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Land off Oakhurst Rise, Charlton Kings, GL52 6NR.

Tree Assessment and Inspection Survey for Bat Roost Potential

Dusk Emergence and Pre-dawn Re- entry Surveys.

Original Report: June 2017
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Notice to readers:

The results of the survey and assessment work undertaken by All Ecology are representative at the time of surveying.

Every endeavour has been made to identify the presence of protected species on site, where this falls within the agreed scope of works.

The flora and fauna detailed within this report are those noted during the field survey and from anecdotal evidence. It should not be viewed as a complete list of flora and fauna species that may frequent or exist on site at other times of the year.

Up to date standard methodologies have been used, which are accepted by Natural England and other statutory conservation bodies. No responsibility will be accepted where these methodologies fail to identify all species on-site.

All Ecology cannot take responsibility where Government, national bodies or industry subsequently modify standards.

All Ecology cannot accept responsibility for data collected from third parties.

Reference to sections or particular paragraphs of this document taken out of context may lead to misrepresentation.

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1.0 Introduction

Background

- 1.1 All Ecology was commissioned to undertake a Tree Assessment and Inspection Survey for Bat Roost Potential of trees, and follow up Dusk Emergence and Pre-dawn Re-entry Surveys, at a site known as Land off Oakhurst Rise, Charlton Kings, GL52 6NR. The site is approximately 4 ha in size and is composed of two fields of grassland, a larger field at 3 ha in size, and a smaller field 1ha in size. These are separated by a mature hedge and trees; a line of trees also extends into the larger field from the north boundary. A small number of mature and semi-mature standard trees are also present on site. The site is bound by a mix of hedges and trees, garden hedges, and fences. It is surrounded by residential housing on all aspects except to the south where St Edwards School is situated.
- 1.2 The site is the subject of a planning application for a new housing development of 90 new dwellings with associated gardens, driveways and a new access road.
- 1.3 A previous Ecological Appraisal of the site carried out by All Ecology in September 2016 identified a number of trees with potential roosting features for bats, many of which would be removed or affected by the development.
- 1.4 The aim of the surveys was to take a detailed inventory of trees with potential roosting features, inspect any features of the trees that had potential for roosting bats. Any features that contained evidence of bats or could those that could not be fully inspected, were subject to dusk emergence and/or pre-dawn re-entry surveys. This work was carried out in order to ascertain the following:
 - Presence/absence of potential or bat roosts
 - Status of roosts if present
 - Whether additional surveys are required.
 - Whether a European Protected Species (EPS) licence is required to ensure legal compliance.
 - Whether any mitigation measures would need to be employed
- 1.5 **This revision of the report includes an updated roosting bat and bird nesting mitigation plan.**

Site Location



2.0 Legislation and Status

2.1 All species of bat are listed on Schedule 5 of The Wildlife and Countryside Act (1981) and as such receive protection under Section 9 of this Act. This has been amended several times, most recently by the Countryside and Rights of Way Act 2000, which added 'or recklessly' to Section 9(4) (a) and (b). In summary, it is a criminal offence to.

- intentionally kill, injure or take a wild bat
- be in possession of, or control, any live or dead wild bat or part of, or anything derived from a wild bat
- intentionally or recklessly damage, destroy or obstruct access to any place that a wild bat uses for shelter or protection
- intentionally or recklessly disturb any wild bat whilst it is occupying a structure or place that it uses for shelter or protection
- transport for sale or exchange, or offer for sale or exchange a live or dead bat or any part of a bat.

2.2 The Conservation of Habitats and Species Regulations 2010, consolidate all the various amendments made to the Conservation (Natural Habitats, &c.) Regulations 1994, in respect of England and Wales. It is an offence to possess, sell or offer or transport for sale any European species of bat or any part derived from such a species. These Regulations also remove the 'incidental result defence'. In other words, it is no longer a defence to show that the killing, capture or disturbance of a species covered by the Regulations or the destruction or damage of their breeding sites or resting places was the incidental and unavoidable result of a lawful activity. Natural England can grant European Protected Species (EPS) licenses in respect of development to permit activities that would otherwise be unlawful.

2.3 Under Section 40 of the Natural Environment and Rural Communities Act (2006) public bodies, including Local and Regional Planning Authorities have a duty to 'have regard' to the conservation of biodiversity in England when carrying out their normal functions, which includes consideration of planning applications. In compliance with Section 41 of the Act, the Secretary of State has published a list of species considered to be of principal importance for conserving biodiversity in England. This is known as The England Biodiversity List, all of which make up the UK BAP Priority Species. Regional Planning Bodies and Local Planning Authorities will use it to identify the species that should be afforded priority when applying the requirements of the National Planning Policy Framework (NPPF) to maintain, restore and enhance species and habitats.

2.4 Seven bat species are UK BAP Priority Species (JNCC, 2017). These are:

- Barbastelle *Barbastella barbastellus*
- Bechstein's *Myotis bechsteinii*
- Noctule *Nyctalus noctula*
- Soprano Pipistrelle *Pipistrellus pygmaeus*
- Brown Long-eared *Plecotus auritus*

- Greater Horseshoe *Rhinolophus ferrumequinum*
- Lesser Horseshoe *Rhinolophus hipposideros*

3.0 Methodology

Personnel

- 3.1 The survey was carried out by James Godbeer BSc Hons MCIEEM, an ecologist with over 10 years experience working as a consultant and experienced bat surveyors. James has extensive experience of managing environmental contracts, and particular experience in surveying, assessment and mitigation for rare and protected species. He has considerable knowledge of the development and planning process including Ecological Impact Assessments, sustainable ecological design and he has completed ecology chapters of Environmental Statements. James holds a number of protected species licences including bats (all species, all counties, Class Licence Registration No. 2015-12313-CLS-CLS), and Great Crested Newts (Class Licence Registration No. 2016-20363-CLS-CLS). He has successfully obtained European Protected Species mitigation licences for a number of bat species including Lesser Horseshoe, Greater Horseshoe, Serotine, Brown Long-eared, Common Pipistrelle and Natterer's bats, for a number of roost types including maternity and hibernation sites.

Timing

- 3.2 The Preliminary Ground Level Roost Assessment was conducted on the 6th February 2017, timed for the winter period when an absence of foliage allows for a more reliable identification of potential roosting features.
- 3.3 These features were then subject to detailed aerial inspections, which took place on the 10th and 17th May 2017, timed for the optimal period when bats are likely to occupy their summer roosts, including maternity roosts.
- 3.4 The first round of further surveys were Dusk Emergence Surveys which took place on the 14th, 15th and 16th June 2017. The second round of surveys were Pre-dawn Re-entry Surveys which took place on the 26th, 27th and 30th June 2017. An additional dusk survey was carried out on T6 on the 3rd July 2017.

