# 1MC04 Main Works - Contract Lot S2

# Species Report - Ruislip Golf Course S2

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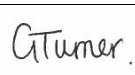
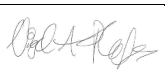
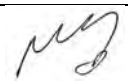
| |  |  |  | | | |

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# Contents

# Executive Summary

1.1.1 This Species Report is prepared by Ove Arup & Partners Ltd (Arup) on behalf of High Speed Two Ltd. (HS2), to provide the methodology and results of ecology surveys undertaken to support the planning application for Ruislip Golf Course, London, which is hereafter referred to as the 'site'. The Proposed Scheme will reconfigure the course to accommodate the loss of land caused by the construction and operation of HS2 to the south of the site, and the subsequent safety buffer zone required.

1.1.2 This report documents the results of further surveys that are recommended in the Preliminary Ecological Appraisal Report, prepared by Arup, which were undertaken to inform the baseline conditions for the ecology chapter of the Environmental Statement. Ecological surveys were undertaken by the HS2 Phase 1 Early Works Contractors (EWC) and Arup ecologists throughout 2017, 2018 and 2019. This comprised surveys for bats, otter *Lutra lutra*, water vole, badger *Meles meles*, breeding birds, reptiles, great crested newt *Triturus cristatus*, terrestrial invertebrates and plants.

1.1.3 The site supports trees with bat potential, predominantly in bands of semi-natural broadleaved woodland. A confirmed roost was recorded within the fairway, which can be retained as part of the Proposed Scheme. However, six trees supporting potential roosts have been identified that will need to be removed. The site also provides foraging and commuting habitat for bats, mainly common pipistrelle *Pipistrellus pipistrellus* and soprano pipistrelle *Pipistrellus pygmaeus*, although rarer species were recorded, including Nathusius' pipistrelle *Pipistrellus nathusii*, Leisler's bat *Nyctalus leisleri* and serotine *Eptesicus serotinus*. A main badger sett was recorded within the site, which can be retained and protected. Few badger signs were recorded across the site, indicating that the site does not form an important part of their territory. No signs of water vole *Arvicola amphibius* or European otter *Lutra lutra* were recorded along the River Pinn.

1.1.4 The most significant bird species present and thought to be breeding within the site are willow warbler *Phylloscopus trochilus*, song thrush *Turdus philomelos* and mistle thrush *Turdus viscivorus*. Great crested newt *Triturus cristatus* was recorded breeding in a pond within the golf course but outside the site boundary in the southwest corner by the railway line. A medium population of great crested newts was translocated from this pond to the pond in the middle of the golf course in March 2020 following enhancements to the pond and surrounding terrestrial habitat. A small population of slow worm *Anguis fragilis* was recorded in marshy grassland and scrub along the River Pinn and the woodland edges along and beyond the southern boundary of the site. A single record of a gravid common lizard *Zootoca vivipara* outside the site boundary indicates a breeding population in the woodland strip to the south of the golf course. The flower-rich marshy grassland and tall ruderal habitat types alongside the River Pinn were found to support a diverse assemblage of terrestrial invertebrates of mainly common species, although two nationally scarce species Roesel's bush-cricket *Metrioptera roeselii* and hornet hoverfly *Volucella zonaria* were also recorded.

1.1.5 Further great crested newtsurveys are recommended to inform the mitigation strategy. The proposed pond should be created and planted at least a year prior to the commencement of works impacting great crested newts. Great crested newts would be translocated from pond 4 and suitable terrestrial habitat to the new proposed pond within the site. A mitigation strategy would be devised and a method statement prepared. Precautionary measures are required during works to trees with potential to support roosting bats. Lighting for the driving range should be designed to minimise disturbance to foraging and commuting bats. A pre-commencement survey for otter and water vole is recommended to confirm the likely absence of these species. No heavy machinery will be permitted within 30m of any badger sett entrances and a suitably qualified ecologist should be consulted on any proposed works within this buffer. Clearance and construction activities should ideally be undertaken outside the main bird breeding season (March to August inclusive). If this is not possible, pre-clearance nesting checks will be required. During ground preparation, sensitive clearance should be undertaken under an ecological watching brief between March and October to avoid harm to slow worm, common lizard and great crested newt. Flower-rich marshy grassland and tall ruderal vegetation near the River Pinn and mature pedunculate oaks and deadwood (standing and fallen) should be protected.

