



**DARWIN ECOLOGY**  
integrating nature conservation

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## **Bat Emergence/Re-entry Surveys and Mitigation Report**

18 Parkside Road  
Reading  
Berkshire  
RG30 2DB

October 2021

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| The information which we 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. |                                               |          |
| Prepared by                                                                                                                                                                                                        | Assistant Ecologist Jessie Forster BSc (Hons) | 11.10.21 |
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| Issue Number                                                                                                                                                                                                       | V1                                            |          |
| This report remains valid for 12 months from date of issue.                                                                                                                                                        |                                               |          |
| Survey data are valid for 12-18 months from the date the survey was undertaken.                                                                                                                                    |                                               |          |

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Whilst every effort has been made to guarantee the accuracy of this report, it should be noted that living creatures are capable of migration and whilst protected species may not have been located during the survey duration, their presence may be found on site at a later date.

The views and opinions contained within the document are based on a reasonable timeframe between the completion of the survey and the commencement of any works. If there is any delay between the commencement of works that may conflict with timeframes laid out within this document, or have the potential to allow the ingress of protected species, a suitably qualified ecologist should be consulted.

It is the duty of care of the landowner/developer to act responsibly and comply with current environmental legislation if protected species are suspected or found prior to works.

## 1. EXECUTIVE SUMMARY

- 1.1. Darwin Ecology Ltd. was commissioned by Mr E Mather of Colony Architects Ltd to undertake Phase 2 emergence / re-entry surveys at 18 Parkside Road, Reading, RG30 2DB<sup>1</sup>. The surveys were required to support a planning application for the demolition of existing buildings and construction of a block of 10 residential units.
- 1.2. A High Level Inspection conducted by Darwin Ecology in October 2020 confirmed that 18 Parkside Road supports a low level roost for soprano pipistrelle *Pipistrellus pygmaeus* bats, however, no bats were recorded emerging from the building during surveys in the 2021 activity season. It is therefore considered likely that the building is used as an occasional low level day roost for this species, as no higher level roosts have been identified.
- 1.3. The proposed plans show the works will directly impact confirmed roosts for soprano pipistrelle bats and have the potential to disturbance bats in their roosts, therefore registration under the Bat Mitigation Class Licence (BMCL) will be required.
- 1.4. Mitigation and compensatory measures to ensure the Favourable Conservation Status (FCS) of bats is maintained will include:
  - Appropriate timing of works;
  - Education of contractors on protection afforded to bats through a Tool Box Talk;
  - Ecological supervision and soft strip of features suitable for use by bats by hand and using hand tools prior to the rest of the building works;
  - Provision of 2 x Schwegler 1FN bat boxes for use as safe release sites, installed in a location determined by a licensed bat ecologist to ensure likelihood of uptake is increased;
  - Compensation features will include 4 x lifted tile features and 2 x ridge tile crevice features to provide roosting opportunities for crevice dwelling species such as pipistrelles to compensate for the loss of both confirmed roosts and potential roosting opportunities at features on the building;
  - Type 1F bitumen roofing felt will be used at areas where bats may gain access; and
  - Any new external lighting will be fitted with downward facing baffles and will be directed to avoid light spillage.
- 1.5. Recommendations for enhancements have also been made to enhance the site for wildlife and work towards biodiversity net gain objectives. These include further ridge tile crevice features, integrated bat boxes, a cavity wall crevice void, swift bricks, bee bricks, hedgehog gaps and a wildlife beneficial landscaping scheme.

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<sup>1</sup> Grid reference - SU 69636 72762

## 2. INTRODUCTION AND BACKGROUND

- 2.1. Darwin Ecology Ltd. was commissioned by Mr E Mather of Colony Architects Ltd to undertake Phase 2 emergence / re-entry surveys at 18 Parkside Road, Reading, RG30 2DB<sup>2</sup>. The surveys were required to support a planning application for the demolition of existing buildings and construction of a block of 10 residential units.
- 2.2. A Preliminary Roost Assessment (PRA) was carried out by Darwin Ecology in 2019, with an update PRA and High Level Inspection was carried out by Darwin Ecology in October 2020. The subsequent report was amended to reflect updated plans in March 2021 and August 2021. Soprano pipistrelle droppings were recorded beneath hanging tiles in three locations during the High Level Inspection, confirming the building as a roost for this species.
- 2.3. The proposed drawings on which this assessment is based are provided at Appendix 1, Proposed Plans.

### Site Overview

- 2.4. The site is in the residential area of Southcote at the western side of the town of Reading, immediately surrounded by similar residential properties with associated gardens
- 2.5. The site comprises a two storey residential house, associated outbuildings and garden. . Parkside Road runs along the western boundary and Westcote Road runs along the northern boundary (see Figure 1).
- 2.6. The wider landscape comprises urban areas of Reading, with potential flight lines leading from the property to nearby deciduous woodland, although these may be significantly compromised and fragmented by light pollution from urban street lighting. Surrounding Reading, the landscape comprises pastoral and agricultural fields, deciduous woodlands, wood pasture and parkland, coastal and floodplain grazing marsh (see Figure 2).

### Scope of Report

- 2.7. The aim of this report is to:
- Determine the presence/absence of bats in the building(s) within the site;
  - Classify the roost type identified (e.g.day roost, maternity roost etc);
  - Carry out an impact assessment of the proposed works and how they will directly / indirectly affects the identified bat roost(s);
  - Outline the relevant legislation and protection afforded to bats; and
  - Provide avoidance, compensation, mitigation and enhancement measures recommended to avoid harm/injury to roosting bats.

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<sup>2</sup> Grid reference - SU 69636 72762



**Figure 1:** Site location within the local landscape (Copyright Google Maps, 2021)



**Figure 2:** Site location within the wider landscape (Copyright Google Maps, 2021)

### 3. LEGISLATION & POLICY

#### Bat Legislation

- 3.1. In England and Wales, all bat species and their roosts are legally protected under the European *Habitats Directive (1992)*; the *Conservation of Habitats and Species Regulations (2017)*; the *Wildlife and Countryside Act (1981) (as amended)*; the *Countryside and Rights of Way Act, 2000*; and the *Natural Environment and Rural Communities Act (NERC, 2006)*.
- 3.2. Barbastelle (*Barbastella barbastellus*), Bechstein's (*Myotis bechsteinii*), greater horseshoe (*Rhinolophus ferrumequinum*), lesser horseshoe (*Rhinolophus hipposideros*), brown long-eared, soprano pipistrelle (*Pipistrellus pygmaeus*), and noctule (*Nyctalus noctula*) bats are all species of principal importance in England under *Section 41 of the Natural Environment and Rural Communities Act 2006*.
- 3.3. You will be committing a criminal offence if you:
  - Deliberately capture, injure or kill a bat;
  - Intentionally or recklessly disturb a bat in its roost or deliberately disturb a group of bats;
  - Damage or destroy a bat roosting place (even if bats are not occupying the roost at the time);
  - Possess or advertise/sell/exchange a bat (dead or alive) or any part of a bat; or
  - Intentionally or recklessly obstruct access to a bat roost.
- 3.4. The government's statutory conservation advisory organisation, Natural England, is responsible for administering EPS licenses that permit activities that would otherwise lead to an offence.
- 3.5. A licence can be obtained if the following three tests have been met:
  - Regulation 53(9)(a) - there is "no satisfactory alternative" to the derogation, and;
  - Regulation 53(9)(b) - the derogation "will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range" and;
  - Regulation 53(2)(e) - the derogation is for the purposes of "preserving public health or public safety or other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment".

## National Planning Policy

- 3.1. The *National Planning Policy Framework (2021)* aims to minimise impacts on biodiversity and provide net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity. Chapter 15 'Conserving and enhancing the natural environment' details what local planning policies should seek to consider with regard to planning applications.
- 3.2. Planning policies and decisions should contribute to and enhance the natural and local environment by:

174 a) Protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);

174 b) Recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;

174 d) Minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;

175) Plans should: distinguish between the hierarchy of international, national and local designated sites; allocate land with the least environmental or amenity value, where consistent with other policies in this Framework; take a strategic approach to maintaining and enhancing networks of habitats and green infrastructure; and plan for the enhancement of natural capital at a catchment or landscape scale across local authority boundaries;

176) Great weight should be given to conserving and enhancing landscape and scenic beauty in National Parks, the Broads and Areas of Outstanding Natural beauty which have the highest status of protection in relation to these issues. The conservation and enhancement of wildlife and cultural heritage are also important considerations in these areas, and should be given great weight in National Parks and Broads. The scale and extent of development within all these designated areas should be limited, while development within their settings should be sensitively located and designed to avoid or minimize adverse impacts on the designated area.

