Bats in Churches Final Report

The Church of St Margaret of Antioch, Wellington

Client: Natural England

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Contents

St Margaret of Antioch, Wellington
Bats in Churches Final Report 2023

1. Summary Page

Objectives	• The Bats in Churches Project (BiC) is a partnership between Natural England, the Church of England, the Bat Conservation Trust, the Churches Conservation Trust and Historic England that seeks to mitigate the negative effects of bats on church users, whilst safeguarding roosts and local bat populations. • Instruction by Natural England included undertaking bat surveys at the church of St Margaret of Antioch, Wellington, and developing and implementing a bespoke Bat Management Plan (BMP). The objective of the project has been to investigate specific issues of concern and the causes of conflicts between bats and church users and to develop novel solutions to overcome these issues.
Summary of Findings	• Church users report significant issues caused by the presence of bats, including disruption to services, restriction of the use of the church to the wider community and a large cleaning burden to volunteers. • Three species of bat regularly use St Mary's for roosting, socialising or hibernating: common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*P. pygmaeus*) and Natterer's bat (*Myotis nattereri*). • Roosting and socialising activity of Natterer's bats inside the church is responsible for most of the issues reported by church users. A maternity colony of Natterer's bats use the church each year as part of a linked roost resource in the local area. • The Natterer's bat maternity colony has been shown to have strong ecological links with the mosaic of nearby woodlands which provide the colony with a local network of foraging habitats and roost features. • Excluding bats from identified roosts in areas of concern within the church as part of the BMP was successful in reducing quantities of bat faeces falling in sensitive areas. However, the presence of bats in St Margaret's continued to cause distress to church users. • Bespoke bat roosts were created under the eaves of the north aisle and north transept to enclose access points and restrict movement of bats within the church interior without compromising functionality of the roost resource. • Overall, there has been a 75% reduction in the mass of droppings falling in the church interior since the BMP was implemented in 2021.
Conclusions	• Excluding Natterer's bats from specific roost locations can have success in reducing the quantity of droppings that fall in those parts of the church, but is unlikely to result in bats leaving the area entirely. • The roosting, flying and socialising of Natterer's bats, together with frequent roost switching, continue to present challenges in terms of quantities of bat faeces encountered through the breeding season. • The BMP for St Margaret's identified that the church is part of a linked roost resource for the Natterer's bat maternity colony, with alternative roosting resources located in nearby woodlands. Hence, works took place to limit bat access to the church interior whilst simultaneously maintaining the roost resource at the church. Further monitoring in 2023 will continue to assess the success of these measures. • It is considered that participation in the BiC project has increased awareness of bats and their ecology in the community at Wellington. An event to be held in May 2023 will include information and activities provided by the Herefordshire Mammal Group and bat ecologists from Mortimer Environmental.

St Margaret of Antioch, Wellington
Bats in Churches - Final Report 2023

2. Introduction

2.1 The Bats in Churches Project

2.1.1. This Report describes the outcome of bat surveys, liaison with stakeholders, the design and implementation of a Bat Management Plan (BMP) and subsequent monitoring of bat populations at the church of St Margaret of Antioch, Wellington, HR4 8AZ. The Report is produced by Mortimer Environmental and Pure Ecology on behalf of Natural England, as part of the Bats in Churches Project.

2.1.2. The Bats in Churches Project (BiC) is a unique partnership between Natural England, the Church of England, the Bat Conservation Trust, the Churches Conservation Trust and Historic England and is supported by the National Lottery Heritage Fund.

2.1.3. Churches have become increasingly important roosting sites for bats as populations have declined due to habitat loss and loss of old buildings. However, due to the open structure of these buildings, the faeces and urine associated with bat roosts can cause smell, mess and damage to important historic artefacts. BiC seeks to mitigate these perceived negative effects of bats on church users as well as the associated increased cleaning burden, while preserving the roosts and maintaining the favourable conservation status (FCS) of the bat populations concerned. For more information see https://batsinchurches.org.uk/.

2.1.4. In March 2019, Mortimer Environmental was commissioned by Natural England to undertake bat surveys and develop a BMP for the church of St Margaret of Antioch (hereafter known as 'St Margaret's'). This work was undertaken in partnership with Pure Ecology and in consultation with Davidson-Watts Ecology.

2.1 Site Description & Location

2.2.1. St Margaret's is located at Ordnance Survey grid reference SO 49723 48212. The church comprises a west tower and nave with south porch, chancel, north aisle and transept. It is a Grade 1 listed historic building, dating from the late 12th Century. The north aisle and transept date to the 15th or early 16th Centuries, with the south porch added in the 14th Century. Later restoration works were undertaken in 1883, 1887, 1912 and 1913.

2.2.2. The building is constructed of sandstone rubble with ashlar dressings, and stone and clay tiled roofs. The tower consists of four stages, with a shallow pyramidal roof set behind an embattled parapet, and

is of notable and unusual design for the period. The south porch has a roof of two trussed bays with moulded ogee tie beams, arch braces and wind braces. Inside there is an open wagon roof to the nave and north transept and a ceiled chancel. (CHURCH OF ST MARGARET | Historic England).

2.2.3. St Margaret's is considered to be of high archaeological, architectural and historical significance (St Margaret of Antioch, Wellington, Statement of Significance 2019). It retains a significant amount of late Romanesque fabric and is notable for its roof carpentry, with that of the south porch being particularly notable. It retains three medieval bells and has a series of distinctive late Georgian wall monuments.

2.2.4. The village of Wellington sits in a rural location, with surrounding countryside represented by a mixture of grazed pasture, arable farmland and patches of deciduous and ancient woodland. The church sits in the centre of the village, 340 m to the west of the A49. Wellington Brook lies 30 m to the north of the church and the River Lugg Site of Special Scientific Interest (SSSI) is located 1.6 km to the east. There are large lakes associated with disused extraction works 600 m to the southeast and Wellington Wood SSSI, which is an area of ancient woodland is located approximately 1.1 km northwest.

2.2.5. A site location plan and aerial view of St Margaret's are shown in Figure 1.

2.3 Previous Studies of Bats at St Margaret's

2.3.1. Herefordshire Mammal Group (HMG) Reports (2014-2017) indicate that a maternity colony of Natterer's bats (*Myotis nattereri*) was present inside St Margaret's during the months of June to August in 2014-2017, with peak counts of between 53 to 70 bats estimated during this period. The maternity roost was located at the west end of the nave. Bats emerged from the building using an open window in the north transept, or otherwise from access points at the northeast end of the north aisle, the northwest end of the nave and from the east face of the north transept.

2.4. Bat Roost Visit Report (2017)

2.4.1. A previous BiC Bat Roost Visit Report completed in August 2017 reported a maternity colony of Natterer's bats present in the church along with pipistrelles and brown long-eared bats (*Plecotus auritus*), indicated by the presence of droppings (Bats in Churches Bat Roost Visit Report Form 2017).

2.4.2. Natterer's droppings were present throughout the nave, north transept, north aisle and vestry and around potential exit points in the north aisle and north transept.

2.4.3. The issues raised in the 2017 Bat Roost Visit Report included bats in the church interior, damage to furnishings/artefacts/memorial/organ, droppings, impact on community activities/use, impact on worship and smell. These issues had been present for longer than five years, with bat droppings and

urine staining present throughout the church. It was reported that there was a constant requirement to clean prior to each service, and that droppings and urine may fall on the congregation. Bats were reported as limiting the church's ability to provide community services.

2.4.4. There was a proposal to install a kitchen and toilet in the church, however it was feared that this would be unlikely due to impacts from bats. Overall, the church users reported a positive attitude towards bats, although some members of the congregation viewed bats very negatively. Church users wished to find solutions that would enable them to provide more community services.

2.5 Statement of Significant 2019

2.5.1. A Statement of Significance for St Margaret's was commissioned by BiC in 2019 and produced by the Architectural History Society (St Margaret of Antioch, Wellington, Statement of Significance 2019). This report concluded that while there was no evidence of significant damage to furnishings and fabrics of high significance, bats cause a considerable cleaning burden and restrict the church's desire to extend the use of the building to the wider community.

2.6 Relevant Protected Species Legislation

2.6.1. All bats and any place used by bats for shelter (i.e., a roost) are legally protected under the Wildlife and Countryside Act 1981 (as amended) and the Conservation of Habitats and Species Regulations 2017 (as amended) in England and Wales. When taken together this legislation makes it an offence to:

- Kill, injure, take or disturb a bat (note that disturbance in this context refers to actions that could inhibit a bat's ability to survive and reproduce or rear their young, to hibernate or to significantly affect the local distribution or abundance of the species);
- Destroy, damage, obstruct or otherwise interfere with a bat roost, breeding site or resting place, whether the roost is occupied at the time or not; and
- Sell, or offer for sale, a bat or any part thereof, live or dead.

2.6.2. The legislation that protects bats allows for licensing under Regulation 55 of the Conservation of Habitats and Species Regulations (2017) for the purpose of preserving public health, or public safety, or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment.

2.6.3. In accordance with the requirements of the Conservation of Habitats and Species Regulations (2017) a bat licence can only be issued where the following requirements are satisfied:

- that there is no satisfactory alternative; and

- that the action authorised will not be detrimental to the FCS of the population or species in their natural range.

2.6.4 Developed as part of the BiC project, works that may impact bat roosts in churches are permitted in special cases for trained ecologists through a Natural England Bats in Churches Class Licence (BiCCL). The licence gives highly trained ecologists flexibility to trial bespoke methods that attempt to minimise impacts of bats in churches where historic monuments are being damaged and/or bats are affecting the community's use of their church.

