Isles of Scilly Wildlife Trust
Trenoweth, St Mary's, Isles of Scilly, TR21 0NS
Tel: 01720 422153
darrenmason@ios-wildlifetrust.org.uk
www.ios-wildlifetrust.org.uk

PRELIMINARY ECOLOGICAL APPRAISAL & PRELIMINARY BAT ROOST ASSESSMENT OF:

THE PACKING SHED
HIGHER TOWN
ST MARTINS
ISLES OF SCILLY
TR25 0QL

Client: RTP Chartered Building Surveyors on behalf of the Duchy of Cornwall

Our reference: BS9-2018

Report date: 16th November 2018

Author: Darren Mason BSc (Hons)

Report peer reviewed: Darren Hart

Report signed off: Sarah Mason

REPORT ISSUED IN ELECTRONIC FORMAT ONLY

This page is intentionally blank

Contents

Non-Technical Summary

- On the 12th November 2018, the Isles of Scilly Wildlife Trust (IoSWT) conducted a Preliminary Ecological Appraisal (PEA) and Preliminary Roost Assessment (PRA) of The Packing Shed, Higher Town, St Martin's, Isles of Scilly, TR25 0QL (BS9-2018), for which there is a proposal to demolish the existing block work building down to the existing stonework and replace it with a timber-framed and timber-clad building, on the same footprint, but with a change in aspect of the roof by 90^0 to face north-east/south-west and a raise in the roof pitch of 900mm.
- This report outlines the findings of the PEA and PRA assessment and provides advice based upon the surveys' conclusions.
- During the PRA an external/internal inspection of the building was undertaken (where accessible). Due to the cladding of the 1st floor most of the roof structure (internally) was unable to be inspected
- No evidence of nesting birds was found in/on the property.
- A small population of the Nationally Scarce Balm-leaved Figwort was found in the small garden area in the north-east of the development site.
- Evidence of bats was found during the PRA and the characteristics of the building suggested a moderate roost potential. The immediate surrounding habitat was limited, but the surrounding mature gardens and hedgerows to the west and east could provide suitable commuting habitat to more optimal foraging habitat further afield.
- The recommendations of this PEA and PRA suggest that two further presence and absence surveys are recommended; one dusk emergence and a separate dawn re-entry survey. These must be carried out within the bat active season between May and September.
- Other than bats, if the recommendations given in this report regarding nesting birds and Balm-leaved Figwort are adhered to, there should be no further ecological constraints to the proposals.

1.0 Introduction

1.1 Survey and reporting

This report details the results of a preliminary ecological appraisal and a preliminary bat roost assessment of The Packing Shed, Higher Town, St Martin's, Isles of Scilly TR25 0QL. The survey, carried out on the 12th November 2018, was undertaken in order to inform proposals to demolish the existing block-work and corrugated asbestos building down to the existing stonework and replace it with a timber-framed and timber-clad building on the same footprint, but with a change in aspect of the roof by 90^0 to face north-east/south-west and a raise in the roofs pitch by 900mm.

1.2 The application site

The house is located on the eastern edge of Higher Town, St Martin's (National Grid Reference SV9307715535, Figure 1.). The application site is comprised of a part stone, part single-skin rendered two-storey former bulb shed, with a corrugated cement fibre roof (Photo 1). The footprint of the building is approximately $40m^2$ and the sites total footprint approximately $200m^2$ (red area, see Figure 1).

1.3 Details of proposed works

It is proposed to demolish the existing building and replace with a timber-framed, timber clad building on the same footprint, but with a change in aspect of the roof by 90^0.

Figure 1. Location of the Packing Shed

Photo 1.

2.0 Methodology

2.1 Preliminary Ecological Appraisal - Desk Study

A desk study data search was undertaken. This involved carrying out a review of the Local Records Centres (LRC) available records for bat species and publicly available datasets and citations of statutory designated sites of importance for nature conservation for sites within the zone of influence (ZOI) of the survey area (considered to be a maximum of 2km in this case). The desk study was also undertaken to identify habitats and features that are likely to be important for bats and assess their connectivity through the use of aerial photographs.

2.2 Preliminary Bat Roost Assessment

The Preliminary Bat Roost Assessment comprised a survey of the building for bats, signs of bats and features potentially suitable for use by roosting bats, and an assessment of the surrounding habitat in terms of its suitability for commuting and foraging bats.