1.1.6 There is significant potential to enhance the site for biodiversity, including through the provision of interconnecting habitat for birds, bats, badger, great crested newt, reptiles and invertebrates including potential breeding ponds, rough grassland with refugia such as log piles, scrub and woodland with understorey and field layers.

# 2 Introduction

## 2.1 Context

2.1.1 This Species Report is prepared by Ove Arup & Partners Ltd (Arup) on behalf of High Speed Two Ltd. (HS2), to provide the results of ecology surveys undertaken to support the planning application for Ruislip Golf Course, London, which is hereafter referred to as the 'site'.

2.1.2 The site, shown in Figure 1, is located within a suburban environment in the London Borough of Hillingdon, surrounded by houses, fields and woodland. The Chiltern Mainline railway is located to the south of the site and the River Pinn is located along the northern border. The Proposed Scheme will reconfigure the course to accommodate the loss of land caused by the construction and operation of HS2 to the south of the site, and the subsequent safety buffer zone required.

2.1.3 A Preliminary Ecological Appraisal (PEA) Report[1], prepared by Arup, outlines the results of a desk study and field survey which maps habitats and identifies potential for protected and notable species. This report documents the results of further surveys that are recommended in the PEA Report, which were undertaken to inform the baseline conditions for the Ecological Impact Assessment (EcIA). The ecology chapter summarises and assesses the findings of this report and the PEA.

## 2.2 Scope of Work and Objectives

2.2.1 The purpose of this report is to inform the EcIA, including the site baseline conditions, impact assessment, requirements for mitigation following the 'Mitigation Hierarchy' and opportunities for enhancement. As part of this process, the results of surveys have informed master-planning, to allow significant ecological effects to be avoided or minimised wherever possible.

## 2.3 Relevant Legislative and Biodiversity Context

2.3.1 This section summarises the legislation and biodiversity context relevant to protected and notable species assessed in this report.

### Bats

2.3.2 The Conservation of Habitats and Species Regulations 2017[2] (Habitats and Species Regulations) provides protection for European Protected Species (EPS) and their habitats, including bats. The Wildlife and Countryside Act 1981[3] (as amended) (WCA) and the Habitats and Species Regulations 2017 make it an offence to:

[1] Ove Arup and Partners (2018); 'Preliminary Ecological Appraisal Report.'
[2] HMSO, (2017); 'The Conservation of Habitats and Species Regulations 2017.'
[3] Her Majesties Stationary Office (HMSO) (1981); 'The Wildlife and Countryside Act 1981.'

- Intentionally or recklessly capture, kill or injure bats;
- Deliberately disturb bats (including when they are outside their roosts) or intentionally or recklessly disturb roosting bats; and
- Damage or destroy their roosts or intentionally or recklessly obstruct access to their roosts (whether bats are present or not).

2.3.3 Under the Habitats and Species Regulations, disturbance includes in particular any disturbance which is likely to impair their ability to survive; breed or reproduce; rear or nurture their young; or hibernate or to affect significantly the local distribution or abundance of the species.

2.3.4 Some bat species are also listed under relevant Biodiversity Action Plans (BAP), which identify priorities for conservation as required under the Convention on Biological Diversity in 1992[4]. The UK BAP[5] is relevant in the context of Section 40 of the Natural Environment and Rural Communities (NERC) Act 2006[6], meaning that Priority Species and Habitats are material considerations in planning. Priority Species under the former UK BAP of relevance to this report includes noctule *Nyctalus noctula*, soprano pipistrelle *Pipistrellus pygmaeus* and brown long-eared bat *Plecotus auritus*. The London BAP[7] includes Species Action Plans (SAPs) aiming to conserve and where possible increase the population and distribution of certain species, including bats.

2.3.5 The NERC Act 2006 puts an obligation on public authorities to have regard for the conservation of species and habitats of principal importance for the purpose of conserving biodiversity under Section 41. The above species are also on the Section 41 list.