4. Specific policies regarding habitats and biodiversity comprise:

179) To protect and enhance biodiversity and geodiversity, plans should:

- a) identify, map and safeguard components of local wildlife-rich habitats and wider ecological networks, including the hierarchy of international, national and locally designated sites of importance for biodiversity, wildlife corridors and stepping stones that connect them; and areas identified by national and local partnerships for habitat management, enhancement, restoration or creation and
- b) promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species and identify and pursue opportunities for securing measurable net gains for biodiversity.

180) When determining planning applications, local planning authorities should apply the following principles:

- a) if significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;
- b) development on land within or outside of Sites of Special Scientific Interest, and which is likely to have an adverse effect on it (either individually or in combination with other developments), should not normally be permitted. The only exception is where the benefits of the development in the location proposed clearly outweigh both its likely impact on the feature of the site that make it of special scientific interest, and any broader impacts on the national network of Sites of Special Scientific Interest;
- c) development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists; and
- d) development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to improve biodiversity in and around development should be integrated as part of their design, especially where this can secure measurable net gains for biodiversity or enhance public access to nature where this is appropriate.

## Local Planning Policy

- 4.1. The local planning policy for the site is the *Reading Borough Local Plan (2019)*, with relevant policies comprising:

*Policy EN12: Biodiversity and the Green Network.* This states “On all sites, development should not result in a net loss of biodiversity and geodiversity, and should provide a net gain for biodiversity wherever possible. In exceptional circumstances where the need for development clearly outweighs the need to protect the value of the site, and it is demonstrated that the impacts cannot be: 1) avoided; 2) mitigated or; 3) compensated for on-site; then new development will provide off-site compensation to ensure that there is “no net loss” of biodiversity. Provision of off-site compensation shall be calculated in accordance with nationally or locally recognised guidance and metrics. It should not replace existing alternative habitats, and should be provided prior to development.”

- 4.2. The local biodiversity action plan relevant to the site is Reading Biodiversity Action Plan. It aims to set out a long-term strategy for biodiversity conservation within Reading and provide a series of objectives and actions for achieving successful conservation of habitats and species across the county.

## Reading Biodiversity Action Plan

- 4.3. The *Reading Biodiversity Action Plan*, produced in March 2021, is an overall framework for conserving biodiversity, within Reading. The BAP contains a number of objectives for biodiversity, together with actions to deliver those objectives.
- 4.4. Section 8 of the *Reading Biodiversity Action Plan* details the ‘Themes for Action’, which include:
- *C1 To continue to assess all planning applications for their ecological impacts.*
  - *C2 To ensure that new development results in measurable net gain in biodiversity units.*
  - *C3 To monitor landscaping and the provision of ecological enhancements.*
  - *J1 To undertake works to benefit priority species.*

## 5. METHODOLOGY

### Phase 2 Bat Surveys

- 5.1. Two dusk emergence surveys and a dawn re-entry survey were conducted during the 2021 survey season. Surveys were undertaken in line with Bat Conservation Trust (BCT) Good Practice Guidelines (2016), with any limitations outlined below.
- 5.2. The surveys were conducted by the following surveyors:
  - Becca Oswin BSc (Hons)<sup>3</sup>;
  - Jessie Forster BSc (Hons);
  - Alex Chapman; and
  - Lucy Walker.
- 5.3. Surveyors were positioned strategically around the building(s) in order to provide adequate coverage of all elevations. Surveyors focused on any features identified during the PRA as having potential to be used as bat access points. The location of the surveyors are shown on Figure 3, Bat Survey Results.
- 5.4. Dusk surveys began 15 minutes prior to sunset and lasted 1.5 hours after sunset. Dawn surveys began 1.5 hours before sunrise. Surveyors recorded bat activity using hand-held Echometer Touch detectors connected to Android or iPhone devices. Analysis of recordings was undertaken after the surveys to confirm species identification. Observations recorded during surveys included bat access points, bat species, time, and type of activity (e.g. emergence, re-entry, commuting, foraging, etc.). Incidental records of bats within the vicinity of the building (but not necessarily roosting) were also recorded.
- 5.5. A Canon AX20 video camera and Black Sun 2 B502 infra-red illuminator were also used to film bat activity at a fixed position, covering an aspect of the building not visible to the surveyors. The video footage was reviewed following the survey to identify any bat activity captured and any significant activity patterns and access points were identified and recorded.
- 5.6. A summary of the survey dates and weather conditions are provided in Table 1.

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<sup>3</sup>CL18 (Class License - Level 2) No. 2017-28780-CLS-CLS

**Table 1:** Emergence and re-entry survey dates and weather conditions

| Date    | Survey type | Temp at start (°C) | Sunset/sunrise time | Weather conditions                                                     |
|---------|-------------|--------------------|---------------------|------------------------------------------------------------------------|
| 9/8/21  | Dusk        | 16                 | 20:37               | Light rain with heavy shower at end of survey, wind 1, cloud cover 80% |
| 25/8/21 | Dusk        | 16                 | 20:05               | Dry, wind 1, cloud cover 50%                                           |
| 8/9/21  | Dawn        | 16                 | 6:27                | Dry, wind 0, cloud cover 0%                                            |

### Evaluating Bat Roosts

- 5.7. The value of the bat roosts on site was assessed in accordance with the article published in the Chartered Institute of Ecology and Environmental Management (CIEEM), In Practice Magazine - *Valuing Bats in Ecological Impact Assessment* (Wray, *et al.*, 2010).
- 5.8. Roosts are assigned a relative ecological value based on the rarity of the species (Table 1) and categorisation of roost type (Table 2), informed by survey results. Once a value has been calculated, robust mitigation for any impacts identified from the proposed development can be determined.

**Table 2:** Categorising bat species by distribution and rarity

| Rarest                                                                                                | Rare                                                                                                                                 | Common                                                        |
|-------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|
| Greater horseshoe<br>Bechstein's<br>Alcahioe<br>Greater mouse-eared<br>Grey long-eared<br>Barbastelle | Lesser horseshoe<br>Whiskered<br>Brandt's<br>Daubenton's<br>Natterer's<br>Leisler's<br>Noctule<br>Nathusius' pipistrelle<br>Serotine | Common pipistrelle<br>Soprano pipistrelle<br>Brown long-eared |

**Table 3:** Valuing bat roosts

| <b>Geographic Frame of Reference</b> | <b>Roost Type</b>                                                                                                                                                                                                                                |
|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| District, Local or Parish            | Feeding perches (common species)<br>Individual bats (common species)<br>Small numbers of non-breeding bats (common species)<br>Mating sites (common species)                                                                                     |
| County                               | Maternity sites (common species)<br>Small number of hibernating bats (common and rarer species)<br>Feeding perches (rarer/rarest species)<br>Individual bats (rarer/rarest species)<br>Small numbers of non-breeding bats (rarer/rarest species) |
| Regional                             | Mating sites(rarer/rarest species) including well-used swarming sites<br>Maternity roosts (rarer species)<br>Hibernation sites (rarest species)<br>Significant hibernation sites for rarer/rarest species or all species assemblages             |
| National/UK                          | Maternity sites (rarest species)<br>Sites meeting Sites of Special Scientific Interest (SSSI) guidelines                                                                                                                                         |
| International                        | Special Areas of conservation (SAC) sites                                                                                                                                                                                                        |

### Limitations

- 5.9. The surveys were generally undertaken in accordance with the best practice guidelines within the peak bat activity period (May to September inclusive). The results are therefore considered to be an accurate representation of the general use of the building(s) by roosting bats.
- 5.10. Nevertheless, bats may use roosting features intermittently throughout the year and may be present in larger or smaller numbers depending on their breeding cycle, weather conditions and in response to disturbance. Bats may be present at other times of the year and the results in this report should therefore be viewed in the context intended.
- 5.11. There was intermittent light rain during the dusk survey on 9th August, with a heavier rain shower in the last ten minutes, however, as bat activity recorded on site during this survey

is consistent with the remaining surveys (which were conducted during good weather), this is not considered to have had a significant impact on the data collected.