Preliminary Ground Level Roost Assessment

- 3.5 This part of the survey involved a detailed inspection of the exterior of the trees from ground level to compile information about the trees and to look for Potential Roosting Features (PRFs). Information collected about the trees included the location, species, diameter at chest height or number stems, and height. PRFs that may be used by bats include the following (Collins, 2016):
- Woodpecker holes
 - Rot holes
 - Hazard beams
 - Other vertical or horizontal splits (such as frost-cracks) in stems or branches
 - Partially detached platey bark

- Knot holes arising from naturally shed branches, or branches previously pruned back to the branch collar
- Man-made holes (e.g. cavities that have developed from flush cut) or cavities created by branches tearing out from parent stems
- Cankers (caused by localised bark death) in which cavities have developed
- Other hollows or cavities, including butt-rots
- Double-leaders forming compression fork with included bark and potential cavities
- Gaps between overlapping stems or branches
- Partially detached ivy with stem diameters in excess of 50 mm
- Bat, bird or Dormouse boxes.

3.6 Information collected about PRFs included a description, height and orientation.

3.7 Signs of bat roosts include the following (Collins, 2016):

- Presence of actual bats
- Bat droppings in, around or below a PRF
- Odour emanating from a PRF (may also be from other animals)
- Audible squeaking at dusk or in warm weather (may also be from other animals)
- Staining below the PRF (may also be the result of wet rot).

PRF Inspection Survey

3.8 All PRFs identified were inspected in detail in order to more accurately assess their suitability for bats and look evidence of bats. Those that could not be inspected from the ground were inspected with the use of a ladder and climbing equipment. Any additional information was then recorded.

Dusk Emergence and Pre-dawn Re-entry Survey

3.9 Eight trees had features of at least moderate potential that could not be fully inspected and in accordance with Bat Conservation Trust – Bat Surveys for Professional Ecologists: Good Practice Guidelines. 3rd Ed (Collins, 2016), PRFs of moderate potential should be subject to a minimum of one dawn survey and a separate dusk survey during May to September (optimum period May to August) to provide confidence in a negative result. If bats are found to be roosting, then an additional dusk or dawn survey is required to provide sufficient information to characterise the roost.

3.10 In accordance with Bat Conservation Trust – Bat Surveys for Professional Ecologists: Good Practice Guidelines. 3rd Ed (Collins, 2016), dusk surveys should begin 15 minutes before sunset and continue for 1.5 – 2 hours after sunset with the survey start time adjusted on subsequent surveys or a repeat of the survey should bats already be in flight at 15 minutes before sunset. The dusk survey therefore began 30 minutes before sunset to avoid the risk of having to repeat the survey as species such as pipistrelles will often emerge well before sunset.

Pre-dawn surveys begin at 2 hours before sunrise and continue until 15 minutes after sunrise or until all bats have entered their roosts.

3.11 Weather conditions encountered during the surveys are presented in the results.

Equipment

3.12 The following equipment was used to carry out and assist with the Preliminary Ground Level Roost Assessment and PRF Inspection Survey:

- 3-stage 9 m ladder
- Ropes and Harness
- 10x50 Binoculars
- 1 m endoscope
- 3000 lumen LED torch
- FLIR One thermal imaging camera
- Camera phone

3.13 For the dusk emergence and pre-dawn re-entry surveys surveyors were equipped with Echo Meter Touch 2 Pro bat detectors. Registrations were recorded on the devices and notes were made on species recorded, behaviour, time of registration, location and direction of flight where possible, including incidental observations from surrounding habitats. Where it was not possible to identify a bat species on site, audio recordings were later analysed using Wildlife Acoustics' Kaleidoscope software. A Canon XA20 camcorder was used in infrared mode to assist with the survey.

Assessment

3.14 The PRFs have been evaluated to assess which of the following categories they fall into (Collins, 2016):

- Confirmed roost
- High roost suitability
- Moderate roost suitability
- Low roost suitability

3.15 Trees with no PRFs or PRFs of low roost suitability do not generally require further emergence/re-entry surveys. Other categories may require further surveys to determine the presence/absence of bats with a greater level of confidence, and/or characterise roosts where present.

3.16 The surveyed trees have been evaluated to assess which of the following categories they fall into, if any (Mitchell-Jones, 2004 & Collins, 2016):

- **Transitional roost** (April-September/October) - On waking from hibernation or in the period prior to hibernation, bats search for roosts in which they stay for only a few days or on some occasions several weeks. These transitional roosts can be

occupied by a few individuals or occasionally small groups. The transitional roosts used prior to hibernation are generally cool and thus may allow bats to reduce their energy requirements before going into hibernation.

- **Maternity roost** (May-August) - Breeding females gather together around the beginning of May to form nursery colonies. During this period gestation begins with births typically occurring between June and July. The females and their young remain within the maternity roost until the young are weaned and independent (late July-August). These roosts tend to break up between August and September. Adult males are rarely found within these colonies. However, the adult males of long-eared bats, Daubenton's, Natterer's, and horseshoe bats can be found roosting within maternity colonies with their numbers increasing throughout the active season.
- **Satellite roost** (May-August) - Breeding females may have alternative roost sites in close proximity to the main nursery colony. These are referred to as 'satellite roosts'. The numbers of bats using these roosts can vary greatly, from a few individuals, to small groups.
- **Mating roost** (September-November) - All British bats are polygynous *i.e.* males mate with several females. Mating generally takes place from late summer and can continue through the winter. A number of different mating strategies are used by bats, though males of some species establish mating roosts, whereby they defend territory and display/call to females to mate.
- **Hibernation roost** (October-March) - Depending on the weather and food availability, bats tend to move to hibernation sites from October. Hibernation roosts can vary greatly in terms of the number of individuals and the diversity of species that occupy them. However, they tend to have a constant cool temperature and high humidity, which allows the bats to use less energy regulating their temperature. Bats will wake occasionally during hibernation to drink and feed.
- **Night roost** (March-November) - Bats may use roosts other than traditional day roosting sites to rest in during the night. These roosts vary in their conservation significance. Night roosts may be used by a single individual on occasion or they could be used regularly by the whole colony. Studies have shown that night roosts may be of particular importance to some species *i.e.* the Lesser Horseshoe, providing key resting places within core foraging areas.
- **Day roost** (March-November) - These roosts are used during the day to rest in. Males of most British species spend the summer roosting alone or in small groups with other males in such roosts. Bats may regularly use a number of day roosts, switching between them on a daily basis, though conversely they may occupy the same roosting site for several weeks.
- **Feeding roost** (May-November) - These roosts can be occupied by a single animal or a few individuals throughout the active season. They vary in their significance as they may be used by the whole colony or just a few individuals to feed, to shelter from the weather or to rest temporarily. Feeding roosts are often used by long-eared and horseshoe species.
- **Other considerations, Swarming sites** - Swarming takes place between August and November, whereby large numbers of bats from several species gather, generally around caves and mines. They are often dominated by the *Myotis* species

and appear to be important mating sites with some bats travelling several kilometres to reach these areas. A proportion of the bats that travel to these sites will remain to hibernate