### Otter

2.3.6 Schedule 5 of the WCA and the Habitats and Species Regulations make it illegal to intentionally or deliberately capture, kill, disturb or injure European otter *Lutra lutra*, intentionally or recklessly damage, destroy or obstruct access to their resting or sheltering places. Otter is on the Section 41 list and is a London priority species.

### Water Vole

2.3.7 Schedule 5 of the WCA makes it illegal to capture, kill, disturb or injure water vole *Arvicola amphibius*, damage or destroy places of shelter or protection (i.e., burrow systems) and obstruct access to such places. Water vole is on the Section 41 list and there is also an SAP for water vole under the London BAP.

[4] United Nations (UN), (1992); 'Convention on Biological Diversity.'
[5] UK Biodiversity Partnership (2011); 'UK Biodiversity Action Plan.'
[6] HMSO (2006); 'Natural Environment and Rural Communities Act.'
[7] Greenspace Information for Greater London, (2018); 'London's Biodiversity Action Plan.'

## Badger

2.3.8 The Protection of Badgers Act 1992[8] makes it an offence to wilfully kill, take, possess or cruelly ill-treat a badger *Meles meles*, or attempt to do so; interfere with a sett by damaging or destroying it; obstruct access to, or any entrance of, a badger sett; or disturb a badger when it is occupying a sett.

## Wild Mammals

2.3.9 The Wild Mammals (Protection) Act 1996[9] makes it an offence to intentionally cause wild mammals any unnecessary suffering by certain methods, including crushing and asphyxiation.

## Birds

2.3.10 The WCA comprises the primary means of protecting wildlife in the UK, including all wild birds and their nests making it illegal to take, kill or injure a wild bird and to take, damage or destroy the nest or eggs of a wild bird. The WCA also makes it illegal to intentionally disturb any wild bird listed in Schedule 1 of the Act while it is building a nest or is in, or near a nest containing eggs or young or to disturb the dependent young.

2.3.11 The Section 41 list includes song thrush *Turdus philomelos* and dunnock *Prunella modularis*. The Birds of Conservation Concern10 places birds on one of three lists indicating their level of conservation concern. Seven species recorded within 2km of the site are on the Red List (highest level).

## Reptiles

2.3.12 Common lizard *Zootoca vivipara*, slow worm *Anguis fragilis* and grass snake *Natrix natrix* are listed on Schedule 5 of the WCA, which makes it illegal to deliberately or recklessly injure or kill these species. These species are listed under the former UK BAP and are on the Section 41 list of species of principal importance in conserving biodiversity. There is also an SAP for reptiles under the London BAP.

## Amphibians

2.3.13 Great crested newt *Triturus cristatus* is fully protected under the WCA and Habitats and Species Regulations, which together make it an offence to:

- Intentionally or recklessly capture, kill, injure or disturb great crested newts; and
- Damage or destroy a breeding site or resting place for great crested newt or intentionally or recklessly obstruct access to any structure or place used for shelter or protection.

[8] HMSO (1992); 'Protection of Badgers Act 1992 (c. 51).'
[9] HMSO (1996); 'Wild Mammals (Protection) Act 1996.'
[10] Eaton *et al.* (2015); 'Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man.' British Birds 108, 708–746.

2.3.14 Under the Habitats and Species Regulations, disturbance includes in particular any disturbance which is likely to impair their ability to survive; breed or reproduce; rear or nurture their young; or hibernate or to affect significantly the local distribution or abundance of the species. This species is also listed under the former UK BAP and on the Section 41 list of species of principal importance in conserving biodiversity.

2.3.15 Common amphibians, including common toad *Bufo bufo*, common frog *Rana temporaria* and smooth newt *Lissotriton vulgaris*, are only protected from sale under the WCA. Common toad is also listed under the former UK BAP and is on the Section 41 list of species of principal importance in conserving biodiversity.

## Invertebrates

2.3.16 British Red Data Book (RDB)[11] species that are either nationally rare or are of international nature conservation importance are allocated into one of three categories RDB1: Endangered, RDB2: Vulnerable and RDB3: Rare. Nationally scarce (Notable) species are those that have been recorded in 16 to 100 10km squares and is further subdivided into Notable A (16 to 30 10km squares) and Notable B (31 to 100 10km squares)[12].