## 6. SURVEY RESULTS

- 6.1. No bats were recorded emerging from the building, however, a soprano pipistrelle was observed passing close to the southern ridge of the building during the first dusk survey, and swarming behaviour by soprano pipistrelles was recorded around the southern gable during the dawn survey (Figure 3). A soprano pipistrelle was observed entering the building of the adjacent property to the south of the site during the dawn survey. Moderate levels of foraging activity by soprano pipistrelles were recorded around the building and in the garden, and a single pass of a common pipistrelle was recorded.

**Table 4:** 9/8/21 - Dusk Survey

| Timing                                                                                                                                                                                                                                                                   | Species                | Roost type | No. of bats | Structure | Location on structure | Roost description |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|------------|-------------|-----------|-----------------------|-------------------|
| Start: 20:22<br><br>Sunset: 20:37<br><br>End: 22:07                                                                                                                                                                                                                      | No emergences recorded |            |             |           |                       |                   |
| <b>Observations:</b> Occasional foraging by soprano pipistrelle in the garden, with one bat pass close to the ridge of the building. Single pass of common pipistrelle. Light showers approximately 1 hr after sunset, with heavier shower 10 mins before end of survey. |                        |            |             |           |                       |                   |

**Table 5:** 25/8/21 - Dusk Survey

| Timing                                                                                           | Species                | Roost type | No. of bats | Structure | Location on structure | Roost description |
|--------------------------------------------------------------------------------------------------|------------------------|------------|-------------|-----------|-----------------------|-------------------|
| Start: 19:50<br><br>Sunset: 20:05<br><br>End: 21:35                                              | No emergences recorded |            |             |           |                       |                   |
| <b>Observations:</b> Occasional foraging of soprano pipistrelle bats, no other species recorded. |                        |            |             |           |                       |                   |

**Table 6:** 8/9/21 - Dawn Survey

| Timing                                                                                                                                                                                                                                                                                               | Species                | Roost type | No. of bats | Structure | Location on structure | Roost description |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|------------|-------------|-----------|-----------------------|-------------------|
| Start: 04:57<br>Sunrise: 06:27<br>End: 06:30                                                                                                                                                                                                                                                         | No re-entries recorded |            |             |           |                       |                   |
| <b>Observations:</b> Moderate levels of foraging activity by at least 3 soprano pipistrelles, some passes close to the building at the southern gable (indicative of swarming behaviour) approximately 30 mins before sunrise. Soprano pipistrelle observed entering adjacent property to the south. |                        |            |             |           |                       |                   |



\*NOTE Areas are indicative and are not shown to exact scale.

— Site Boundary

● Surveyor positions

■ Building Surveyed

→ Flight paths of soprano pipistrelle bats on site



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**Project:** 18 Parkside Road,  
RG30 2DB

**Figure 3:** Emergence/Re-entry  
Survey Results

**Date:** October 2021

## 7. DISCUSSION, RECOMMENDATIONS AND MITIGATION

### Bats

#### *Evaluation of Bat Roosts on Site*

- 7.1. The High Level Inspection conducted by Darwin Ecology in October 2020 confirmed 18 Parkside Road supports a low level roost for soprano pipistrelle bats (see Appendix 4 for High Level Inspection Results, October 2020), however, no bats were recorded emerging from the building during the surveys in the 2021 activity season. It is therefore considered likely that the building is used as an occasional low level day roost for this species, as no higher level roosts have been identified.
- 7.2. See Table 7 for value of each roost in accordance with Wrey *et al.*, 2010. Impact of works.

**Table 7:** Value of bat roosts at 18 Parkside Road

| Species             | Rarity | Roost Type                         | Value |
|---------------------|--------|------------------------------------|-------|
| Soprano pipistrelle | Common | Small numbers of non-breeding bats | Local |

#### *Impact of Works*

- 7.3. The proposed plans at 18 Parkside Road comprise the demolition of the existing building, which will result in the destruction of the roosts identified.
- 7.4. Potential impacts to bats at 18 Parkside Road therefore include destruction of a roosting site, with potential for disturbance, injury or killing of bats in their roosts during works. Without mitigation the works will result in an offence under the *Conservation of Habitats and Species Regulations (2017)*.
- 7.5. The submission of a mitigation and compensation strategy will be necessary to permit the proposed works. The mitigation strategy provides details of the mitigation measures to minimise the risk of killing or injury of individual bats during the works process. The compensation strategy demonstrates that compensatory roosts will be provided to replace the roosting opportunities present at the existing building, which will be lost.

#### *Mitigation*

- 7.6. In line with the Bat Mitigation Guidelines (Mitchell-Jones, 2004) the roost is of **low** conservation status. Therefore the mitigation will require minimal timing constraints and monitoring requirements. Compensation need not be exactly like-for-like, but should be suitable, based on species' requirements and an appropriate licence is required.
- 7.7. Due to the number of species / roosts present registration under the Bat Mitigation Class Licence (BMCL) is the appropriate licensing route.

- 7.8. *Registration Under BMCL:* Registration of the site can be submitted following planning approval by the Local Planning Authority (LPA) and the registration must be granted prior to any works commencing on site with potential to impact bats or their roosts. Whilst Natural England aim to provide licensing decisions within 10 working days, processing times may extend to 15 working days.
- 7.9. Under the BMCL, registered consultants can register a site, which permits the disturbance and / or capture of bats and / or damage / destruction of bat roost(s) of low conservation significance. Sites may be registered under the BMCL where there are:
- No more than three common species of bat;
  - Only individual or small numbers of bats of each species; and
  - No more than three roosts in total across all structures at the site.
- 7.10. Please note that such licences will only be granted where it can be shown that there will be no detriment to the species of bat concerned. As such, suitable mitigation measures are will still be required. Mitigation measures will be proportionate to the level of use by bats on site and to the species roosting on site. Mitigation will include measures to ensure that bats are not harmed during the proposed works and to ensure that there is long-term provision of roosting opportunities on site. Input from a registered consultant (or their accredited agent) will be required during licensable activities at the site (such as roof removal).
- 7.11. *Timing of Works:* As the roosts present are occasional day roosts (i.e. not maternity roosts), works may occur between March and October inclusive. Works between November and February should be avoided wherever possible as this is the winter hibernation period and bats are sensitive to disturbance at this time. The ideal period for works is during either the spring or autumn transitional periods (March / August and September / October / November respectively).
- 7.12. *Toolbox Talk:* Before commencing any work on site, all contractors will be inducted by a licensed bat ecologist or accredited agent in a Toolbox Talk, to ensure they are aware of the risks to wildlife, and particularly the presence of bat roosts, their legal protection and the working practices required to avoid harming bats and other species in order to ensure works follow legal requirements.
- 7.13. *Ecological Supervision:* Immediately prior to any works on site, the buildings must be subject to an internal and external survey by a suitably qualified and licensed bat ecologist to ensure as far as possible that no bats are present. In addition, hand removal / soft strip of all features suitable for use by bats must be done very cautiously and under supervision by a bat licensed ecologist.
- 7.14. *Alternative Roost Provision:* To provide safe release sites for any bats found during works, 2 x Schwegler 1FN bat boxes will be installed at mature trees within the site. The location of

the boxes will be determined by a licensed bat ecologist to ensure the likelihood of uptake is increased. Bat boxes will be installed at a height of between 4 - 10 m, preferably on a sheltered, southern, un-cluttered aspect with good connectivity to linear features such as other mature trees and hedgerows. The boxes must be installed prior to the works commencing to ensure that roosting opportunities are available on site at all times during and post-development.