2.6.5. An application to Natural England for the BiCCL will assess the level of damage caused to the church. This includes an assessment of damage to monuments and artefacts, disruption to church activities and functions, and the burden of cleaning the building. Impacts caused by the presence of bats must be significant, and whilst there is not a prescribed threshold to evaluate damage, the National Heritage Protection Plan makes clear the importance of preventing damage to places of special architectural or historic interest. Users of this licence must implement management measures to safeguard bats and ensure the ecological function of the site is maintained.

2.7 Aims & Objectives of BiC at St Margaret's

2.7.1. The BiC project aims to work closely with churches to gather ecological, built heritage and social information to inform the development of a 'Bat Management Plan' (BMP), with approaches designed to support the church in reducing the impact of bats on historic artefacts and church users. The project also aims to produce a sustainable network of skilled volunteers to provide ongoing support to church communities with bats. The specific aims and objectives at St Margaret's (as detailed in Sections 3 - 7 below) were as follows:

- **Section 3: Bat Roost Visit Report & Bat Surveys 2019/20** – To hold an initial meeting with the parochial church council (PCC) and to complete a Bat Roost Visit Report of St Margaret's during May 2019 to understand the issues caused by bats, the impact of bats on users of the church and the outcomes church users hope to achieve through participation in the project. To carry out a suite of dusk emergence/pre-dawn re-entry surveys during the bat activity period (May to September) at St Margaret's, in collaboration with members of HMG, to identify the species of bat using the church, the type and location of roosts present, the entry/egress points used by bats and to evaluate the conservation significance of bat roosts in the church;
- **Section 4: Bat Management Plan** - To develop a BMP for St Margaret's, in consultation with stakeholders, containing a suite of bespoke management measures aimed at reducing negative impacts of bats on church users and historic monuments. The plan will include an embedded

mitigation strategy that adheres to the Mitigation Hierarchy of avoid, minimise or compensate for impacts on bats and bat roosts and which meets the FCS legal test under The Conservation of Habitats and Species Regulations (2017). To obtain a site registration for St Margaret's under Natural England's BiCCL to undertake the works described in the BMP;

- **Section 5: BMP Phase 1 -** To implement Phase 1 of the BMP and monitor any effects on bat populations;
- **Section 6: BMP Phase 2** - To refine or amend the BMP in light of Phase 1 works and to implement strategies under Phase 2. To monitor any effects on bat populations;
- **Section 7: Conclusions & Recommendations** - To assess the success (or otherwise) of different management options and the outcomes for bats, bat roosts and church users. To make recommendations for further work and ongoing monitoring of the bat roost resource at St Margaret's.

3. Bat Roost Visit Report & Bat Surveys 2019/20

3.1 Internal/External Inspection Including Bat Roost Visit Report

3.1.1. A daytime inspection and meeting with PCC members at St Margaret's were undertaken on 3rd May 2019 by two experienced bat ecologists, one holding a Natural England Bat Class Licence WML CL18 (Bat Survey Level 2) bat licence. A Bat Roost Visit Report Form was completed in consultation with church wardens to evaluate the impacts of bats on historic monuments and on church users (Bat Roost Visit Report Form, St Margaret of Antioch, 2019). The survey adhered to professional standards detailed in the *Good Practice Guidelines* published by the Bat Conservation Trust (BCT; 2016). Full details of the methodologies used are given in Bats in Churches Report, St Margaret of Antioch Church, MDWE (2019).

3.1.2. The church had been cleaned immediately prior to the daytime inspection in preparation for a funeral. Hence, the number of droppings recorded did not provide a true indication of bat activity. Bat faeces were found in the porch, nave, north transept and north aisle. Fresh faeces were also found on the external wall of the north aisle, under a potential access point. Faeces were determined as coming from Natterer's bat, and this was confirmed by DNA analysis carried out by SureScreen Scientifics. Full details and results of the internal/external inspection are given in Bats in Churches Report, St Margaret of Antioch Church, MDWE (2019).

3.1.3. The Bat Roost Visit Report highlighted the following issues with bats at St Margaret's: bats in the church interior, damage to furnishings/artefacts/memorials/organ, droppings, fear, impact on community activities/use, impact on worship, intolerance, pest control and smell. Church users reported damage to the fabric of the church, monuments, fixtures and fittings. They noted that they were planning to install toilets and catering facilities in the base of the tower, and wished to move bats away from this area and the area of the west nave as they would like to use this area as a social space for exhibitions and displays.

3.1.4. The outcomes the church representatives wished to achieve through working with the project were listed as follows:

- To mitigate the damage caused by bat faeces and urine;
- To reduce the cleaning burden (which was reported as very high);
- To move bats away from the rear of the church (west nave) to allow its use as a social space.

3.2 Bat Surveys 2019/20

3.2.1. Full details of the methodologies used during surveys conducted at St Margaret's during 2019 and 2020 are given in Bats in Churches Report, St Margaret of Antioch Church, MDWE (2019), Bats in Churches Static Logger Survey (2020) and are summarised below:

- Dusk Emergence/Pre-dawn Re-entry Surveys: Three dusk emergence surveys and one pre-dawn re-entry survey were carried out between 13 May and 5 September 2019. Surveys followed professional standards detailed in the BCT *Good Practice Guidelines* (2016) and guidance provided by BiC. Surveys were undertaken by a team of four professional bat surveyors (one or more holding a Natural England CL18 [level2] bat licence). Surveyors used bat detectors recording echolocation calls in full spectrum output and up to three Canon XA11/XA25 camcorders equipped with infrared (IR) torches and set to IR recording mode.
- Static Automated Acoustic Monitoring: A static acoustic recording device (SM4, Wildlife Acoustics) was deployed in the interior of St Margaret's on 01 July and left *in situ* for 14 days. The device was set to record from one hour before sunset to one hour after dawn. Unfortunately, the device went missing from the church during this period and the associated data was lost.
- Winter Hibernation Surveys: Two static acoustic recording devices (SM4, Wildlife Acoustics) were deployed in the interior of St Margaret's on 16 January 2020 and 03 February 2020 and left *in situ* for 10 days on both occasions. Units were set to record from one hour before sunset to one hour after sunrise and calls were analysed using BatExplorer Pro and BatSound software (Elekon).

3.2.2. Surveyor locations, positions of IR cameras and locations of the static acoustic devices are shown in Figure 2.

3.2.3. Surveys showed that St Margaret's supported three species of roosting bats in 2019 (common pipistrelle, soprano pipistrelle and Natterer's bat). Surveys in May recorded up to 12 Natterer's bats using the church as a maternity roost, with roost locations in the north aisle and transept and in the nave. There were also day roosts of three soprano pipistrelles and one common pipistrelle in the exterior fabric of the church. The number of Natterer's bats roosting at the church had increased to a peak count of 35 - 40 by July. Several bats remained inside the church after emergence and were observed foraging and socialising in the church interior.

3.2.4. Access points were confirmed in the north aisle and north transept (Figure 2). During May, five bats were seen emerging from the underside of the roof of the south porch.

3.2.5. Overall, nine Natterer's bat roosting locations were identified in the north transept, north aisle and nave, with main roosting locations being in the north transept and north-west nave (Figure 2).

3.2.6. Bats roosting and socialising inside the church are the cause of the widespread and scattered mess produced by faeces and urine. Natterer's bat activity was determined to be the main cause of the reported issues, with this species generating most of the scattered faeces and switching roosting locations frequently over the course of the summer.

3.2.7. Winter hibernation surveys recorded common and soprano pipistrelle bats using the interior of St Margaret's through the 2020 hibernation period. There was no evidence to suggest that Natterer's bats use the church as a hibernation roost.

3.3 Ecological Evaluation & Impact Assessment

3.3.1. Biological Records Centre data were provided by Herefordshire Biological Records Centre (HBRC) in February 2023 for records of bats within a 2 km radius of St Margaret's. Multi-Agency Geographic Information for the Countryside (MAGIC) Maps website (www.magic.gov.uk) was searched for European Protected Species (EPS) mitigation licences relating to bats within 2 km of the church.

3.3.2. There were 91 records of bats within 2 km of St Margaret's within the last 10 years (data provided by HBRC). Of these, 56 records relate to the church and churchyard and include common and soprano pipistrelle, brown long-eared bat, Natterer's bat, noctule (*Nyctalus noctula*) and Daubenton's bat (*Myotis daubentonii*), including a maternity colony of Natterer's bats. The remaining records relate to Daubenton's bat, common and soprano pipistrelle, noctule, brown long-eared bat, Natterer's bat, western barbastelle (*Barbastella barbastellus*), whiskered bat (*M. mystacinus*) and unidentified *Myotis* species, all recorded in fields and gardens in the Wellington, Wootton and Auberrow areas as well as several records from a bird hide at Leystone Bridge, which is the site of several large lakes located approximately 1 km southeast of Wellington.

3.3.3. There are two records of EPS mitigation licenses relating to bats recorded within 2 km of the site. Both date from 2012, one allows for destruction of a resting place for common pipistrelle, brown long-eared and Natterer's bats and the other allows for destruction of a resting place for common pipistrelle, brown long-eared, whiskered and Brandt's bats (*M. brandtii*). Both are located within approximately 100 m of St Margaret's in the centre of Wellington village.

3.3.4. The church has been assigned an ecological value with regard to roosting bats based on the approach described in the 'Guidelines for Ecological Impact Assessment in the UK & Ireland' published by the Chartered Institute of Ecology and Environmental Management (2018) which defines the resource (in this case the bat roost resource within the church) within a geographical context. Full details can be found in Bats in Churches Report, St Margaret of Antioch Church, MDWE (2019).

