the stairway but access could be enhanced if needed. Activity in the tower can be monitored with a static detector.

With more detailed information gained from additional data collection and exploratory works in 2020, it may be possible to develop the management proposals further in 2021, subject to findings.

2. Introduction

2.1. Purpose

Wild Wings Ecology was contracted to undertake bat surveys and produce an ecology report and management plan for Natural England's 'Bats in Churches Project' (funded by Heritage Lottery Fund). The church assessed was St Remigius, Dunston in Norfolk. This report details the surveys that were undertaken and proposes next steps for trying to reduce the impact of the bats on the church whilst minimising risks to the church's bat population.

2.2. St Remigius, Dunston

2.2.1. Location

St Remigius Church is located approximately 3km south of the outskirts of Norwich. The church is just north-east of Dunston Hall and is accessed via a track from Stoke Lane, see Figures 1 & 2.

To the south of the church is a golf course (part of Dunston Hall). There are wooded habitats in the vicinity of the church, including at Dunston Common, which is located approximately 200m to the north. Dunston Common is designated as a County Wildlife Site (CWS, ref 268), with the section to the south-west of Stoke Lane also designated as a Local Nature Reserve (LNR). See Figure 2.

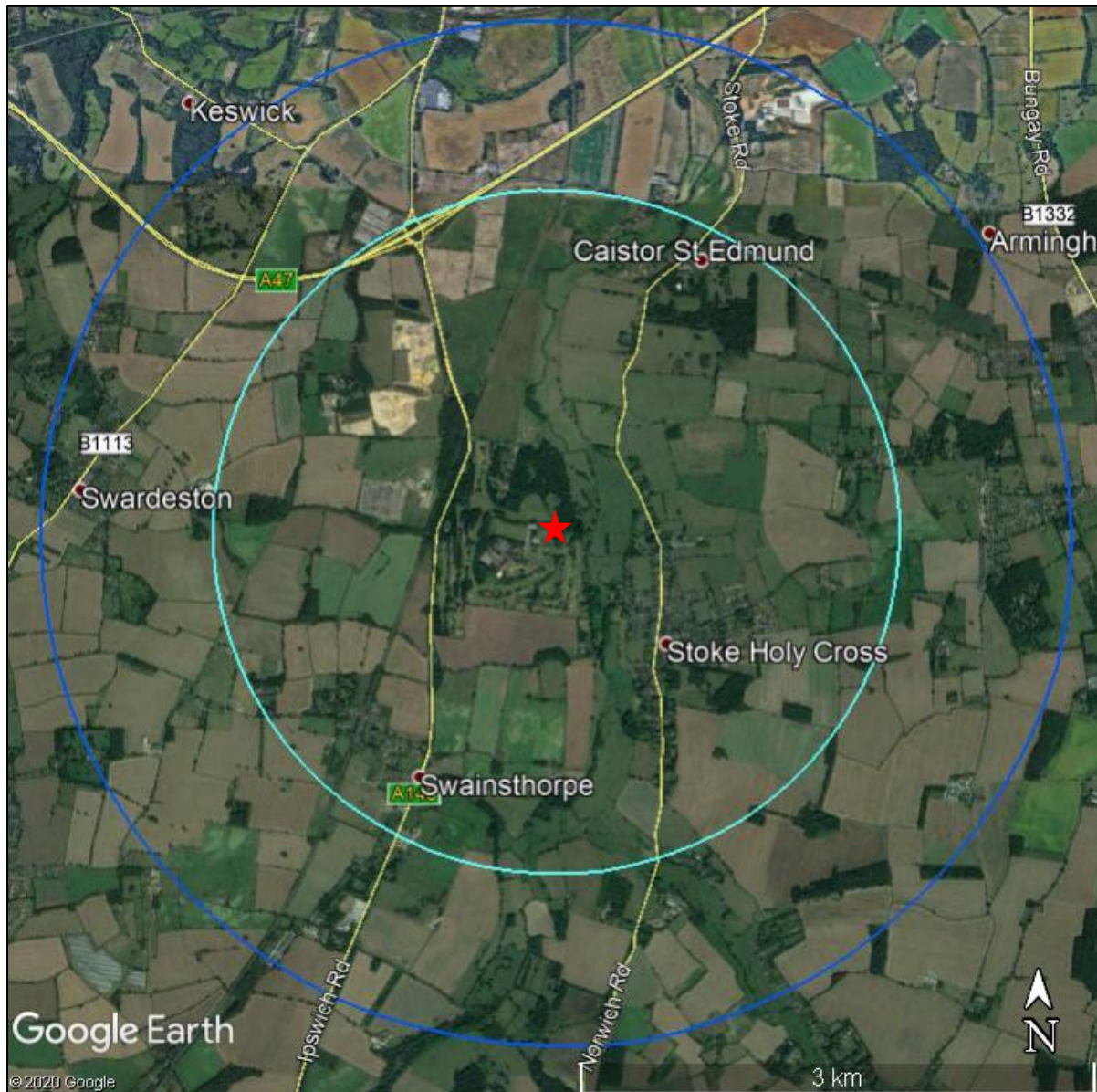


Figure 1. Location (landscape scale) of St Remigius, Dunston (red star) on Google Earth Pro 2018 aerial image. Pale blue circle indicates the 2km radius Core Sustenance Zone¹ (CSZ) around the church for common pipistrelles, dark blue circle indicates the 3km radius CSZ for brown long-eared bats and soprano pipistrelles.

¹"A Core Sustenance Zone refers to the area surrounding a communal bat roost within which habitat availability and quality will have a significant influence on the resilience and conservation status of the colony using the roost." (Bat Conservation Trust, 2016).