- 7.15. *Roofing Membrane:* **NO breathable roofing membrane will be permissible in any part of the building that may be used by bats.** Type 1F bitumen roofing felt must be used at areas where bats may gain access (to be discussed with licensed ecologist but generally including features such as traditional clay-tiled roofs, verges, ridges, chimney bases, dormer windows, etc.) or where specific bat roosting features are created, as breathable roofing membranes are proven to create a lethal entanglement hazard to bats. Any deviation from use of Type 1F bitumen roofing felt must be discussed and approved in advance by a licensed ecologist. Mitigation solutions can sometimes be found where optimal ventilation is required (for example, where the proposed works include the conversion of loft voids into habitable spaces).
- 7.16. *Timber Treatment:* Any use of timber-treatment or pest control treatment must be selected from the approved lists for safe use in or near bat roosts which can be provided on request.
- 7.17. *Lighting:* Any new external lighting must not illuminate bat access points and must be directed to avoid light spillage onto vegetation, particularly linear habitat features such as the gardens and hedgerows at the east of the site. Bats are sensitive to light and could potentially avoid the area if access points or the surrounding areas become lit. Minimising the periods of lighting and using motion sensors is strongly recommended, using a short timer to reduce the duration of lighting and reduce disturbance to bats. It is important to direct the light only where it is needed and avoid light spillage onto vegetated margins. Upward lighting can be minimised by fitting lights with downward facing baffles to avoid light pollution. Preventing light spillage above an angle of 70 degrees can be achieved by using fixtures that shield the bulb and direct the light downward. Warm white LEDs are less harmful to bats than bright white LEDs. If appropriate measures are taken to reduce light spillage from the development, it is likely that there will be no negative impacts on local bat populations.
- 7.18. See Appendix 2 for further information on designing lighting to minimise impacts on bats.
- 7.19. *Habitats:* The proposals do not result in significant loss of foraging habitat for bats, however, a wildlife friendly landscaping scheme is recommended to enhance the site for bats and other wildlife.

### *Compensation*

- 7.20. To provide compensatory roosting opportunities for soprano pipistrelle bats, 4 x lifted tile features and 2 x ridge tile crevice features will be installed in suitable locations on the new building (see Figure 4 and Appendix 5 for further details). Ridge tile crevice features require a wet ridge and work best incorporated into clay tile pitches. Should alternative materials be proposed the crevice feature design may require modification, which will be designed and approved by a suitably qualified and bat licensed ecologist. Type 1F bitumen roofing felt must be used in areas where bat roosting features are created.
- 7.21. These will provide suitable alternative roosting opportunities to compensate for the loss of both confirmed roosts and potential roosting opportunities at features on the building.

## **8. ENHANCEMENT RECOMMENDATIONS**

- 8.1. National planning policy states that all developments should seek to enhance onsite biodiversity whether impacts on protected species are recorded or not. Incorporating enhancement features into new or renovated buildings should be carefully considered. These features can be simple and inexpensive, please see below for specific recommendations.
- 8.2. In order to work towards biodiversity net gain objectives, enhancement features will be incorporated into the new building and elsewhere on site (Figure 4). Specific recommendations to enhance the site for wildlife are detailed below.

### **Bats**

- 8.3. A further 2 x ridge tile crevice features and 2 x Habibat or Schwegler 1FR integrated bat box will be installed in order to provide additional roosting opportunities for bats within the local landscape.
- 8.4. In addition, to provide a maternity-level roosting feature for soprano pipistrelle bats, a cavity wall crevice void will be installed at the apex of the west facing gable end of the new building (Figure 4). A Habibat or Schwegler 1FR integrated bat box with rear access point into an enclosed wall cavity space, a gable end access feature, ridge tile access feature and a barge board access feature will be incorporated to provide multiple access points to the cavity wall and varied crevice roosting opportunities. This is a bespoke design developed by Darwin Ecology Ltd. Multiple access points and varied internal conditions increase the chances of uptake and development of a large colony.

### **Birds**

- 8.5. 2 x Green & Blue Swift Block integrated swift boxes will be installed in the new building. These should be fitted on a side of the building that gets some shade during the day, to give protection from heat, but not over windows or near to vents. Boxes should be sited at least 5 m above ground, with clear adjacent airspace so the birds can access it in high-speed direct flight.

### **Invertebrates**

- 8.6. To enhance the site for invertebrates, 2 x bee bricks will be integrated within the new building. These should be located in a sunny south-facing location, at least 1 m above ground level.

### **Hedgehogs**

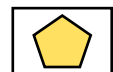
- 8.7. Any new walls or fence lines will include wildlife access holes so that species such as hedgehogs can freely access/exit the site. 13cm by 13cm is sufficient for hedgehogs.

**Wildlife Beneficial Landscaping Scheme**

- 8.8. Wildlife friendly landscape planting seeks to enhance biodiversity, improve connectivity to the surrounding habitats and provide food and shelter for a wide range of wildlife. All amenity planting and formally landscaped areas should be designed using a variety of plant species beneficial for wildlife. These do not necessarily have to be native but should be chosen for their ability to provide nectar or fruit and should be non-invasive species. There are a number of specialist seed mixes available specific to certain soil types, growing conditions and designed to benefit different groups of species such as bees or butterflies and moths.
- 8.9. All habitats should be managed in a suitable way to encourage a wide variety of insects and other wildlife to use the site.
- 8.10. Further information regarding habitat creation, enhancement and management can be provided on request.

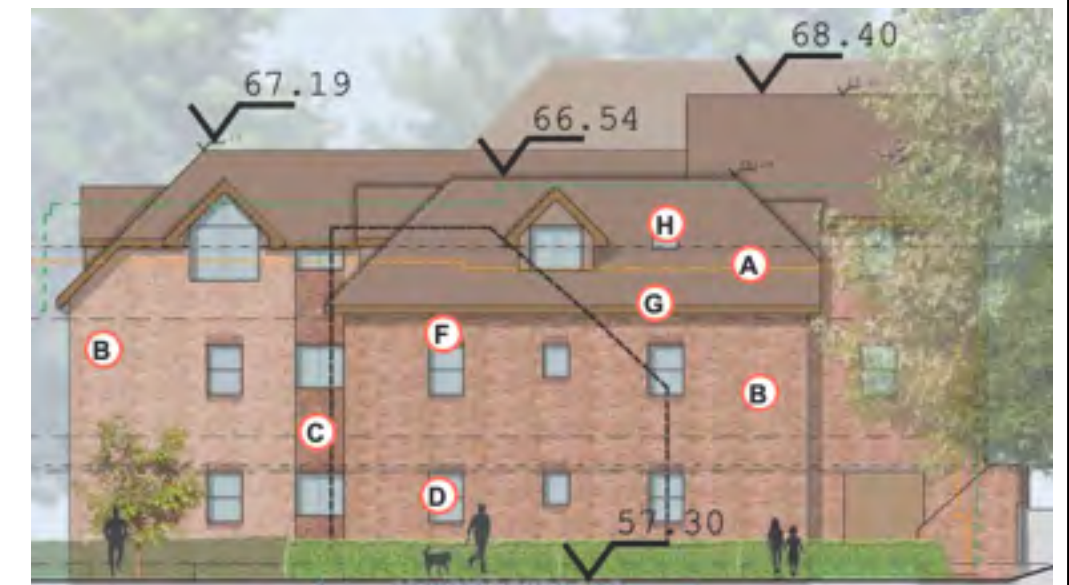


\*NOTE Areas are indicative and are not shown to exact scale.



2 x Habitat or Schwegler 1FR  
integrated bat box or similar

2 x Schwegler 1FD bat boxes



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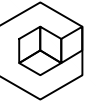
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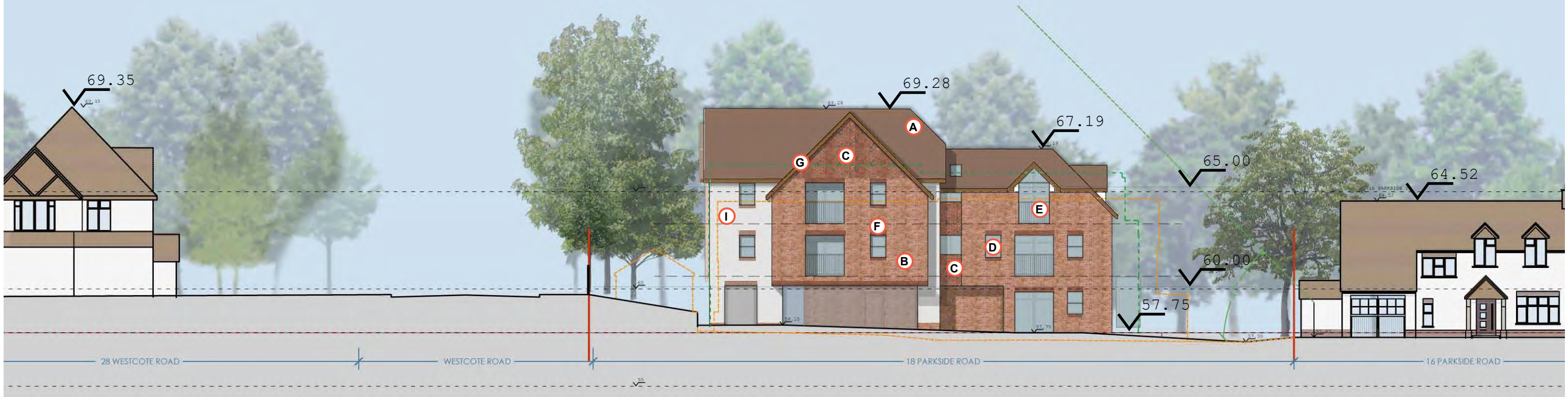
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Proposed site plan