3.3.5. St Margaret's has been recorded as supporting a maternity colony of Natterer's bats since at least 2014 and by the surveys detailed in this report. Natterer's bats in England are considered to be

common and widespread and population sizes have increased since 1999 (BCT, 2018). The Natterer's bat maternity roost is therefore considered to be of *local* level value.

3.3.6. Brown long-eared bats were recorded using St Margaret's during surveys carried out by HMG in 2014-2017. Brown long-eared bats are considered widespread and common with stable populations since 1999 (BCT, 2018). They are also a NERC 2006 S41 species of principal importance. The brown long-eared bat day roost is therefore considered to be of *site* level value.

3.3.7. Soprano pipistrelles are considered common and widespread and their populations have been stable in England since 1999. They are listed as species of principal importance on the NERC Act S41. The soprano pipistrelle occasional day roost and hibernation roost is therefore considered to be of *site* level value.

3.3.8. Common pipistrelle populations are considered to be increasing in England since 1999 and are common and widespread. The common pipistrelle occasional day roost and hibernation roost is therefore considered to be of *site* level value.

3.3.9. Proposed measures aimed at reducing Natterer's bat activity (and the associated impacts of bat faeces and urine) at the west end of the nave at St Margaret's need to consider the potential consequences, including the loss of roosts, a reduction in available area for socialisation and the risk of disturbance of the main Natterer's bat maternity roost. Additionally, impacts could result in disturbance to common pipistrelle, soprano pipistrelle and brown long-eared bat day roosts and hibernation roosts. Overall, this impact would result in a permanent negative effect on bats that would be significant at the *local* level.

3.4 Stakeholder liaison & public engagement

3.4.1. Meetings were held in May and October 2019 with the PCC, ecologists from Mortimer Environmental and Pure Ecology and BiC stakeholders, including the BiC Heritage Advisor, BiC Engagement Officer, DAC Secretary, Historic England, church architect and church wardens. Meetings were used to explain the aims and objectives of the BiC project, to understand the issues caused by bats at St Margaret's and the outcomes church users hope to achieve. Additionally, meetings allowed for the results of the bat surveys undertaken in 2019 to be explained and to support development of a BMP that seeks to mitigate negative effects of bats whilst safeguarding the FCS of bat species using the church.

3.4.2. A further meeting was held with the Chair and Bat Lead at HMG, to establish their participation in the project (including taking part in surveys and long-term monitoring of project outcomes) and offer training opportunities to local bat volunteers.

3.4.3. During February 2020, Engagement officers from BiC visited Wellington Primary School to undertake bat themed educational activities with the children. Further activities were planned for later in the year but did not take place due to restrictions imposed by the COVID-19 pandemic.

3.4.4. The meeting outcomes and the BMP developed in consultation with church users are summarised in Section 4, below.

4. Bat Management Plan

4.1 Meeting Outcomes

4.1.1. Meeting outcomes show that bats cause significant conflict with church users during summer months. Pews need to be covered between May and September and church volunteers expressed concerns relating to their health when sweeping up bat faeces. Bat urine has caused significant staining to floor tiles. The mess is produced by the Natterer's maternity colony roosting in the west end of the nave and the north transept and by Natterer's bats flying and socialising in the church.

4.1.2. There is a plan to use the space at the base of the west tower and west nave as a social area, with new toilets and catering facilities. Currently bats cause a lot of mess in this area, preventing the church from using it for exhibitions and displays. Furthermore, the roof structure has wooden carvings (bosses) of note in the roof of the nave and north transept which church users would like to up-light. This has potential to cause significant harm and disturbance to bats roosting close by in the roof structure and advice should be sought from a professional bat ecologist to ensure no offence is committed undertaking this work.

4.1.3. Meetings discussed the following options to mitigate the adverse effects of bat activity within the church:

- Excluding bats from the church by closing access and egress points and the difficulties and considerations associated with this;
- Deterrents - directed use of acoustic deterrents to modify Natterer's bat roosting and flight patterns within the church;
- Provision of some immediate relief from the considerable cleaning burden experienced by church volunteers, which they reported is having severe physical and psychological effects on them;
- Roost exclusion, to exclude bats from roost locations in the west nave; and,
- The potential provision of suitable alternative roosting sites for bats in less contentious locations within the church.

4.1.4. The feasibility of each option was discussed and considered with respect to maintaining the FCS of the Natterer's bat population. With agreement of church users and stakeholders, the BMP outlined below was developed with several management options aimed at mitigating the impacts of faeces and urine on St Margaret's, to be carried out under a Natural England BiCCL.

4.1.5. The BMP was split into two phases, with the option to review and amend the second phase of works in light of the findings/effectiveness of the first phase. The full BMP, along with a review of alternative methods to deliver the objectives and further justification of the proposed methods, can be found in

Bats in Churches Report, St Margaret of Antioch Church, MDWE (2019). A summary of the BMP is given below in Table 1.

Table 1. Bat Management Plan for St Margaret of Antioch, Wellington

Prescription	Method	Timings	Rationale
PHASE 1			
Provide financial support for church cleaning	To provide the church with the means to employ professional cleaners on a weekly basis through the bat breeding season	May to September 2020 & May to September 2021	Church members can no longer face the considerable cleaning burden caused by bat faeces during the breeding season. This provides an immediate solution, while bat management measures are implemented to provide a longer-term solution.
Radiotracking of Natterer's bats at St Margaret's	Two trapping /tagging and radiotracking surveys	May/June and August/Sep 2020	To identify other roost locations within the church interior and the local area, which is essential for understanding the context of St Margaret's as part of a wider linked roost resource.
Roost monitoring and recording social activity	Two surveys using night vision cameras to monitor roost behaviour and social activity at the western end of the nave and north transept and/or other areas of the church that support colony roosts in 2020. The objective was to record a minimum of three nights activity in core areas occupied Natterer's bats.	May/June and August/Sep 2020	Video footage captured by IR camera or thermal imaging camera to be analysed to assess the type and level of Natterer's bat activity in colony core areas where the build-up of bat faeces is problematic for church activities. To understand the types of bat behaviour that are causing the problem, and to obtain results against which the effectiveness of the management plan can be assessed.
Monitoring of faeces	One survey per month in the absence of cleaning for up to seven days prior to survey. Systematic counts or 'sweep, collect and weigh'.	May to September 2020	Establish accurate and systematic baselines for quantities of bat faeces from which future quantitative assessment/analysis of success of mitigation/deterrent measures can be reliably assessed.
Exclude bats from roosts in the west nave	Emergence checks and licensed soft blocking of roosts on three consecutive nights, followed by permanent access blocking.	Autumn 2020	Excluding bats from roosts in sensitive areas of the church (west nave) to prevent faeces and urine from falling in this area, permitting its use as a social space.

Prescription	Method	Timings	Rationale
Provision of compensatory roost sites under the eaves of the north aisle	Identify new locations in the north side of the church to build bespoke under-eave roost boxes.	Autumn 2020	Provide alternative roosting locations in less contentious areas of the church and compensation for loss of roosts in the nave, maintaining FCS of the bat population.
Monitoring of excluded and new roosts	Emergence surveys of new roosts and former roost locations via walked transects.	May to September 2021	To determine effectiveness of exclusion measures and monitor use of new roosts.
Monitoring of faeces	One survey per month in the absence of cleaning for up to seven days prior to survey (to be agreed with PCC). Systematic counts or sweep, collect and weigh.	May to September 2021	To provide an accurate and systematic assessment of quantities of faeces to be compared against the established baseline, to assess effectiveness of roost exclusion measures.
Phase 1 Assessment & Development of Phase 2	Evaluations of success (or otherwise) of Phase 1 works with the PCC. Further development of the BMP and implementation in Phase 2.	2021-2022	Undertaking bat management and mitigation methods using an incremental approach allows flexibility to adapt and develop the plan as necessary to achieve success.
PHASE 2			
Possible use of other measures to prevent bats from flying and socialising in the church interior	To be determined	2022	If after implementation of Phase 1, bat faeces and urine continue to cause significant issues for church users, the BMP will be developed and refined as necessary.

5. Implementation of BMP Phase 1 (2020-2021)

5.1 Bat Activity Surveys 2020

5.1.1. It was not possible to undertake radiotracking surveys during the summer of 2020, due to restrictions imposed during the COVID-19 pandemic. Therefore, surveys were adapted to provide detailed information on roost locations inside St Margaret's and consisted of dusk through to dawn walked transect surveys of the church interior. The details of these are described in full in St Margaret of Antioch Church, Wellington Update Bat Surveys (2020) and are summarised below.

5.1.2. Together with surveys of faeces quantities undertaken throughout the summer months (detailed below), internal walked transect surveys were used to confirm key areas where roost locations and social activity was causing issues with levels of bat faeces. In summary, two surveys were undertaken on the 11th of June and the 11th of August 2020 by two surveyors (one holding a Natural England CL18 [level 2] bat licence) equipped with bat detectors recording echolocation calls in full spectrum output, two Canon XA11 camcorders equipped with infrared (IR) torches and set to IR recording mode and Thermal Eye X200xp lighting. Surveys began 15 minutes before sunset and finished 15 minutes after sunrise. Members of the Herefordshire Mammal Group also attended both surveys and carried out dusk emergence observations of the church exterior. Surveyor locations and positions of IR cameras are detailed in Figure 3.

5.1.3. Two static acoustic recording devices (SM4, Wildlife Acoustics) were deployed in the interior of St Margaret's on the 6th of June and the 12th of August 2020 and left *in situ* for six days. Devices were set to record from one hour before sunset to one hour after sunrise and recorded bat calls were analysed using BatExplorer Pro and BatSound software (Elekon).

