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Bat Survey:
House at Troedrhiwfedwen, Llanbister Road, Llandrindod Wells LD1 5UW

Grid Reference 318280, 272205

Site Visit 1: 24 June 2022
Site Visit 2: 6 July 2022
Site Visit 3: 5 August 2022
Report Submitted: 13 September 2022

Report Reference: KB/2755/22.1

Report Status: Pre-design and pre-planning

Client:
Ms. K. Bowen
Troedrhiwfedwen
Llanbister Road
Llandrindod Wells
LD1 5UW

Disclaimer.

Declaration of compliance.

The information, data, evidence, advice and opinions which I have prepared and provided is true, and has been prepared and provided in accordance with the Chartered Institute of Ecology and Environmental Management's Code of Professional Conduct. I confirm that the opinions expressed are my true and professional bona fide opinions.
Dr R. M. Jones.

CONTENTS

1. SUMMARY

Between 24 June 2022 and 5 August 2022, at the request of Ms. K. Bowen, Bat Surveys were carried out on House at Troedrhiwfedwen, Llanbister Road, Llandrindod Wells LD1 5UW.

The Bat Surveys comprised an assessment of bat roost potential, surveys for physical evidence of bat occupation and three Nocturnal Bat Surveys.

1.1 Proposed development

The House is currently vacant.
There is a proposal to demolish the House and to construct a new, replacement house.
Full details of the proposed development are not currently known.

1.2 Bat

A search of historical records of bats within 2km of House at Troedrhiwfedwen (results dated 15 July 2022) obtained from the Biodiversity Information Service for Powys and Brecon Beacons National Park confirms that no record of bat has historically been found at or within Troedrhiwfedwen yard and building complex.

There is one record of bat within 2km of the House. The record was collected in year 2020 and more than 1km away.

Part of the River Lugg Site of Special Scientific Interest is situated approximately 360m from the House. Roosting bats are not recorded as a reason for the designation of the River Lugg Site of Special Scientific Interest.

An Initial Bat Survey was carried out on 24 June 2022. The survey determined that House at Troedrhiwfedwen provides high summer bat roosting potential and physical evidence of bat roosting was found within the a second-floor room. In addition, evidence of a feeding perch was found within a first-floor room.

A series of three Nocturnal Bat Surveys were carried out; on 24 June 2022, 6 July 2022 and 5 August 2022.

The results of the Initial Bat Survey and the Nocturnal Bat Surveys determine that House at Troedrhiwfedwen contains:
- a Brown long-eared bat day roost and feeding perch, of a lone bat; and,
- a Lesser horseshoe day roost.

No maternity roosting was identified.

Considering the structural fabric of the House and the results of the survey, it is reasonably unlikely that bats use the House for hibernation purposes.

The demolition of the House will result in the destruction of low conservation roosts of Brown long-eared and Lesser horseshoe bat.
The destruction of the Brown long-eared and Lesser horseshoe bat roosts may only be carried out on receipt of a European Protected Species Licence issued by Natural Resources Wales.

Ideally, the demolition of the House should take place in the autumn and winter months when it is unlikely that bats will be present within the House. However, as the bat roosts recorded are non-maternity roosts of a low number of bats – there is no timing constraint.

Bat roosting features will need to be installed within the new, replacement, house and/or elsewhere within the Troedrhiwfedwen yard and building complex, to (potentially) compensate for the loss of bat roosting space within the House.

1.3 Small Breeding Bird

Development work should be timed to avoid the Small Breeding Bird nesting season.

The bird nesting opportunity provided by the House will need to be replicated on the new replacement house and/or elsewhere in the Troedrhiwfedwen property to (continue to) allow birds to nest there post-development.

1.4 Protected Species Survey Summary and Assessment

In accordance with The Powys Supplementary Planning Guidance, Biodiversity and Geodiversity (October 2018) (Section 7.47 and Table 4), the Natural Resources Wales 'Standard Summary Sheet' has been completed, below:

Star Ecology

Cyfoeth Naturiol Cymru Natural Resources Wales

Protected species survey summary and assessment form

Applicant name	Ms. K. Bowen
Site name	House at Troedrhiwfedwin
Site grid reference	318280, 272205
Consultant name and survey licence number	Dr. R.M. Jones (Star Ecology) S088947/1
Planning application type (if known)	
Planning application reference (if known)	

Briefly state the purpose of the report (including client's brief) and the work undertaken.

Bat Survey (including Nesting Bird) to inform the demolition of the House.

Exact details of the proposed development are currently unknown.

The survey is required to determine the likelihood of the proposed demolition triggering Conservation of Habitats and Species Regulations 2017 (as amended) offences against bats.

Summary of the survey work undertaken:

Please provide references to the published survey guidance followed:

- Collins, J. (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines, 3rd ed ("BCT Good Practice Guidelines");
- BS42020:2013 'Biodiversity – Code of practice for planning and development';
- The Powys Supplementary Planning Guidance, Biodiversity and Geodiversity (October 2018);
- CIEEM Professional Guidance Series No. 9 Ecological Report Writing; and,
- CIEEM issued Guidelines for Preliminary Ecology Appraisal in 2017.

Survey Type	Dates	Departure from guidance*	
Initial Bat Survey	24/06/2022	Yes ☐	No ☒
Dusk Bat Emergence and Activity Survey	24/06/2022	Yes ☐	No ☒
Dusk Bat Emergence and Activity Survey	06/07/2022	Yes ☐	No ☒
Dusk Bat Emergence and Activity Survey	05/08/2022	Yes ☐	No ☒
		Yes ☐	No ☐
		Yes ☐	No ☐
		Yes ☐	No ☐

*Any departure from guidance must be fully qualified within the main body of the report

Summary of the Reports Results:

Please note: only record the negative presence of a species below if there is a medium or high likelihood of that species being present at the site. Please then provide your assessment of the 'likelihood of presence'* below.

Species	**Number**	**Likelihood of presence*** (Low, medium, high)	**Impact assessment** (Low, medium, high)	**Functionality of site** (e.g. breeding, hibernation, resting place and/or place of shelter, foraging, dispersal routes)	**Current conservation status of site** (Favourable, unfavourable, or unknown)
Brown Long-eared	1	High	High	Day roost Feeding Perch Foraging/commuting	Favourable
Lesser Horseshoe	1	High	High	Day roost Foraging/commuting	Favourable

Summary of the report's recommendations and conclusions:

A second-floor room is used by a Brown long-eared and a Lesser horseshoe for day roosting.
A first-floor room is used by Brown Long-eared as a feeding perch.

Demolition of the House will mean the destruction of the identified bat roosts.
Compensation bat roost habitat is required.

Nesting bird are present and mitigation for nesting bird are recommended.

An external lighting scheme sensitive to commuting and foraging bats is recommended.

Please fill answers as Yes / No / blank for N/A

	Has the report identified the need for the following measures?									Please fill out, for European Protected Species.		
Species	Avoidance	Mitigation	Compensation	Monitoring	Long term measures	Ecological Compliance Audit	Biosecurity measures	Further Survey Required?	Detrimental to FCS? *	EPS derogation licence required?	Is there a valid derogation purpose?	Are there satisfactory alternatives to the development ?
Bat	Y	Y	Y	N	N	N	N	N	N	Yes	Yes	No
Nesting bird	Y	Y	Y	N	N	N	N	N	N			

Please confirm whether there are any further details (for example. reserved matters, by condition) to be submitted and provide details below:

Name	Dr. R.M. Jones
Date	12/09/2022

2. INTRODUCTION

2.1 Background

In July and August 2022, Bat Surveys were carried out on House at Troedrhiwfedwen, Llanbister Road, Llandrindod Wells LD1 5UW.

The Bat Surveys were carried out at the request of Ms. K. Bowen, the owner of House at Troedrhiwfedwen.

An Initial Bat Survey was carried out on 24 June 2022 (Visit 1).

Nocturnal Bat Surveys were carried out on 24 June 2022 (Visit 1), 6 July 2022 (Visit 2) and 5 August 2022 (Visit 3).

Surveys were carried out by Dr. R. M. Jones, experienced field biologist, surveyor, and Natural Resources Wales Licensed bat worker (Licence number S088947/1) with the assistance of Mr. A. Edwards, surveyor and recorder.

2.2 Report Status

This report has been produced to inform proposed development plans and (a) proposed planning application(s).

The report includes recommendations for mitigation and biodiversity compensation and enhancement.