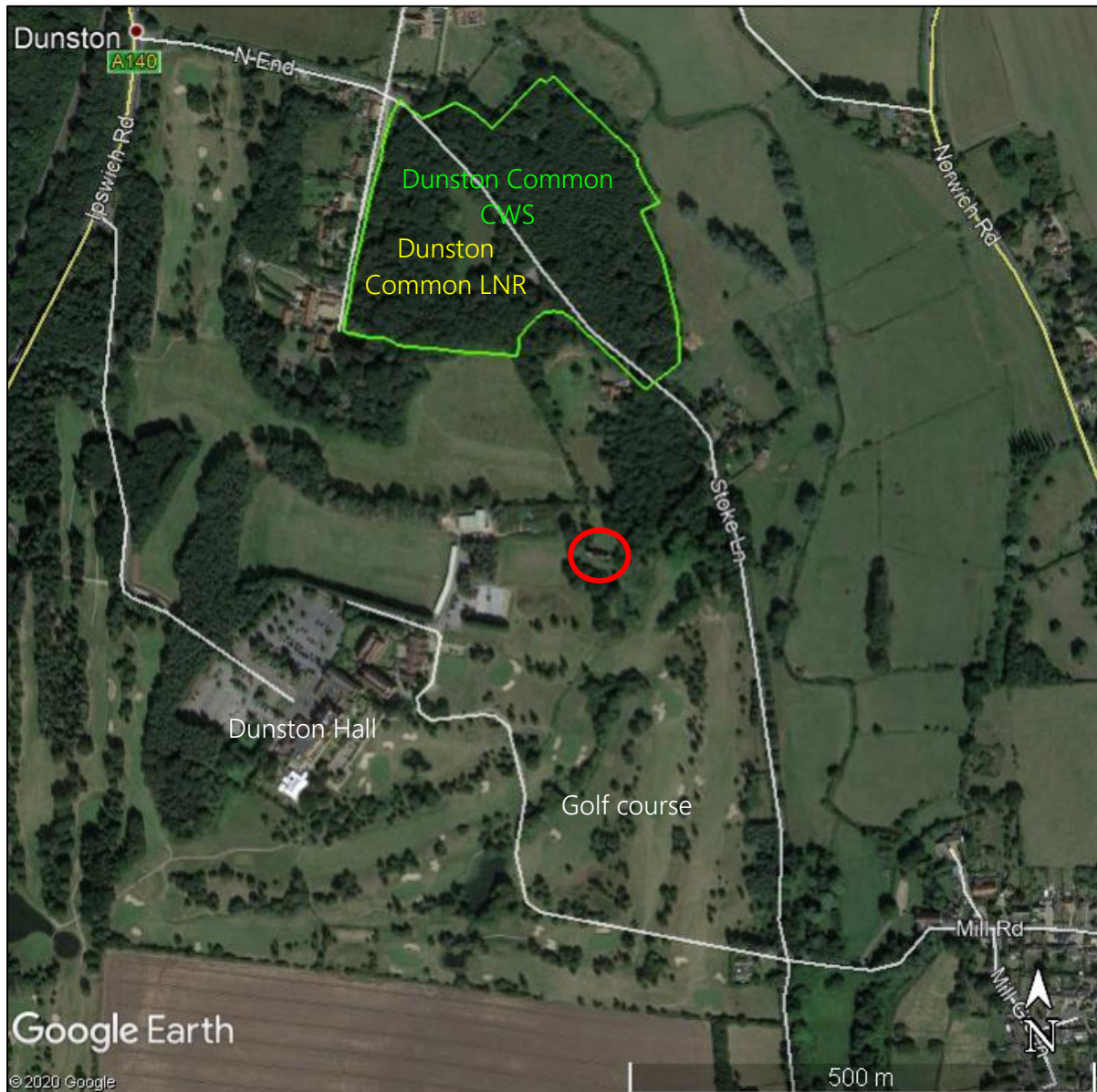


Figure 2. St Remigius, Dunston (circled in red) with surrounding habitats - Google Earth Pro 2018 aerial image. A nearby County Wildlife Site (CWS), Dunston Common, is outlined in green (the south-west section is also designated as a Local Nature Reserve, LNR).

2.2.2. Statement of Significance

Executive Summary of Statement of Significance, written by Richard Halsey (2019):

"A small, essentially fourteenth century church, probably extended to the east around the middle of the nineteenth century and heavily restored then and in 1898. The nave roof is probably of seventeenth century date, the chancel roof mid-nineteenth. It is not far from Dunston Hall, but this is now a hotel and conference centre, so the church is isolated from it and approached up a track through woodland. The latter is regularly used by walkers and the churchyard is well tended.

There is hardly any village, and the church is historically associated with the owners of the Hall (especially the Longs), who restored it and used as a mausoleum. There are therefore many post-medieval ledger stones and two unexpectedly good wall monuments, one certainly by Rysbrack. The font and chancel screen are mainly medieval, albeit restored, and the chancel stalls and a few nave pews re-use medieval bench ends and moulded woodwork. A few pieces of medieval stained glass exist in 1873-4 windows, but it is not clear if they are survivals or introductions by the glazier, George King. The 1898 restoration of the tower has given it a grander roofline and staircase, but might not have created the long and short quoining at low level. It is likely that it was at this time that the wall ends of the nave pews were adorned with a pair of feathered wings, a very unusual bench end. The alabaster internal tracery of c.1907 makes the otherwise gaunt east window a fitting end to the internal long view.

The impact of bats on the interior is 'very severe' (LTS 2017) and until further studies can identify species, access and habits, it would seem that exclusion is the only solution for this small church. Re-installing the lath and plaster nave ceiling would be beneficial to both the bats, congregation and the heritage interest."

2.2.3. History of bat use/previous bat survey work

The churchwardens reported that they were not aware of any previous bat surveys having been carried out at the church.

3. Methodology

3.1. Visual inspection

A detailed daytime visual inspection of the church was undertaken on the 10th May 2019 by Dr Charlotte Packman (see Table 1 for surveyor details). The visual inspection provided an update to the 'Light Touch Survey' which was completed on 28th September 2017 (using the 'Bats in Churches Heritage Lottery Fund Heritage Grant Bat Roost Visit Report Form', see Appendix 1, attached as a separate document as contains personal details).

The visual inspection updated information on bat usage of the building (probable species, impacts, photos and observations). A torch, endoscope, binoculars, camera and ladder were available for use during the inspection.

Churchwarden Viv Carrington was present for the initial meeting prior to the visual inspection, providing an update on the bat issues at the church and the desired outcomes from the project. The meeting was also attended by Bats in Churches Project Engagement Officer, Diana Spencer.

3.2. Bat activity surveys

Bat activity surveys were undertaken between May and August 2019, following the Bats in Churches Class Licence Survey Criteria (see Appendix 2). The activity surveys sought to identify/confirm species using the church, bat numbers, roost locations, exit and re-entry points and observe behaviour (both inside and outside the church).

Dusk emergence surveys were undertaken on: 10th May, 10th July and 29th August 2019. Dusk emergence surveys are best suited to obtaining accurate counts (most, if not all the bats, are likely to emerge during the survey and in a manner that is relatively easy to count), determining exit locations, species and, internally, roost locations. Note that where a bat is recorded re-entering the church during an emergence survey, the subsequent bat to emerge (if applicable and if of the same species) is not counted to avoid potentially counting the same individual emerging more than once during a survey, thereby giving a minimum count as the total.

The dawn re-entry survey was carried out on 3rd July 2019. The Bats in Churches Class Licence Survey Criteria state that the dawn survey should be undertaken between May and mid-June. However, frequent rainfall during the early part of the season meant that the dawn survey had to be postponed multiple times. This was discussed with Natural England and the later time period (still within the optimal survey period) was not considered to be detrimental to the survey data.

The dawn re-entry survey focussed on assessing bat activity inside and outside of the church, identifying/confirming species using the church, roost locations, entry points and

observations of behaviour. Dawn surveys are less well suited to reliably recording numbers of bats roosting at a church. This is because accurate counts of bats re-entering at larger roosts can be difficult due to 'dawn swarming' behaviour and because some bats will almost certainly have already returned to the roost before the survey commences. Note that where a bat is recorded emerging from the church during a re-entry survey, the subsequent bat to re-enter (if applicable and if of the same species) is not counted to avoid potentially counting the same individual re-entering more than once during a survey, thereby giving a minimum count as the total.