## Plants

2.3.17 Part 2 of Schedule 9 of the WCA lists invasive non-native species which make it illegal to plant or otherwise cause to grow in the wild, species on this list including giant hogweed *Heracleum mantegazzianum* and Himalayan balsam *Impatiens glandulifera.*

2.3.18 The Vascular Plant Red Data List for Great Britain[13] assesses all vascular plants in the UK using the International Union for Conservation of Nature criteria and will be used to inform future priority setting in the BAP process.

[11] Bratton (1991); 'Red Data Book of British Invertebrates.'
[12] Hyman (revised Parsons) (1992); 'A review of the scarce and threatened Coleoptera of Great Britain. Part 1. UK Nature Conservation: 3.' Joint Nature Conservation Committee, Peterborough.
[13] Cheffings *et al.* (2005); 'The Vascular Plant Red Data List for Great Britain. Species Status 7: 1-116.' Joint Nature Conservation Committee, Peterborough.

# 3 Methods

## 3.1 Bat Surveys

3.1.1 Bat surveys were conducted by the HS2 Phase 1 Early Works Contractor (EWC) and Arup surveyors in accordance with the HS2 Ecological Field Survey Methods and Standards[14] (FSMS) and Bat Surveys: Good Practice Guidelines 3rd Edition[15].

### Bat Scoping

3.1.2 Bat scoping surveys were carried out by the EWC on 7, 13 and 19 July 2017. Binoculars and torches were used to inspect the canopy of the trees for evidence of features that may be used by bats, with each feature graded based on its potential to support roosting bats as identified in Table 1.

Table 1. Criteria for assessing bat potential

| Potential to Support Roosting Bats | Description |
|---|---|
| Confirmed | A tree within which bats are seen to be present (either live bats, or bat carcasses) or heard 'chattering' will be classified as a confirmed roost. In addition, any feature/structure found to contain droppings during inspections will in the first instance be considered as a confirmed roost. |
| High | A tree which, due to its size, depth, shape, orientation or other physical properties (such as ability to maintain a constant temperature, accessibility for bats) is considered to be ideal for use by bats in larger numbers and on a more regular basis and potentially for longer periods of time. Potential feeding remains, urine staining or scratch marks (in the absence of droppings) within or around the feature are likely to indicate presence of bat occupation and therefore suggest high potential that a roost is present. In the absence of such signs, assigning a feature high potential will also be informed by the surveyor's knowledge of bat ecology and preferred roost types (relative to the feature being assessed). The quality of the surrounding habitat for bats will also be considered. |
| Moderate | A tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status. A feature/structure that would be ideal for bats but where other factors such as sub-optimal habitat limit the potential to be used by bats. |
| Low | A tree containing features where opportunistic use by individual bats cannot be ruled out but where the roost sites are of limited potential as they do not provide enough space, shelter, protection, appropriate conditions (e.g. temperature, humidity, light levels or disturbance) and/or lack suitable surrounding habitat to be used on a regular basis or by larger numbers of bats. |
| Negligible | A tree which is considered to lack any features suitable for use by roosting bats. |

[14] Department for Transport, (2013); 'London-West Midlands Environmental Statement. Volume 5 Technical Appendices. Scope and Methodology Report (CT-001-000/1).'
[15] Collins, J. (Ed) 2016. 'Bat surveys for professional ecologists: good practice guidelines (3rd Edition).' Bat Conservation Trust, London.

## Climb-and-Inspect Survey (Trees)

3.1.3 Climb-and-inspect surveys were undertaken on moderate and high potential trees that could not be inspected fully from the ground by suitably qualified EWC surveyors on 31 March and 7, 8, 9 and 11 August 2017 and 18 and 25 September 2018. On 6 May 2019, suitably qualified surveyors from Sylvatica Ecology Limited conducted additional climb-and-inspect surveys on trees with moderate or high potential to support roosting bats that would be impacted by the Proposed Scheme, unless these trees had been subject to climb-and-inspect surveys within the last two years.

3.1.4 The initial gradings of each feature were reviewed and re-graded where necessary according to Table 1. Where evidence of bats was confirmed or where features could not be investigated in full, emergence/re-entry surveys were required. Features assessed to have a low or negligible potential to support roosting bats (following inspection and re-grading) were scoped out of further survey work.