5.1.4. The internal survey in June recorded up to six Natterer's bats and one common pipistrelle in the church interior. New roost locations were recorded (Figure 3) with most activity in the north aisle and north transept. In August, approximately 50 Natterer's bats were recorded in the church, along with one common pipistrelle and two soprano pipistrelles. Most activity was centred in the north transept and western end of the nave (Figure 3). Internal and external surveys confirmed access points in the north aisle and north transept, with bats predominantly using the eastern end of the north transept to return to roost at dawn.

5.1.5. Static acoustic recording devices identified Natterer's, common and soprano pipistrelles inside the church, with Natterer's activity being recorded throughout the night on all twelve nights. Activity levels were highest in the north transept during June and west nave during August.

5.2 Bat Faeces Surveys 2020

5.2.1. Surveys of bat faeces inside St Margaret's were undertaken each month between June and September inclusive (it was not possible to survey during May as the church was closed due to the COVID-19 pandemic). Full details of the surveys and methodology can be found in Temporal & Spatial Analysis of Bat Droppings at St Margaret of Antioch (2020).

5.2.2 The results showed that the mass of faeces falling inside the church increased between June and July/August, before decreasing again in September. This was in line with the increase in colony size and associated social behaviour observed during internal bat surveys in 2020. Accumulations of faeces were observed beneath roost locations in the nave and north transept, with locations changing frequently.

5.3 Management Works 2021

5.3.1. Internal bat surveys and surveys of faeces were used to identify core roost locations and centres of bat activity that were causing issues with faeces and urine. This information was used to refine the BMP, to confirm which roosts bats should be excluded from and to inform a BiCCL application and an application for Faculty Permission (the permissive right to undertake works to a church building or its contents).

5.3.2. Although three species of bat were identified roosting at St Margaret's, surveys confirmed that Natterer's bats are the cause of a majority of the bat faeces in the church, with socialisation behaviour around roosts producing accumulations of droppings in these areas. Areas of most concern were confirmed as being in the west nave.

5.3.3. Faculty Permission for the bat management works was not granted until late in 2020, meaning works were rescheduled for April 2021 instead of October 2020. Works proceeded as follows, in accordance with the BMP:

- Closure of roosts identified in the west nave (Figure 3), to prevent bat faeces and urine from falling in the area church users wish to use as a social space. Roosts were accessed using a cherry-picker, with roost exclusion activities undertaken after sunset and after endoscope inspections showed roosts to be unoccupied;
- Provision of bespoke compensatory roosts under the eaves of the north aisle. Eaves boxes were designed in consultation with the church architect (Hook Mason) and these plans are shown in Figure 4, with the location of the eaves box shown in Figure 5. Boxes were designed to provide a range of roosting opportunities for bats, with crawling spaces between sections to allow access to the full extent of roost features. An access/egress point to the outside was created to allow bats to enter and leave the roost to the north. Sliding doors to the front provide the option to enclose the

roost in the future, preventing bats from accessing the church interior from this location. Doors were initially left open to allow bats to find and familiarise themselves with the roost;

- Further alternative roosting options were provided in the form of crevice and chamber bat boxes that were erected in the nave, north aisle and south porch (Figure 5).

5.4 Bat Activity Surveys 2021

5.4.1. Previous surveys undertaken in 2019 and 2020 (described above) showed that Natterer's bats used roost resources in the nave and north transept, which created issues with falling faeces and urine. Use of roost resources in the church changed during the season, therefore closure of some roosts would be unlikely to result in removal of the roost resource from the church, but should reduce use of key activity areas, helping to reduces faeces in this area.

5.4.2. In 2021, internal bat activity surveys, dusk emergence and pre-dawn re-entry surveys, radiotracking surveys and faeces surveys were used to assess how bats were using the church after closure of roosts in the west nave. Surveys aimed to monitor bat activity, roosts and access points inside the church, to identify linked roost resources in the wider Wellington area and to assess quantities of bat faeces inside the church compared to those before management works were undertaken.

5.4.3. Full details of the bat surveys undertaken in 2021 and methodologies used are given in St Margaret of Antioch Church, Wellington Monitoring Report (2021). In summary, internal surveys were carried out by two surveyors (one holding a Natural England CL18 [level 2] bat licence) equipped with bat detectors recording echolocation calls in full spectrum output, Canon XA11 camcorders equipped with infrared (IR) torches and set to IR recording mode and a FLIR E75 thermal imaging (TI) camera set to recording mode. This combination ensured the wider field of view provided by the TI camera could be used to identify roost locations from their heat signature and the narrower field of view with higher resolution provided by the IR camera could be used to record behaviour at identified roosts. Surveys were undertaken on consecutive days between the 24th and 27th of May 2021, and on the 2nd and 3rd of September 2021. Surveys commenced 15 minutes before sunset and finished 120 minutes after sunset.

5.4.4. Pre-dawn re-entry and dusk emergence surveys were also conducted on the 16th of July and the 19th of August 2021 respectively. Survey methodology followed that described for 2019 and 2020 above.

5.4.5. During 2021, peak counts of around 30-35 Natterer's bats were recorded using the church. No bats emerged from roost locations that were closed during April 2021 (with the possible exception of a single Natterer's bat). During the earlier part of the breeding season (May to July), bats were most active in the north transept, with activity moving to the west nave later in the season.

5.4.6. During September 2021, 12 to 14 bats were roosting in the west nave, showing that while individual roost closures in this area were successful, bats were able to locate new roost features nearby. A summary of bat survey results, along with a plan of excluded roosts and compensatory bat boxes can be found in Figure 5.

5.5 Bat Radiotracking 2021

5.5.1. Radiotracking surveys of Natterer's bats were undertaken in 2021 to identify additional roosting locations inside the church, to monitor the effect of licenced roost closures on bat populations and to identify linked roost resources in the local area.

5.5.2. Full details of the methodology employed for the radiotracking surveys is provided in St Margaret of Antioch Church, Wellington Radiotracking Report (2021). Two trapping and radiotracking surveys of approximately seven days duration were undertaken in May 2021 and August/September 2021. Surveys were undertaken in line with BCT *Good Practice Guidelines* (2016), by surveyors holding Natural England CL19/20 [level 3/4] bat licences and working under a Natural England BiCCL.

5.5.3. Bats were trapped using a hand net with pole extenders and a mist net and fitted with lightweight radio-transmitter tags (Biotrack). Lactating bats were tagged if they met a target weight and were in good condition, female bats in advanced stages of pregnancy or early lactation were not tagged. Tagged bats were located and tracked with a Sika receiver (Lotek) and a 3-element Yagi antenna (Biotrack). Bats were located during the day to find roost locations and tracked for 3-4 hours after release or emergence. Radiotracking fixes were plotted in the field on digitised 1:25,000 scale Ordnance Survey maps and later analysed in Ranges 9 (Anatrak) to calculate home ranges.

5.5.4. Once accessible roost sites were identified, exit counts were undertaken using Canon XA11 camcorders equipped with IR torches and set to recording mode.

5.5.5. All bats were trapped inside the church, in the north transept. Five Natterer's bats were tagged during each of the two surveys, including five pregnant females, one non-breeding female and four post-lactating females. Each bat was tracked for between two and four days. Data indicated that the total home range of the colony is approximately 637 ha, with an average individual home range of 94 ha (range 11 to 221 ha).

5.5.6. Bats were located to roosting locations inside the church, with 15 bats later seen emerging from a roost located in the north transept in May and 12-14 bats emerging from a roost located in the east nave in September. Another five roosts were located in a large complex of ancient and broadleaved woodland, approximately 1.50 to 2.25 km to the north of St Margaret's (Figure 6).

5.5.7. To summarise, radiotracking surveys revealed that the roost resource at St Margaret's is important within a wider context in the surrounding area, with a strong ecological link to ancient woodland

complexes located at Wellington Wood, Chancehill Wood and Dinmore Manor. Radiotracking allowed for the identification of additional roosts inside the church and also revealed that implementation of management option in 2021 had no detectable effect on the FCS of the population.

5.6 Bat Faeces Surveys 2021

5.6.1. Surveys of bat faeces were conducted in 2021 using the same methodology as in 2020. Full details are provided in Temporal & Spatial Analysis of Bat Droppings at St Margaret of Antioch (2021). The mass of faeces increased as the breeding season progressed, before falling in September in the same pattern as in 2020.

5.6.2. Overall, the amount of faeces collected in the church interior fell by nearly 40% compared to 2020. Notably, accumulations that were present in the west nave in 2020 were not present in 2021, indicating this area was being used less by bats after key roosts had been closed earlier in 2021. However, bats continued to switch roosts frequently and accumulations of faeces showed they were using the south and east areas of the nave more in 2021 than in 2020.

5.7 Summary of BMP Phase 1

5.7.1. In 2020, a bespoke BMP was developed for St Margaret's to manage the impacts of bat faeces and urine on the church and church users while maintaining the FCS of resident bat populations. Surveys undertaken between 2019 and 2021 indicate that a colony of Natterer's bats using the church to roost and socialise are causing the issues identified. The colony of bats use the church as a maternity roost, as part of a network of linked roosts in the local area, including a complex of ancient and broadleaved woodlands to the north.

5.7.2. Bat urine and faeces cause damage throughout the church. In particular, the presence of bats in the west nave prevents the church from using this area as a social space. As part of the BMP, bats were excluded from these locations in 2021. Subsequent surveys and monitoring revealed this was successful in reducing bat activity at these roosts. The amount of faeces observed in the west nave was reduced in 2021, along with an overall reduction of nearly 40% in the mass of faeces observed in the church. However, bats were able to locate alternative roosts in nearby roof trusses and accumulations of faeces were observed in other areas of the church such as the south and east nave.