Survey details, including surveyors, timings and weather conditions (which were suitable), are provided in Table 2.

Five surveyors were present for each survey and of these, one surveyor was always positioned inside the church for the duration of the survey (see Table 1 for surveyor details and credentials and Figure 3 for surveyor positions). The surveys made use of infrared camcorders (Canon XA10/20/30) located inside and outside of the church, with infrared floodlighting. Infrared camera footage was subsequently reviewed using VLC Media Player (or similar). Surveyors were equipped with full spectrum recording bat detectors (mostly Wildlife Acoustics Echo Meter Touch). Surveyors also utilised two-way radios to corroborate observations between surveyors and especially for comparing exterior and interior observations during surveys (e.g. exterior versus interior exit and re-entry locations and determining if any roosts were exterior roosts only). Tally counters were used to aid accurate recording of numbers. Bat call recordings were subsequently reviewed using Kaleidoscope Viewer (Wildlife Acoustics).

Table 1. Surveyor names, initials (as used in Table 2 and Figure 3) and credentials.

Surveyor name & qualifications	Initials	Bat licences held	Licence numbers
Dr Charlotte Packman BSc (Hons), MSc, PhD CEcol ¹ MCIEEM ²	CP	Bats in Churches Class Licence (CL32) Level 2 Bat Mitigation Class Licence (CL21) Level 3 Bat Survey Class Licence (CL19) Level 4 Bat Survey Class Licence (CL20)	B32RC001 RC155 2015-16479-CLS-CLS 2015-11760-CLS-CLS
Philip Parker BA (Hons) CEnv ³ MCIEEM ²	PP	Bats in Churches Class Licence (CL32) Level 1 Bat Mitigation Class Licence (CL21) Level 2 Bat Survey Class Licence (CL18)	B32RC007 RC091 2015-14467-CLS-CLS
Ben Jervis BSc (Hons), MSc MCIEEM ²	BJ	Level 2 Bat Survey Class Licence (CL18)	2016-25752-CLS-CLS
Christine Hipperson BSc (Hons) MCIEEM ²	CH	Level 2 Bat Survey Class Licence (CL18)	2015-16077-CLS-CLS
Holly Nichols BSc (Hons)	HN	Level 2 Bat Survey Class Licence (CL18)	2020-44423-CLS-CLS
Steven Gilham BSc (Hons)	SG	Level 2 Bat Survey Class Licence (CL18)	2020-44376-CLS-CLS
John Worthington-Hill BSc (Hons), MSc	JWH	n/a	n/a

¹CEcol = Chartered Ecologist (with the Chartered Institute for Ecology & Environmental Management)

²MCIEEM = (full) Member of the Chartered Institute for Ecology & Environmental Management

³CEnv = Chartered Environmentalist (with the Society for the Environment)

Table 2. Bat activity survey timings (24 hr), weather conditions and surveyors (see Table 1 for surveyor details).

Dusk/ dawn survey	Date	Survey timings			Weather conditions				
		Sunset/ sunrise	Survey start	Survey end	Start temp. (°C)	End temp. (°C)	Precipitation	Windspeed (Beaufort Scale)	Cloud cover (%)
Dusk 1	10/5/19	20:47	20:20	22:30	8.2	6.2	Nil	1	<10
Surveyors: CP, JWH, BJ, CH, PP									
Dusk 2	10/07/19	21:16	21:01	23:10	17.8	16.0	Nil	0	>95
Surveyors: CP, SG, HN, BJ, CH									
Dusk 3	29/08/19	19:51	19:36	21:10	19.3	14.4	Nil	0	40
Surveyors: CP, HN, BJ, CH, SG									
Dawn 1	03/07/19	04:37	02:56	04:53	10.8	10.9	Nil	1	70
Surveyors: CP, HN, SG, CH, BJ									