The survey consisted of a ground based inspection and a detailed search of the interior and exterior of the building (from ground level), looking for bats and/or evidence of bats including droppings (on walls and windowsills and in roof and loft spaces), rub or scratch marks, staining at potential roosts and exit holes,

live or dead bats and features, such as raised or missing tiles, potentially suitable for use by roosting bats. Binoculars, a ladder and a high-powered torch were used as required.

2.3 Classification of building

The building was classified according to its suitability for use by roosting bats. The classification was dependent on a number of factors including:

- Bats and/or signs of bats;
- External and internal features potentially suitable for use by roosting bats (e.g. raised or missing tiles, gaps behind fascia boards etc);
- Setting;
- Night time light levels;
- Disturbance levels;
- Proximity of suitable foraging habitat and commuting routes (e.g. ponds, streams, woodland, large gardens, hedgerows).

The categories used to classify buildings and the survey effort required to determine the presence or absence of bats (as per the Bat Conservation Trust's Bat Survey Guidelines[1], referred to by Natural England in their standing advice to planning officers) are described in Table 1.

2.4 Surveyor details

The survey was undertaken by Darren Mason BSc and Darren Hart BSc of the Isles of Scilly Wildlife Trust. Both have undertaken professional Bat Licence Training to permit him to undertake professional surveys and are currently gathering sufficient 'working hours' to achieve a Natural England Class Level 1 licence.

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

Table 1 – Description of the categories used to classify a building's bat roost potential and the survey effort required to determine the likely presence or absence of bats

	Roost status	Description	Survey effort required to determine the likely presence or absence of bats
Bat Roost Potential	High	Numerous features potentially suitable for use by roosting bats, optimal or good quality bat foraging habitat nearby and good habitat connectivity. Alternatively, a building with fewer features potentially suitable for use by roosting bats and optimal foraging habitat nearby.	Three dusk emergence and/or pre-dawn re-entry surveys between May and September. Optimum period May – August. Two surveys should be undertaken during the optimal period and at least one survey should be a pre-dawn survey.
	Moderate	More than a few features potentially suitable for use by roosting bats, good foraging habitat nearby and limited habitat connectivity. Alternatively, a building with a few features potentially suitable for use by roosting bats but optimal foraging habitat nearby.	Two or three dusk emergence and/or pre-dawn re-entry surveys between May and September (but only if features will be affected by the proposals).
	Low	Only a few features potentially suitable for use by roosting bats but good bat foraging habitat nearby. Alternatively, a building with more than a few features potentially suitable for use by roosting bats but sub-optimal foraging habitat nearby and limited habitat connectivity.	One or two dusk emergence and/or pre-dawn re-entry surveys between May and September (but only if features will be affected by the proposals).
	Negligible	Very few features potentially suitable for use by roosting bats and / or in an area (such as a densely populated urban area) which has limited habitat connectivity and poor foraging habitat.	No further surveys required.

3.0 Results

3.1 Preliminary Ecological Appraisal

3.1.1 Pre-existing information on bat species

The desk study showed that no species of bat had previously been recorded within the building. A data search of LRC records for bats revealed information on 2 species of bat recorded within the 2km ZOI of the site. The species conclusively identified were Common Pipistrelle (*Pipistrellus pipistrellus*) and Soprano Pipistrelle (*Pipistrellus pygmaeus*), a UK Biodiversity Action Plan (BAP) priority species. No known roosts lie within the 2km ZOI of the proposed development.

3.1.2 Statutory and non-statutory sites

In addition, the desk study revealed the presence of the following statutory designated sites within the 2Km ZOI of the site:

i. **Plains and Great Bay SSSI –** Lying approximately 500m north-west of the Packing Shed, Plains and Great Bay SSSI is designated for a variety of habitats, including a well-developed strandline and embryo dunes and associated species. The dune grassland further inland is particularly important for the nationally scarce Orange Bird's-foot (*Ornithopus pinnatus*) and the rare Ramping Fumitory (*Fumaria capreolata*). The heathland is dominated by Common Heather (*Calluna vulgaris*), Bell Heather (*Erica cinerea*) and Western Gorse (*Ulex gallii*) and associated lichen flora.

ii. **Chapel Down SSSI –** Situated approximately 700m east-north-east of the Packing Shed is Chapel Down SSSI. An important site for its 'waved' maritime heath, dominated by Common and Bell Heather, with scarce records of Bird's-foot-trefoil (*Lotus corniculatus*), Heath Bedstraw (*Galium saxatile*) and the nationally scarce Orange Bird's-foot and rare Hairy Bird's-foot (*Lotus subuliflorus*). On the western edge of the SSSI there is a small population of the locally rare Pignut (*Conopodium majus*).