5.7.3. Faeces falling in the south and east nave land on pew covers, where they are much more visible to members of the public than when they fall in the west nave. Hence, despite the reduction in faeces observed in 2021, church users remained unhappy with the situation and continued to express distress at the cleaning burden resulting from the presence of the maternity colony. It was decided that further

work was needed under Phase 2 of the BMP, with the aim of making further improvements to alternative bat roost provision to reduce bat activity inside St Margaret's.

6. Implementation of Bat Management Plan Phase 2 (2022-2023)

6.1 Revision of BMP

6.1.1. In light of the results of the implementation of Phase 1 of the BMP described above, some further refinements were required, and were implemented in 2022 in Phase 2.

6.1.2. Excluding Natterer's bats from roosts in the west nave during Phase 1 of the BMP appears to have had success in reducing quantities of bat faeces in this area. However, faeces continue to fall into the church from other roosts in the nave and this remains an issue for church users.

6.1.3. Radiotracking surveys demonstrated that the Natterer's bat colony use both the church interior and nearby woodland for roosting during the maternity season. Half of bats tagged at St Margaret's were later tracked to roosts located outside of the church. Phase 2 work was designed to create roosting spaces for the Natterer's bat colony under the eaves of the church roof, preserving this linked roost resource and FCS of the population. Roosts would surround the two main access points to the church interior used by bats between 2019 and 2021, allowing control of access of bats to the church interior from these locations.

6.1.4. Surveys in 2021 showed bats were entering the church through an access point located in the eastern end of the north aisle, in the location of the bespoke roost box created in early 2021. However, bats were accessing the church interior through a small gap to the side of the box, rather than from the boxed area itself. This was enclosed by boarding in March 2022, to ensure all bats accessing the church from this location would be directed through the roost box (Figure 7).

6.1.5. A second roost box was created on the east face of the north transept to enclose a second bat access point in this location (see Figure 5). The sliding doors to both of the artificial roost boxes in the north aisle and north transept were left open during the early part of the bat breeding season, to allow bats to find the roost and to minimise disturbance to pregnant and lactating females. Sliding doors were then closed incrementally in late August 2022, to prevent bats from accessing the church interior at these locations.

6.1.6. Closure of the roost boxes to restrict access by bats to the church interior was intended to reduce the number of bats that use the interior roof structure of the church as a roost, while preserving a roost resource within the eaves of the church interior itself. However, bats may access the church interior from other locations in the fabric of the building and as such the measures implemented are likely to result in a significant reduction in use of the church by bats, rather than complete removal of the maternity colony from the structure.

6.1.7. Bat emergence surveys and surveys of bat faeces were undertaken in 2022, to monitor the use of the church by the maternity colony in 2022, after Phase 2 of the BMP had been implemented.

6.2 Bat Activity Surveys 2022

6.2.1. Two monitoring surveys of the new roosts created in 2021 and 2022 (shown on Figure 5) were undertaken on the 29 June and 23 August 2022 as part of the reporting process for the BiCCL. A team of four professional surveyors and one HMG volunteer undertook dusk roost emergence surveys during each visit. Surveys followed professional standards detailed in the BCT Good Practice Guidelines (2016) with each surveyor using bat detectors recording echolocation calls in full spectrum output.

6.2.2. In June, two surveyors were positioned outside the church to record exit counts from the new roosts in the north aisle and north transept. Two surveyors were positioned inside the church and were each equipped with a Canon XA11 camcorder fitted with IR torches. The cameras were positioned on the new roosts (Figure 5) to record bat activity associated with boxed eaves in the north transept and north aisle. The third surveyor inside the church made observations of bat activity in the nave. The June survey estimated there were seven Natterer's bats roosting at the church. Four Natterer's bats were recorded inside the church, with bats flying in the nave, but did not exit the building; one grounded adult Natterer's bat was also found at the start of the survey.

6.2.3. In August, three surveyors were positioned outside the church to watch bat exit points from the north transept, north aisle and south porch. Two surveyors equipped with a Canon XA11 camcorders fitted with IR torches were once again positioned inside the church to record bat activity associated with the new roosts in the north transept and north aisle and record observations of bat activity in the nave. The August survey estimated there were seven Natterer's and two pipistrelle bats roosting at the church. Five Natterer's bats were recorded flying inside the church, and appeared to have emerged from roosts in the nave. There were high levels of activity by these bats inside the church for approximately 30 minutes, with a drop in activity approximately 45 minutes after sunset, but it was not clear whether these bats had exited the building or returned to roosts.

6.2.4. Two Natterer's bats emerged from the new roost in the north transept and socialisation calls were heard from the roost. This indicates the new bat roost in the north aisle is being utilised by Natterer's bats.

6.3 Bat Faeces Surveys 2022

6.3.1. Surveys were conducted using the same methodology as in 2020 and 2021 and further details can be found in Temporal & Spatial Analysis of Bat Droppings at St Margaret of Antioch (2022). Once again, the mass of faeces recorded increased markedly between May and July, before reducing in August and September.

6.3.2. The total mass of faeces collected in 2022 was 60% lower than in 2021, meaning the overall reduction in faeces between 2020 before implementation of the BMP and 2022 was 75%. A graph of the mass of faeces collected from St Margaret's each month between May and September, for 2020, 2021 and 2022 is shown in Figure 8.

6.3.3. As in 2021, accumulations of faeces showed that bats switched roosts frequently during the breeding season. However, as in 2021, the area of the west nave had consistently fewer accumulations of faeces than in 2020.

6.3.4. In summary, the total mass of bat droppings in the church of St Margaret of Antioch reduced by around 75% after roost closure work in the west nave and enclosure of bat access points in the north aisle and north transept. Furthermore, bat activity levels in the west nave (as measured by droppings counts) were reduced in both 2021 and 2022, demonstrating that this management measure was successful in significantly reducing bat mess and the associated cleaning burden in this localised area.

6.3.5. Further monitoring of bat populations and bat droppings in 2023 will reveal whether activity levels within the church interior continue to remain low in response to the management and mitigation measures that have been implemented at the Church of St Margaret of Antioch.

6.4 Further Work for 2023

6.4.1. Due to delays in the proposed schedule of surveys, monitoring and BMP works caused by the COVID-19 pandemic, ongoing monitoring of the bat population at St Margaret's will continue through the 2023 bat breeding season. Sliding doors that were fitted to new roost boxes in the north aisle and north transept were closed during late August 2022 and these surveys will monitor the effects of restricting access to the church interior to bats, by undertaking emergence surveys and surveys of faeces during the 2023 bat breeding season.

6.4.2. This period will also include a handover of future surveys and monitoring of bat populations at St Margaret's to members of HMG. Bat volunteers have agreed to undertake annual surveys at St Margaret's from 2023 onwards and to report their findings to Natural England.

6.5 Ongoing Public Engagement

6.5.1. Ecologists from Mortimer Environmental and volunteers from HMG will be in attendance and representing BiC at St Margaret's during May 2023 as part of an 'Our Natural World' event. This will include bat-related children's activities, information and advice on bats and other mammals in Herefordshire and videos of the maternity colony of bats that reside at the church.

7. Conclusions & Recommendations

7.1 Conclusions

7.1.1. The enclosure of two access points to the church used by bats (located in the north-east corner of the north aisle and the south-east corner of the north transept), as well as the associated creation of roosts accessible from only the church exterior, and the licensed closure of further roosts within the church interior in 2021 have resulted in a 75% reduction in the quantity of bat faeces deposited within the church (as determined by surveys undertaken throughout 2020, 2021 and 2022).

7.1.2. The difficulties encountered in closing bat roosts within the church are illustrated by the roost feature located between the final roof joist at the western end of the nave and the adjacent wall to the west tower. This feature is only accessible via scaffolding or Mobile Elevated Working Platform (MEWP), is several meters in length, varies significantly in width, and whilst considerable efforts were made to block the roost feature under license from Natural England in 2021, access challenges make it likely that some aspects of the feature remain accessible to bats. These challenges are applicable to many of the remaining roost features located throughout the church structure, highlighting the difficulties of closing roost features within such a complex, historic structure.

7.1.3. Nonetheless, the significant improvements achieved with regard to reducing quantities of bat faeces and urine deposited within the church, particularly in the area of the west nave, show that this can have success in reducing bat activity in localised and sensitive areas. Furthermore, enclosure of two main access points should restrict the number of bats using the church interior, and this will be monitored during the bat breeding season in 2023.

7.1.4. The project has been similarly successful in raising awareness and improving attitudes towards bats, with an afternoon of events and activities to be held at the church in May 2023, to celebrate the bats and wildlife of St Margaret's and the village of Wellington.

7.1.5. It is considered that the BiC project at St Margaret's has achieved success in delivering the key outcomes of reducing bat mess in the area of the west nave that the church desires to use as a social space, by reducing the overall quantity of bat faeces and urine falling inside the church and in providing training opportunities and engaging local bat volunteers who will provide ongoing monitoring of bat populations and support to church users.