Following the finalisation of development plans; the report may be upgraded/revised to confirm mitigation measures and/or to confirm (if possible) the likely post-development biodiversity net gain.

2.3 Proposed Development

The House at Troedrhiwfedwen is currently vacant, unused and in a dilapidated condition. There is a proposal to demolish the House and to building a new, replacement, house.
Full details of the proposed development are currently unknown.

2.4 Survey Objectives

- To ascertain if bats are present in the House.
- To confirm where bats (if present) are roosting in the House and where they emerge from.
- To determine the species of bat roosting in the House.
- To determine the number of bats that may be roosting in the House.
- To establish the type of roost(s).
- To assess potential impacts of the proposed development on bats.
- To determine if breeding birds are nesting in, or on, the House, and to assess potential impacts of the proposed development on them.
- To make suitable recommendations for further survey work if appropriate.

2.5 Report Objectives

- To report on the findings of the Bat Survey.
- To determine if a European Protected Species Licence, issued by Natural Resources Wales, is necessary for the proposed development works.
- To make recommendations as to how mitigation and/or compensation measures can be incorporated into the proposed development designs.

2.6 Site Location and Description

The House is situated within the northwest area of the Troedrhiwfedwen yard and building complex, that is remotely situated within the northwest area of the sprawling village of Llanbister Road.

Improved grassland agricultural fields surround the yard and building complex. Mature managed, and unmanaged, hedgerows bound the fields and various broadleaved copses are present in the vicinity.

Part of the Llanbister Road to Llangynllo Station train line is situated approximately 150m southeast of the House.

The B3456 highway is situated approximately 300m northeast of the House and numerous other (minor) highways are present within 2km.

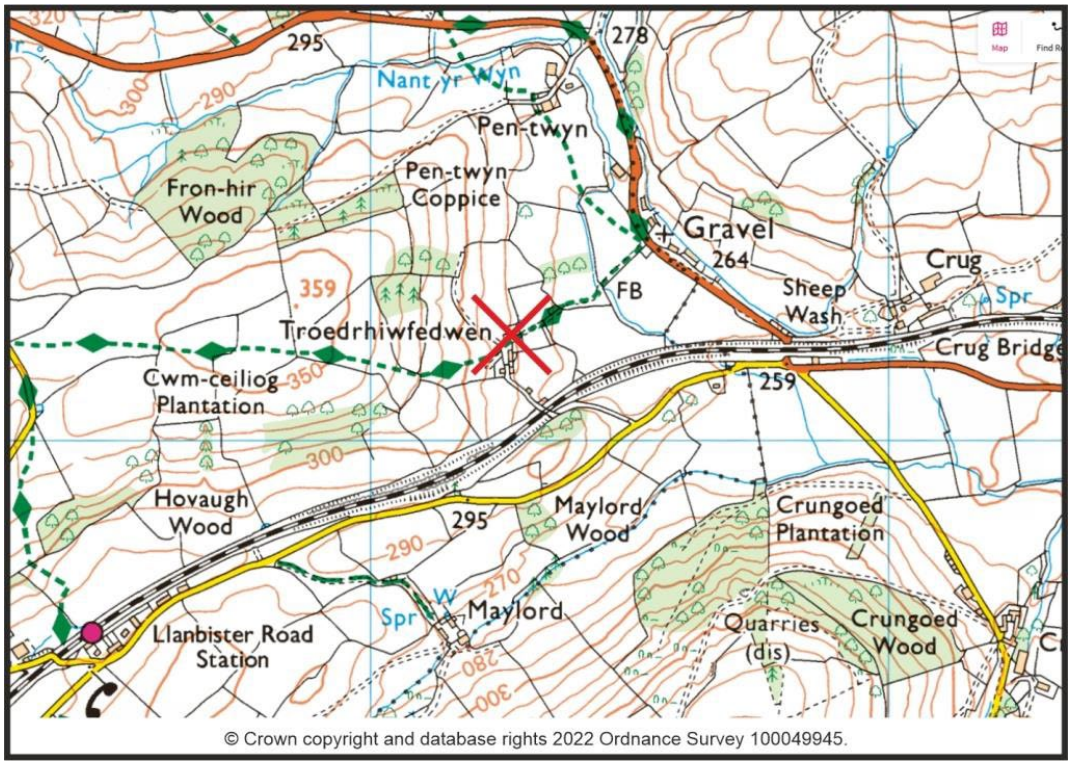
The River Lugg flows roughly northwest to southeast approximately 360m northeast of the house.

Field boundary hedges and the nearby train line, highways and the River Lugg and their associated habitats provide good habitat connectivity in the local landscape.

Map 1. Location of House at Troedrhiwfedwen.

Map 2. Location of the House at Troedrhiwfedwen and surrounding habitat types. Please note: the aerial photograph of habitat types is a 'screenshot' from Google Maps.

Map 1. Location of House at Troedrhiwfedwen (indicated by a red cross).



Map 2. Location of the House at Troedrhiwfedwen (indicated by a red cross) and surrounding habitat types.

3. LEGISLATION

N.B. This is a simplified summary of the legislation.
See other texts or refer to the full legislation for more detail.

3.1 Bat

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

Under the Conservation of Habitats and Species Regulations 2017 legislation it is illegal to:

- deliberately capture, injure or kill a bat;
- deliberately disturb bats. This includes in particular, disturbance in a way any such which is likely to (i) impair their ability to survive, breed or reproduce, or to rear or nurture their young; (ii) impair their ability to hibernate or migrate; or (iii) to affect significantly the local distribution or abundance of the species to which they belong;
- damage or destroy a breeding site or resting place of a bat;
- to be in possession or control, to keep, transport, to sell or exchange, or to offer for sale or exchange, any live or dead bat, or any part of, or anything derived from such a wild animal.

Under the Wildlife and Countryside Act 1981, it is illegal to:

- intentionally or recklessly disturb a bat while it is occupying a structure or place which it uses for shelter or protection.
- intentionally or recklessly obstruct access to any structure or place which a bat uses for shelter or protection.

A bat resting place may be a structure a bat uses for breeding, resting, shelter or protection. Resting place sites are protected whether or not bats are in occupation, as they may be re-used by bats.

Eight species of bat are listed as 'priority species' under Schedule 7 of the Environment (Wales) Act 2016.

A European Protected Species (EPS) Development Licence from Natural Resources Wales may be required for development works triggering Conservation of Habitats and Species Regulations 2017 offences against bats.

3.2 European Protected Species Licensing

European Protected Species (EPS) Licences derogating from the protection afforded to bats can be issued for a number of specified reasons or purposes as set out in Regulation 55(1)(e-g) and 55(9)(a-b) of the Conservation of Habitats and Species Regulations 2017 (as amended).

There are three purposes that EPS Licences may be issued.
The first purpose ('test') must be one of either:

- Preserving public health or public safety or other imperative reasons of overriding public interest including those of a social and economic nature and beneficial consequences of primary importance for the environment;
- Preventing the spread of disease;

- Preventing serious damage to livestock, foodstuffs for livestock, crops, vegetables, fruit, growing timber or any other forms of property or to fisheries; to allow people to carry out activities which would otherwise be illegal.

The following two criteria ('tests') must also be met:
- there is no satisfactory alternative; and
- the action authorised will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range.

EPS Licence applications need to provide sufficient evidence to demonstrate that the 'three tests' are met before a Licence can be issued.

Each application is assessed by Natural Resources Wales on its own merits.

3.3 Small Breeding Bird

Under the Wildlife and Countryside Act 1981, all birds are protected while breeding.

It is an offence, with certain exceptions to:
- intentionally kill, injure or take any wild bird;
- intentionally take, damage or destroy the nest of any wild bird while it is in use or being built;
- intentionally take or destroy the egg of any wild bird.

4. DESK STUDY

4.1 Designated Sites

A search for designated wildlife sites within 2km of the House was carried out using the Multi-Agency Geographic Information Centre (MAGIC) (http://magic.gov.uk).

There is one designated wildlife site within 2km of House at Troedrhiwfedwen.

The River Lugg Site of Special Scientific Interest is situated approximately 360m northeast of the House. Bats are not listed as a reason for the designation of the River Lugg Site of Special Scientific Interest.

Considering the nature and scale of the proposed development (the demolition of a House within an existing agricultural yard and building complex); it is unlikely that the development would have a detrimental impact on the conservation status of the River Lugg Site of Special Scientific Interest.