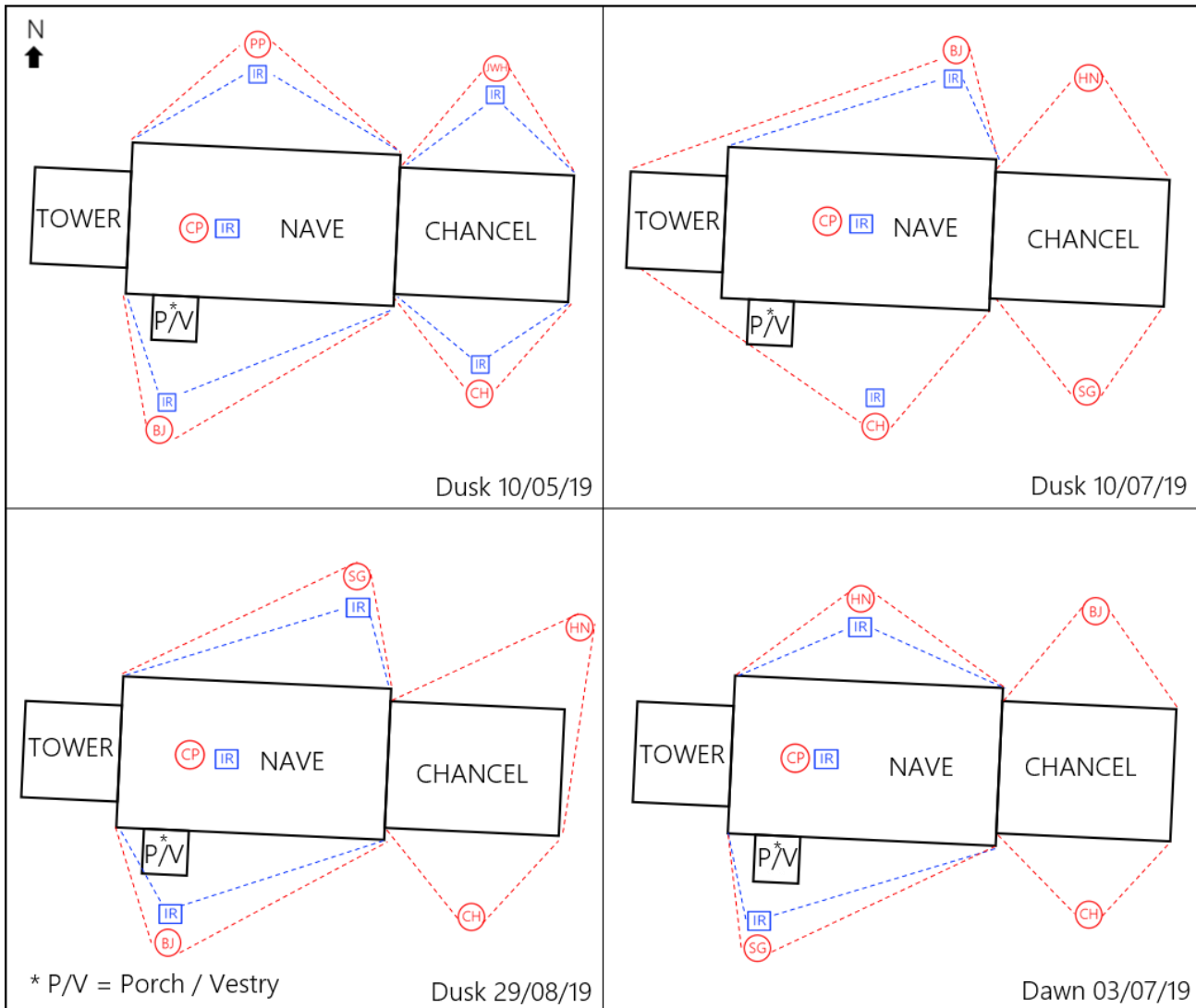


Figure 3. Bat activity survey locations of surveyors (red circles with surveyor initials (see Table 1), fields of view indicated by red dashed lines) and infrared cameras (blue squares labelled 'IR', fields of view indicated by blue dashed lines) overlaid on simplified church plan (not to scale). Surveyors and cameras positioned outside the church remained in fixed locations for the duration of the survey. The surveyor located inside the church moved around to observe behaviour and assess access points into/out of the church interior, equipped with a mobile infrared camera set-up.

4. Results

4.1. Visual inspection

Refer to the St Remigius Church, Dunston 'Light Touch Survey' 'Bats in Churches Heritage Lottery Fund Heritage Grant Bat Roost Visit Report Form' from 28th September 2017. This contains personal details (names and addresses etc.) and therefore is not included here but is attached as a separate Appendix (1). The findings from the original Light Touch Survey and updated survey of 10th May 2019 are summarised here and, for the visual inspection element, in Figure 4. General photographs of the church are provided in Appendix 3.

St Remigius is a small medieval church with a flint tower and porch and rendered nave (there are no aisles) and chancel. The nave and chancel have peg tile roofs.

On entering the church, bat evidence was immediately apparent, with an extensive covering of bat droppings and urine on floors and surfaces. Long-term impacts from bats can be seen throughout the building: staining/bleaching from bat droppings/urine on the floors, walls, pews, ledger stones, wall memorials and font (see Figure 5). At the time of the visual inspection, fresh droppings were concentrated along the centre of the nave (R1 in Figure 4), including above the west arch (R2), with some also at the east end wall of the chancel (R3), indicating that these were the main roost areas. There is potential bat access along the lengths of both sides of the nave, with some exterior gaps marked with bat droppings.

The church representatives described concerns about bat droppings and urine (and the substantial cleaning burden they create, limiting usage of the church) and damage to furnishings, artefacts and memorials.

Measures taken to date to try to manage the impact of bats on the church include plastic sheet coverings (nave and chancel floors, altar) and cleaning. Coverings and cleaning are not sufficient to mitigate the damage from droppings and urine (especially with regards to the walls and memorials, which cannot be easily protected) and given the level of impact, are not sustainable or manageable in the long-term.

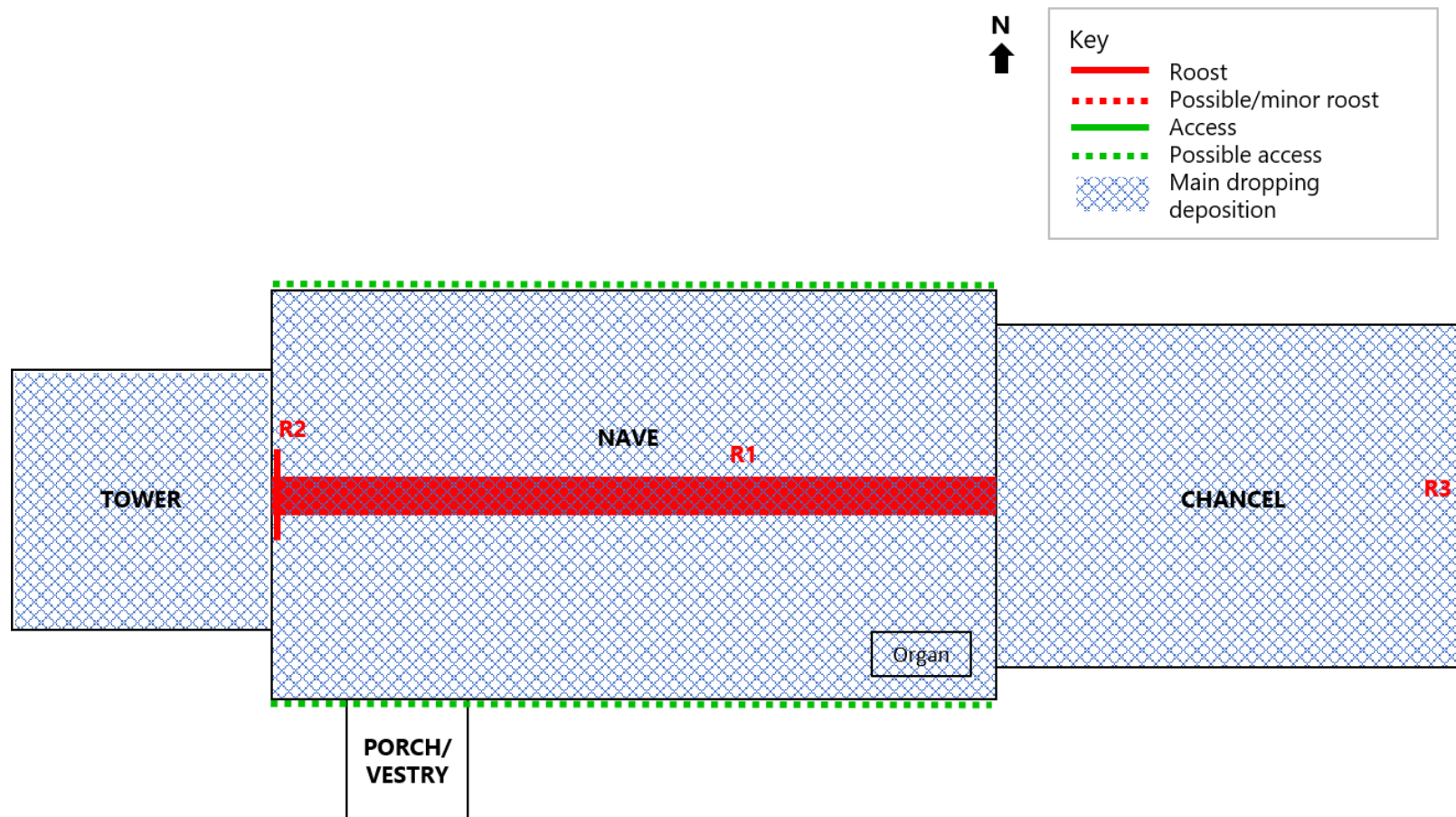


Figure 4. Visual inspection results from Light Touch Survey 28/09/17, updated 10/05/19. Plan not to scale. Rx indicates roost locations (see main text and 2017 Bat Roost Visit Report Form, Appendix 1).