7.2 Recommendations

7.2.1. Recommendations for further monitoring and management with regard to bats and the St Margaret's Church are as follows:

- A further access point for bats was previously recorded by HMG prior to commencement of the BiC project. This is located above the vestry and nave, at the western end of the north aisle. Whilst surveys undertaken in 2020 through to 2022 did not identify this access point as being in current use by bats, there is potential that this may change and the access point comes back into use. Further surveys to monitor this access point will inform to consider blocking or enclosure of this access point under licence from Natural England in the future.
- Monitoring of the two existing enclosed access points and associated bat roosts, located in the north-east corner of the north aisle and the south-east corner of the north transept, is recommended to ensure these interventions remain effective in restricting access of bats to the church interior, whilst continuing to support active bat roosts and the FCS of local bat populations.
- Continual and ongoing improvement should be made to the local network of bat foraging habitats and roost features, recognising that the church is one of a depleting number of historic local structures which remain available and accessible to bats. Radio-tracking surveys undertaken in 2021 demonstrated that bats using the church also make use of the wider network of roost resources, including trees within local woodland habitats, including Wellington Wood. However, careful consideration should be given to all local planning proposals, ensuring the remaining limited number of roost features associated with local structures and trees is not depleted further, and to replace roost features already lost to development. In essence, St Margaret's church remains one of the last structures of significant value to bats in the Wellington area, as other historic buildings and former farm structures have been modernised and converted over recent years and decades. Replacing and reinstating the local network roost features over the coming years, will help to reduce the ongoing impact of bats on church users by providing bats with alternative roosts locations and further reducing the frequency and duration of use of the church for bat roosting and socialisation purposes. Similarly, improving local habitats in terms of invertebrate prey abundance and diversity will encourage foraging bats away from the church and could be undertaken within St Margaret's church yard as well as along the riparian corridor to Wellington Brook, located immediately to the north of the church.

7.2.2. Our work on the BiC project at St Margaret's and at St Mary the Virgin in Pembridge (Bats in Churches Final Report, St Mary the Virgin, Pembridge, 2023), has shown that use of church structures by bats is less important to local bat populations in Herefordshire than in other countries such as Norfolk (Zeale *et.al*, 2016). This is likely to reflect regional differences in farming practices and local land use, and highlights opportunities to embrace the recommendations detailed above, and improve the surrounding network of bat foraging habitats and roost features which are likely to encourage bats

away from St Margaret's church in the long-term, improving the experience of church users for many decades to come.

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9. Figures

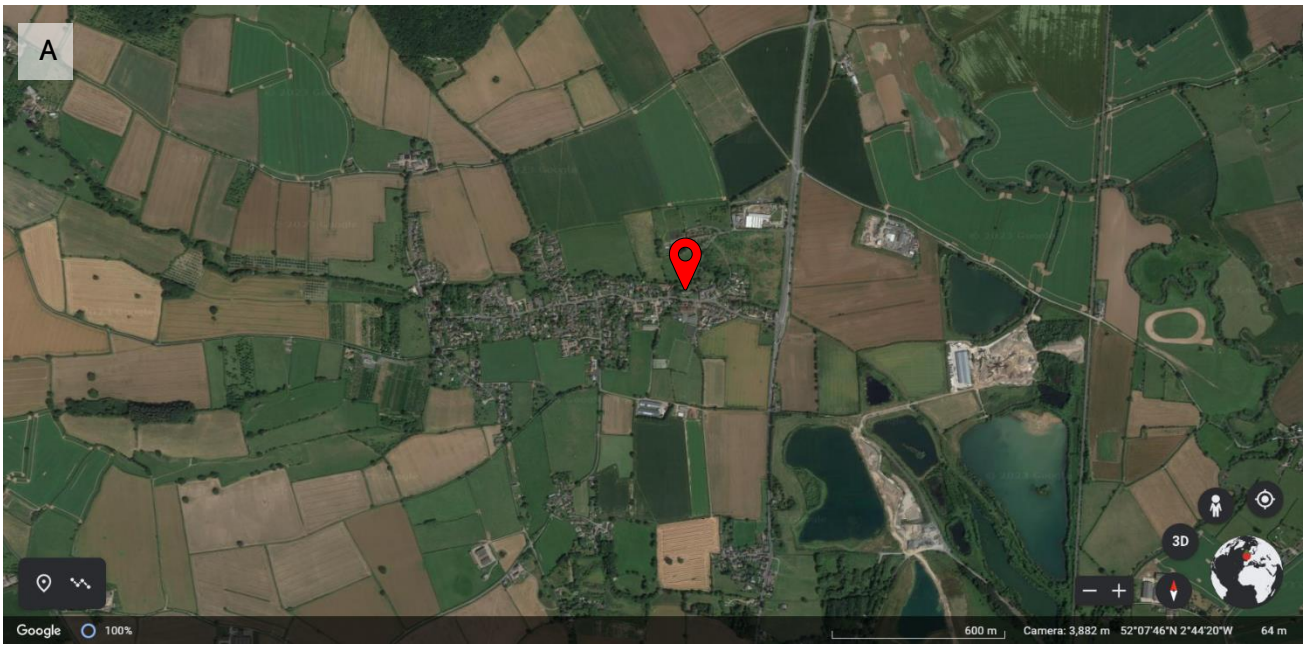


Figure 1: Location Plan

Site location plan (A) and aerial view (B) of the church of St Margaret of Antioch, Wellington. Images courtesy of Google Earth.

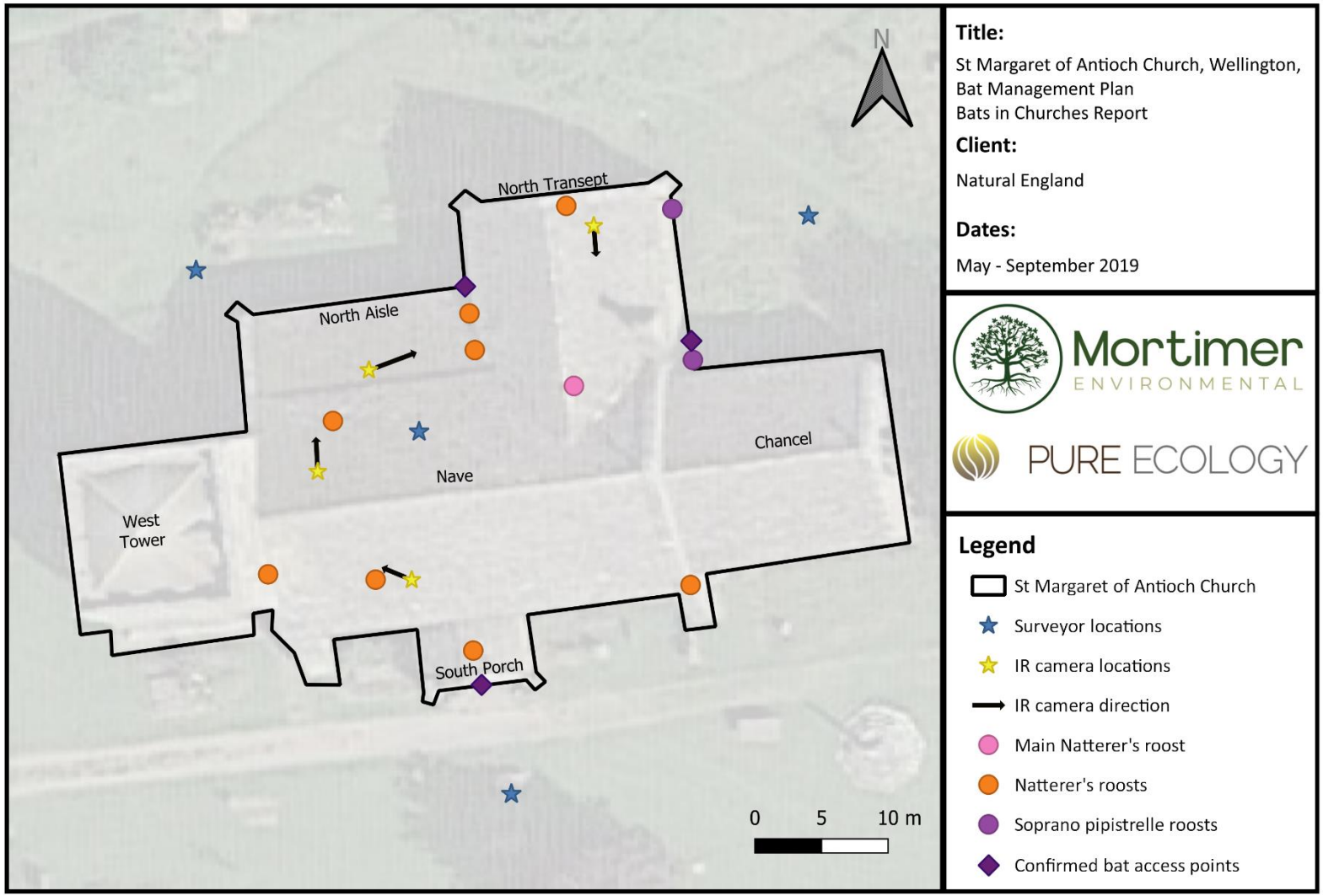


Figure 2: Bat Survey Results 2019

GIS Plan of St Margaret's, Wellington, showing positions of surveyors and position of the IR cameras. Dawn re-entry and dusk emergence bat survey results are summarised.