Limitations

- 3.17 The best time for identifying PRFs on the trees is winter when most broad-leaved trees and some conifers (larch) have shed their leaves/needles. This was the case here and the likelihood of PRFs being missed was low.
- 3.18 It was not possible to access some of the PRFs for detailed aerial inspections due to nature of the ground (uneven, sloping etc.) preventing use of the ladder, and lack of suitable anchor points for rope climbing. Some PRFs were also too extensive to fully inspect with the endoscope. These were subject to emergence/re-entry surveys.
- 3.19 BCT guidelines state that dusk emergence and dawn re-entry surveys may be undertaken from May to September inclusive and that the optimum time for carrying out these surveys is May to August. The surveys were therefore carried out at the optimal time of year for detecting maternity roosts but these only provide a 'snapshot' of the bat activity on site and surveys undertaken at other times of the year may encounter other roost types and changes in activity.

4.0 Results

Habitat

- 4.1 The trees form part of hedges which extend around and across the site providing sheltered areas for foraging and commuting bats.

Preliminary Ground Level Roost Assessment

- 4.2 The locations of the surveyed trees are illustrated on Plan 1. The remaining trees on site did not have any PRFs and were therefore not included in the survey. The results of the preliminary ground level roost assessment are presented in Table 1. This also includes a small number of additional features identified during the PRF inspection survey e.g. new woodpecker holes.

Table 1. Preliminary Ground Level Roost Assessment Survey Results

Tree No.	Species	Est. Height	Girth	PRF - Type, height, aspect.	Notes.
1	Pedunculate Oak	10m	1.2m	PRF 1. Hollow trunk with extensive rot, large openings on the north and south sides PRF 2. Flaking bark on all aspects.	
2	Pedunculate Oak	20m	0.2m	PRF 1. Knot hole at 2.5 m S PRF 2. Limb rot at 5.5 m S PRF 3. Limb rot at 6 m S	Minor flaking bark.
3	Pedunculate Oak	20m	1m	PRF 1. Squirrel hole at 6 m S PRF 2. 3 x woodpecker holes at 7.5 E PRF 3. Knot hole at 4 m W PRF 4. Woodpecker hole at 4.5 m W PRF 5. Woodpecker hole at 4.5 m W PRF 6. Knot hole at 5.5 m W PRF 7. Hollow limb at 6.5 W PRF 8. Rot hole at 8 m W	
4	Pedunculate Oak	20 m	1.2	PRF 1. Hollow limb at 2.5 m E PRF 2. Limb rot at 3 m N PRF 3. Flaking limb bark at 3.5 m S PRF 4. Limb rot x 2 at 8 m E PRF 5. Limb rot at 8 m S PRF 6. Limb woodpecker hole 11 m S	
5	Pedunculate Oak	13m	0.9m	PRF 1. Trunk rot at 0 – 8 m, numerous cavities PRF 2. Hollow limb at 6 m N PRF 3. Woodpecker/squirrel hole at 6.5 NE PRF 4. Rot hole and hollow trunk at 7 m N	Minor flaking bark.
6	Pedunculate Oak	20m	1.2m	PRF 1. Large rot hole in trunk at 3 m E PRF 2. Split limb at 3.5 m E PRF 3. Rot hole at 4.5 m SE PRF 4. Rot hole at 10 m N PRF 5. Rotten limb at 2 m S PRF 6. Dead stem with flaking bark and rot hole at 6 m N PRF 7. Split in trunk 4 m W	-
7	Dead (2.5 m trunk only)	2.5m	1.3m	PRF 1. Hollow trunk, open at the top but with flaking bark and rot fissures throughout.	-
8	Ash	10m	1.3m	PRF 1. Truck rot from 0 – 5 m, all aspects	-
9	Pedunculate Oak	20m	1m	PRF 1. Dead limb with splits at 6 m SW PRF 2. Branch rot hole at 6 m NE	-
10	Pedunculate Oak (off site but overhangs the boundary)	20	1	PRF 1. Knot hole at 6 m NE PRF 2. Rot hole at 9 m NE PRF 3. Snapped limb and flaking bark at 9 m N PRF 4. Snapped hollow limb 6 m N	-

Tree No.	Species	Est. Height	Girth	PRF - Type, height, aspect.	Notes.
11	Pedunculate Oak	20	0.8	PRF 1. Knot hole at 8 m S	-
12	Pedunculate Oak	20	1.1	PRF 1. Flaking bark on limb at 4 – 5 m S PRF 2. Dense epicormic growth at 2.5 m PRF 3. Snapped limb, splits, flaking bark at 8 m N	-
13	Pedunculate Oak	20	1.5	PRF 1. Snapped limb at 9 m S PRF 2. Knot hole 6 m N PRF 3. Woodpecker holes 7.5 m W	-
14	Dead (5 m trunk only)	5	0.6	PRF 1. Numerous minor rot holes at 1.5 – 5 m east PRF 2. Woodpecker hole at 4 m E	-
15	Pedunculate Oak	20	1	PRF 1. Spilt in limb at 5 m NW PRF 2. Rot in limb stump at 6 m SE	-
16	Pedunculate Oak	10	1.3	PRF 1. Minor cavities in open hollow trunk at 2 m SE	-
17	Pedunculate Oak	25	1.2	PRF 1. Rot hole at 8 m SE PRF 2. Knot hole at 7 m S PRF 3. Knot hole at 2.5 m SW PRF 4. Snapped limb rot at 7.75 m south PRF 5. Rot hole at 7.5 m E PRF 6. Knot hole at 6 m E	-
18	Hawthorn	10	0.3	PRF 1. Bird box at 1.5 m S PRF 2. Bat box x 2 at 3 m SW	-
19	Sycamore	12	0.4	PRF 1. Bat box at 6 m S PRF 2. Bat box at 6 m W PRF 3. Bat box at 6 m NW	-

PRF Inspection Survey Results

4.3 T1 (Pedunculate Oak) had a number PRFs as follows:

- PRF1. Hollow trunk, extensive rot and flaking bark on all aspects, large openings on the north and south sides. The hollow trunk extended down to the ground and was open at the top but with internal overhangs some of which were beyond the reach of the endoscope. No evidence of bats but **moderate** potential for roosting.
- PRF 2. Flaking bark on all aspects. The potential for use by roosting bats is **low**; no evidence of use.