iii. **White Island SSSI –** Located 1.6km north-east of the Packing Shed and lying just off the coast of St Martin's is White Island SSSI. Designated primarily for its geological deposits, maritime heathland and supporting lichen communities, maritime grassland and small colonies of breeding seabirds along its isolated cliffs.

iv. **Tean SSSI –** Lying 1.9km due west of the Packing Shed Tean SSSI is an uninhabited island designated primarily for its dune and scrubby grassland species assemblage including the very rare Dwarf Pansy (*Viola kitaibeliana*), Four-leaved Allseed (*Polycarpon tetraphyllum*), the nationally scarce Balm-leaved Figwort (*Scrophularia scorodonia*) and Orange Bird's-foot.

v. **Eastern Isles SSSI –** Situated off the south-east coast of St Martin's and 1.4km south-east of the Packing Shed lies this small group of isolated islands. Designated for their wildflower assemblage (111 species in total), archaeology and breeding seabirds including, Lesser Black-backed Gull (*Larus fuscus*), Great Black-backed Gull (*Larus marinus*), Puffin (*Fratercula arctica*), European Shag (*Phalacrocorax arstotelis*) and Fulmar (*Fulmaris glacialis*).

vi. **St Martin's Sedimentary Shore –** Situated approximately 425m to the south-west of the Packing shed lies a 2km of shoreline which are sheltered by strong wave and tidal action that enables species that would normally occur further offshore to occur in this intertidal zone. Species include a variety of bivalve molluscs, most notably the tellin *Angula tenuis*, Rayed Artemis (*Dosinia exoleta*) and the razor shell *Ensis arcuatus*. Burrowing heart urchin (*Echinocardium* cordatum) is common along with a variety of marine worms (*Polychaete*) including *Scololepsis fuliginosa* and *Travesia forbesi*.

3.1.3 Habitats surrounding the application site

The Packing Shed is situated on the eastern edge of Higher Town, St Martin's, the main conurbation of the island consisting of approximately 50 detached and semi-detached dwellings, gardens and associated outbuildings. The packing shed is surrounded immediately to the north, west and east by several large dwellings and an agricultural barn complex. These dwellings are all bounded by mature hedgerows, with scattered trees and shrubs of varying age. Immediately to the south and south east of the development site there are abundant small fields (typical on Scilly) used traditionally for the production of Narcissi. All are enclosed by mature hedgerows. Those hedgerows immediately to the south are connected to two small Elm (*Ulmus* sp.) copses and a pond, which has little overhanging vegetation.

Further to the east (730m), west (800m) and north-west (300m) this mosaic of small enclosed fields, laid to fallow or planted with Narcissi (*Narcissus* sp.) continues. Beyond these field systems and to the north the habitat becomes more open, dominated by improved and semi-improved grassland, contained within

small irregular-shaped fields which are enclosed by dry stone walls. These fields, typically grazed by cattle, open onto the exposed coastal headlands of St Martin's northern coastline. This habitat consists of a mosaic of dwarf-shrub heathland, scattered stands of gorse and semi-natural grassland which continues up to the north-facing cliffs.

In summary, though the immediate habitat around the packing shed is limited, the mature gardens just beyond the development site provide foraging habitat for both species of bat, particularly Soprano pipistrelle which has shown to preferentially feed in and around small woodlands and watercourses[2,3,&4] as well as being able to utilise more built up areas, compared to Common pipistrelle[5]. The habitat remains favourable for up to a further 800m (particularly to the west), as both pipistrelle species are known to regularly utilise 'edge' habitats like hedgerows to both feed from and to commute to other feeding grounds[2,3&4]. Beyond this mosaic of small fields and hedgerows, the habitat connectivity for both species, particularly to the north, breaks down very quickly, as both species prefer not to utilise very open habitats[6]. However, it has been shown that Common pipistrelle will often exploit coastal habitats, particularly the strandline along beaches[7], a habitat which is present to the south of the proposed development and which could easily be reached utilising the hedgerow corridors.