4.2 Habitat Connectivity

On 2 September 2022, the Natural Resources Wales 'Beta: Wales Environmental Information Portal' (https://smnr-nrw.hub.arcgis.com/) was used to identify important habitat connectivity at and in the vicinity of the House at Troedrhiwfedwen.

The Natural Resources Wales 'Wales Environmental Information Portal' uses three habitat network categories. These categories and their definitions are provided below:

Category	**Definition 1** Latham *et al*. 2013	**Definition 2** Garett & Ayling (2021)
Local network	"very limited areas of connectivity around every habitat patch…"	"for species that require a lot of their habitat and disperse poorly"
Focal network	"extensive areas of general connectivity…"	"for species that require less habitat and disperse reasonably well"
Core network	"areas of strongest connectivity"	"for species that require only small areas of habitat and disperse very poorly"

House at Troedrhiwfedwen is not within or adjacent to a Natural Resources Wales defined local habitat network. However, land approximately 80m northeast of the House is within a local lowland grass habitat network. Also, local woodland habitat network is present within 150m (or-so) southeast and northwest of the House.

House at Troedrhiwfedwen is not within or adjacent to a Natural Resources Wales defined focal habitat. However, land within the Natural Resources Wales defined focal woodland habitat network is present roughly 250m northeast, 340m southeast and 120m northwest of the House.

House at Troedrhiwfedwen is not within or adjacent to a Natural Resources Wales defined core habitat. There is no core habitat within 1km of the House.

4.3 Records of Bat

A search of historical records of bats within 2km of House at Troedrhiwfedwen was commissioned from the Biodiversity Information Service for Powys and Brecon Beacons National Park.

The search was achieved by searching for records within 2km of National Grid Reference 318280, 272205.
Record search results were provided to Star Ecology on 11 July 2022.

The Biodiversity Information Service for Powys and Brecon has one record of bat recorded within 2km of the House.

In year 2020 a record of Brown long-eared bat (*Plecotus auritus*) was collected approximately 1.1km south of the House.
The record has a 100m precision.

Considering the nature and scale of the proposed development; it is unlikely that the development would have a detrimental impact on the conservation status of the Brown long-eared bat recorded over 1km from the House.

4.4 Records of Roof Nesting Birds

A search of historical records of roof nesting birds at and within 150m of House at Troedrhiwfedwen was commissioned from the Biodiversity Information Service for Powys and Brecon Beacons National Park.

The search was achieved by searching for records within 2km of National Grid Reference 318280, 272205.
Record search results were provided to Star Ecology on 11 July 2022.

The Biodiversity Information Service for Powys and Brecon has a record of nesting bird at Troedrhiwfedwen.

In August 2021 five pairs of House Martin (*Delichon urbicum*) were recorded nesting under eaves of the House.

The Biodiversity Information Service for Powys and Brecon has no other record of roof nesting bird at or within 150m of the House.

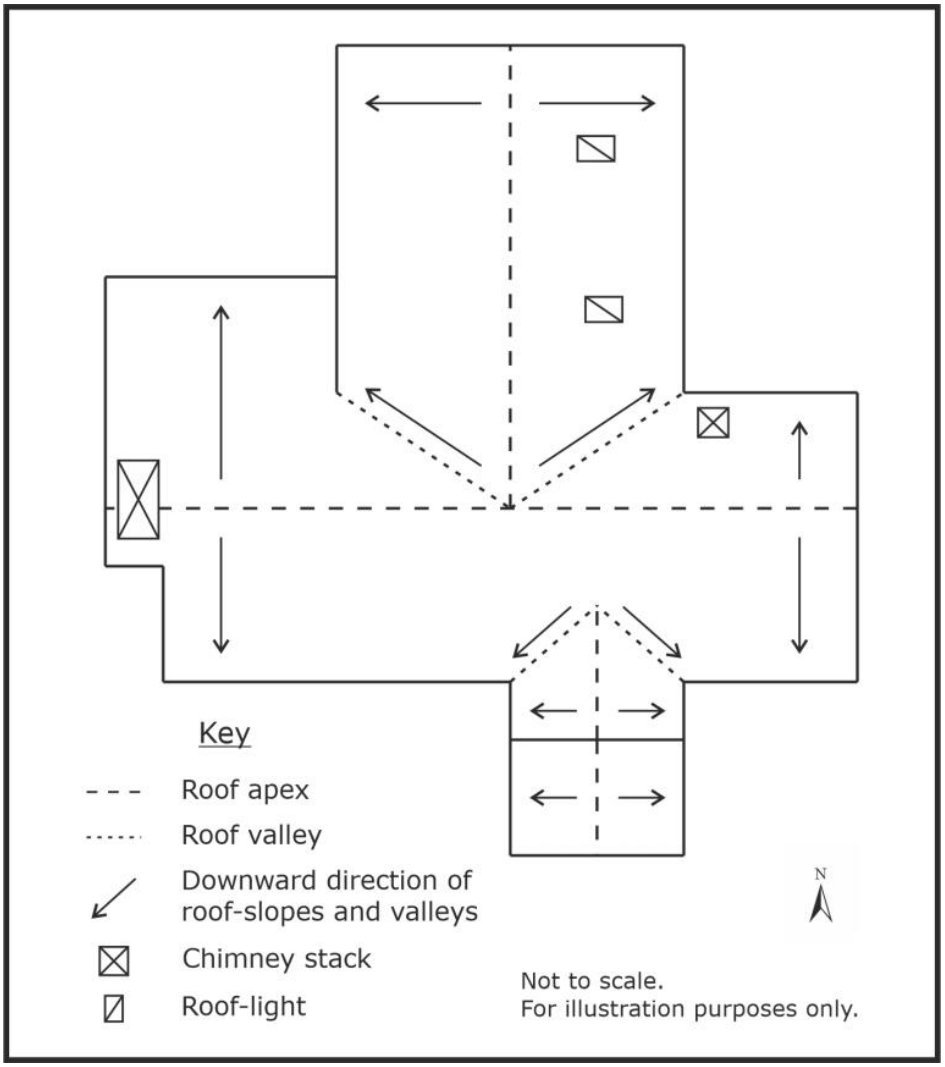
5. House Description

Appendix 1 contains a photographic record of House.

A brief description, only, of the House is provided here.

A diagram of the structural outlay of House at Troedrhiwfedwen (roof structures) is contained in Plan 1.

Plan 1. Outlay plan of the House.



The House is a single-, two- and three-storey structure constructed of brick, concrete-block, stone and timber-framing. Exterior walls are either bare, rendered or covered with sheet metal.

A small single-storey porch is present on the south elevation and a small (single-room) section is present within the northwest area of the House.

The main, east-to-west, section of the House is two-storey. First-floor rooms are partly within the roof structure and small, narrow-height) roof-spaces are present beneath roof apexes.

A three-storey section is present at the north. No ceiling is present within the second-floor room, and the underside of the roof-structure is exposed.

The ground-floor room of the north section is used for the housing of Ducks, and other ground-floor rooms appear to be used for the storage of household and agricultural/equestrian items.
First-floor and second-floor rooms are unused and predominantly empty.

The porch (on the south elevation) has a slate covered apex roof. The roof apex is covered with abutting ridge tiles bedded on mortar and lead flashings are present between the roof structure and the adjoining south elevation wall of the two-storey section of the House. Mortared roof slate verges oversail the gable by roughly 20mm. Eaves are flush and closed. No roof-spaces is present within the porch.

The roof of the single-storey section within the northwest area is covered by a slate covered roof-slope that extends down from the adjoining two-storey section at the south. The gables and eaves (of the single-storey section) overhang and are enclosed with soffit boxes. Lead flashing is present between the roof structure of the single-storey section and the adjoining west elevation wall of part of the two-/three-storey section of the House. No roof-space is present within the single-storey section.

The two-storey and three-storey sections of the House are covered with two inter-locking slate covered apex roofs. The north-to-south roof apex is covered with abutting ridge tiles bedded on mortar. The east-to-west- roof apex is covered with inter-locking ridge tiles bedded on mortar. Roof valleys are flush/under-boarded and lined with lead.
Roof structures overhang gables and eaves and are enclosed with soffit boxes.
Two chimney stacks, with lead aprons and flashings, are present within the roof structures.
Two purpose-made roof-lights (with purpose-made flashings/surrounds) are present within the east elevation roof-slope (one above the two-storey section of the House, and one above the three-storey section of the House).