|                                                |  |  |                                                                                   |  |  |                                                                                                                         |  |  |
|------------------------------------------------|--|--|-----------------------------------------------------------------------------------|--|--|-------------------------------------------------------------------------------------------------------------------------|--|--|
| 01 APPLICATION BOUNDARY - RED LINE             |  |  | A SOUTH FACING PV ON ROOF                                                         |  |  | K PROPOSED STAIRS                                                                                                       |  |  |
| 02 EXISTING BUILDING OUTLINE - DASHED ORANGE   |  |  | B PERMEABLE PAVING                                                                |  |  | L ACCESS WAY TO UNDERCROFT AND BUILDING ENTRANCE                                                                        |  |  |
| 03 PREVIOUS APPLICATION FOOTPRINT - DASHED RED |  |  | C GRASSED AMENITY AREAS                                                           |  |  | M TARMAC DRIVE                                                                                                          |  |  |
|                                                |  |  | D LOCKABLE CYCLE STORAGE FOR GROUND FLOOR FLATS                                   |  |  | N SEATING AREAS                                                                                                         |  |  |
|                                                |  |  | E PRIVATE DECKED AMENITY AREAS                                                    |  |  | O EXISTING LANDSCAPING - TO BE IMPROVED WITH APPROPRIATE ADDITIONAL PLANTING                                            |  |  |
|                                                |  |  | F ADDITIONAL SCREENING TO BOUNDARIES - SEE LANDSCAPE INTENT PLAN FOR MORE DETAILS |  |  |                                                                                                                         |  |  |
|                                                |  |  | G RETAINED TREES- SEE ARBORICULTURAL SURVEY & REPORT                              |  |  |                                                                                                                         |  |  |
|                                                |  |  | H OFF SITE TREES- SEE ARBORICULTURAL SURVEY & REPORT                              |  |  |                                                                                                                         |  |  |
|                                                |  |  | I PARKING SPACES - PERMEABLE HERRINGBONE PAVEMENTS                                |  |  |                                                                                                                         |  |  |
|                                                |  |  | J PROPOSED PEDESTRIAN GATE                                                        |  |  |                                                                                                                         |  |  |
| NOTES: SITE PLAN                               |  |  | NOTES: SITE PLAN                                                                  |  |  |                                                                                                                         |  |  |
| <b>colony</b>                                  |  |  | <b>Project:</b><br>18 Parkside Road<br>Reading, RG30 2DB                          |  |  |  <b>RIBA</b><br>Chartered Practice |  |  |
| Collaborating with:<br><b>Colony</b>           |  |  | <b>Drawing Name:</b><br>Proposed Site Plan<br>1:200                               |  |  | <b>Colony Architects Ltd.</b><br>The Wine Store, Brewery Court,<br>Theale, Reading, RG7 5AJ                             |  |  |
| <b>Job:</b><br>500                             |  |  | <b>Date:</b><br>06.2020                                                           |  |  | <b>Date:</b><br>06.2020                                                                                                 |  |  |
| <b>Drawing:</b><br>02-15                       |  |  | <b>Status:</b><br>planning                                                        |  |  | <b>Drawn By:</b><br>ip                                                                                                  |  |  |
| <b>Revision:</b><br>P5                         |  |  | <b>Checked By:</b><br>EM                                                          |  |  | <b>Colony Architects Ltd.</b><br>The Wine Store, Brewery Court,<br>Theale, Reading, RG7 5AJ                             |  |  |
|                                                |  |  |                                                                                   |  |  | <b>+44 (0)118 380 0328</b><br><b>hello@colonyarchitects.com</b><br><b>colonyarchitects.com</b>                          |  |  |

Parkside Road Elevation 1:200



Parkside Road Streetscene 1:200



|                                                                                                                                                                                                                                                   |                                                                                                             |  |                                                                                                                                                |                                                                                                                      |                                                                                                                                                                                                                                                                                                            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>KEY</b><br>A. Clay roof Tiles<br>B. Red Brick (mottled)<br>C. Red Brick (Herringbone)<br>D. Aluminium Framed Windows (dark Grey)<br>E. Metal Railings<br>F. Brick Headers & Cils<br>G. Timber effect Facias<br>H. Rooflights<br>I. Grey Render |                                                                                                             |  | <br><b>colony</b><br>Collaborating with:<br><b>Colony</b> | <b>Project:</b><br>18 Parkside Road<br>Reading, RG30 2DB<br><br><b>Drawing Name:</b><br>Proposed Elevations<br>1:200 | <br><b>RIBA</b><br>Chartered Practice<br><br><b>Colony Architects Ltd.</b><br>The Wine Store, Brewery Court,<br>Theale, Reading, RG7 5AJ<br>+44 (0)118 380 0328<br>hello@colonyarchitects.com<br>colonyarchitects.com |
| <b>Job:</b><br>500<br><b>Drawing:</b><br>05-10<br><b>Revision:</b><br>P5                                                                                                                                                                          | <b>Date:</b><br>06.2020<br><b>Status:</b><br>planning<br><b>Drawn By:</b><br>ip<br><b>Checked By:</b><br>EM |  |                                                                                                                                                |                                                                                                                      |                                                                                                                                                                                                                                                                                                            |