3.1.4 Habitats within the application site

The packing shed is a detached property bounded to the south-west by a low granite dry-stone wall and clipped Pittosporum hedge (*Pittosporum tenuifolium*). The boundary to the south-east is a mature, overgrown hedge of Coprosma (*Coprosma repens*), which as it progresses to the north-east changes into an old fence that has become overgrown primarily by Bramble (*Rubus fruticosus*). The boundary to the north-west is a low granite dry-stone wall, which becomes overgrown and smothered by Bracken (*Pteridium aquilinum*). Immediately north-west of the packing shed is a single-storey, stone built outbuilding of the neighbouring property. Within the development footprint the vegetation particularly to the north-east, is dominated by a mixture of species that suggest deep soils and some nutrient enrichment including; Bracken, Three-cornered Leek (*Allium triquetum*), Cleavers (*Galium aparine*) and Ivy (*Hedera helix*). Of note, also found here were several specimens of the nationally scarce Balm-leaved Figwort (*Scrophularia scorodonia*).

The small patch of vegetation in the south-west/south-east corner were some composting had taken place was dominated by Nasturtium (*Tropaeolum sp.*). The granite stone base of the packing shed on its south-east aspect was covered primarily by Bramble and the occasional specimen of Valerian (*Valeriana officinalis*) and Intermediate Polypody (*Polypodium interjectum*).

In summary, the habitat within the development site is of limited ecological value, with the exception of Balm-leaved Figwort. Though there are not many species that may attract invertebrates which bats may prey upon, the surrounding hedgerows provide adequate shelter and hunting grounds, as well as providing a corridor to more optimal foraging areas to the west, east and south.

3.2 Preliminary Roost Assessment

3.2.1 External

The packing shed is a detached, two-storey open gable-ended, block-built concrete rendered building with a granite stone base (exposed on its lower south-eastern aspect). The roof has an approximate pitch of 17^0 with a north-west, south-east aspect. The roofing material consists of corrugated fibre cement sheets and capping tiles. The windows are a combination of single and double glazed units, with both wooden and upvc frames; 3 on its south-western aspect (2 single-glazed/wooden framed and 1 upvc double-glazed) and 2 on its south-eastern aspect (1 large single-glazed, wooden framed lattice window and 1 upvc double-glazed). On its north-west aspect there is a wooden-framed hatch, whilst on its north-east aspect is a wooden-framed wooden door into the building. On both the north-west and south-east aspects there is plastic guttering which is bolted onto what appears to be a wall plate which is in disrepair with several large areas of rot, as are several of the wooden window frames. There are no soffit, fascia or barge boards present.

The proposed development has several features potentially suitable for roosting bats, along with many features that may provide bats with access into the interior of the building including;

- Gap between the block-work and the wall plate due to the rotting away of the wooden frame at the south-west/south-east corner (see photo 2.)
- Gap into roof space on south-west aspect, due to rotting away of the 1^{st} batten above the eaves (see photo 3.)

- Gap between south-west gable end ridge tile and corrugated roof sheets (see photo 4.)
- Gap between the south-east aspect ground floor window and the render/block work (see photo 5 and 5a)
- Large crack in render and block work and gap between the rotten wall plate and block work at the eaves at north-eastern corner of the north-east aspect (see photo 6.)
- Gap between block work and render and 1st –floor floor joist above door on north-east aspect (see photo 7).
- Gap behind wall plate and block work, where water and power cables enter the eaves at the north-western corner of the north-east aspect (see photo 8.)
- Gaps between the north-east gable end ridge tile and corrugated roof sheet for approximately 2m (see photo 9).
- Gap in framework around 1st floor wooden hatch on the north-west aspect (see photo 10.)
- Gaps between wall plate and corrugated roof sheets where the guttering has come away at the eaves at the south-west corner of the north-west aspect (see photo 11.)