All roofs are in good structural condition and underlined with modern-type (woven) breathable roof membrane. Composite board insulation and/or quilt insulation is present down roof-slopes and within roof-spaces of the two-storey roof structure.

Whilst the House is generally in poor structural condition; it appears likely that all roof-slopes were stripped and re-covered within 15 years, or-so, of the date of survey.

6. SURVEY METHOD

6.1 Bat Survey

An Initial Bat Survey (a visual inspection for bat roost potential and physical evidence of bats) of the House was carried out on 24 June 2022 (Visit 1).

Three Nocturnal Bat Surveys were carried out:
- Visit 1, 24 June 2022
- Visit 2, 6 July 2022
- Visit 3, 5 August 2022

As deemed necessary; immediately prior to and immediately after the Nocturnal Bat Surveys carried out on 6 July 2022 (Visit 2) and 5 August 2022 (Visit 3), the exterior and interior of the House was inspected for (fresh) physical evidence of bat.

6.1.1 Initial Bat Survey – Visit 1 and Visit 2

6.1.1.1 Assessment of Bat Roost Potential

The House was assessed for its potential to support bats and the type and number of bat roosts.

This involves consideration of a number of abiotic factors including:
- Access to the interior of the House or to other suitable roosts
- Age
- Construction fabric
- Habitat context
- Light levels
- Previous use of, and activity within, the House
- Temperature regime and protection from weather

6.1.1.2 Physical Evidence of Bat Occupation

The exterior and interior of the House was surveyed for the presence of bats and their roosts.

Search methods included the use of mirrors, torches (including a Fenix RC40 3800 lumen torch and a DeWalt DCL043 1000 lumen torch), binoculars (Zeiss 10x42), borescope (Visual Optics VO18 5.8mm Fibre Optic), fibrescope (Provision PV2636-21 5.8mm), video-scope (Draper 05163 Recording Flexi Inspection Camera), thermal imaging binoculars (Pulsar Accolade 2 LRF XP50 Pro Thermal Binocular (50Hz)), thermal imaging monocular (Zeiss DTI 3/25 Thermal Monocular), a night vision scope (Sytong HT-66 with infrared illuminator), a 3.8m Telescopic ladder, 4.1m Telescopic ladder; and combinations of these.

A search was also made for notable signs of past and/or present bat roost activity, including bat urine stains, fur oil stains, scratch marks and faeces. These may be found around a bat roost entrance, within a roost, and within flight/foraging areas.

The following list explains how the survey equipment was used to inspect the House and Building:

- torches are portable battery powered (artificial) light emitting devices that were used to illuminate areas/features to aid the surveyor's inspection for physical evidence of bat.

- mirrors are portable reflective pieces of equipment that can aid the visual perception of features that may otherwise be inaccessible.

- binoculars are portable pieces of equipment that consist of two magnification telescopes, mounted side-by-side, and were used to aid the visual perception of distant and/or small objects.

- borescopes, fibrescopes and video-scopes are portable battery powered optical devices with flexible (light emitting) tubes that were used to aid the internal visual inspection - for physical evidence of bat - of small (structural) features and crevices that would otherwise be inaccessible.

- thermal imaging binoculars and monoculars are handheld electronic devices with an integrated visual display, designed for detecting heat energy, that were used to aid the external and internal visual inspection for bat presence.
- night vision binoculars, monoculars and (spotting) scopes are electro-optical devices that are used to detect visible and infrared energy and provide a visible image. The night vision scope was used to aid internal inspection for bat presence.
- a rigid ladder is a portable piece of equipment used for climbing up and/or down, which consists of two vertical stiles (bars) that are joined together by a series of horizontal rungs. Rigid ladders are self-supporting and may be leaned against (vertical) structures (such as walls) and/or on gradients (such as roof-slopes). The ladder was used to aid access to otherwise inaccessible spaces/features and therefore allow the close inspection of spaces/features for physical evidence of bat.

Combinations of survey equipment were used throughout the survey to enable the survey of spaces/features and inspections for physical evidence of bat.
For example; a surveyor used unaided visual perception from the ground to establish that there may be gaps between the lower edges of (roof apex) ridge tiles. The surveyor may then use binoculars and a torch to confirm or not, from the ground, if gaps are present and if these gaps are likely to provide bats with potential access to voids beneath the ridge tiles (i.e. within ridge tile voids - above the roof apex and beneath the undersides of ridge tiles).

6.1.1.3 Limitations of Initial Bat Survey

Physical evidence of bats that may have been created within the previous bat-active season may have deteriorated or have been removed (for example by wind and/or rain) prior to the Initial Bat Survey being carried out.

Considering the structural fabric of the House and the results of the Bat Survey; the constraints of the above limitations are considered to be negligible.

6.1.1.3.1 Bat dropping descriptions

Bat droppings have been identified to species level, on the basis that they are consistent in size and appearance with those deposited by that species; i.e. they are of that 'type'.

It is never possible to unequivocally state the species origin of bat droppings based on their presence alone.

The size and appearance of bat droppings produced may alter due to the age, diet and possibly sex of bats.
In some environments - for example a high humidity - bat droppings, particularly old ones, may resemble those of other species.

6.1.1.3.2 Long-eared bats

Two species of long-eared bat occur in the United Kingdom, Brown long-eared (*Plecotus auritus*) and Grey Long-eared (*Plecotus austriacu*).

Whilst it is not possible to distinguish the species by their immediate visual appearance, droppings, or echolocation calls, Grey long-eared bats are confined to distinct areas in southern counties of England.

Statements of the presence of Brown long-eared bats are a reasonable assumption, and not necessarily fact, unless DNA analysis of droppings has been carried out (see Section 6.1.3).

6.1.2 Nocturnal Bat Surveys

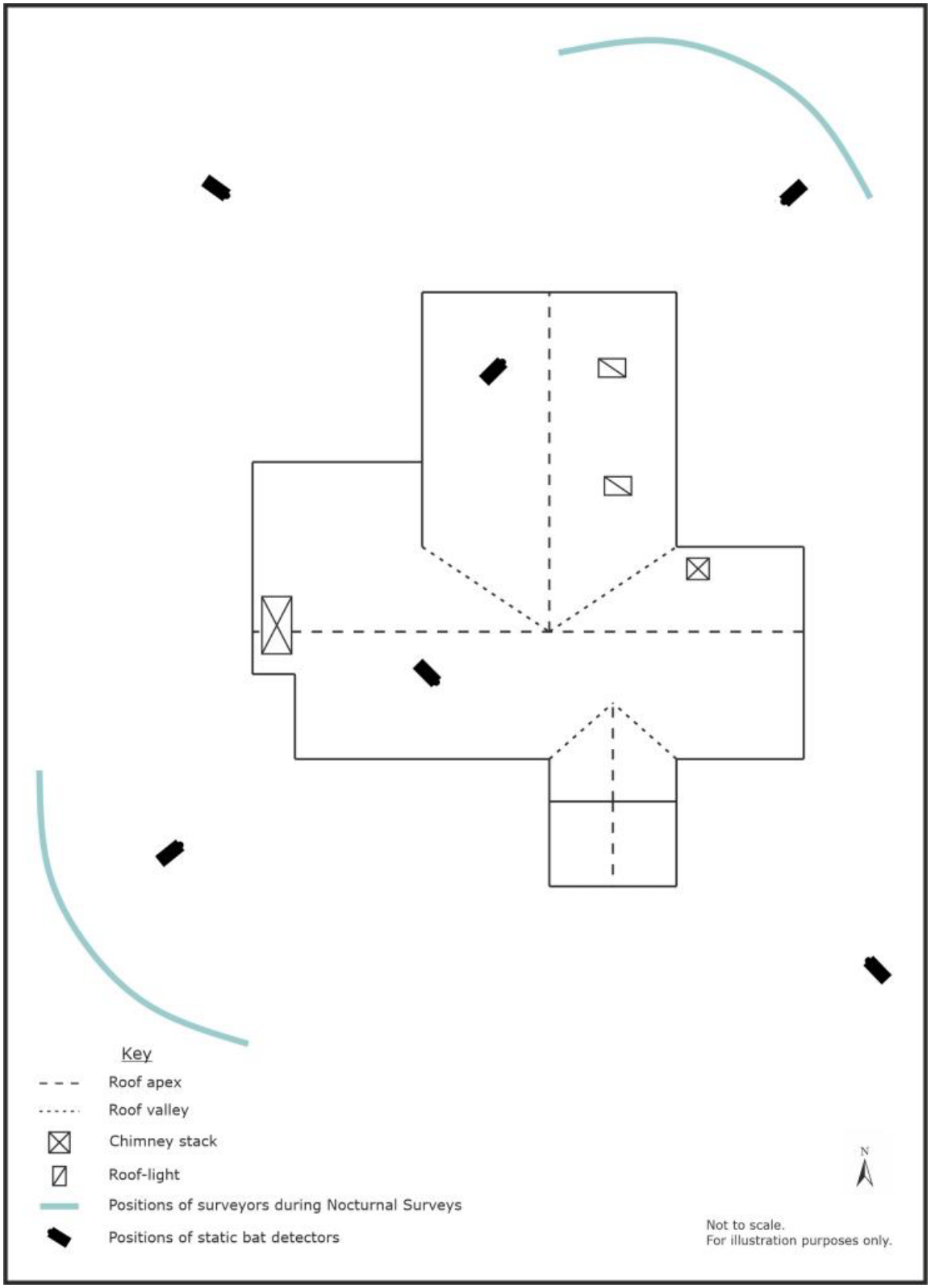
Each Dusk Bat Emergence and Activity Survey covered the mean roost emergence times of all United Kingdom bat species.