4.4 T2 (Pedunculate Oak) had three PRFs as follows:

- PRF 1. Knot hole at 2.5 m south. 6 cm x 4 cm in size with a tapered passage extending 30 cm into the trunk. **Moderate** potential for roosting but no evidence found after a full inspection.
- PRF 2. Limb rot at 5.5 m south. Minor depression that didn't extend into the limb. **Negligible** roosting potential.
- PRF 3. Limb rot at 6 m south. 3 cm diameter hole extending 6 cm into the limb. The potential for use by roosting bats is **low**; no evidence of use.

4.5 T3 (Pedunculate Oak) had eight PRFs as follows:

- PRF 1. Squirrel hole at 6 m south. **Not accessible for inspection.**
- PRF 2. 3 x woodpecker holes at 7.5 east. **Not accessible for inspection.**
- PRF 3. Knot hole at 4 m west. 4 cm diameter hole extending 25 cm into the trunk. **Moderate** potential for roosting but no evidence found after a full inspection.
- PRF 4. Woodpecker hole at 4.5 m west. 6 cm x 4 cm hole entering cavity extending into the trunk for 30 cm, down and up for 5 cm. **Moderate** potential for roosting but no evidence found after a full inspection.
- PRF 5. Woodpecker hole at 4.5 m west. 6 cm x 5 cm hole, 10 cm deep. The potential for use by roosting bats is **low**; no evidence of use.
- PRF 6. Knot hole at 5.5 m west. **Not accessible for inspection.**
- PRF 7. Hollow limb at 6.5 west. **Not accessible for inspection.**
- PRF 8. Rot hole at 8 m west. **Not accessible for inspection.**

4.6 T4 (Pedunculate Oak) had six PRFs as follows:

- PRF 1. Hollow limb at 2.5 m east. Limb with hollow which extends 20 cm into the trunk. Accessible through cracks along the length of the limb. Old bird nesting material, not in current use. The potential for use by roosting bats is low; no evidence of use.
- PRF 2. Limb rot at 3 m north. Limb with hollow accessed through narrow crack. The potential for use by roosting bats is **low**; no evidence of use.
- PRF 3. Flaking limb bark at 3.5 m south. Minor exposed crevices. **Negligible** roosting potential.
- PRF 4. Limb rot x 2 at 8 m east. **Not accessible for inspection.**
- PRF 5. Limb rot at 8 m south. **Not accessible for inspection.**
- PRF 6. Limb woodpecker hole 11 m south. **Not accessible for inspection.**

4.7 T5 (Pedunculate Oak) had three PRFs as follows:

- PRF 1. Trunk rot at 0 – 8 m, numerous cavities. Minor cavities extending up the edge of rot where bark has healed and overlapped. **Almost negligible** roosting potential.
- PRF 2. Hollow limb at 6 m north. Large opening into cavity which extends 30 cm down into the trunk and 1.2 m along the limb. Opening means it is relatively exposed; **moderate** potential for roosting but no evidence found after a full inspection.
- PRF 3. Woodpecker/squirrel hole at 6.5 northeast. 8 cm x 7 cm hole extending down into large cavity approximately 40 cm in height and 20 cm deep. Squirrel with young was present. **Almost negligible** roosting potential.
- PRF 4. Rot hole and hollow trunk at 7 m north. Significant trunk rot resulting in a cavity open to the top and side. Open and exposed; **almost negligible** roosting potential.

4.8 T6 (Pedunculate Oak) had seven PRFs as follows:

- PRF 1. Large rot hole in trunk at 3 m east. Large opening in the side of the trunk approximately 70 cm x 50 cm in size, which leads to a large hollow which extends approximately 1.2 m up into the trunk including side cavities that were beyond the reach of the endoscope. No evidence of bats but evidence would likely fall directly to the floor and quickly degrade; **high** potential for roosting.
- PRF 2. Split limb at 3.5 m east. Large split 10 cm wide extending for 1.5 m along an upward facing limb revealing a rotten interior. Main cavity too open and exposed for roosting bats but minor overhangs and internal crevices. The potential for use by roosting bats is **low**; no evidence of use.
- PRF 3. Rot hole at 4.5 m southeast. 8 cm diameter passing into large hollow, which extends downwards for 60 cm before apparently turning upwards. No evidence of bats but a full inspection was not possible. **High** potential for roosting.
- PRF 4. Rot hole at 10 m north. 10 cm diameter extending 8 cm into hollow trunk, which is snapped at the top. Open above so exposed cavity with **almost negligible** roosting potential.
- PRF 5. Rotten limb at 2 m south. Minor fissures and splits. **Almost negligible** roosting potential.
- PRF 6. Dead stem with flaking bark and rot hole at 6 m N. Cavities behind the edges of the bark but open to above. 8 cm x 5 cm rot hole into small cavity in the dead stem; The potential for use by roosting bats is **low**; no evidence of use.
- PRF 7. Split in trunk 4 m west. Minor split in the trunk. Relatively open and exposed. The potential for use by roosting bats is **low**; no evidence of use.

4.9 T7 (Dead) had a small number of PRFs as follows:

- PRF 1. Hollow trunk, open at the top but with flaking bark and rot fissures throughout. No evidence of bats using the flaking bark or rot fissures; hollow trunk completely open at the top. **Almost negligible** roosting potential.

4.10 T8 (Ash) had a small number of PRFs as follows:

- PRF 1. Trunk rot from 0 – 5 m, all aspects. No evidence of bats and **almost negligible** roosting potential.

4.11 T9 (Pedunculate Oak) had four PRFs as follows:

- PRF 1. Knot hole at 6 m northeast. 6 cm diameter hole extending 3 cm into the limb. **Almost negligible** roosting potential.
- PRF 2. Rot hole at 9 m northeast. 6 cm x 3 cm hole in the underside of a branch leading into a small void, 10 cm x 4 cm in size. The potential for use by roosting bats is **low**; no evidence of use.
- PRF 3. Snapped limb and flaking bark at 9 m north. Minor fissures. **Almost negligible** roosting potential.
- PRF 4. Snapped hollow limb 6 m N. 10 cm limb with hollow end extending 10 cm in. The potential for use by roosting bats is **low**; no evidence of use.

4.12 T10 (Pedunculate Oak) had four PRFs as follows:

- PRF 1. Knot hole at 6 m northeast. 10 cm diameter hole extending back into the trunk for 20 cm. **Moderate** potential for roosting but no evidence found after a full inspection
- PRF 2. Rot hole at 9 m northeast. Apparently 5 cm diameter minor hole but an aerial **inspection was not possible**.
- PRF 3. Snapped limb and flaking bark at 9 m north. Apparently minor crevices but an aerial **inspection was not possible**.
- PRF 4. Snapped hollow limb 6 m north. Minor void extending back into the limb. Fully inspected and no evidence of use by bats was recorded. The potential for use by roosting bats is **low**.

4.13 T11 (Pedunculate Oak) had one PRFs as follows:

- PRF 1. Knot hole at 8 m south. 15 cm x 5 cm hole but healed over leaving a small hole with 4 cm diameter. **Inspection was not possible**.