Westcote Road Elevation 1:200

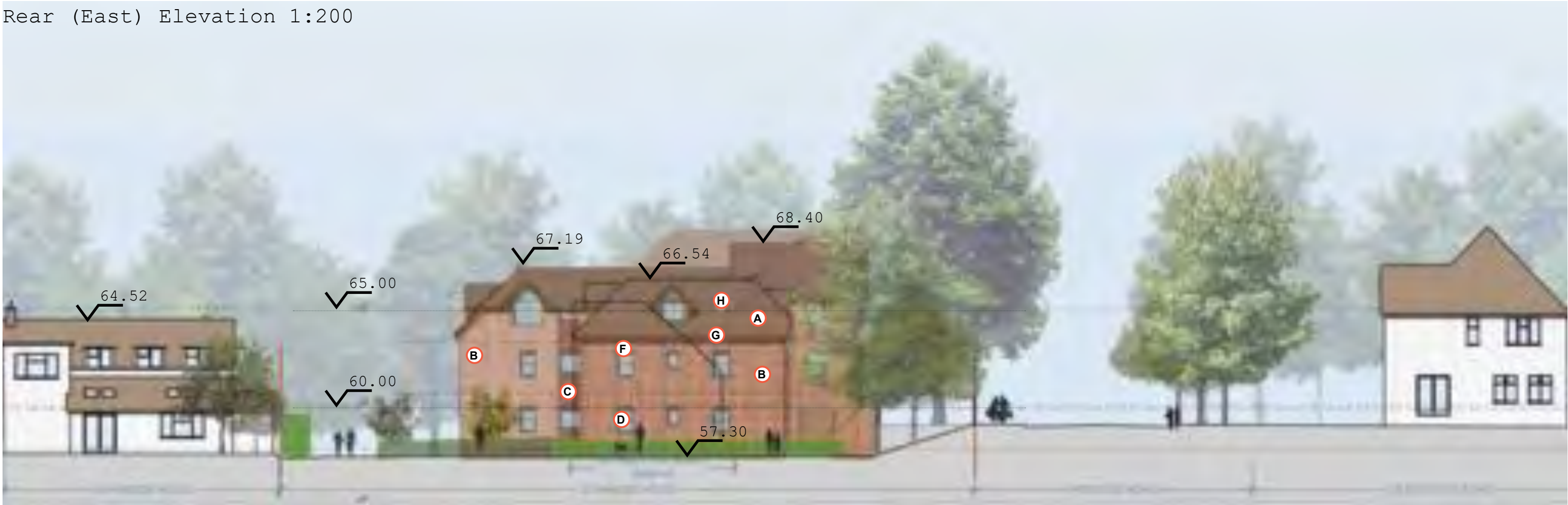


Westcote Road Streetscene 1:200



|                                                                                                                                                                                                                                                   |  |  |                                                                                                                                                                             |                                                                                                                                                                       |                                                        |                                                                                                                                                                                                                                                                   |
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| <b>KEY</b><br>A. Clay roof Tiles<br>B. Red Brick (mottled)<br>C. Red Brick (Herringbone)<br>D. Aluminium Framed Windows (dark Grey)<br>E. Metal Railings<br>F. Brick Headers & Cils<br>G. Timber effect Facias<br>H. Rooflights<br>I. Grey Render |  |  | <br><b>Colony</b><br>Collaborating with:<br>Job: 500<br>Drawing: 05-11<br>Revision: P5 | <b>Project:</b><br>18 Parkside Road<br>Reading, RG30 2DB<br><b>Drawing Name:</b><br>Proposed Elevations<br>1:200<br><b>Date:</b><br>06.2020<br><b>Drawn By:</b><br>lp | <b>Status:</b><br>planning<br><b>Checked By:</b><br>EM | <br><b>Colony Architects Ltd.</b><br>The Wine Store, Brewery Court,<br>Theale, Reading, RG7 5AJ<br>+44 (0)118 380 0328<br>hello@colonyarchitects.com<br>colonyarchitects.com |
|                                                                                                                                                                                                                                                   |  |  |                                                                                                                                                                             |                                                                                                                                                                       |                                                        |                                                                                                                                                                                                                                                                   |

Rear (East) Elevation 1:200



Side (South) Elevation 1:200



|                                                                                                                                                                                                                                                                                           |                                                                                                                                |                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>KEY</p> <p>A. Clay roof Tiles</p> <p>B. Red Brick (mottled)</p> <p>C. Red Brick (Herringbone)</p> <p>D. Aluminium Framed Windows (dark Grey)</p> <p>E. Metal Railings</p> <p>F. Brick Headers &amp; Cils</p> <p>G. Timber effect Facias</p> <p>H. Rooflights</p> <p>I. Grey Render</p> | <p><b>colony</b></p> <p>Collaborating with:</p> <p><b>Colony</b></p> <p>Job: 500</p> <p>Drawing: 05-12</p> <p>Revision: P5</p> | <p><b>Project:</b></p> <p>18 Parkside Road<br/>Reading, RG30 2DB</p> <p><b>Drawing Name:</b></p> <p>Proposed Elevations<br/>1:200</p> <p><b>Date:</b></p> <p>06.2020</p> <p><b>Drawn By:</b></p> <p>lp</p> <p><b>Status:</b></p> <p>planning</p> <p><b>Checked By:</b></p> <p>EM</p> | <p> <b>RIBA</b> <small>Chartered Practice</small></p> <p><b>Colony Architects Ltd.</b></p> <p>The Wine Store, Brewery Court,<br/>Theale, Reading, RG7 5AJ</p> <p>+44 (0)118 380 0328<br/>hello@colonyarchitects.com<br/>colonyarchitects.com</p> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## APPENDIX 1 - PROTECTED SPECIES LEGISLATION

### **Bats**

In England and Wales, all bat species and their roosts are legally protected under the Wildlife and Countryside Act (1981) (as amended); the Countryside and Rights of Way Act, 2000; the Natural Environment and Rural Communities Act (NERC, 2006); and by the Conservation of Habitats and Species Regulations (2010). You will be committing a criminal offence if you:

- Deliberately capture, injure or kill a bat
- Intentionally or recklessly disturb a bat in its roost or deliberately disturb a group of bats
- Damage or destroy a bat roosting place (even if bats are not occupying the roost at the time)
- Possess or advertise/sell/exchange a bat (dead or alive) or any part of a bat
- Intentionally or recklessly obstruct access to a bat roost

Barbastelle, Bechstein's, greater horseshoe, lesser horseshoe, brown long-eared, soprano pipistrelle, and noctule bats are all priority species under the UK Biodiversity Action Plan (UK BAP) and have also been adopted as species of principal importance in England under Section 41 of the NERC Act 2006.

### **Badgers**

Badgers and their setts are afforded strict protection under the Protection of Badgers Act 1992. This Act consolidates past badger legislation and, in addition to protecting the badger itself, makes it an offence to damage, destroy or obstruct badger setts. Badgers are also protected under Schedule 6 of the Wildlife and Countryside Act 1981 (as amended), and listed under Appendix III of the Bern Convention, as a species that is in need of protection but may be hunted in exceptional instances. Only badger setts that are currently in use are covered by wildlife legislation.

### **Birds**

All wild birds in the UK are protected under Section 1 of the Wildlife and Countryside Act 1981 (as amended) which makes it an offence to intentionally kill, injure or take any wild bird or to take, damage or destroy the nest or its eggs.

Some bird species, such as the barn owl *Tyto alba*, are listed in Schedule 1 of the 1981 Act and receive further protection, making it an offence to intentionally or recklessly disturb these birds whilst building a nest or in, on or near a nest containing eggs or young; or to disturb dependent young of such a bird.

The NERC Act (2006) inserts a new schedule into the Wildlife and Countryside Act (1981) to protect the nests of some bird species that regularly re-use their nests, even when the nests are not in use. This protection currently applies to golden eagle, white-tailed eagle and osprey.

### **Reptiles**

All British reptiles are listed under schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and are therefore protected from intentional killing or injury. This is largely as a consequence of a national decline in numbers associated with habitat loss.

Two scarcer native British reptiles (smooth snake *Coronella austriaca* and sand lizard *Lacerta agilis*), are afforded 'full' protection. This legislation makes it an offence to intentionally or recklessly kill, injure, disturb, take, possess or sell these species (in all life stages). It is also illegal to damage, destroy or obstruct access to places they use for breeding, resting, shelter and protection.

All species of reptile are priority species in the UKBAP and have been adopted as Species of Principal Importance under Section 41 of the NERC Act (2006) in England (Section 42 in Wales).

## **Amphibians**

Great crested newts (GCN's) *Triturus cristatus* and their habitats are fully protected by the Conservation of Habitats and Species Regulations (2010) and partially protected under the Wildlife and Countryside Act 1981 (as amended). This legislation makes it an offence to kill, injure or capture GCN's, their young or eggs, or destroy / damage their ponds or places of shelter used for breeding or protection. The great crested newt is also a Priority species in the UK Biodiversity Action Plan (UKBAP), and had been adopted as a Species of Principle Importance in England under Section 41 of the NERC Act 2006.

The natterjack toad *Epidalea calamita* is fully protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and Schedule 2 of The Conservation of Habitats and Species Regulations 2010 making it a European Protected Species. The natterjack toad is also a priority species under the UK Biodiversity Action Plan.

The pool frog *Rana lessonae* is protected under the Conservation (Natural Habitats &C.) Regulations 1994 (as amended). As a European protected species the deliberate capturing, disturbing, injuring or killing of this species is prohibited, as is damage or destruction of its breeding sites or resting places. The pool frog is also a priority species under the UK Biodiversity Action Plan due to a 100% decline over 25 years (1980-2005).

Common toads *Bufo bufo* are also designated UKBAP species due to a serious decline of populations across large areas of southern, eastern and central England, thought to be mainly due to changes in habitat management, mortalities on the roads, and climate change.

## **Dormice**

Common dormice *Muscardinus avellanarius* and their habitats are fully protected by both the Wildlife and Countryside Act 1981 (as amended) and the Conservation of Habitats and Species Regulations (2010). This legislation makes it an offence to kill, injure, disturb or capture dormice, or destroy or obstruct their resting or breeding places.

The dormouse is also a priority species under the UK Biodiversity Action Plan and has been adopted as a species of Principal Importance in England under Section 41 of the NERC Act 2006 (section 42 in Wales) and so is protected from any adverse effects as a result of development.

## **Otters**

Otters *Lutra lutra* are protected by both the Wildlife and Countryside Act 1981 (as amended) and The Conservation of Habitats and Species Regulations 2010. This legislation makes it illegal to; deliberately or recklessly kill, injure or capture an otter, deliberately or recklessly disturb or harass an otter, damage, destroy or obstruct access to a breeding site or resting place of an otter.