For each respective survey:
- each surveyor used a Magenta Bat5 heterodyne bat detector, an Elekon Batscanner automatic tuning heterodyne bat detector and an Anabat Walkabout bat detector.
- four Anabat SD1 bat detectors were positioned to record bat activity within and in the vicinity of the House.
- two Anabat SD1 bat detectors were positioned to record bat activity within second-floor and third-floor rooms of the House.
- the House was carefully and continuously observed, and surveyors kept in contact via private mobile radios.
- as appropriate and deemed necessary, the interior of the House was regularly inspected for bat activity.
- where necessary, low-intensity red-filtered lighting was used to aid the viewing of House, or parts of it.
- air temperature (°c), relative air humidity (%), wind speed (Beaufort Force scale) and cloud cover (Oktas) was recorded at the start and at the end of each survey.
- where necessary, general comments on weather conditions (particularly if adverse for bat activity) were made.

The Anabat bat detectors record and interpret bat echolocation calls.
Data is stored on computer memory cards with both date and time signatures.
Full computer exploration of the data and sonogram analysis is performed.

A diagram indicating the approximate locations of surveyors and bat echolocation equipment used during the Nocturnal Bat Surveys is contained in Plan 2.

Plan 2. Locations of surveyors and survey equipment.



6.1.2.1 Physical Evidence of Bat Activity

As deemed necessary, immediately prior to and immediately after the Nocturnal Bat Surveys, (parts of) the exterior and interior of the House were inspected for (fresh) physical evidence of bats.

Search methods included the use of torches (including a Fenix RC40 3800 lumen torch and a DeWalt DCL043 1000 lumen torch), binoculars (Zeiss 10x42), a 3.8m Telescopic ladder, 4.1m Telescopic ladder, 8.15m Combination ladder; and combinations of these.

A search was also made for notable signs of past and/or present bat roost activity, including bat urine stains, fur oil stains, scratch marks and faeces. These may be found around a bat roost entrance, within a roost, and within flight/foraging areas.

6.1.2.2 Limitations of the Nocturnal Bat Surveys

It is not considered that there are limitations to the surveys.

6.1.3 Bat Dropping DNA Analysis

If deemed appropriate and necessary; samples of bat droppings were sent to EcoWarwicker ecological Forensics for (deoxyribonucleic acid) DNA Analysis.

6.2 Small Breeding Bird

During each survey visit, the presence of bird nests, active (in current use) and inactive (not in current use), were noted.

7. RESULTS

A summary of the surveys carried out on the House is provided in Table 1.

Table 1. Summary of surveys carried out.

Visit	Date	Survey
1	24 June 2022	• Initial Bat Survey • Dusk Bat Emergence and Activity Survey
2	6 July 2022	• Dusk Bat Emergence and Activity Survey
3	5 August 2022	• Dusk Bat Emergence and Activity Survey

A record of start and end times and the weather conditions for each Dusk Bat Emergence and Activity Survey is provided in Table 2.

Please note:
- all stated quantities are approximate
- all stated times are approximate

Table 2. Survey times and conditions.

		Visit 1	Visit 2	Visit 3
Date		24/06/2022	06/07/2022	05/08/2022
Sunset time		21:39	21:35	20:57
Survey time	Start	21:25	21:20	20:50
	End	23:00	22:40	22:00
Air temperature (°c)	Start	17	20	20
	End	14	17	14
Relative air humidity (%)	Start	55	42	37
	End	69	67	44
Wind speed (Force)	Start	1-4	0-3	0-2
	End	1-2	1	0-1
Wind direction	Start	NE	n/a	n/a
	End	n/a	n/a	n/a
Cloud cover (Oktas)	Start	8	3	1
Weather change		No significant change	No significant change	No significant change

7.1 Initial Bat Survey – Visit 1

7.1.1 Assessment of Bat Roost Potential

The exterior of the House does not provide bat roost habitat. However, the interior of the House provides a high summer bat roosting potential.

Roof structures are in good ('new') condition and there are no features on/within the (exterior) roof structure in which bats may roost and/or use to gain access to interior roosting space.
All ridge tiles and slates are intact, *in situ* and close-fitting and do not provide bat roost habitat.
All (gable and eave) soffit boxes are intact, *in situ* and close-fitting and do not provide bat roost habitat.

All lead flashings and abutments are intact, *in situ* and close-fitting and do not provide bat roost habitat.

However, bats may easily gain access to the interior of the House via open (exterior) doors, broken windows (with missing panes of glass), and a hole at first-floor height within the (west-end) of the first-floor south elevation wall.

Interior doors between most rooms within the House are open and bats may easily travel between ground-, first- and second-floor rooms.

Most rooms within the House are subject to high natural light levels, but some dark and enclosed places suitable for bat roosting are present - including (open) cupboards, the first-floor landing area, and the second-floor room. Bats may roost on exposed (structural) surfaces withing these areas of the House.

7.1.2 Physical Evidence of Bat Occupation

Please note:
- bat droppings have been identified to species level, on the basis that they are consistent in size and appearance with those deposited by that species; i.e. they are of that 'type'. It is never possible to unequivocally state the species origin of bat droppings based on their presence alone. The size and appearance of bat droppings produced may alter due to the age, diet and possibly sex of bats. In some environments, for example a high humidity, bat droppings, particularly old ones, may resemble those of other species.
- the age of bat droppings – or the year(s) that they were deposited – has been estimated using a combination of surveyor experience and knowledge of the environment in which the bat dropping(s) was/were found.
- stated quantities are approximate.

Finding 1: Several year 2022 Brown long-eared bat droppings found scattered on floor and storage item surfaces within ground-floor rooms of the two-storey (east-to-west) section.

Finding 2: Several year 2022 Brown long-eared bat droppings found scattered on floor surfaces within first-floor rooms of the two-storey (east-to-west) section.

Finding 3: A cluster of 30 Yellow underwing (*Noctua* sp.) moth wings found on the floor surface of a first-floor cupboard of the two-storey (east-to-west) section.
Fifty year 2021 bat droppings were found amongst the wings.
A sample of the droppings was collected and sent to EcoWarwicker ecological Forensics for DNA Analysis. The bat species identified as depositing the droppings is Brown long-eared. A copy of the result sheet from EcoWarwicker ecological Forensics is contained in Appendix 2, sample labelled 'M12'.
The group of butterfly wings (and bat droppings) indicated the presence of a Brown long-eared bat feeding perch.

Finding 4: Several year 2022 Lesser horseshoe bat droppings were found scattered on floor surfaces within first-floor rooms of the two-storey (east-to-west) section of the House.
A sample of the droppings was collected and sent to EcoWarwicker ecological Forensics for DNA Analysis. The bat species identified as depositing the droppings is Lesser horseshoe. A copy of the result sheet from EcoWarwicker ecological Forensics is contained in Appendix 2,

sample labelled 'N12'.

Finding 5: A cluster of 40 mixed age bat droppings was found on the floor surface (and items of rubbish) in the north area of the third-floor room (of the north section of the House). Ten of the bat droppings were deposited in year 2022 and the other 30 had been deposited in year 2021 and/or (a) previous year(s). The cluster of bat droppings was immediately beneath the roof apex.
A sample of the droppings was collected and sent to EcoWarwicker ecological Forensics for DNA Analysis. The bat species identified as depositing the droppings is Brown long-eared. A copy of the result sheet from EcoWarwicker ecological Forensics is contained in Appendix 2, sample labelled 'O12'.