## Bat Back Tracking Surveys

3.1.5 Dusk and dawn back tracking surveys were conducted in the northwest part of the site in July 2017 by the EWC on areas where a group of trees with multiple moderate and high PRF's. A perimeter was established around the group of trees with surveyors spaced at intervals at no greater than 50m apart. Surveyors back tracked any commuting bats to potential roosts.

3.1.6 The dusk surveys started 15 minutes before sunset until it was too dark to observe bats and the dawn surveys started two hours before sunrise and ceased at sunrise.

3.1.7 Details regarding bat emergence and re-entry and back tracking surveys conducted by the EWC are outlined in Table 2.

## Dusk Emergence and Pre-dawn Re-entry Surveys

3.1.8 One dusk emergence and one pre-dawn re-entry survey were carried by the EWC out on trees 22, 41 and 48 (previously named F031, F046 and F050 respectively) on 14 and 29 June 2018. Dusk emergence and pre-dawn re-entry surveys were also carried out by Arup ecologists on trees 41 and 51. The surveys on each tree were undertaken a minimum of two weeks apart.

3.1.9 Evening emergence surveys were undertaken 15 minutes before sunset until two hours after sunset; and pre-dawn re-entry surveys undertaken from two hours before sunrise until sunrise. When bats were still active after sunrise, the survey was extended a further 15 minutes after sunrise.

3.1.10 Surveyors were positioned in sufficient numbers so that all potential roost features (PRF) could be seen by at least one surveyor. Surveyors used echolocation detectors which produced recordings in .WAV format thus allowing calls to be analysed in suitable sound analysis software.

3.1.11 A record of the number of bat passes of each species was made together with additional information including direction of flight, emergence/re-entry point and activity. All recordings were analysed by a competent and suitably experienced ecologist using call analysis software to confirm species (where possible) and number of passes made.

3.1.12 Details of these surveys are displayed in Table 2.

Table 2. Bat surveys carried out by the EWC and Arup.

| Survey Type | Date | Weather Conditions |
|---|---|---|
| Back tracking survey | 03/07/2017 | Dusk: Clear, still and dry: Air Temperature: 19, Cloud Cover: 3, Wind: 2, Rain: 0 |
| | 04/07/2017 | Dawn: Clear, still and dry: Although warm to start, there were clear skies therefore hit 11 degrees at one point in the survey; Air Temperature: 13, Cloud Cover: 2, Wind: 1, Rain: 0 |
| Emergence / re-entry surveys | 14/06/2018 | Dusk: Warm, sunny, humid clear and still: Air Temperature: 16, Cloud Cover: 4, Wind: 0, Rain: 0 |
| | 29/06/2018 | Dawn: Cool, light breeze, clear morning: Air Temperature: 15, Cloud Cover: 1, Wind: 2, Rain: 0 |
| | 15/05/2019 | Dusk: light breeze, clear, dry: Air Temperature: 14, Cloud Cover: 2, Wind: 1, Rain: 0 |
| | 16/05/2019 | Dawn: Sunny: Air Temperature: 15, Cloud Cover: 0, Wind 2, Rain: 0 |
| | 04/06/019 | Dusk: Clear, light breeze: Air Temperature: 16, Cloud Cover: 1, Wind: 2, Rain: 0 |
| | 05/06/2019 | Dawn: warm, mostly cloudy: Air Temperature: 12, Cloud Cover: 7, Wind: 1, Rain: 0 |
| | 09/07/2019 | Dusk: dry, still, warm: Air Temperature: 22, Cloud Cover: 0, Wind 1, Rain 0 |

## Bat Activity Surveys (Walked Transect)

3.1.13 Monthly bat activity surveys were carried out by Arup staff from June to September 2018. Two transect routes were defined within the site based on aerial mapping, site photographs and extended Phase 1 habitat survey data by a suitably qualified Arup ecologist considering likely impacts of the Proposed Scheme and the locations of potential feeding areas and commuting routes. These are shown in Figure 3. The transect routes covered the entirety of the site and included 10 listening station stops of three to five minutes per stop. Surveyors used Bat Box Duets and Elekon Batlogger M+, A+ or Anabat Walkabout bat detectors, which produced recordings in .WAV format thus allowing calls to be analysed in suitable sound analysis software.