The otter is also a UK BAP Priority Species and has been adopted as a Species of Principal Importance in England under Section 41 of the NERC Act 2006 (Section 42 in Wales) and the Conservation (Scotland) Act in Scotland.

## **Water Voles**

Water voles *Arvicola terrestris* are fully protected under the Wildlife and Countryside Act 1981 (as amended). This legislation makes it an offence to kill or injure water voles, and to damage, destroy or obstruct access to places used for protection or shelter, and to disturb water voles whilst they occupy such a place.

The water vole is also a Priority species in the UK Biodiversity Action Plan, and had been adopted as a Species of Principle Importance in England under Section 41 of the NERC Act 2006.

## **White-Clawed Crayfish**

The white-clawed crayfish *Austropotamobius pallipes* is protected under the Wildlife and Countryside Act 1981 (as amended), making it a criminal offence to; intentionally or recklessly kill or injure a white-clawed crayfish, or sell or

attempt to sell any part of this species. The Habitats Regulations (2010) provide further protection through the declaration of Special Areas of Conservation (SAC). This protection aims to prevent commercial harvesting of white-clawed crayfish and prohibits their capture without a licence.

The white-clawed crayfish is also a Priority species in the UK Biodiversity Action Plan (BAP), and has been adopted as a Species of Principal Importance in England under Section 41 of the NERC Act 2006.

### ***Hedgehogs***

Hedgehogs are UK Biodiversity Action Plan (BAP) species, and therefore must be taken into consideration as part of development planning. A recent report (Wembridge, 2011) shows that hedgehog numbers have declined by 25% in the last ten years.

## **APPENDIX 2 - SURVEY AND REPORTING LIMITATIONS AND EXCEPTIONS**

This report and its survey results should be considered in conjunction with the terms and conditions proposed and scope of works agreed between Darwin Ecology Ltd and the client.

This report has been produced in the context of the proposals stated in the Introduction & Background section of this report (Section 2) and should not be used in any other context.

Darwin Ecology Ltd have endeavoured to identify the likely presence / absence of protected species wherever possible on site, where this falls within the agreed scope of works. Current standard methodologies have been used, which are accepted by Natural England and other statutory conservation bodies. No responsibility can be accepted where these methodologies fail to identify all species or significant species on site.

Extended Phase 1 and Preliminary Ecological survey techniques provide a preliminary assessment of the likelihood of protected species occurring on the development site, based on the suitability of the habitats and any field signs found during the site visit. A Phase 1 survey should not be taken as providing a full and definitive survey of any protected species group.

Extended Phase 1 and Preliminary Ecological Appraisals represent a snapshot of conditions at the time of survey and are limited by factors which affect the presence of plants and animals such as the time of year, migration patterns and behaviour. Surveys should therefore not be considered a comprehensive list of all plant species or as conclusive proof that certain protected species are not present or will not be present in the future.

Where the presence/absence of a certain species is in question our ecologists must apply a precautionary approach until further survey data can be sought to better inform the decision.

Darwin Ecology Ltd will advise on the optimum survey season for a particular habitat or protected species prior to undertaking the survey work. Darwin Ecology Ltd cannot accept responsibility for the accuracy of surveys undertaken outside this period.

The potential impacts, mitigation and enhancement sections of the report provide an overview and is for guidance only. This section should not be solely relied upon, but should be considered in the context of the whole report.

Interpretations of survey results and recommendations outlined in the report represent our professional opinions, expressed in accordance with recognised industry practices and current legislation at the time of reporting. The results of survey work undertaken by Darwin Ecology Ltd are representative at the time of surveying.

Where the client had supplied us with data from previous reports, it has been assumed that this information is valid. No responsibility can be accepted by Darwin Ecology Ltd for inaccuracies within any previous data supplied.

The copyright in this report, plans and other associated documents prepared by Darwin Ecology Ltd is owned by them and no such report, plans and other associated documents may be reproduced without their written consent.

Amendments to this report after its submission may be necessary in light of new, relevant information and / or legislation. This report should be referred to us for re-assessment if any such amendments are necessary or after the expiry of one year from the date of the report.



## THE IMPACT OF LIGHTING ON BATS

Bats favour a dark environment for both roosting and foraging as they are adapted to low-light conditions. Artificial lighting will disturb bats if the lighting covers roost access points, flight paths or foraging habitats.

The main peak of nocturnal insect abundance occurs at dusk and a delay in emergence results in a lower foraging rate for bats.

Artificial lighting creates a 'vacuum effect' for nocturnal insects. During the night nocturnal insects use the light of the moon\* to navigate. However, artificial lighting and even sky glow above cities obscures the natural moonlight as it is closer

and radiates light in multiple directions.

Some species of bats have been recorded foraging around street lights such as *Pipistrellus* species and *Nyctalus* species. However, species that are less tolerant of artificial light are at a disadvantage when foraging as insects are drawn away from these species usual foraging grounds into the zones of artificial light.

Lighting must be considered in context to any development as increased lighting may cause roost abandonment, reduced reproductive success, and reduced foraging. Mitigation to reduce the impacts of lighting for bats is therefore of great importance in bat conservation.

Table 1: Summary of predicted impact of lighting for each species/genus

| Impact          | High                                                                                                              | Medium                                                                                                            | Low                                                                                                               |
|-----------------|-------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Behaviour       |                                                                                                                   |                                                                                                                   |                                                                                                                   |
| Maternity roost | All species                                                                                                       | -                                                                                                                 | +                                                                                                                 |
| Night roost     | <i>Rhinolophus hipposideros</i><br><i>Rhinolophus ferrumequinum</i><br><i>Myotis</i> spp.<br><i>Plecotus</i> spp. | <i>Pipistrellus</i> spp.<br><i>Nyctalus</i> spp.<br><i>Eptesicus serotinus</i><br><i>Barbastella barbastellus</i> | +                                                                                                                 |
| Emergence       | All species                                                                                                       | -                                                                                                                 | -                                                                                                                 |
| Foraging        | <i>Rhinolophus hipposideros</i><br><i>Rhinolophus ferrumequinum</i><br><i>Myotis</i> spp.<br><i>Plecotus</i> spp. | -                                                                                                                 | <i>Pipistrellus</i> spp.<br><i>Nyctalus</i> spp.<br><i>Eptesicus serotinus</i><br><i>Barbastella barbastellus</i> |
| Commuting       | <i>Rhinolophus hipposideros</i><br><i>Rhinolophus ferrumequinum</i><br><i>Myotis</i> spp.<br><i>Plecotus</i> spp. | -                                                                                                                 | <i>Pipistrellus</i> spp.<br><i>Nyctalus</i> spp.<br><i>Eptesicus serotinus</i><br><i>Barbastella barbastellus</i> |
| Swarming        | All species                                                                                                       | -                                                                                                                 | -                                                                                                                 |
| Hibernation     | All species                                                                                                       | -                                                                                                                 | -                                                                                                                 |

\*For more information see Warrant, E., and Dacke, M. (2016) Visual Navigation in Nocturnal insects. *Physiology*, 31, 182-196.



Sources of light that can disturb bats include; light spill via windows, sport floodlighting, car headlights, roadside lighting, security lighting, aesthetic lighting of waterways, and aesthetic illumination of buildings. Glare will affect bats over greater distance than the target area directly illuminated.

Avoidance is the most effective method, but if this is not possible the following measures should be considered.

## What lighting should I use?

- Low pressure sodium lights or 'warm' LEDs
- Wavelength above 540nm
- Colour temperature below 2700K
- Shielded lights that prevent light spill above a 70 degree angle
- Passive infrared (PIR) motion sensors



## What to avoid:

- Lighting roost entrances, flightpaths, and foraging or commuting routes
- Reflective surfaces beneath lighting
- High level lights
- Non-directional lighting

Lighting should be considered at an early stage allowing impacts to be minimised through the design of the site.