4.14 T12 (Pedunculate Oak) had three PRFs as follows:

- PRF 1. Flaking bark on limb at 4 – 5 m south. **Almost negligible** roosting potential.
- PRF 2. Dense epicormic growth at 2.5 m. Fully inspected and no evidence of use by bats was recorded. The potential for use by roosting bats is **low**.
- PRF 3. Snapped limb, splits, flaking bark at 8 m north. Minor crevices. **Almost negligible** roosting potential.

4.15 T13 (Pedunculate Oak) had three PRFs as follows:

- PRF 1. Snapped limb at 9 m south. Partially snapped, creating minor crevices within the limb. Fully inspected and no evidence of use by bats was recorded. The potential for use by roosting bats is **low**.
- PRF 2. Knot hole 6 m north. 5 cm diameter. Overhangs neighbours garden and could not be inspected. Likely **low/moderate** roosting potential.
- PRF 3. Woodpecker holes 7.5 m W. Three holes leading into a hollow limb extending into the limb for 10 cm down and 20 cm up. **Moderate** potential for roosting but no evidence found after a full inspection.

4.16 T14 (dead) had two PRFs as follows:

- PRF 1. Numerous minor rot holes at 1.5 – 5 m east. Decay and woodpecker attention has created minor holes of with **almost negligible** roosting potential.
- PRF 2. Woodpecker hole at 4 m E. 70 mm diameter tapering into the trunk to a depth of 80 mm. The potential for use by roosting bats is **low**; no evidence of use.

4.17 T15 (Pedunculate Oak) had two PRFs as follows:

- PRF 1. Spilt in limb at 5 m northwest. Split 0.6 m long extending 100 mm into the limb at its deepest point. Relatively open and exposed and the potential for use by roosting bats is **low**; no evidence of use.

- PRF 2. Rot in limb stump at 6 m SE. Does not extend into the tree. Minor crevices with **almost negligible** roosting potential.

4.18 T16 (Pedunculate Oak) had one PRF as follows:

- PRF1. Minor cavities in open hollow trunk at 2 m southeast. Entire side of the trunk split away leaving exposed interior. Too exposed for roosting bats and minor cavities offer minimal shelter of **almost negligible** roosting potential.

4.19 T17 (Pedunculate Oak) had a number of PRFs as follows:

- PRF 1. Rot hole at 8 m southeast. **Not accessible for inspection.**
- PRF 2. Knot hole at 7 m south. 50 mm diameter extending 100 mm into the trunk. The potential for use by roosting bats is **low**; no evidence of use
- PRF 3. Knot hole at 2.5 m south. 50 mm diameter extending 80 mm into the trunk and 50 mm down. The potential for use by roosting bats is **low**; no evidence of use.
- PRF 4. Snapped limb rot at 7.75 m south. **Not accessible for inspection.**
- PRF 5. Rot hole at 7.5 m E. **Not accessible for inspection.**
- PRF 6. Knot hole at 6 m E. **Not accessible for inspection.**

4.20 T18 (Hawthorn) had two PRFs as follows:

- PRF 1. Bird box at 1.5 m south. **Low** potential for use by bats but no evidence of use by bats after a full inspection.
- PRF 2. Two bat boxes at 3 m southwest. **Low to moderate** potential for use by bats but no evidence of use by bats after a full inspection.

4.21 T19 (Sycamore) had three PRFs as follows:

- PRF 1. Bat box at 6 m south. **Low to moderate** potential for use by bats but no evidence of use by bats after a full inspection.
- PRF 2. Bat box at 6 m west. **Low to moderate** potential for use by bats but no evidence of use by bats after a full inspection.
- PRF 3. Bat box at 6 m NW. **Low to moderate** potential for use by bats but no evidence of use by bats after a full inspection.

Table 2. PRF Inspection Survey Results Summary

Tree No.	Species	Roosting Potential	Emergence and Re-entry Surveys?	Rationale
1	Pedunculate Oak	Moderate	YES	Moderate potential features that could not be fully inspected.
2	Pedunculate Oak	Moderate	NO	One feature of moderate potential but fully inspected in optimal period; no evidence of bats. Remaining features were low potential.
3	Pedunculate Oak	Moderate	YES	Five features likely to be of at least moderate potential that could not be inspected.
4	Pedunculate Oak	Unknown (moderate)	YES	Three features that could not be inspected, one of which is likely to be of moderate potential.
5	Pedunculate Oak	Moderate	NO	One feature of moderate potential but fully inspected in optimal period; no evidence of bats. Remaining features were low potential or used by breeding squirrels.
6	Pedunculate Oak	High	YES	High potential features that could not be fully inspected
7	Dead (2.5 m trunk only)	Low	NO	Features of almost negligible roosting potential; no evidence of use.
8	Ash	Low	NO	Features of almost negligible roosting potential; no evidence of use.
9	Pedunculate Oak	Low	NO	Features of low and almost negligible potential; no evidence of use.
10	Pedunculate Oak (off site but overhangs the boundary)	Unknown (moderate)	YES	Two features that could not be inspected.
11	Pedunculate Oak	Unknown (moderate)	YES	One feature that could not be inspected.
12	Pedunculate Oak	Low	NO	Features of low and almost negligible potential; no evidence of use.
13	Pedunculate Oak	Unknown (moderate)	YES	One feature likely to be of low to moderate roosting potential that could not be inspected.
14	Dead (5 m trunk only)	Low	NO	Features of low and almost negligible potential; no evidence of use.
15	Pedunculate Oak	Low	NO	Features of low and almost negligible potential; no evidence of use.
16	Pedunculate Oak	Low	NO	Features of low and almost negligible potential; no evidence of use.
17	Pedunculate Oak	Unknown (moderate)	YES	Four features that could not be inspected but likely to be of moderate potential.
18	Hawthorn	Low/moderate	NO	Features of moderate/low potential but fully inspected in optimal period; no evidence of bats.
19	Sycamore	Low/moderate	NO	Features of moderate/low potential but fully inspected in optimal period; no evidence of bats.

Dusk Emergence and Pre-dawn Re-entry Survey Results

4.22 A total of eight trees had features that could not be fully inspected. These were T1, T3, T4, T6, T10, T11, T13, T17. These were therefore subject to dusk emergence and pre-dawn re-entry surveys with T6 subject to an additional dusk survey in order to characterise a discovered roost.

Dusk Surveys

4.23 Each tree was initially subject to a dusk emergence survey. These took place on the 14th, 15th and 16th June 2017. No bats were recorded emerging from or entering any of the trees during the surveys.

Dawn Surveys

4.24 Each tree was subject to a pre-dawn re-entry survey, which took place on the 26th, 27th and 30th June 2017. **A single Common Pipistrelle was recorded entering PRF 1 on T6** at 39 minutes before sunrise on the 27th June 2017; this appeared to arrive from the north. No other bats were recorded entering any other features on the trees.