Photo 2. Gap between wall plate and block work

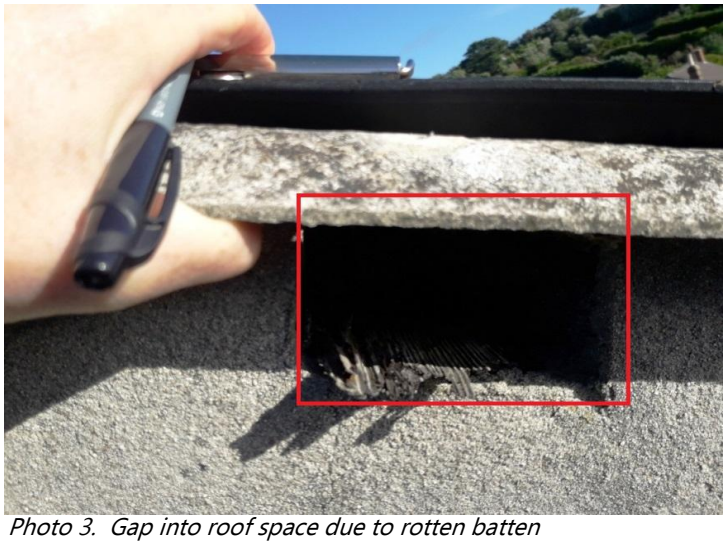

Photo 3. Gap into roof space due to rotten batten

Photo 4. Gap between ridge tile and roof sheet

Photo 5. Gap between window frame and block work

Photo 5a. close-up of gap between window frame and block work

Photo 6. Crack in render and gap behind wall plate

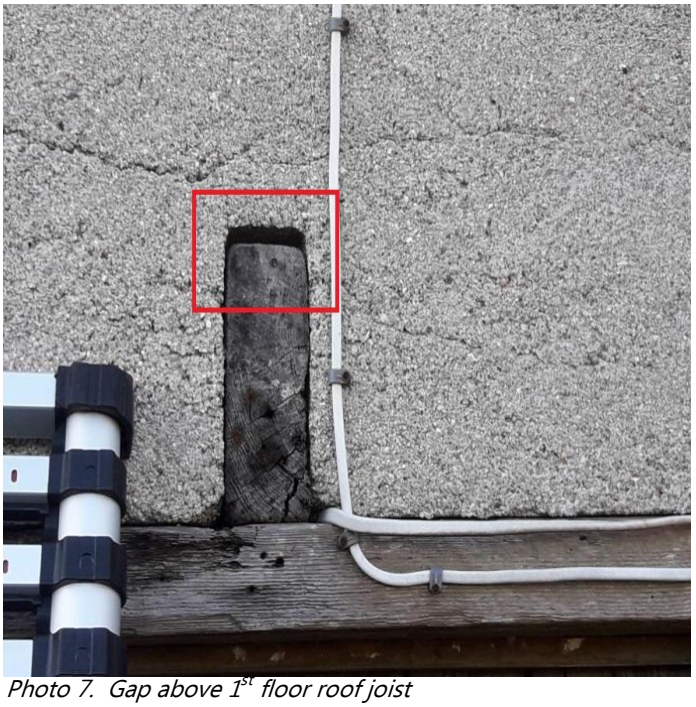

Photo 7. Gap above 1st floor roof joist

Photo 8. Gap behind wall plate for services

Photo 9. Gap between roof ridge tile and corrugated roof sheet

Photo 10. Gap in wooden surround of 1st floor hatch

Photo 11. Gaps between wall plate and corrugated roof sheets

3.2.2 Internal

Internally, the packing shed ground floor is open and used primarily for storage (see photo 12.). Along the north-west wall there is floor to ceiling shelving and in front of this a set of wooden stairs up to the 1st floor. Examination around the windows and on top of the stored items revealed no evidence of bat droppings. However, numerous Lesser white-toothed Shrew (*Crocidura suaveolens*) and House Mouse (*Mus musculus*) droppings were obvious, particularly along the damp south-west window sill and along the full length of the shelving on the north-west wall.