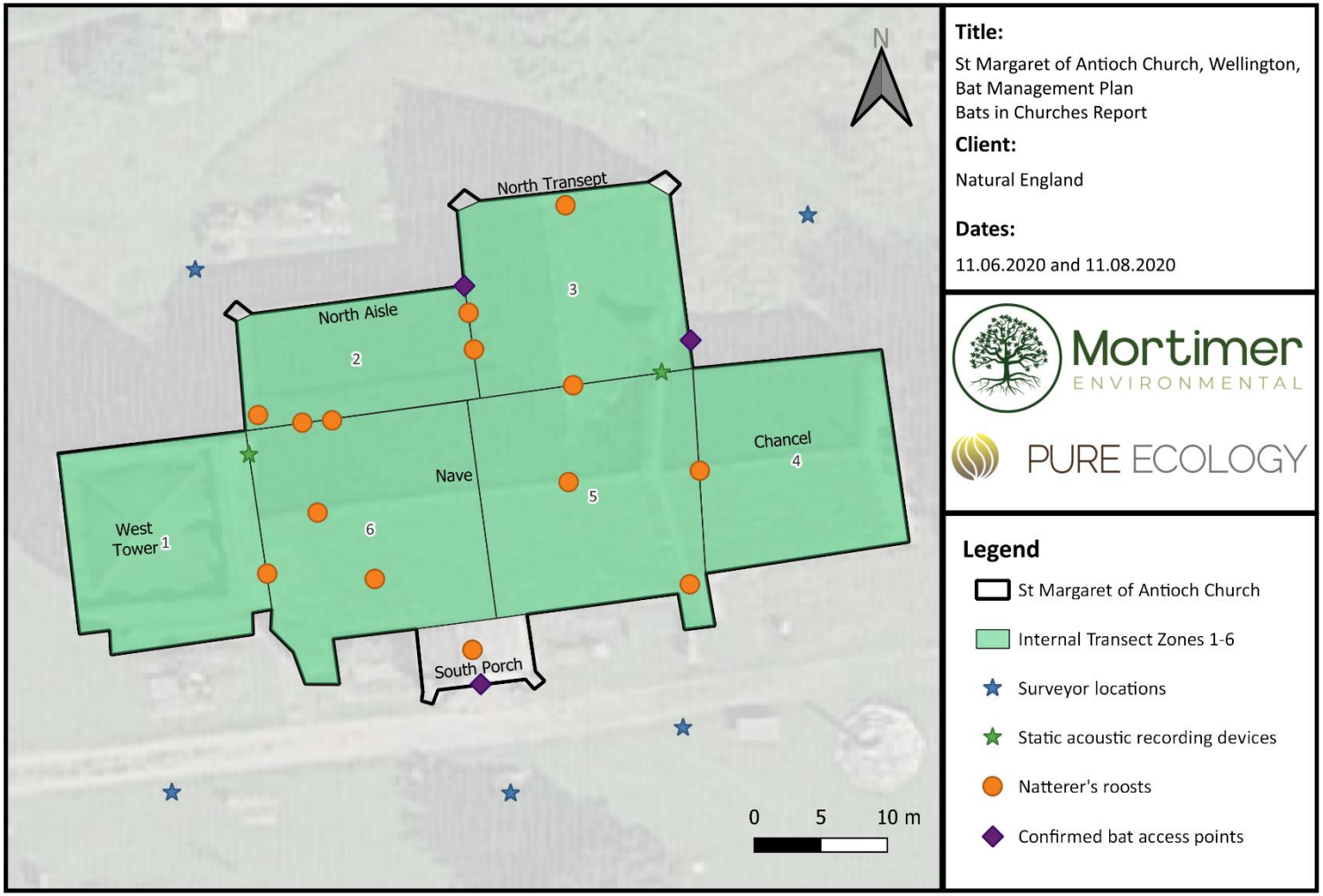
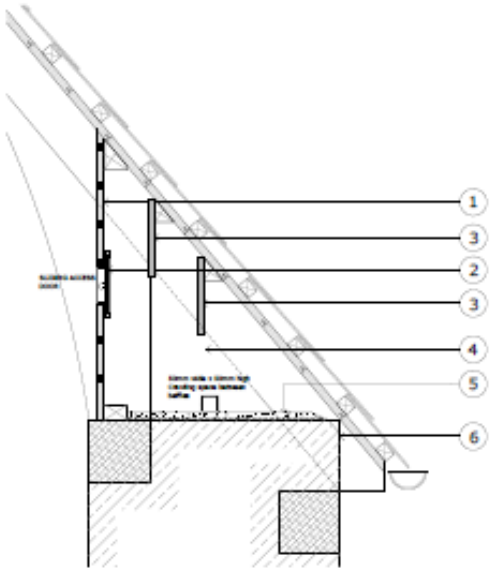


Figure 3: Bat Survey Results 2020

GIS Plan of St Margaret's, Wellington, showing approximate positions of external surveyors and transect survey zones. Bat survey results are summarised.

A



General Notes:

1. Vertical eaves infill comprising T&G timber planks to match roof sarking boards with bare rough sawn finish to roost side. Apply non-toxic stain to North aisle facings to match existing finish internally.
2. Sliding access door detail for visual inspections of roost and also cleaning of bat droppings and the like. Provide one access per baffled area.
3. 2no. vertical rough sawn untreated planks fixed in each roost section to allow for bats to rest.
4. Vertical baffles at approximate 500mm centres within roost bays to allow bats to change area subject to crowding and temperature.
5. Provide lime render 'dressing detail to head of external stone wall at eaves on expanded mesh across top of wall.
6. Provide a maximum 50mm wide x 30mm high crawling space along external elevation to allow bats to enter / egress. Each slot to be central to each roost bay / baffled section.

A 18.02.2020 Details amended to suit Ecologists comments WF

REVISIONS

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ST MARGARET'S CHURCH

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HEREFORD

PROPOSED EAVES 'BAT ROOST' DETAIL
PRELIMINARY PROPOSALS

SCALE @ A1	DATE	DRAWING NO.
As shown	10.02.2020	4944-9-8A

DO NOT SCALE FROM THIS DRAWING — DRAWN BY WF — CHECKED BY KL

B

C

Figure 4: Management Works at St Margaret's Church 2021

Architect's plans of bat roost boxes created under the eaves of the north aisle at St Margaret's (Hook Mason; A). On completion, sliding doors to the church interior were left open to allow bats to find the roost (B). An access hole (circled in blue) was created to allow bats to enter and exit from the north side of the church (C).

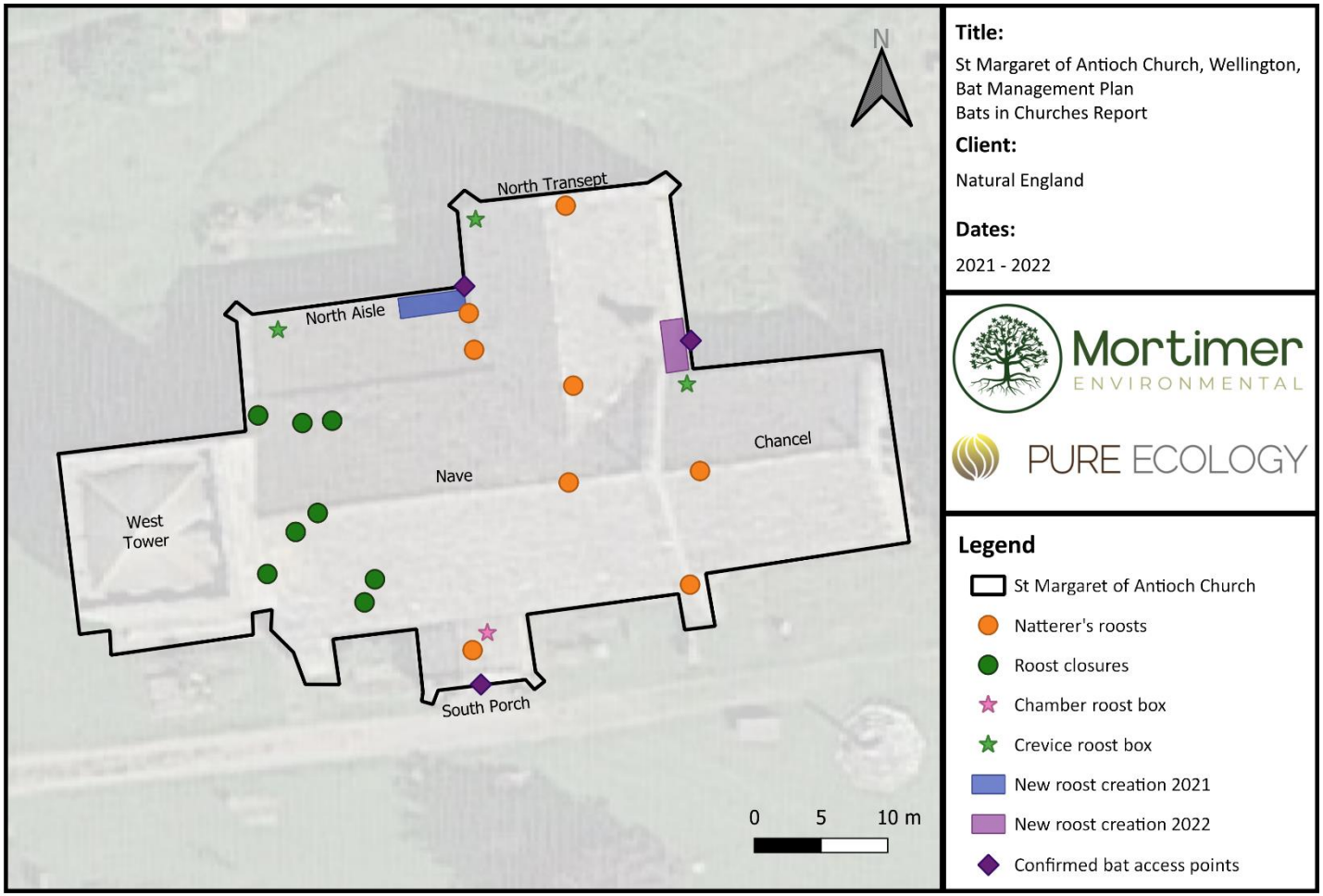

Figure 5: Bat Survey Results & Management Work 2021 & 2022

GIS plan of St Margaret's Church showing identified bat roosts and access points. Bat roosts excluded during management works in 2021 are shown in green. Locations of compensatory bat roosts are provided, along with a bespoke bat roost in the eaves of the north aisle and north transept.