Dusk Surveys

4.25 An additional dusk survey was carried out on T6 in order to characterise the roost on the 3rd of July 2017. No bats were recorded emerging from or entering any of the potential roosting features on this tree during the survey.

4.26 Incidental recordings were made of the following species during the surveys:

- Common Pipistrelle
- Noctule
- Myotis sp
- Long-eared
- Lesser Horseshoe

4.27 The majority of the activity was that of sporadic foraging by Common Pipistrelles. Occasional recordings of Noctule were early in the dusk surveys of bats apparently commuting overhead. Recordings of Myotis sp, long-eared and Lesser Horseshoe were rare and were limited to brief recordings late in the dusk surveys.

Weather Conditions

4.28 The following table presents the sunset time, and weather conditions encountered during the surveys.

Date	Temperature (°C)	Sunset/Sunrise Times	Wind	Cloud Cover (%)
06/02/17	9	n/a	Light	40

10/05/17	14	n/a	Light	100
17/05/17	16	n/a	Light	60
14/06/17 (dusk)	26-23	21:29	None	20
15/06/17 (dusk)	21-19	21:29	Light	40
16/06/17 (dusk)	20-18	21:30	Light	40
26/06/17 (dawn)	16-15	04:50	None	50
27/06/17 (dawn)	14	04:51	None	60
30/06/17 (dawn)	14	04:53	None	30
03/07/17 (dusk)	20-19	21:30	Light	40

5.0 Evaluation

- 5.1 T6 supports a roost used by a Common Pipistrelle. This was recorded in PRF 1, which is a large cavity which extends up into the tree, during the dawn survey. The average size of a Common Pipistrelle maternity roost is around 75 bats (BCT, 2010), and although bats of many species have been recorded giving birth to young alone or in smaller groups, the use of this roost by a single individual, which was not recorded during the preceding dusk survey or the subsequent dusk survey, indicates it is an occasional day roost. These type of roost, used by a common species can be classified as being of **low conservation significance** (Mitchell-Jones, 2004).
- 5.2 No evidence of roosting bats was found in the remaining trees and no bats were recorded emerging or entering PRFs during the dusk and dawn surveys.
- 5.3 T7, T8, T9, T12, T14, T15, T16 all had PRFs although the majority were minor features such as small knot or rot holes, which were classed as being of low to negligible potential for roosting bats.
- 5.4 T2, T5, T18 and T19 all had features regarded as being of moderate potential. These were fully inspected and no evidence of bats was found. It is difficult to conclusively determine that PRFs are not used by bats due to switching behaviour and the short time that evidence of presence such as droppings may persist in trees. However, the nature of the PRFs that were inspected, which were dry and free of invertebrates, means that an absence of bats at the time of the survey was determined with a high level of confidence and they were not subject to dusk and dawn surveys. The potential for use in the future is moderate.
- 5.5 T1, T3, T4, T10, T11, T13 and T17 all had features of moderate potential, which could not be inspected. The subsequent dusk and dawn surveys did not record any roosting bats and the absence of bats at the time of the surveys was determined with a high level of confidence; however, it is possible that bats could roost at other times or could roost in the future.
- 5.6 The species of bat recorded foraging on site and in the surrounding area during the surveys were not unexpected given the location of the site. The apparently low level of activity would usually be unexpected but this is similar to the findings of a number of activity surveys completed to date on site. A final assessment of bat activity will be made once the activity surveys are complete and presented in a separate report.

6.0 Impacts and Recommendations

Impacts

- 6.1 The site is the subject of a planning application for a new housing development of approximately 100 new dwellings with associated gardens, driveways and a new access road. A number of trees will require removal as part of the landscape plan and development layout proposed for the site.
- 6.2 The following potential impacts have therefore been identified:
- Removal of T3, T4, T5, T11, T18 and T19, and possible pruning back of T10 resulting in the loss of PRFs regarded as being of moderate potential. No evidence of use by roosting bats but moderate potential for use in the future.
 - Retention T6 which contains a known bat roost. Potential for disturbance of roosting bats from nearby works or tree surgery works.
 - Removal of T7, T8, T9 and T16 which have PRFs of low or negligible potential from which it has been concluded that roosting bats are absent. No direct impacts to roosting bats predicted.

Further surveys

- 6.3 No further surveys are required at this time. Sufficient survey work has been carried out to establish the nature of the roost present and the absence of roosting bats from the other trees with a reasonable level of confidence and in accordance with the Bat Conservation Trust – Bat Surveys for Professional Ecologists: Good Practice Guidelines. 3rd Ed (Collins, 2016).
- 6.4 Repeat surveys would only be required if the planning application or the proposed tree removals were delayed by one year or more in order to confirm that the statuses of the trees are the same as that described in this report.

Legal compliance

- 6.5 The Wildlife and Countryside Act 1981 as amended by The CROW Act 2000 and The Conservation of Habitats and Species Regulations 2010 makes it illegal to recklessly damage, destroy or obstruct access to any place that a wild bat uses for shelter or protection, whether the bat is occupying the shelter at the time or not.
- 6.6 Licences to permit the above for the purposes of development must be obtained from Natural England. To gain a licence the scheme must have been issued with detailed planning permission and must not result in a loss of conservation status of the species concerned. In this instance, a licence from Natural England would only be required should works to T6 result in the loss of the roosting site, or if bats are subsequently found during the recommended pre-works checks, or subsequent works.

Provision for bats

- 6.7 The removal of T3, T4, T5 and T11, will result in the loss of PRFs regarded as being of moderate suitability. These features should be inspected or subject to a pre-commencement dawn survey prior to felling in order to confirm that roosting bats are absent.
- 6.8 The removal of T18 and T19 would result in loss of trees that currently have bat boxes installed. It has been concluded that roosting bats are not using these boxes and it recommended that they be removed and installed on retained trees elsewhere on site in more suitable locations to increase the likelihood of colonisation.
- 6.9 The removal of T7, T8, T9 and T16 will result in the loss of PRFs of low and negligible suitability for bats and from which it has been concluded that roosting bats are absent. As a precaution, it is recommended that these trees be 'soft felled'. This is a generic term used to describe more cautious felling approaches, using lowering and cushioning techniques to reduce the impact of falling limbs, which could have bats within the cavities. Limbs with cavities should be left at the base of the tree for 24 hours before removal from the site.
- 6.10 The tree containing the roost will be retained and no works are proposed at this time. No provision for roosting bats is legally required. However, in order to compensate for the loss of the PRFs of moderate suitability, or PRFs of low and negligible suitability which could eventually develop into features of higher potential, and to generally enhance the development for bats, it is proposed that a number of bat tubes be installed on the new buildings and bat boxes on trees (see Plan 3). Bats are very particular about the internal conditions of bat boxes, so by providing several bat boxes with different aspects creates differences in temperature, humidity etc. thereby increasing the chance of colonisation.