3.1.14 Transect surveys were undertaken from sunset until two hours after sunset or until the full transect length has been walked (whichever was later) and for at least two hours before sunrise until sunrise. During the surveys, a record of the number of bat passes of each species

was made together with additional information including direction of flight, emergence/re-entry point and activity recorded.

3.1.15 Following the survey work, all recordings were analysed by a competent and suitably experienced ecologist using call analysis software to confirm species (where possible) and number of passes made.

## Automated Surveys

3.1.16 Monthly automated surveys were carried out by Arup staff from June to September 2018. Two Elekon Batlogger A+ bat detectors were placed along each of the transects, as shown in Figure 3, and set to record for five consecutive nights each month between June and September 2018. All recordings were analysed by a competent and suitably experienced ecologist using call analysis software to confirm species (where possible) and number of passes made.

3.1.17 Details regarding bat transect and automated surveys conducted by Arup are outlined in Table 3.

Table 3. Bat surveys carried out by Arup surveyors

| Survey Type | Date | Weather Conditions |
|---|---|---|
| Dusk transect survey | 28/06/2018 | Slight breeze, clear: Air Temperature: 22, Cloud Cover: 0, Wind: 1, Rain: 0 |
| | 18/07/2018 | Dry, still, warm: Air Temperature: 21, Cloud Cover: 1, Wind: 0, Rain: 0 |
| | 09/08/2018 | Still, light shower at the end of the survey: Air Temperature: 14, Cloud Cover: 7, Wind: 1, Rain: 1 |
| | 05/09/2018 | Dry, still, warm: Air Temperature: 19, Cloud Cover: 3, Wind: 1, Rain: 0 |
| Dawn transect survey | 19/07/2018 | Chilly, dry, no wind: Air Temperature: 14, Cloud Cover: 0, Wind: 0, Rain: 0 |
| Automated survey | 28/06/2018 – 03/07/2018 | Lowest Night Air Temperature: 12, Highest Day Air Temperature: 31. Wind: 1-4, Rain: 0 |
| | 19/07/2018 – 24/07/2018 | Lowest Night Air Temperature: 13, Highest Day Air Temperature: 34. Wind: 0-4, Rain: 0 |
| | 09/08/2018 – 14/08/2018 | Lowest Night Air Temperature: 8, Highest Day Air Temperature: 25. Wind: 0-3, Rain: 0-3 |
| | 05/09/2018 – 10/09/2018 | Lowest Night Air Temperature: 7, Highest Day Air Temperature: 24. Wind: 0-3, Rain: 0 |

## Limitations

3.1.18 During tree climbing surveys, some trees were difficult to successfully assess from the ground and were unable to be climbed. In these cases, the highest possible score for the PRF of the tree in question was taken from the scoping assessment.

3.1.19 During the pre-dawn re-entry survey on 5 June 2019, the echolocation detector failed and no sound data was recorded. The survey forms provided a detailed account of the bat activity surrounding the tree and no bats were observed or recorded returning or potentially returning to roost.

3.1.20 The programme for the project only allowed for the completion of bat activity surveys between June and September inclusive, rather than April to October (for sites with moderate suitability for bats) as stipulated in the latest BCT guidelines[15]. Furthermore, due to equipment failure, the automated detectors did not record for five nights in every case (refer to Appendix D). Some of the microphones became damaged in the field, the SD cards recorded a large volume of environmental noise (likely sprinklers or other such devices associated with the active golf course) and consequently some of the detectors lost power.

3.1.21 These issues related to one period for SD1 along the River Pinn (such that there were only three nights of data in July), all periods for SD2 on the Fairway (with four nights of data in June, two in July, two in August and less than one night in September) and one period for SD4 at the Driving Range (with four nights of data in July). Bat activity indices have been calculated that take into account these variations between locations, to provide a comparable baseline for bat activity across the site. The key limitation relating to the static data was SD2 at the Fairway, particularly with respect to the July to September period, meaning that it is possible that a greater diversity of species could have been recorded had the detector been functioning for the full five days each month and the bat activity indices may be slightly inaccurate.