Finding 6: A cluster of 30 year 2022 bat droppings was found on the floor surface (and items of rubbish) in the south area of the third-floor room (of the north section of the House). The cluster of bat droppings was immediately beneath the roof apex.
A sample of the droppings was collected and sent to EcoWarwicker ecological Forensics for DNA Analysis. The bat species identified as depositing the droppings is Lesser horseshoe. A copy of the result sheet from EcoWarwicker ecological Forensics is contained in Appendix 2, sample labelled 'P12'.

7.2 Dusk Bat Emergence and Activity Survey – Visit 1

- 21:50 One Common pipistrelle (*Pipistrellus pipistrellus*) flew towards the House from the northwest. The bat flew around the east elevation of the House and then south, away from the House.
- 22:05 – 22:15 Foraging by two Common pipistrelle bat was seen and heard in the vicinity of the House.

7.3 Visit 2

7.3.1 Physical Evidence of Bat Occupation

Finding 7: One adult Brown long-eared bat and one adult Lesser horseshoe bat were found roosting on the ridge beam within the third-floor room (of the north section).

7.3.2 Dusk Bat Emergence and Activity Survey

- 21:50 – 22:20 Two Common pipistrelle bats flew towards the House from the northwest and intermittently foraged in the vicinity of the House (and presumably other areas of the Troedrhiwfedwen yard and building complex).
- 21:55-21:15 No more than two Soprano pipistrelle foraged in the vicinity of the House.
- 21:52 One Lesser horseshoe bat was flying within first-floor rooms (of the two-storey, east-to-west) section. No Lesser horseshoe bat

was roosting at the location previously identified (see Finding 7) and it was thought likely that the Lesser horseshoe bat flying within the first-floor rooms was the same bat previously found roosting within the second-floor room (of the north section).

- 21:55 The Brown long-eared bat previously found roosting within the third-floor room of the House was flying within first-floor rooms (of the two-storey, east-to-west) section.

  No Brown long-eared bat was roosting at the location previously identified (see Finding 7) and it was thought likely that the Brown long-eared bat flying within the first-floor rooms was the same bat previously found roosting within the second-floor room (of the north section).

- 22:00 The Brown long-eared bat recorded flying within the first-floor rooms of the House emerged via the hole within the south elevation wall. Upon emerging, the bat flew immediately south and into another building.

- 22:08 The Lesser horseshoe bat recorded flying within the first-floor rooms of the House emerged via the hole within the south elevation wall. Upon emerging, the bat flew west, away from the House.

7.4 Visit 3

7.4.1 Physical Evidence of Bat Occupation

Finding 9: One adult Brown long-eared bat and one adult Lesser horseshoe bat were found roosting on the ridge beam within the third-floor room (of the north section).

7.4.2 Dusk Bat Emergence and Activity Survey

- 21:25 – 21:30 One Common pipistrelle bat flew towards the House from the northwest and foraged in the vicinity of the House before flying southeast, away from the House.

- 21:35 One Brown long-eared bat and one Lesser horseshoe bat were flying within first-floor rooms (of the two-storey, east-to-west) section.

  No Brown long-eared or Lesser horseshoe bat were roosting at the locations previously identified (see Finding 8) and the bats were the same as thought previously found roosting within the second-floor room (of the north section).

- 21:45 The Brown long-eared and Lesser horseshoe bats recorded flying within the first-floor rooms of the House emerged via the hole within the south elevation wall.

  Upon emerging, the Brown long-eared bat foraged in the yard area at the south of the House for three minutes, before

dispersing elsewhere.

Upon emerging, the Lesser horseshoe bat flew immediately west, away from the House.

7.5 Summary of Results

Species	Type	Number	Likelihood of presence	Functionality of site
Brown long-eared	Roosting	1	High	Day roost
Brown long-eared	Foraging	1	High	Feeding perch
Lesser horseshoe	Roosting	1	High	Day roost
Common pipistrelle	Commuting/foraging	≈2	High	Commuting/foraging
Soprano pipistrelle	Commuting/foraging	≈2	High	Commuting/foraging

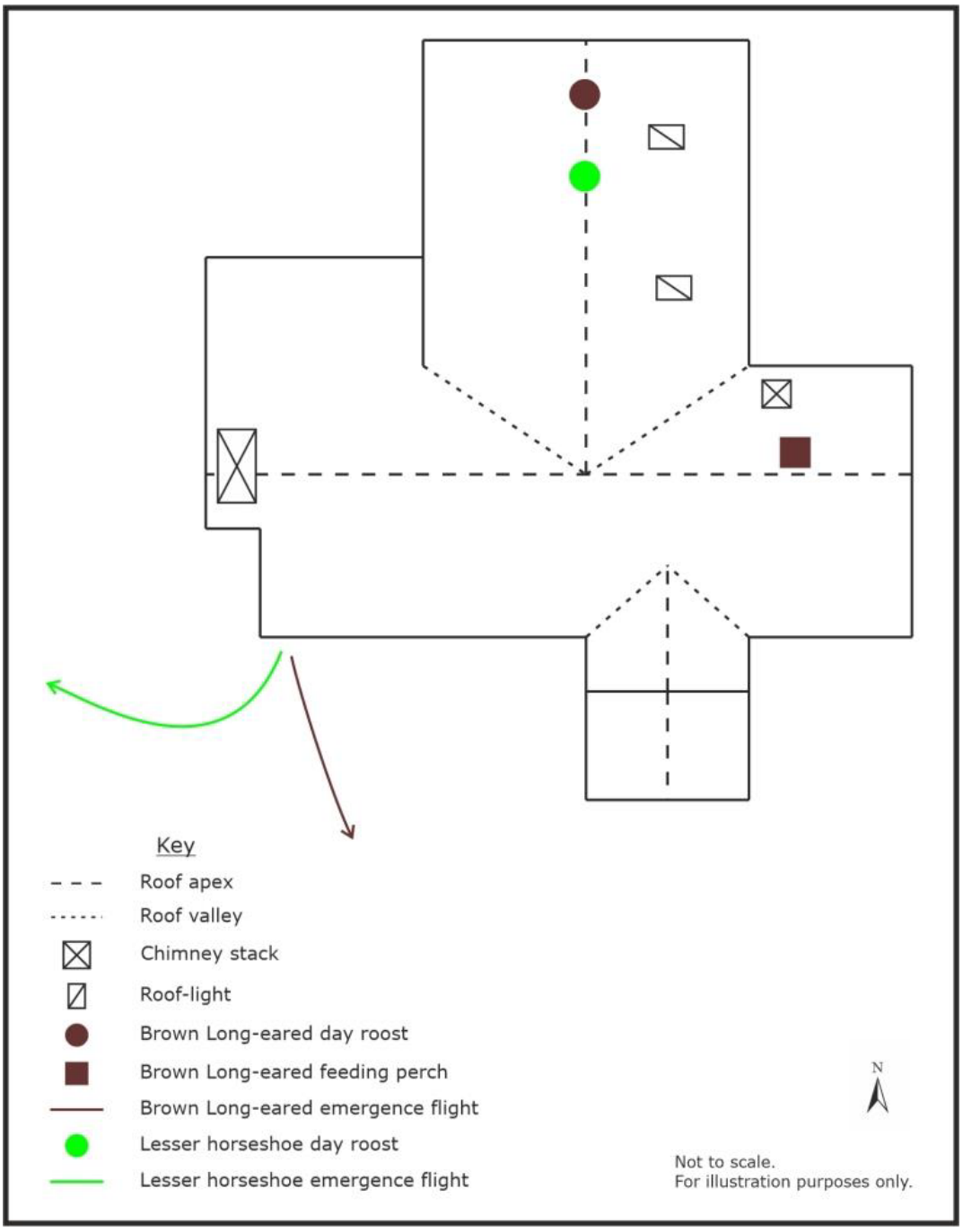
7.6 Small Breeding Bird

The following evidence of bird nesting was recorded:
- one in-use House sparrow (*Passer domesticus*) nest within the House.
- three in-use House martin nests on the exterior of the House.
- remnant markings of three old/deteriorated House martin nests.