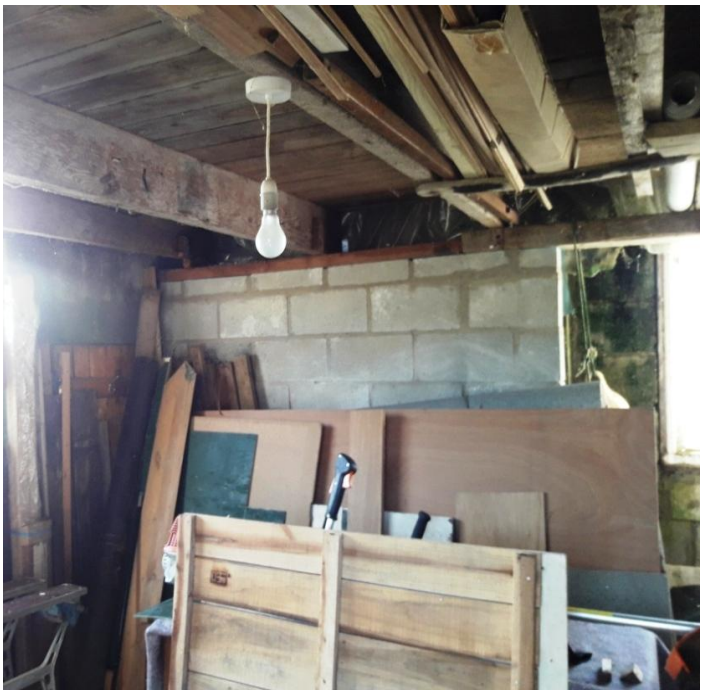

Photo 12. Open ground floor

Photo 13. 1st floor showing exposed roof sheets

The first floor was divided into two spaces; the first which encompasses the stairs and everything to the north-west (one third) reveals the roof-space fully, clearly showing the gaps between the wall plate and the corrugated roof sheets (see photo 13.). This small area is used for storage and examination of the tops of the boxes revealed several small droppings found in the north-east corner of the north-west aspect, below where the water pipe enters the building (see photo 14). The droppings were found on the top of a box adjacent to a wardrobe (see photos 15 and 15a). These were taken away for examination. The lengths of the droppings were 9mm long by 2mm wide. The texture when broken-up, was of a very fine consistency. These findings are consistent with droppings at the upper size range for a pipistrelle species of bat.