Figure 5. Photos illustrating some of the impacts of bats on the church. A. Plastic sheeting on the nave floor, with bat droppings and urine. B. Bleaching to ledger stone from bat urine. C. Bat droppings on the font. D. Brown long-eared bat feeding remains (moth wings) and droppings. E. Bat urine bleaching on a wall memorial. F. Bat droppings and urine bleaching on a pew.

4.2. Bat activity surveys

Species in tables/figures/text reported as:

- *P.aur* = *Plecotus auritus* (brown long-eared bat)
- *P.pip* = *Pipistrellus pipistrellus* (common pipistrelle)
- *P.pyg* = *Pipistrellus pygmaeus* (soprano pipistrelle)
- *P. sp* = *Pipistrellus* species (common/soprano pipistrelle, species not determined)
- Bat sp. = bat (species not determined – usually as no vocalisation detected)

The highest bat count (all species) was recorded during the August dusk emergence survey, with a total count of 19 bats leaving the church. During the first dusk emergence survey (on 10th May), no bats were observed emerging from the building. However, at the end of the survey, a cluster of four brown long-eared bats appeared in the interior, at the central ridge beam of the nave, presumably having been roosting above the beam/sarking boards (see Figures 6 and 7). Counts for brown long-eared bats were similar for the July and August surveys, varying between 8-11. The brown long-eared bats were active inside the church for much of the survey time, flying around or ing-up along the ridge beam. Consequently, a complete count is unlikely to have been achieved, as some of the bats remained inside the building throughout the surveys. See Tables 3-5. During the dusk emergence survey on 10th July, a sparrowhawk (*Accipiter nisus*) was observed hunting the brown long-eared bats (approximately 30 minutes after sunset) as they exited from the church and succeeded in catching one.

Six soprano pipistrelles were also recorded emerging from the church during the late August dusk emergence survey, but during the other three surveys only one individual was recorded (July dawn survey). Individual common pipistrelles (1-2) were recorded during the August dusk and July dawn surveys, giving a total of three species recorded using the church (see Tables 3-5).

The main exterior access point for the brown long-eared bats is at eaves levels at the east end of the north side of the nave, with smaller numbers accessing the church on the south side of the nave and occasional access also further west on the north side of the nave (see Figures 6 & 7). Inside the building, brown long-eared bats were observed exiting and re-entering at the east end of the nave (north and south sides, see Figures 6 & 7) between gaps in the boards/rafters at eaves level. However, most notably on the south side, this did not usually tally with where the brown long-eared bats emerged on the outside (further west), suggesting that they were travelling along the eaves void before emerging on the exterior side.

The pipistrelles emerged/re-entered on the south side of the nave (and to a much lesser extent, the chancel), mostly at eaves level, with occasional emergence/re-entry from under roof tiles. Two pipistrelles also emerged from the tower louvres (east and south sides). See Figures 6 and 7.

The brown long-eared bats were roosting above the nave central ridge beam/sarking boards at various locations along the length of the nave. Feeding remains (multiple large yellow underwing (*Noctua pronuba*) moth wings with bat droppings, see Figure 5 (D)) were evident at the east end of the nave, a favoured spot for brown long-eared bat clusters to form during the survey.

Few pipistrelles were recorded flying inside the building and most are thought to be roosting in the building's exterior (without passing through to the interior). For example, on 29th August only one common pipistrelle was recorded flying inside the church and none of the six soprano pipistrelles that were recorded emerging from the building's exterior were recorded inside the building.

No bats emerged/re-entered during the first dusk survey on 10th May, so no count data table is presented here.

Table 3. Emergence/re-entry counts by species for second dusk survey on 10th July 2019.

Species	Emergence	Re-entry	Time of first exit/entry	Time of last exit/entry	Total
<i>P.aur</i>	15	4	21:39	23:06	11*
				Total	11

*Minimum count based on sequence of emergence and re-entry

Table 4. Emergence/re-entry counts by species for third dusk survey on 29th August 2019.

Species	Emergence	Re-entry	Time of first exit/entry	Time of last exit/entry	Total
<i>P.aur</i>	8	0	20:25	20:52	8
<i>P.pyg</i>	6	0	19:53	20:12	6
<i>P.pip</i>	1	0	20:14	20:14	1
<i>P. sp.</i>	2	0	19:58	20:08	2
Bat sp.	2	0	20:01	20:55	2
				Total	19

Table 5. Emergence/re-entry counts by species for the dawn survey on 3rd July 2019.

Species	Emergence	Re-entry	Time of first exit/entry	Time of last exit/entry	Total
<i>P.aur</i>	8	13	03:41	04:06	10*
<i>P.pyg</i>	1	0	04:23	04:23	1
<i>P.pip</i>	2	0	03:36	03:45	2
Bat sp.	1	0	04:00	04:00	1
				Total	14