## Key Points

- Keep lighting intensity to the minimum level required
- Limit the times that lights are on to provide some dark periods (e.g. switching installations off between midnight and 5am)
- Dim lighting according to demand
- As an alternative to lighting pathways use paving materials that reflect moonlight
- Low level lighting allows darkness to be retained within higher vegetation
- Set dark habitat buffers - lighting should always be a minimum of 25m from vegetated margins and 40m from waterbodies
- Incorporate dark corridors within the site
- Compensate for the loss of dark areas by enhancing other dark areas
- Consider building design - install internal lighting away from windows

Droppings found under hanging tiles on the western elevation:



Droppings found stuck to hanging tile on the eastern elevation:



Droppings found under hanging corner tile on the eastern elevation:



\*NOTE Areas are indicative and are not shown to exact scale.



Site Boundary



Building - majority of the roof tiles with a coverage of moss



Soprano pipistrelle droppings identified



Hanging tiles investigated during high level inspection



Lifted/missing verge tiles



[Info@darwin-ecology.co.uk](mailto:Info@darwin-ecology.co.uk)  
[www.darwin-ecology.co.uk](http://www.darwin-ecology.co.uk)

**Project:** 18 Parkside Road,  
RG30 2DB

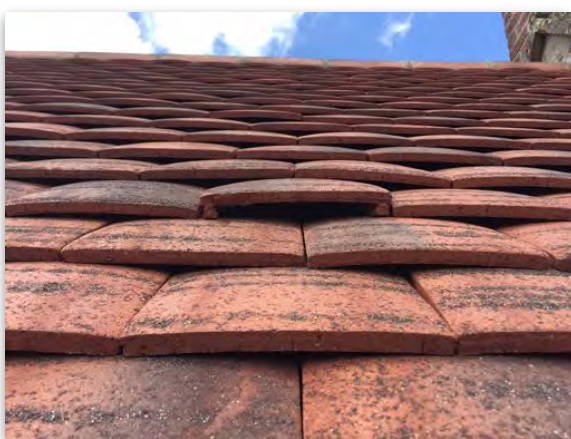
**Figure 3:** High Level Inspection  
Results

**Date:** October 2020



## Lifted tile bat access features

Lifted tiles provide a simple, discreet bat roosting opportunity which are great for replicating existing roost features on traditional tiled roofs. They can be cheaply and easily created using materials available on site to provide a bespoke mitigation solutions for bat licence projects.



Lifted tiles should provide a gap of approximately 15-25 mm beneath the tile to provide access to the batten space of the roof. The roof should be lined with bitumastic felt to create the perfect warm crevices suitable for roosting bats.



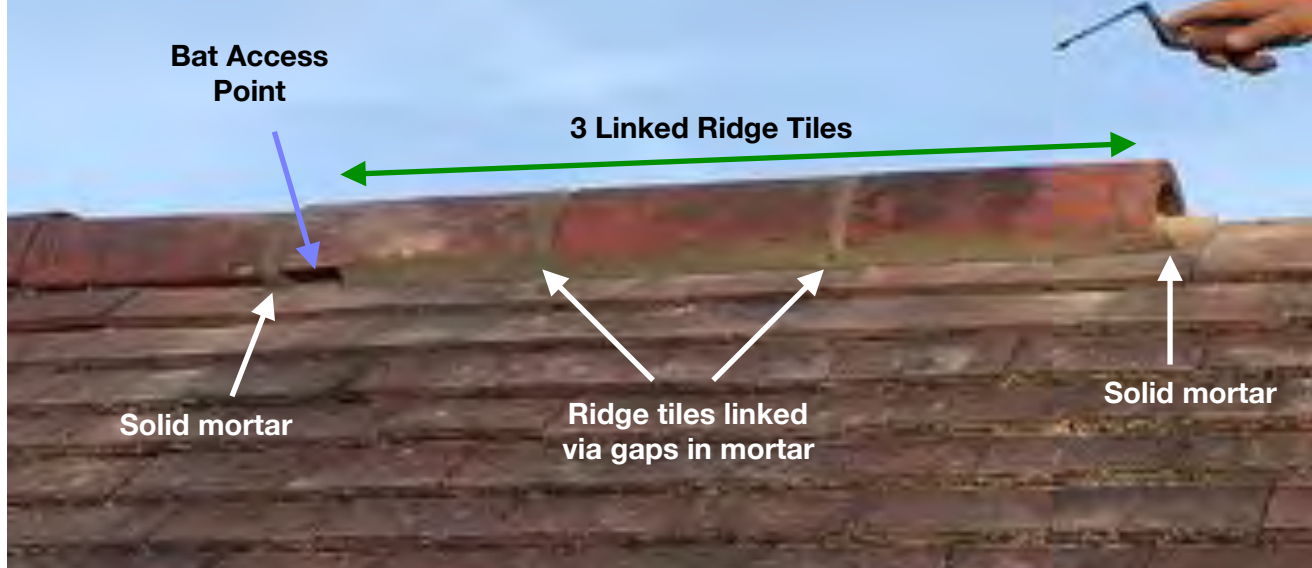
Small pieces of tile, mortar, pieces of wooden batten or rolled lead tingle can be used to raise the tile and create a suitable access gap for bats.



These features are also suitable for incorporation on areas of hanging tiles to provide bat access to the batten space.

The locations for these features should be agreed with an ecologist to provide optimal conditions for the bat species and roost types present on site.

Lifted tile features can also be used to provide access into a roof void suitable for roosting bats. To provide access into the roof space, a small gap must be cut into the roofing felt. This should be approximately 50 mm x 20 mm to provide access for bats but discourage birds from entering the roof space.

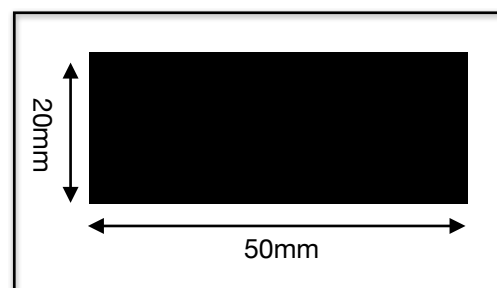


## HOW TO CREATE

Note: Use three adjacent ridge tiles for one Ridge Tile Crevice Feature



1. Notch out the underside of a ridge tile measuring 20mm high by 50mm wide.



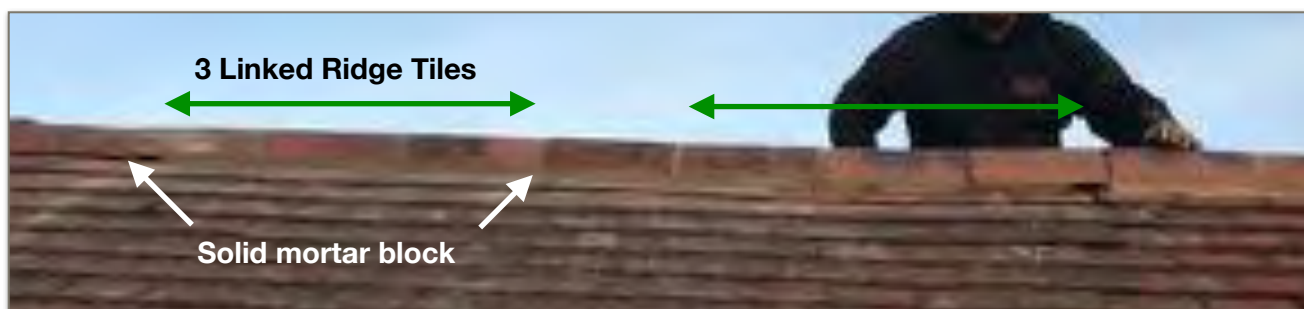
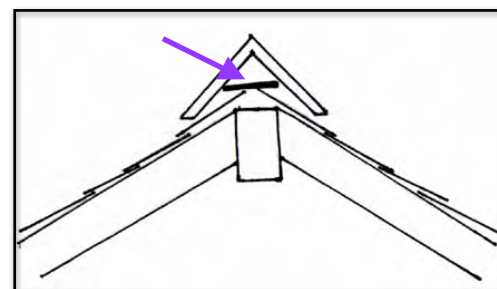
2. Or leave a gap in the mortar of the same size



3. Leave the gap mortar free when bedding the tile onto the ridge.



4. To ensure the three ridge tiles remain linked either; place a broken tile over the ridge and mortar only above the tile (left) or fill one side with mortar and leave the other side empty (do this on alternate sides to ensure the feature does not become draughty) (right).



5. At each end of the three linked ridge tiles insert a solid mortar block to reduce through draughts.