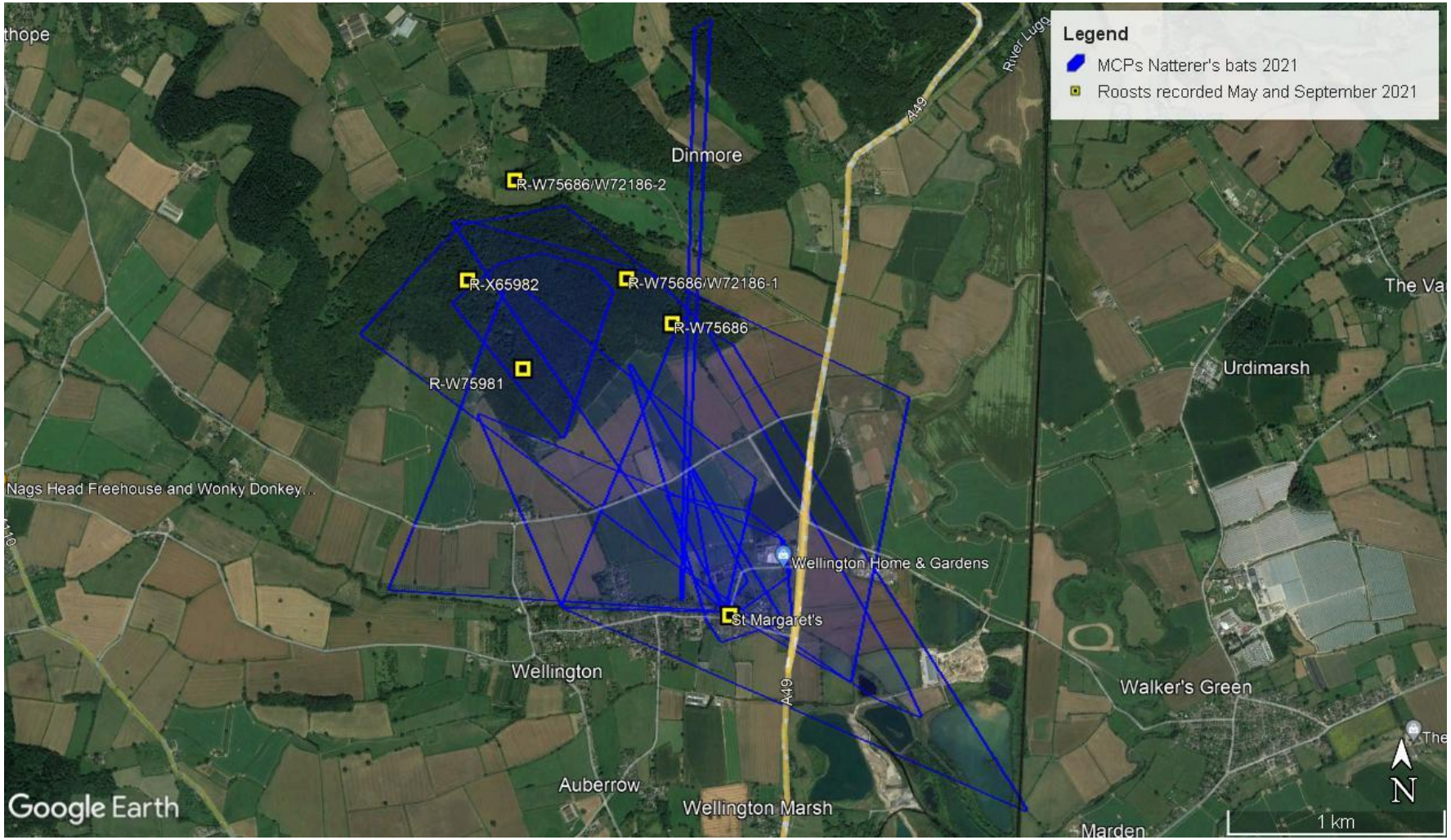

Figure 6: Bat Radiotracking Home Ranges

Home ranges (as measured by minimum convex polygons [MCPs]) and tracked roosts of Natterer's bats tagged during 2021. Home ranges were determined using Ranges 9 (Anatrack). Figure reproduced from St Margaret of Antioch Church, Wellington Radiotracking Report (2021). Image courtesy of Google Earth.

Figure 7: Bat Management Works at St Margaret of Antioch 2022

In 2021, bats accessed the church interior through a gap next to the roost box in the north aisle (A). The gap was enclosed in 2022 to ensure access was maintained through the roost box (B).

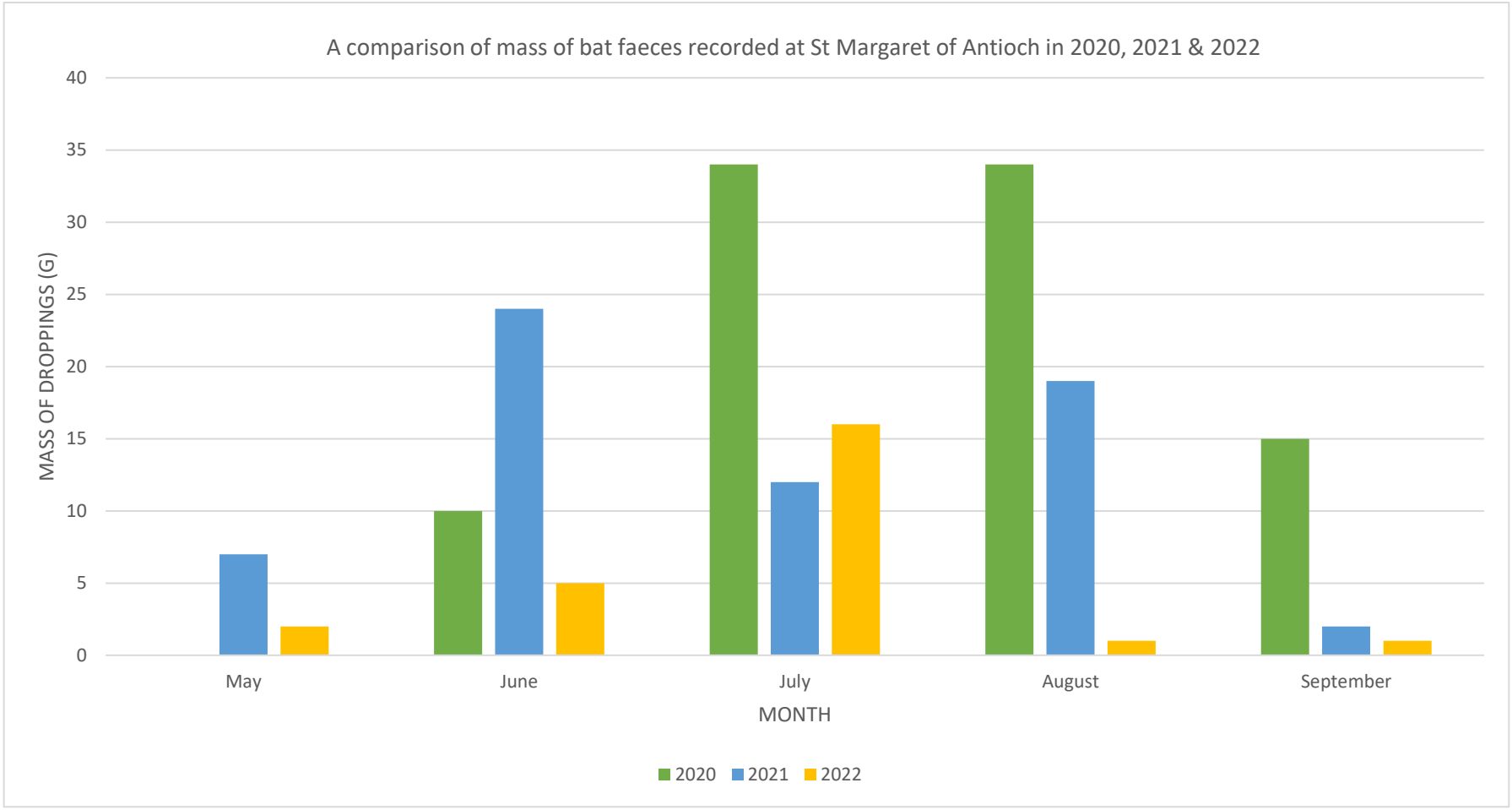

Figure 8: Bat Faeces at St Margaret of Antioch Church 2020-2022

Graph showing the mass of bat faeces collected and recorded at St Margaret's during May to September 2020-2022.

10. Annex 1. Guidelines for Proportionate Mitigation.

Taken from the Bat Mitigation Guidelines (Mitchell-Jones, 2004)

Low / Conservation significance / High	Roost status	Mitigation/compensation requirement (depending on impact)
	Feeding perches of common/rarer species	Flexibility over provision of bat-boxes, access to new buildings etc. No conditions about timing or monitoring
	Individual bats of common species	
	Small numbers of common species. Not a maternity site	
	Feeding perches of Annex II species	Provision of new roost facilities where possible. Need not be exactly like-for-like, but should be suitable, based on species' requirements. Minimal timing constraints or monitoring requirements
	Small numbers of rarer species. Not a maternity site	
	Hibernation sites for small numbers of common/rarer species	Timing constraints. More or less like-for-like replacement. Bats not to be left without a roost and must be given time to find the replacement. Monitoring for 2 years preferred.
	Maternity sites of common species	
	Maternity sites of rarer species	Timing constraints. Like-for-like replacement as a minimum. No destruction of former roost until replacement completed and usage demonstrated. Monitoring for at least 2 years.
	Significant hibernation sites for rarer/rarest species or all species assemblages	
	Sites meeting SSSI guidelines	Oppose interference with existing roosts or seek improved roost provision. Timing constraints. No destruction of former roost until replacement completed and significant usage demonstrated. Monitoring for as long as possible.
	Maternity sites of rarest species	