*Minimum count based on sequence of emergence and re-entry

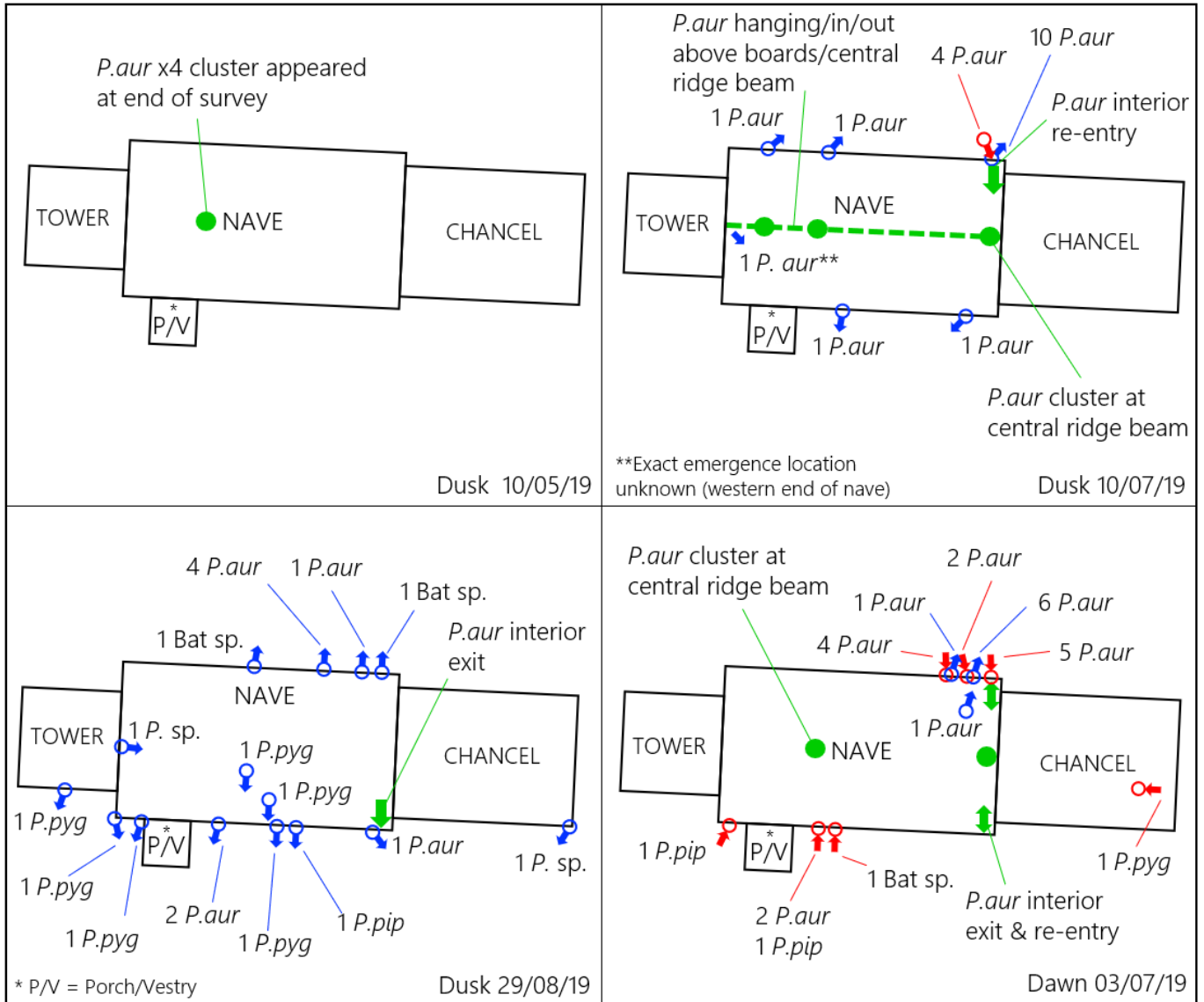


Figure 6. Results from the bat activity surveys (dusk 10th May, 10th July and 29th August 2019 and dawn 3rd July 2019) shown on a simplified plan of the church (not to scale): emergence (blue circle & arrow)/re-entry (red circle and arrow) locations, species and numbers. Green arrows show brown long-eared bat interior access locations, green dots main brown long-eared bat clusters and dashed green line main area of brown long-eared bat activity inside the building (along the nave central ridge beam).

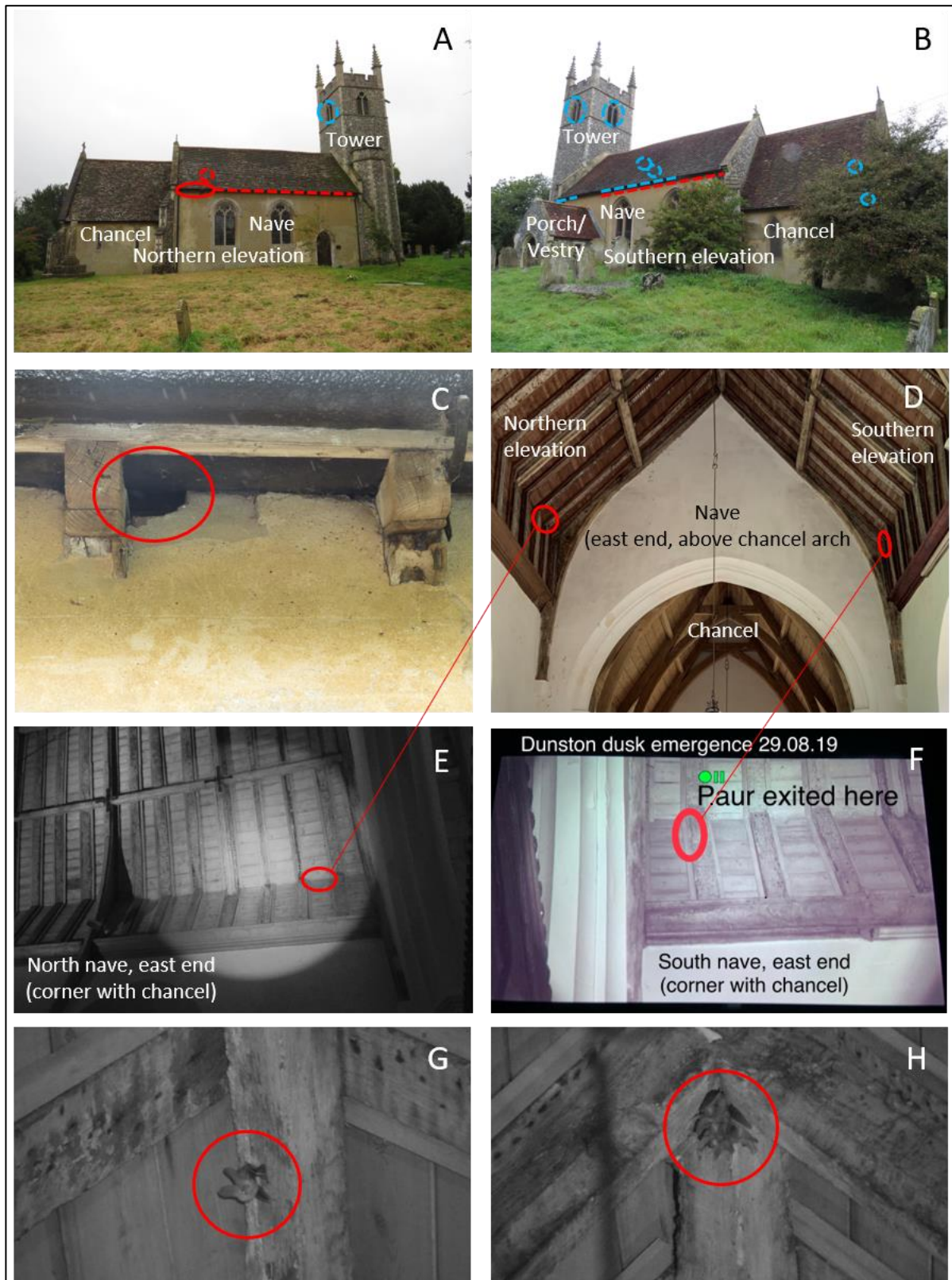


Figure 7. Annotated photos illustrating exterior and interior access points and roost locations. A. Church northern elevation and B. church southern elevation with brown long-eared bat major access circled in red (solid line), minor access shown with red dashed line and pipistrelle access blue dashed circle/line. C. Typical eaves level external access point. D. East end of nave showing brown long-eared bat interior access points (circled in red) and enlarged in infrared camera images in E (north side) and F (south side). Brown long-eared bats night-time roost locations (resting/feeding) beneath nave central ridge beam in G (individual) and H (cluster). Daytime roosts thought to be above ridge beam/sarking boards.