Photo 14. Location of where droppings were found

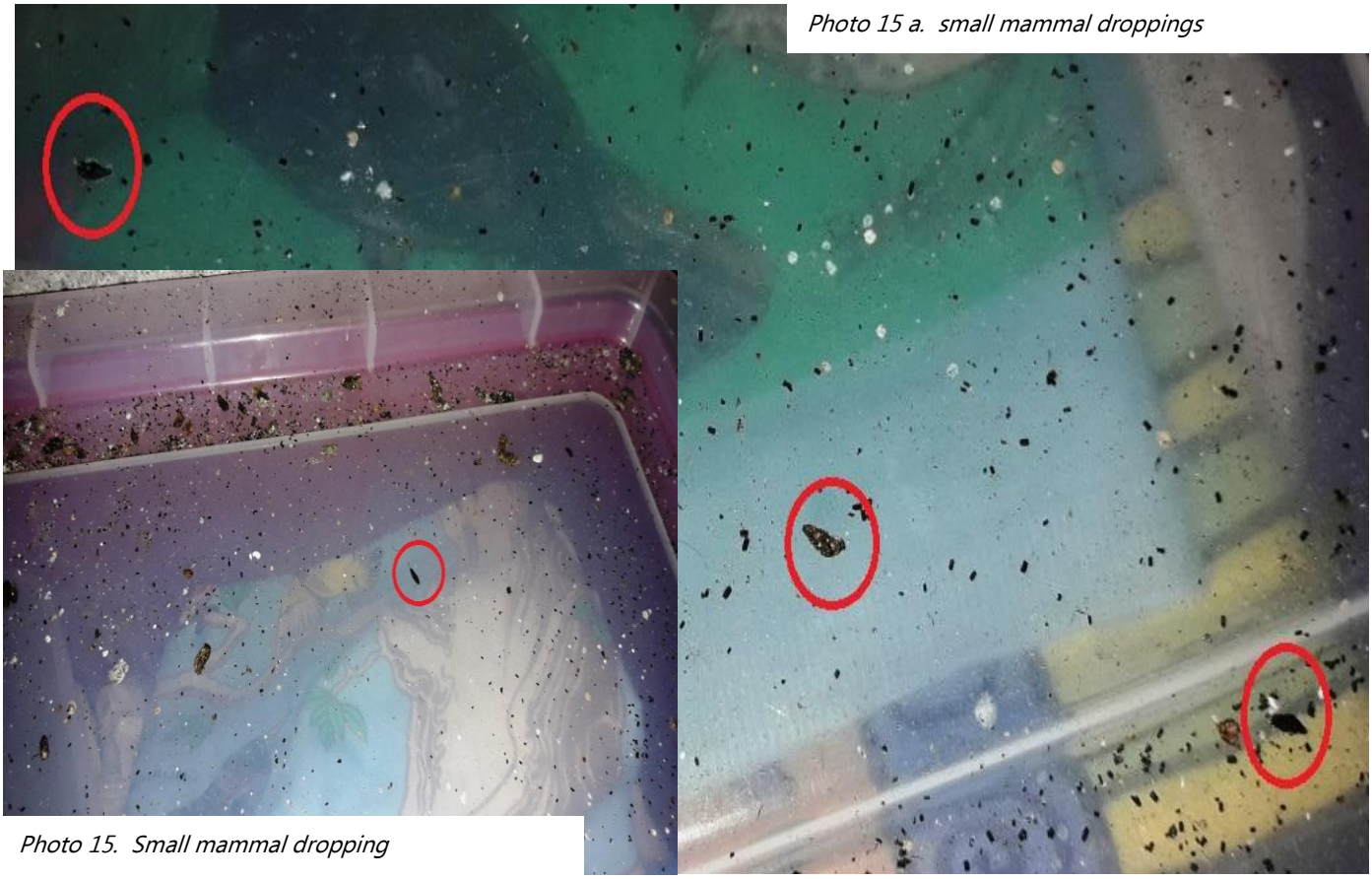

Photo 15 a. small mammal droppings

Photo 15. Small mammal dropping

Throughout the remaining open part of the 1st floor it was noted that there were many cobwebs, which by the amount of prey and dust that had accumulated in them had been present for some time (see photo 16.). On examination of the joints between the rafters and the battens of the close-coupled style roof no obvious claw marks or staining were present.

Entering the second space on the 1st floor revealed that the whole of this area was clad making an inspection of the remaining roof structure impossible (see photo 17.) Likewise, the wardrobe (as seen in photo 14.) prevented inspection of part of the north-east gable end. Inspection of the window sills, the tops of the stored items and floor of this room revealed no apparent evidence of bat activity.

Photo 16. Evidence of numerous cobwebs

Photo 17. Remaining two-thirds of the 1st floor

4. Assessment and recommendations (excluding bats)

4.1 Protected sites

The proposed development falls into the SSSI Impact Risk Zones of Plains and Great Bay and The Eastern Isles SSSIs. Impact zones are used in the assessment of planning applications for likely impacts on SSSI's, Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Ramsar Sites (England). However, the impact in this zone is for large-scale residential developments and therefore the development is not likely to impact on the surrounding SSSI.

4.2 Nesting birds

All wild birds are protected under the Wildlife and Countryside Act 1981 (as amended). Section 1 of this Act makes it an offence to kill, injure or take any wild bird, or intentionally to take damage or destroy the nest of any wild bird while that nest is in use or being built[8]. During this survey, no evidence was found of nests, or breeding birds. However, if works on the roof are to commence between the months of March and August inclusive, then the site would need to be checked first for nesting birds and, if any nests are found, works that would disturb the nest must be postponed until all young have fledged the nest and it is no longer in use.

4.3 Balm-leaved Figwort

The conservation status of Balm-leaved Figwort is classed as Nationally Scarce, found in only sixty eight 10km squares in Great Britain[9]. Presumed native in the Isles of Scilly, Cornwall, Devon and Dorset it is typically found in scrubby field margins, hedgebanks and waste ground. It is threatened through tidying up of such sites and from competition from species such as Cleavers and Common Nettle (*Urtica dioica*), which have developed due to nutrient enrichment. It is recommended that these specimens are dug up prior to development beginning, potted and maintained during the development and then re-planted under the Pittosporum hedgerow along the south-west boundary, once development is complete.

5. Assessment and recommendations (bats)

5.1 Survey constraints

The survey was undertaken at a time of year suitable for undertaking preliminary bat roost assessments. However, due to the cladding of two-thirds of the 1st floor, there was limited space to inspect a large proportion of the roof structure (internally).

5.2 Further survey requirements

The value of the shed for bats is considered to be 'moderate' (see Table 1). This assessment is based on the occurrence of the following features within or immediately adjacent to the site:

- Evidence of use due to the presence of droppings typical of a Pipistrelle species of bat.
- Several potential roost sites for a small number of bats
- The shed is surrounded by other developments with mature gardens, with a varied structure both in terms of height and the species present providing optimal foraging habitat immediately beyond the development site.
- The shed is connected to the west and east by established hedgerows that lead to either small enclosed fields with further hedgerows as boundaries, 2 small copses and a pond and strandline along the coast to the south. However, this habitat connectivity is limited to approximately 800m to the west and 730m to the east respectively. Pipistrelle species typically have a minimum foraging distance between .7km and 3km[2&10].