Timing of works

- 6.11 There are no constraints with respect to the timing of works for the trees where it has been concluded that bats are absent although the felling of the trees from March to August should be preceded by a nesting bird survey. If any active nests are discovered, then the nest and surrounding habitat must be left undisturbed until the young have fledged.

Care and vigilance during works

- 6.12 It has been recommended that T3, T4, T5 and T11 be subject to pre-works surveys or detailed checks by a licensed ecologist immediately prior to felling to confirm absence. Due to the low and negligible suitability of the PRFs on the remaining trees, no pre-works surveys or detailed checks by a licensed ecologist are proposed. When removing these trees, the contractor should be advised that care and vigilance should be used when carrying out the works. The following procedures should be employed in the unlikely event a bat or bats are discovered.
- If the roost is still on the tree and bats are not injured, seek advice from a licensed ecologist. If help is not available, allow bats to fly out of harm's way.
 - If the timber is felled, the roost is not exposed and the bats are not injured, temporarily seal and isolate the roost and seek advice from a licensed ecologist. If advice is not readily available, position the roost off the ground, re-open it and allow bats to relocate of their own accord.

- If the roost has been exposed, and especially if bats have been injured, collect bats in a secure box or bag (using a glove) and contact a licensed ecologist.
- Note the date, locality, type of tree, situation in tree and bat species if known.

7.0 References

Collins (2016). *Bat Surveys for Professional Ecologists: Good Practice Guidelines*. 3rd Ed. The Bat Conservation Trust: London.

The Conservation of Habitats and Species Regulations 2010, SI 2010/490

The Conservation (Natural Habitats, &c.) (Amendment) Regulations 2007, SI 2007/1843, London: HMSO.

JNCC (2016). *UK BAP Priority Species*. [Online]. Available at: <http://jncc.defra.gov.uk/page-5717> [accessed on 6th July 2016]

Mitchell-Jones, A.J. (2004). *The Bat Mitigation Guidelines*. English Nature: Peterborough.

Countryside and Rights of Way Act 2000, (c.37), London: HMSO.

Wildlife and Countryside Act 1981 (and amendments), (c.69), London: HMSO

8.0 Photographs

T1



Photograph 1: T1 (Oak).



Photograph 2: T1 - PRF 1.

T2



Photograph 3: T2 (Oak).



Photograph 4: T2 - PRF 1.



Photograph 5: T2 - PRF 2.

T3



Photograph 6: T3 (Oak).



Photograph 7: T3 – PRF 1.



Photograph 8: T3 – PRF 3.

T4



Photograph 9: T4 (Oak).



Photograph 10: T4 – PRF 1.



Photograph 11: T4 – PRF 2.

T5



Photograph 12: T5 (Oak).



Photograph 13: T5 – PRF 5 Squirrel drey.



Photograph 14: T5 – PRF 2.

T6



Photograph 15: T6 (Oak).



Photograph 16: T6 – PRF 3.



Photograph 17: T6 – PRF 1, confirmed Common Pipistrelle day roost..

T7



Photograph 18: T7 (dead).



Photograph 19: T7 - PRF 1.



Photograph 20: T7 - PRF 1.

T8



Photograph 21: T8 (Ash).



Photograph 22: T8 – PRF 1.



Photograph 23: T8 – PRF 1.

T9



Photograph 24: T9 (Oak).



Photograph 25: T9 - PRF 2.



Photograph 26: T9 - PRF 3.

T10



Photograph 27: T10 (Oak) - PRF 1.



Photograph 28: T10 - PRF 3.

T11



Photograph 29: T11 (Oak)



Photograph 30: T11 – PRF 1.

T12



Photograph 31: T12 (Oak).



Photograph 32: T12 – PRF 3.

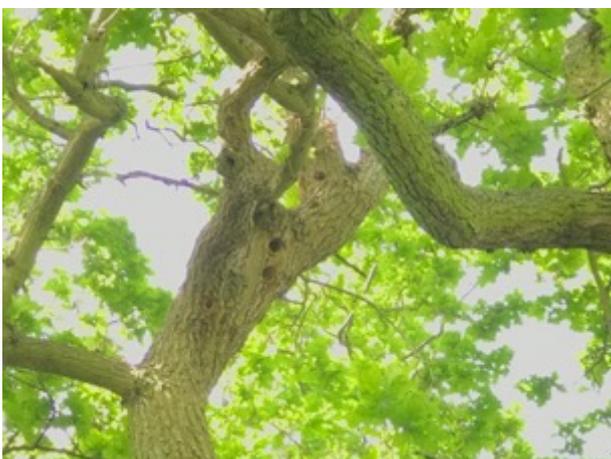
T13



Photograph 33: T13 (Oak)



Photograph 34: T13 – PRF 2.



Photograph 35: T13 – PRF 3.

T14



Photograph 36: T14 (dead).



Photograph 37: T14 – PRF 2.



Photograph 38: T14 – PRF 1.

T15



Photograph 39: T15 (Oak).



Photograph 40: T15 - PRF 1.



Photograph 41: T15 - PRF 2.

T16



Photograph 42: T16 (Oak).



Photograph 43: T16 – PRF 1.

T17



Photograph 44: T17 (Oak)



Photograph 45: T17 - PRF 3.



Photograph 46: T17 - PRF 4.

T18



Photograph 47: T18 (Sycamore).



Photograph 48: T18 – Bat boxes – no evidence of use.



Photograph 49: T18 Bat boxes – no evidence of use.