5. Discussion

The data show that St Remigius is home to a modest-sized brown long-eared bat colony (probable maternity use, possible satellite roost) and small numbers of (day roosting) soprano and common pipistrelles.

Brown long-eared bats tend to return to maternity sites relatively late in the season (i.e. June rather than May), so the low activity levels observed during the first (May) survey are not unusual for this species. Gaining accurate counts for the brown long-eared bats was difficult, with little activity (and no emergence) during the first survey and during subsequent surveys it was evident that not all the bats were emerging from the building during the survey. Instead, the bats were often moving between the roosts above the central ridge beam/sarking boards of the nave, flying around and resting up on the central ridge beam. Consequently, the highest count of 11 individuals (emerging) is likely to be an underestimate. We are not aware of any previous bat surveys at the church, so there are no comparative figures.

Numbers of soprano pipistrelles were highest (six) during the late August survey, which is not unusual at churches in Norfolk, with pipistrelles often gathering at (non-maternity site) churches in larger numbers in the post-maternity period (possibly using the buildings for swarming/mating). However the pipistrelles seem to be mostly confined to exterior roosts (including under roof tiles), rarely entering the interior of the church.

Despite modest numbers of bats present inside the building, the impacts on this small church are substantial, in part exacerbated by infrequent use of the church (which in itself is partly due to the significant clean-up of bat droppings and urine needed prior to any use). As the brown long-eared bats appear to spend a lot of time active inside the church during the night, the dropping and urine deposition may be greater than for other church-dwelling species which tend to leave the building for much of the night (i.e. Natterer's bats (*Myotis nattereri*) and pipistrelles), and may explain why the 'mess' seems disproportionate to the number of bats counted.

5.1. Proposed management plan

The survey findings and potential management options were discussed with church representatives at a progress meeting on 1st November 2019 (also attended by Bats in Churches Engagement Officer Diana Spencer and Bats in Churches Heritage Adviser Rachel Arnold).

The church representatives are keen to have the bats excluded from the interior of the church. However this would be challenging to achieve here, especially as brown long-eared bats are considered to be a roof void dwelling species and the Bat Mitigation Guidelines (Mitchell-Jones 2004) state the need for a significant amount of space to be retained for their roost use (i.e. apex height >2.8m, length and width ≥5m). Consequently

'boxing-in' approaches and artificial roosts/bat boxes, as used in some churches with Natterer's bats and pipistrelles, would be unlikely to be appropriate here. There was some discussion of a ceiling along the upper section of the nave to create a void and Halsey 2019 mentions *"re-installing the lath and plaster nave ceiling would be beneficial to both the bats, congregation and the heritage interest"*. However this would probably not be practical and would almost certainly be prohibitively expensive/beyond the scope of the project.

It may be possible to confine the bats to the nave eaves voids (which they appear to travel along, quite possibly in flight), although the voids do not meet the minimum dimensions specified in the guidance for brown long-eared bat maternity use (Mitchell-Jones 2004). Exploratory opening up of a small section of the eaves voids would allow a better assessment of suitability and current use. Similarly, a roost camera could be inserted at the east end of both the north and south nave eaves voids to gain insight into how the bats are travelling through and using this space.

With limited data on the bats at the church (and no previous survey data to refer to) it would be beneficial to carry out further surveys to better understand the bats' usage of the church and also to carry out some exploratory work and enhancements to aid the development of management approaches here. Radio-tracking of a small number of individuals would allow any alternative roosts to be located and may help clarify if this is a satellite roost to a more substantial nearby maternity colony, which could affect decisions on management approaches (but may be beyond the scope of the project).

Whilst further data are gathered and exploratory works are undertaken during 'Phase 1', enhancements to the tower could create new roosting areas (with flight space), outside of the church interior.

The church architects, Peter Codling Architects, and the Norwich Diocesan Advisory Committee (DAC) should be consulted about management proposals, as they develop. Proposed works *may* fall under List A and List B works which can be carried out without a Faculty, but (for List B) would still need written approval from the Archdeacon.

The proposed management approach (to be developed further) is as follows:

Nave eaves void roof inspection and installation of cameras (see Figure 8)

- Opening up of a small section of the nave eaves roof void to allow inspection (a similar inspection was carried out to inform management approaches at Swanton Morley Church in 2018). This is likely to take a day and would require a mobile scaffold tower and builder to work with the ecologist.
- If suitable (depending on the findings from the inspection), install an infrared camera at the east end of the north and south nave eaves roof voids to allow monitoring of bat activity/use of the space.

Roost enhancements to tower (see Figures 8 & 9)

- Static bat detector to be placed in the tower to monitor activity.
- Installation of suitable bat boxes/roost features in the tower (first floor).
- Check adequate bat access into tower.
- Some blocking of draughts may be needed.
- Blocking of light from the window would be needed.

Bat activity surveys

- Further bat activity surveys in summer 2020 to gain a better understanding of bat numbers and usage of the building.

Trapping and radio-tracking

- Trapping survey and radio-tracking of a small number of individuals to inform roost status (maternity/satellite/non-breeding) and presence of any linked/alternative roosts.

Following the above steps, it may be possible to develop further management measures in 'Phase 2' (2021), subject to findings.