7.7 Results Plan

A site plan indicating the locations of the identified bat roost findings is contained in Plan 3.

Plan 3. Results plan.



8. CONCLUSION

8.1 Bat

The House at Troedrhiwfedwen provides bat summer roosting habitat.
It is not thought likely that bats would be present within the House during the winter and it is reasonably unlikely that bats would use the House for hibernation.

The results of the Bat Survey indicate that the House is used by:

- a lone Brown long-eared bat for day roosting.
- Brown Long-eared bat as a feeding perch.
- a lone Lesser horseshoe bat for day roosting.

No maternity roosting was identified.

Land surrounding the House is used by Brown long-eared, Common pipistrelle, Lesser horseshoe and Soprano pipistrelle for commuting an/or foraging.

8.1.1 Species Conservation Importance

8.1.1.1 Brown long-eared

There is one record of Brown long-eared bat within 2km of the House; however, the record was collected more than 1km away.

Brown long-eared are frequently encountered in Powys and surrounding counties and nationally are regarded as being "common" (UK Mammals, 2005, Matthews *et al*., 2018).

In accordance with the Bat Mitigation Guidelines (Natural England, 2004) the Brown long-eared bat day roost and feeding perch are of low conservation significance.

The Brown long-eared bat roosts found within House are of site importance.
However, the Brown long-eared bat roosts are not considered to be of regional or national importance.

8.1.1.2 Lesser horseshoe

There is no record of Lesser horseshoe within 2km of House.

Nationally Lesser horseshoe are regarded as being "rare and endangered" (UK Mammals, 2005).
However, it is considered that "...the dramatic decline in the population levels of this species, recorded in the middle of the last century, has slowed and is reversing" (Vincent Wildlife Trust, 2008).

Lesser horseshoe are frequently encountered in Powys and neighbouring counties and, nationally, the Lesser horseshoe population size and range is increasing (Matthews *et al*., 2018).

In accordance with the Bat Mitigation Guidelines (Natural England, 2004) the Lesser horseshoe bat roost within the House are of low conservation significance.

The Lesser horseshoe bat roost is of site importance.
However, the Lesser horseshoe bat roost is not considered to be of regional or national importance.

8.1.2 Development Impact

In the absence of mitigation, the proposed development may lead to the killing and/or injury of, Brown long-eared and/or Lesser horseshoe bats.

The demolition of the House will mean the destruction of the recorded bat roosts.

8.1.3 Recommendations

The demolition of the House will require a EPS Licence for bats to be issued by Natural Resources Wales. The EPS Licence will need to be issued by Natural Resources Wales prior to demolition work commencing and demolition work will need to be carried out under the terms of the EPS Licence.

Ideally, the demolition of the House should take place in the autumn and winter months when it is unlikely that bats will be present within the House. However, as the bat roosts recorded are non-maternity roosts of lone / low numbers of bats – there is no timing constraint.

8.1.4 House and its environs

Depending on the exact nature of the proposed development plans, compensation and enhancement for bats will need to be provided to ensure the long-term survival of bats at Troedrhiwfedwen.

An outline of bat mitigation, compensation and enhancement that may be appropriate for the proposed development is contained in Section 9.1 and Section 9.2.

External lighting:
The Troedrhiwfedwen yard and building complex is used by bats for commuting and foraging.
In order to negate the potential impact of the development on commuting and foraging bats; external lighting to be installed should be done so in a sympathetic manner.
See Section 9.3.

8.2 Small Breeding Bird

Evidence of Small Breeding Birds was found.
It is possible that birds may nest on and/or within the House in the future.

The demolition of the House will need to be carried out when there are no Small Breeding Birds present.

Bird nesting habitat may be created, post-development, to encourage birds to nest within the Troedrhiwfedwen yard and building complex in the future.

Recommended mitigation, compensation and enhancement for Small Breeding Birds is contained in Section 9.4.

9. RECOMMENDATIONS

9.1 Bat Mitigation Measures

9.1.1 European Protected Species Licence

The demolition of the House may only be carried out on receipt of a European Protected Species (EPS) Licence for bats from Natural Resources Wales.

9.1.2 Timing of Work

Ideally, the demolition of the House should only take place between (roughly) 1 October and 15 April inclusive.
The likelihood of bats being encountered at this time is severely negated.

However, as the bat roosts contained within the House are non-maternity roosts of lone bats; in accordance with the Bat Mitigation Guidelines (Natural England, 2004), demolition work may be carried out at any time of year.

9.1.3 Work Methods

Prior to demolition work commencing it will be necessary to ensure that (ecologist accessible) bat roosting opportunity is available within the immediate vicinity (<50m) of the House.

This may be achieved by installing a minimum of two Schwegler bat boxes (such as models 1FF and 2F) on nearby buildings and/or trees (to remain as existing).

It may be necessary for bats to be moved to alternative bat roosting locations should bats be found during the demolition of the House.

Prior to demolition work commencing the House will need to be inspected, by a Natural Resources Wales licensed bat ecologist, for the presence of bats.

Where no bats are present, (known and suspected) bat openings to roost locations may be (temporarily) sealed-off.

Where the absence of bats cannot be assumed, it may be necessary for one-way bat excluders to be used to prevent bats from returning to roost.

The removal of the roof coverings will need to be carried out by hand under the supervision of a Natural Resources Wales licensed bat ecologist.

9.2 Bat Compensation and Enhancement Measures

The Bat Mitigation Guidelines (English Nature, 2004) encourage the replacement of destroyed roosts on a like-for-like basis. However, they also state that proportionate and appropriate mitigation and compensation measures should be applied.

In accordance with the Bat Mitigation Guidelines (English Nature, 2004) and the conservation significance of the bat roosts within House; flexibility should be given to the provision of new bat roosting facilities.

However, current Planning Policy encourages development to have an enhancement of biodiversity.

Therefore, there needs to be careful weighting of what are the legal and policy requirements, the requirements of the bat species/roost identified and the constraints of the proposed development.

9.2.1 Brown long-eared

Brown long-eared bats are frequently found in buildings that have large unobstructed roof voids which may provide internal bat flying space.
However, the requirement of such an internal area is of primary importance to maternity roosts.

The Bat Mitigation Guidelines (English Nature, 2004) encourage the replacement of destroyed roosts on a like-for-like basis. However, they also state that proportionate and appropriate mitigation and compensation measures should be applied.

Brown long-eared will readily roost in a variety of structures, including purpose-made Bat Boxes, beneath ridge tiles and within roof slate-to-slate crevices.

To compensate Brown long-eared bat for the loss of roosting space within the House; it is recommended that:

- a minimum of six potential bat access points be created between ridge tiles and the top course(s) of roof slates on the new, replacement, house roof.
  These may allow Brown long-eared bat access to voids along the undersides of ridge tiles and/or to roof-slope batten-voids.
- purpose-made bat roost boxes be installed on or within the external fabric of the new, replacement, house and/or elsewhere within the Troedrhiwfedwen yard and building complex.

Should a feature suitable for Lesser-horseshoe bat day/night roosting be created (see Section 9.2.2); depending on its structural fabric and size, the feature may be (made) suitable for Brown long-eared to roost within, also.

9.2.2 Lesser horseshoe

Lesser horseshoe bats will readily use any internal and sheltered structure as a night-roost and, if dark and undisturbed, as a day roost.

For Lesser horseshoe day roosts:
"The key requirements are to maintain access and provide perching places. Light levels are not an issue.....and predation and disturbance are less of a problem. The space required by the bats is also less important."
(Vincent Wildlife Trust, 2008)

(Partially) open-sided structures with overhanging roofs, such as porches, log-stores, car ports (with roof-spaces) and waste bin stores, may be appropriate.

Alternatively, Lesser horseshoe roosting space may be provided in an existing building in the vicinity of the House.

Design suggestions on roosting provision for Lesser horseshoe bat may be provided on request.

9.3 External Lighting for Bats

In order to avoid any unnecessary disturbance to bats in the future, any external lighting to be installed on or within the vicinity of House at Troedrhiwfedwen should:

- use Light emitting diodes (LED) luminaries
- have a warm white spectrum <2700° Kelvin (degrees colour temperature)
- have peak wavelengths higher than 550nm
- be set on motion-sensors
- use short duration (e.g. one minute) timers
- not be in the vicinity of, or shine towards, bat roost openings
- not shine towards (the) roof structure(s)
- not be in the vicinity of, or shine towards, boundary vegetation

9.4 Small Breeding Bird

9.4.1 Mitigation

Ideally, development work on the House should not be started between 1 March and 1 October (inclusive).