3.1.22 Given the volume of data obtained in the other locations, it is unlikely that these issues had a significant impact on the results, or imposed any limitations relating to the assessment. It is considered that adequate survey data was obtained to understand the overall value of the site for commuting and foraging bats. The survey data obtained is considered adequate to inform the masterplanning process and assess the impacts of the Proposed Scheme.

3.1.23 All surveys were conducted during suitable weather conditions. Bats show great variety in their calls depending on the surrounding habitat and species call parameters overlap. As such, it was not always possible to identify bats to species level.

## 3.2 Otter and Water Vole Survey

3.2.1 Suitably qualified EWC ecologists conducted an otter and water vole riparian habitat assessment survey and field signs survey following the HS2 Phase 1 FSMS[16] on 1 August 2018. There was an extreme drought prior to the survey, resulting in low water levels.

3.2.2 The River Pinn was surveyed from approximately 500m south of the site to approximately 200m north of the site. All evidence of otter and water vole and other noteworthy species, including American mink *Neovison vison*, were recorded, including the number and location (GPS accurate to less than 5m) of field signs. For otter, this included natal holts, holts and potential holt sites, couches and spraints and for water vole, this included droppings, burrows, feeding remains and runs along the banks.

3.2.3 Where both sides of the river bank could not be recorded due to topography or vegetation, this information was noted. The criteria devised by Chanin 2012[17] and laid out in the HS2 Phase 1 FSMS was used when searching for potential holt sites and to determine whether or not they are in use.

### Limitations

3.2.4 An estimated 70-80% of the River Pinn adjacent to the site was surveyed due to vegetation preventing access in some places, meaning that it is possible that signs could have been missed in inaccessible areas of dense vegetation.

## 3.3 Badger Survey

3.3.1 A badger survey was undertaken within the site on 27 June 2018 by an Arup ecologist with considerable experience in badger surveys in accordance with the HS2 Phase 1 FSMS. The survey methodology is based on Harris et al. (1989)[18] and consisted of ecologists walking the site systematically using large-scale maps and plans, assessing site boundaries, open grassland, any bunds/banks and woodland areas of the site for any evidence of badger activity. Any signs indicating the presence of badgers were recorded on field maps along with grid references and photographs (where appropriate). Field signs indicating the presence of badgers include sett entrances, hairs, latrines, snuffle holes and footprints.

3.3.2 Sett classifications (based on Harris et al. 1989) utilised during the survey are described below:

- Main setts - These usually have a large number of holes with conspicuous spoil heaps and the sett generally looks well-used. They usually have well-used paths to and from the sett and between sett entrances. Although normally the breeding sett is in continual use, it is possible to find a main sett that has become disused, in which case

[16] Department for Transport (2013); 'London to West Midlands Environmental Statement: Euston to Ickenham, Volume 5 Technical Appendices.' HS2, London.
[17] Chanin, P. (2013); 'Otters.' Whittet Books Ltd, London, UK.
[18] Harris, S. *et al.* (1989); 'Surveying Badgers.' Mammal Society.

it is recorded as a disused main sett.

- Annex setts - These are close to a main sett, usually less than 150m away, and are usually connected to the main sett by one or more obvious, well-worn paths. They consist of several holes, but are not necessarily in use all the time, even if the main sett is very active.
- Subsidiary setts - These often these have only a few holes, are usually at least 50m from a main sett, and do not have an obvious path connecting them with another sett. They are not continuously active.
- Outlying setts - These usually only have one or two holes, often have little spoil outside the hole, have no obvious path connecting them with another sett, and are only used sporadically. When not in use by badgers, they are often taken over by foxes or even rabbits.

### Limitations

3.3.3 Badger surveys should ideally be conducted during the early spring or autumn/winter, as vegetation can restrict access or the visibility of badger signs during the summer. The survey was carried out in June to align with the programme for the project. Vegetation coverage made it difficult to assess all areas of the site for the presence of badger signs, including setts. Some areas of the site consisted of impenetrable scrub which prevented full access for a thorough survey. Access was not obtained to land outside the golf course.