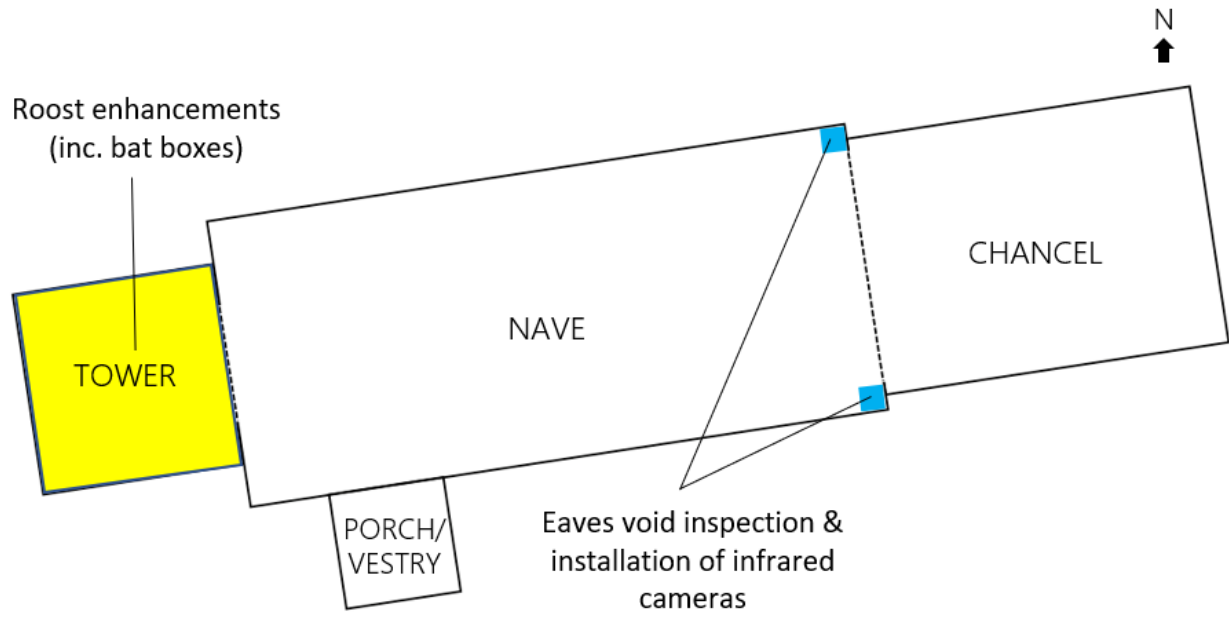


Figure 8. Annotated church plan (not to scale) showing locations of the proposed management interventions/Phase 1 exploratory works.



Figure 9. Photos of the tower, where roost enhancements are proposed. A. Tower exterior (entrance and first floor), potential bat access circled in red. B. First floor interior of tower (with doorway from stairway where slits are present, allowing bat access). C. First floor looking up to second floor (may be possible to fix bat boxes onto wooden floor structure). D. First floor window (will need covering on the inside to reduce light levels).

5.2. Schedule of works

The schedule of works for Year 1 (2020) is set out below in Table 6. Note that originally the intention was for Phase 1 works to commence in spring 2020, but due to the Covid-19 pandemic it became clear that would no longer be possible, therefore a revised work schedule is presented here. **This is a provisional work schedule only, some activities are not possible at the current time as they cannot be carried out safely whilst working to Covid-19 protocols (including social-distancing).**

Table 6. Year 1 (2020) schedule of works. Blue indicates proposed timing of works, red when works must not take place (maternity period when bats will be most vulnerable to disturbance) and grey when no works could take place due to Covid-19 restrictions.

Activity	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Bat activity surveys & static detector monitoring of tower	Grey	Grey	Blue	Blue	Blue	Blue		
Bat trapping, radio-tagging & tracking	Grey	Grey	Red	Red	Blue			
*Nave eaves void inspection & installation of cameras	Grey	Grey	Red	Red	Blue	Blue		
Tower enhancements	Grey	Grey			Blue	Blue	Blue	Blue

****Activity cannot be done at the current time (02.06.2020) as social-distancing is not possible***

Monitoring in the form of two bat activity surveys per year (one in the pre-maternity and one in the post-maternity period) will continue in Years 2 (2021) and 3 (2022), as detailed and costed in the original tender for the ecological works at St Remigius, Dunston.

Cost estimates are provided in a separate Appendix (4, Excel spreadsheet). For accurate costings for capital works it will be necessary to obtain quotes from selected contractors. Costing for ecological aspects should be accurate, providing there are no unexpected eventualities. **Note that at this stage only 'Phase 1' exploratory works/further data collection and tower enhancements can be costed – further management approaches may be developed and proposed for 'Phase 2' in 2021, informed by Phase 1 findings.**

6. References

Bat Conservation Trust (2016) Core sustenance zones: determining zone size. Bat Conservation Trust, London. Available at https://cdn.bats.org.uk/pdf/Resources/Core_Sustenance_Zones_Explained_04.02.16.pdf?mtime=20190219173135&focal=none

Halsey, R. (2019) Statement of Significance for St Remigius, Dunston, Norfolk.

Mitchell Jones, A.J. (2004) Bat mitigation guidelines. English Nature.

Appendix 1: Bat Roost Visit Report Form, Sept 2017

'Bats in Churches Heritage Lottery Fund Heritage Grant Bat Roost Visit Report Form' – completed 28th September 2017.

Submitted as a separate document as includes personal details.

Appendix 2: Bats in Churches Class Licence Survey Criteria

Natural England - minimum survey standards for site registration

The following survey standard describes the **minimum** survey effort required to enable registration of a church for the Bats in Churches Class Licence.

1. High quality survey data, accurately reflecting the usage of the building by bats, must be presented representing at least one full active season.
2. Places of worship will vary considerably in size and structural complexity so methods, techniques and frequency of surveys used must be appropriate and adjusted to suit each situation. Survey methods chosen should maximise collection of information. Surveys should continue until the relevant level of information has been collected.
3. At least four surveys, comprising three dusk and one dawn survey, and one thorough physical inspection, must have been completed for each church applying to be registered in the season prior to starting licensable works. Larger and more complex buildings might require a greater survey effort both in terms of numbers of surveys and numbers of surveyors involved.
4. Surveys should be undertaken in the optimum period for bats (as stated in the BCT Good Practice Guidelines) between May-August. At least one dusk activity survey must be presented from each of the following periods and each survey must be conducted at least two weeks apart:
 - a. May to mid-June;
 - b. Mid-June to end July; and
 - c. August to mid-September.
5. Survey data must be presented from the most recent active season prior to the start of works. If licensed works are planned to begin post maternity period and before the following spring, and a full suite of surveys was conducted the previous year, an update survey will be required during early or mid-maternity period in the year that work is to commence.

6. If surveys meeting the requirements were not undertaken in the active season preceding the intended start of works, but were undertaken within 3 years, a reduced survey effort will be acceptable. In these cases a minimum of two update surveys (one of which must be a dusk survey) will be required. Update surveys should be undertaken between May and August but both may be undertaken earlier in the year i.e. pre or during the maternity period, to allow work to take place immediately prior to or after the maternity season.
7. The mandatory dawn survey must be conducted during the early survey period between May and mid-June. It may be timed to take place directly after an emergence survey.
8. A surveyor must be present inside the building during a dawn survey to identify internal access points.
9. If during the update surveys it is identified that usage of the building by bats has changed significantly, any pre-agreed approach to mitigation must be re-appraised.
10. All major entry and exit points for bats on the exterior of the building *must* be identified. Entry and exit points on the interior of the building *should* be identified.
11. Surveys must identify species of bat and approximate numbers of bats of each species using the building. If breeding roosts are present, this will include a clear understanding of where nursery clusters form and how these and all other roost sites within the building are accessed.
12. Special attention should be given to establishing if access to the interior void of the building is required to access roosting locations or if these locations can be accessed by bats directly from the exterior.

Appendix 3: Photographs (general)



Photo 1. Northern elevation.



Photo 2. Southern elevation.



Photo 3. Nave interior (from west end facing east).



Photo 4. Nave roof interior.



Photo 5. Chancel interior.



Photo 6. Chancel roof interior.



Photo 7. Porch/vestry interior.

Appendix 4: Budget/estimated costs

Attached as a separate Excel spreadsheet document. Contains confidential/commercially sensitive information.