T19



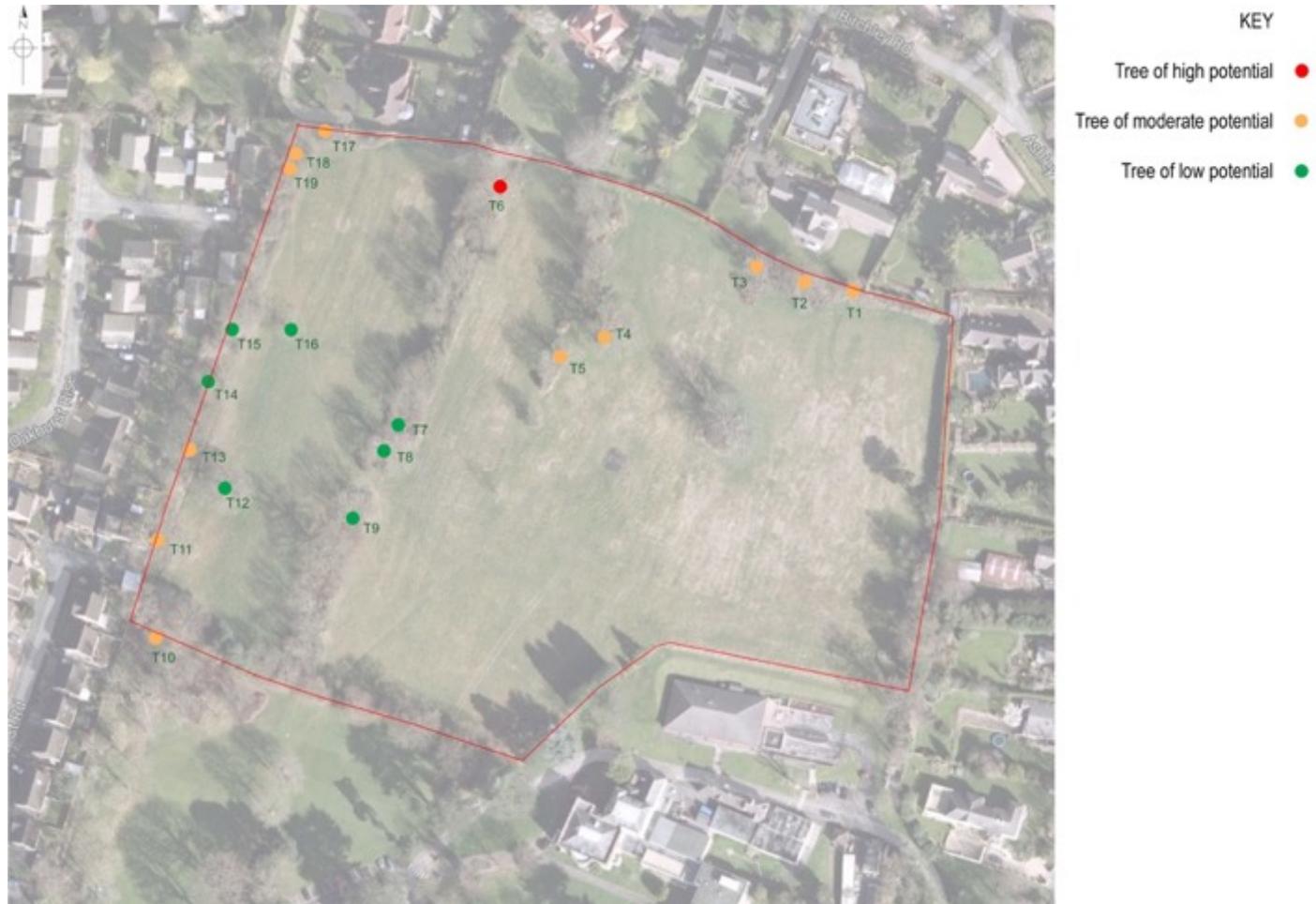
Photograph 50: T19 (Hawthorn).



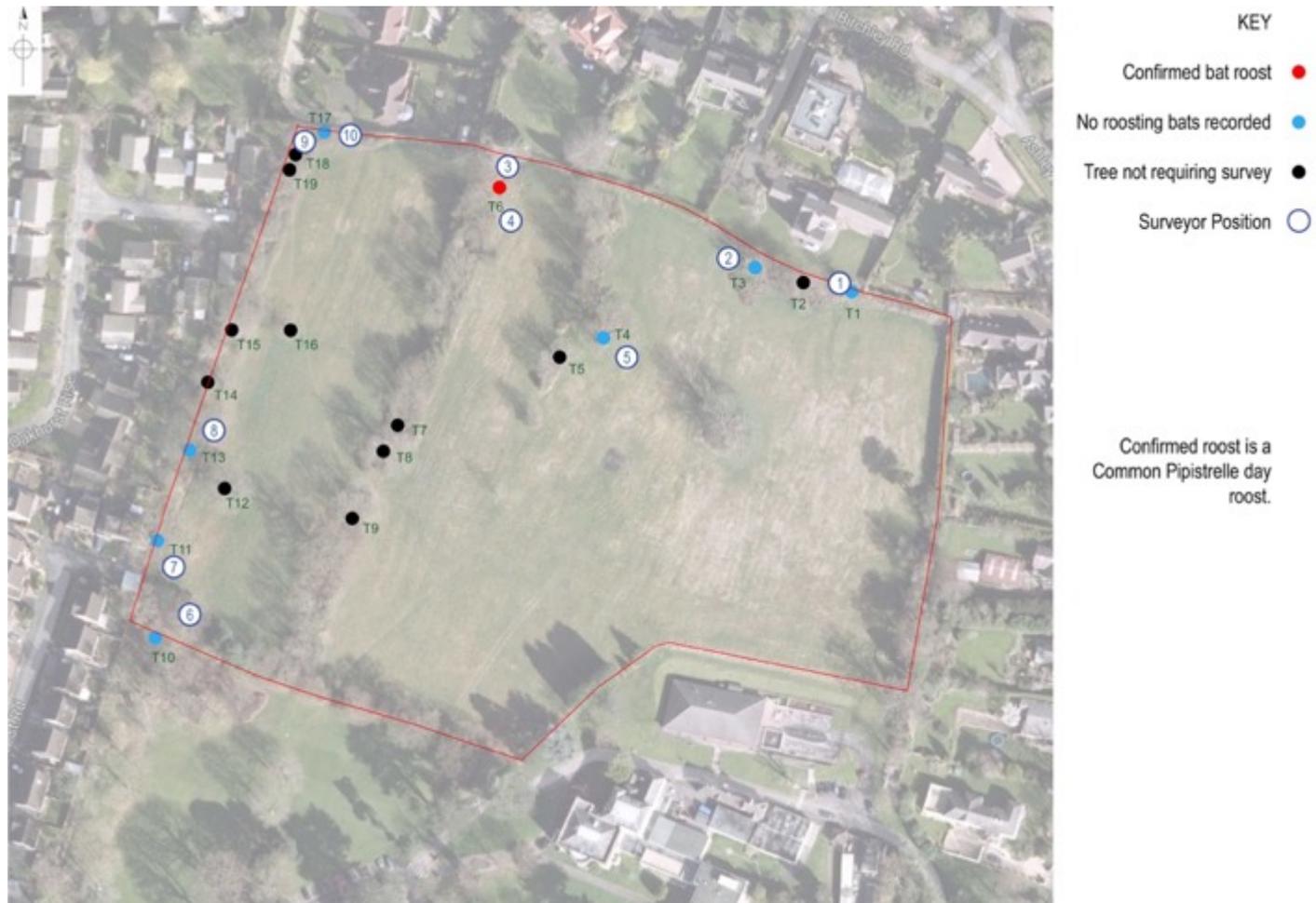
Photograph 51: T19 - Bat boxes – no evidence of use.

9.0 Plans

Plan 1 - Tree Inspection Survey Results



Plan 2 - Dusk Emergence and Pre-dawn Re-entry Survey Results



Plan 3 - Proposed Mitigation