The packing shed has been used by bats, on the basis of the evidence found so far, it is considered most likely to have been a pipistrelle species (most likely Common Pipistrelle) used occasionally by one or two individual bats. The building also has potential to host further crevice-dwelling species of bat.

To confirm whether or not the packing shed continues to host roosting bats, further surveys (see section 5.3) carried out during the bat active season would need to be undertaken.

5.3 Presence or absence surveys

The Bat Conservation Trust's Bat Survey Guidelines[1] (referred to by Natural England in their advice to planning officers) state that buildings with 'moderate' bat suitability require two separate survey visits between May and September. These surveys should consist of one dusk emergence survey and a separate dawn re-entry survey a minimum of two weeks apart.

The surveys should take place in optimum weather conditions, in order to maximise the likelihood of recording bats, with dusk air temperatures exceeding 10^0C and not rain or strong wind.

Dusk emergence surveys should commence 15 minutes before sunset and continue for 1.5 – 2 hours after sunset. A pre-dawn re-entry survey should commence 1.5 – 2 hours before sunrise and continue until 15 minutes after sunrise.

Sufficient surveyors should be used on each survey so that all aspects of the building can be viewed at one time, therefore the building should be adequately surveyed by two surveyors. Surveyors should be positioned no more than 50m away from the buildings with an awareness of the likely exit/access points and potential roost locations. Each surveyor should be equipped with a bat detector and recording equipment and should count the number and species of bats and their activity in a defined area.

If no roosts are found during the presence or likely absence surveys then no further surveys would be required.

5.4 Mitigation

In order to comply with planning policy and wildlife legislation (both domestic and European) it will be necessary to ensure that following the development the "favourable conservation status" of bats will be maintained. This means that, where a roost will be lost, appropriate mitigation needs to be provided.

If roosts are found a detailed roost characterisation survey would be required to establish how bats use the roost, the intensity of use and what features and characteristics of the roost and the surroundings are important. The information gained would allow an accurate assessment of the potential impacts of the development on bats and inform the requirement of a European Protected Species Mitigation licence, to be considered and issued by Natural England prior to the works commencing.

If roosts are found then a data search will be required to support the European Protected Species Mitigation licence if an application is required. Information should be obtained in relation to bat roost sites or any sites of nature conservation importance designated for their bat interest within or near to the proposed development site. When requesting information a minimum search radius of 2km from the site should be applied.

6. Summary

The packing shed has been used by bats (on the basis of the evidence so far) and it may still be used by a pipistrelle species. The packing shed also has several features that potentially could roost a small number of crevice dwelling species of bat, along with good foraging habitat immediately surrounding the development site and up to 800m further afield. To assess whether bats roost in the building two surveys are recommended; one dusk emergence and one separate dawn re-entry survey carried out between May and September. If bats are found to be roosting in the dwelling then, the status of the roost(s) will need to be identified. Further surveys will then be required to inform a mitigation strategy which would need to be implemented.

Other than bats, if the recommendations given in this report regarding nesting birds and Balm-leaved Figwort are adhered to, there should be no further ecological constraints to the proposals.

7. Bibliography

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

2. Vaughan N, Jones G, Harris S (1997) *Habitat use by bats (Chiroptera) assessed by means of a broad-band acoustic method*. J Appl Ecol 34:716-730.

3. Russ JM, Montgomery WI (2002) *Habitat use associations of bats in Northern Ireland: implications for conservation*. Biol Conserv 108:49-58

4. Nicholls B, Racey PA (2006) *Habitat selection as a mechanism of resource partitioning in two cryptic bat species Pipistrellus pipistrellus and Pipistrellus pygmaeus*. Ecography, vol 29 (5) 697-708.

5. Lintott, P. eta. (2015). *Differential responses of cryptic bat species to the urban landscape.* Ecology and Evolution 6 (7). P2044-2052

6. Downs N, Racey PA (2006). *The use by bats of habitat features in mixed farmland in Scotland*. Acta Chiropterologica, vol 8:169-185.

7. Hough, T. (2015). *Coastal habitat use by bat species.* BSG Ecology

8. H.M.S.O. (1981). *The Wildlife and Countryside Act 1981* (as amended). London.

9. www.brc.ac.uk/plantatlas/plant/scrophularia-scorodonia

10. Nicholls, B. & Racey, P.A. (2006). *Contrasting home-range size and spatial partitioning in cryptic sympatric pipistrelle bats.* Behav. Ecol. Sociobiol. 61: p131-142