Should it be required that development works commence between March and September, the House should be inspected by a suitably qualified ecologist for evidence of nesting birds.

No works may commence if birds have started to build, or if they already occupy, nests within the areas of the House.
If birds gain access to the House and start nesting - prior to or during demolition work - delays will be inevitable up to the moment when the young birds leave the nest.

9.4.2 Small Breeding Bird Compensation and Enhancement

In order to encourage the long-term survival of nesting birds at Troedrhiwfedwen it is recommended that woodcrete nest boxes (or similar) be installed where possible. Ideally, these should be positioned in areas of low future disturbance.

Ideally nest box placement and construction of nesting features should be undertaken outside the bird breeding season (March-September inclusive).
Nest boxes should be placed under the eaves of the House, or under gable-ends.

A minimum of ten Schwegler woodcrete (or similar alternative) bird nest boxes should be installed on and/or within the vicinity of the House.
It is recommended that this number be divided as follows:

- six House Martin nest boxes (e.g. Schwegler House martin Nest 9A)
- two Swift nest boxes (e.g. Schwegler No. 16 Swift box)
- one Tit nest box (e.g. Schwegler 2M woodcrete bird box)
- one generic bird species nest box (e.g. Schwegler 1B bird nest box)

If any protected species is found at any stage of the property development, work should immediately cease and Natural Resources Wales should be consulted (Telephone 0300 065 3000).

Another survey will need to be conducted if no development work is carried out on the House at Troedrhiwfedwen within two years from the date of the most recent survey.

10. RELEVANT PUBLICATIONS

Bat Conservation Trust (2006). *A review of the success of bat boxes in House*. Scottish Natural Heritage Commissioned Report No. 160 (ROAME No. F01AC310).

Bat Conservation Trust and Institution of Lighting Professionals (2018). Guidance Note 8 Bats and Artificial Lighting.

Collins, J. (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines, 3rd ed., Bat Conservation Trust.

Greenaway, F. and Hutson, A.M. (1990). *A Field Guide to British Bats*. Bruce Coleman Books, London.

Gunnell, K., Murphy, B. and Williams, C. (2013). *Designing for Biodiversity: A Technical Guide for New and Existing House*, 2nd ed., RIBA Publishing.

Mathews F., Kubasiewicz L.M., Gurnell J., Harrower C.A., McDonald R.A., Shore R.F. (2018). A Review of the Population and Conservation Status of British Mammals. A report by the Mammal Society under contract to Natural England, Natural Resources Wales and Scottish Natural Heritage. Natural England, Peterborough. Natural England Access to Evidence Catalogue Code JP025.

Multi-Agency Geographic Information Centre (MAGIC) (http://magic.gov.uk).

Natural England (2004). *Bat Mitigation Guidelines*. English Nature, Peterborough, England.

Natural Resources Wales 'Wales Environmental Information Portal'. https://smnr-nrw.hub.arcgis.com/

Russ, J. (2012). British Bat Calls A Guide to Species Identification. Pelagic Publishing.

Schofield, H.W. and Mitchell-Jones, A.J. (2004). *The bats of Britain and Ireland*. The Vincent Wildlife Trust, Ledbury, England.

UK Mammals: Species Status and Population Trends. JNCC/Tracking Mammals Partnership. 2005.

APPENDIX 1 – Survey Photographs

Photograph 1. House at Troedrhiwfedwen. Exterior.
North elevation.

Photograph 2. House at Troedrhiwfedwen. Exterior.
Left and right: part of the North elevation.
Centre: part of the East elevation.

Photograph 3. House at Troedrhiwfedwen. Exterior.
East elevation.

Photograph 4. House at Troedrhiwfedwen. Exterior.
South elevation.

Photograph 5. House at Troedrhiwfedwen. Exterior.
Left: part of the West elevation.
Centre and right: South elevation.

Photograph 6. House at Troedrhiwfedwen. Exterior.
Far left and right-of-centre: part of the North elevation.
Left-of-centre and far right: West elevation.

APPENDIX 2 – EcoWarwicker ecological Forensics

WARWICK
THE UNIVERSITY OF WARWICK

EcoWarwicker
Ecological Forensics

2 August 22

Re: Identification Results for Ross Jones, Star Ecology

Job number 18467, received 20 July 2022
Sample labelled: M12
PCR amplification successful. DNA sequence:
ATGACCAACATTCGAAAGTCCCACCCTCTCATAAAAATTATCAATGACTCATTCATTG
ACTTACCTGCTCCCTCAAATATTTCATCATGATGAAACTTTGGTCTCTTCTAGGCATT

Phylogenetic analysis identification: *Plecotus auritus*

Confirmed by maximum likelihood, maximum parsimony, bootstrap 100%.

Best regards,

Professor Robin Allaby

The results and conclusions in this report are based on an investigation of mtDNA sequence analysis. The results obtained have been reported with accuracy. The interpretation represents the most probable conclusion for the DNA sequence obtained rather than the sample provided given current levels of species data. It should be borne in mind that different circumstances might produce different results. Therefore, care must be taken with interpretation of the results especially if they are used as the basis for commercial recommendations.

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WARWICK
THE UNIVERSITY OF WARWICK

Star Ecology
EcoWarwicker
Ecological Forensics

2 August 22

Re: Identification Results for Ross Jones, Star Ecology

Job number 18468, received 20 July 2022
Sample labelled: N12
PCR amplification successful. DNA sequence:
ATGACCAACATTCGCAAGTCCCACCCACTATTTAAAATTATCAATGACTCATTCATTG
ATCTACCTGCCCCATCAAGTATTTCCTCCTGATGAAACTTTGGATCCCTACTAGGAGT
ATGCC

Phylogenetic analysis identification: *Rhinolophus hipposideros*

Confirmed by maximum likelihood, maximum parsimony, bootstrap 100%.

Best regards,

Professor Robin Allaby

The results and conclusions in this report are based on an investigation of mtDNA sequence analysis. The results obtained have been reported with accuracy. The interpretation represents the most probable conclusion for the DNA sequence obtained rather than the sample provided given current levels of species data. It should be borne in mind that different circumstances might produce different results. Therefore, care must be taken with interpretation of the results especially if they are used as the basis for commercial recommendations.

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WARWICK
THE UNIVERSITY OF WARWICK

Star Ecology
EcoWarwicker
Ecological Forensics

2 August 22

Re: Identification Results for Ross Jones, Star Ecology

Job number 18469, received 20 July 2022
Sample labelled: O12
PCR amplification successful. DNA sequence:
ATGACCAACATTCGAAAGTCCCACCCTCTCATAAAAATTATCAATGACTCATTCATTG
ACTTACCTGCTCCCTCAAATATTTCAT

Phylogenetic analysis identification: *Plecotus auritus*

Confirmed by maximum likelihood, maximum parsimony, bootstrap 100%.

Best regards,

Professor Robin Allaby

The results and conclusions in this report are based on an investigation of mtDNA sequence analysis. The results obtained have been reported with accuracy. The interpretation represents the most probable conclusion for the DNA sequence obtained rather than the sample provided given current levels of species data. It should be borne in mind that different circumstances might produce different results. Therefore, care must be taken with interpretation of the results especially if they are used as the basis for commercial recommendations.

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WARWICK
THE UNIVERSITY OF WARWICK

Star Ecology

EcoWarwicker
Ecological Forensics

2 August 22

Re: Identification Results for Ross Jones, Star Ecology

Job number 18470, received 20 July 2022
Sample labelled: P12
PCR amplification successful. DNA sequence:
ATGACCAACATTCGAAAGTCCCACCCACTATTTAAAATTATCAATGACTCATTCATTGA
TCTACCTGCCCCATCAAGTATTTCCTCCTGATGAAACTTGGATCCCTACTAGGAGTAG
CC

Phylogenetic analysis identification: *Rhinolophus hipposideros*

Confirmed by maximum likelihood, maximum parsimony, bootstrap 100%.

Best regards,

Professor Robin Allaby

The results and conclusions in this report are based on an investigation of mtDNA sequence analysis. The results obtained have been reported with accuracy. The interpretation represents the most probable conclusion for the DNA sequence obtained rather than the sample provided given current levels of species data. It should be borne in mind that different circumstances might produce different results. Therefore, care must be taken with interpretation of the results especially if they are used as the basis for commercial recommendations.

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