## 3.4 Breeding Bird Surveys

3.4.1 A total of five breeding bird surveys were undertaken by suitably experienced Arup ornithologists in June 2018 and in March, April and May 2019. The surveys involved mapping bird breeding territories in accordance with the standard methodology (Marchant, 1983[19]) and HS2 Phase 1 FSMS within the site and immediately adjacent to the site boundaries (within 20m). The surveys were undertaken within 4.5 hours after sunrise, as detailed in Table 4 below.

3.4.2 On each visit, the site was surveyed by slowly walking around the site boundaries and fairways. All birds within the survey area were identified and recorded on 1:2,500 scale site maps using standard British Trust for Ornithology (BTO) species codes (Gilbert et al., 1998[20]). Ecologists used 8x42 binoculars to identify birds and observe and record signs of breeding activity.

3.4.3 The methodology used is based on the observation that, during the breeding season, many species are territorial. This is found particularly amongst passerines, where territories are

[19] Marchant, J. (1983); 'BTO Common Bird Census Instructions.' British Trust for Ornithology, Tring.
[20] Gilbert, G. *et al.* (1998); 'Bird Monitoring Methods: A Manual of Techniques for Key UK Species'. Royal Society for the Protection of Birds, Sandy.

often marked by conspicuous song, display, and periodic disputes with neighbouring individuals.

3.4.4 Upon completion of the survey visits, breeding bird data was transferred to a master map, to highlight the location of any occupied nest site or presumed centre of any breeding territory. When the same species was recorded in the same vicinity on both visits, this was taken to constitute a breeding territory.

Table 4. Conditions during the breeding bird surveys.

| Date | Time | Weather conditions |
|---|---|---|
| 12/06/2018 | 05:00-07:45 | Overcast: Air Temperature: 12, Cloud Cover: 7, Wind: east-north-easterly: 9mph, Rain: 0 |
| 27/06/2018 | 04:45-07:30 | Overcast: Air Temperature 13, Cloud Cover: 8, Wind: easterly: 9mph, Rain: 0 |
| 19/03/2019 | 06:10-08:30 | Overcast: Air Temperature 5, Cloud Cover: 8, Wind: south-south-westerly 6mph, Rain: 1 |
| 15/04/2019 | 06:00-08:00 | Dry, sunny spells: Air Temperature 7, Cloud Cover: 4, Wind: easterly 12mph, Rain: 0 |
| 07/05/2019 | 06:00-08:00 | Dry, sunny spells: Air Temperature 12, Cloud Cover: 5, Wind: south-westerly 2mph, Rain: 0 |

### Limitations

3.4.5 At least five visits should ideally be undertaken in the same year between March and mid-June. However, this was not possible due to the project timescales. Two surveys were undertaken in 2018, both in June and three additional surveys were carried out in March, April and May 2019. The combined survey effort across both survey years is considered to provide an accurate baseline for the site.

## 3.5 Reptile Surveys

3.5.1 Reptile surveys were undertaken at the site by the EWC between May and September 2017 in accordance with the HS2 Phase 1 FSMS. Areas of potentially suitable habitat within the site were identified by reviewing preliminary work, alongside a desk study data and results of a Phase 1 habitat survey and each habitat area was graded on its potential as 'poor', 'good' or 'exceptional. All habitat areas identified as having 'good' or 'exceptional' potential to support reptiles were surveyed using artificial refugia to determine presence/absence.

3.5.2 A combination of corrugated tin and roofing felt refugia, all measuring a minimum of 0.5m x 0.5m, were placed out at a density of at least 100/ha on 25 May 2017. All refugia were number

marked and their location recorded using a GPS device to an accuracy of <5m and translated into GIS. After at least a 14 day settle period, seven visits were conducted to each refugia, using binoculars to look for reptiles. Each artificial refugia was lifted to look for reptiles underneath. Details regarding the reptile surveys are provided in Table 5. Figure 6 shows the central locations for refugia at the site and the locations of reptiles recorded.

Table 5. Reptile surveys undertaken by the EWC

| Date | Weather Conditions |
|---|---|
| 08/06/2017 | Overcast with occasional light rain: Air Temperature: 16, Cloud Cover: 7, Wind: 1, Rain 3 |
| 15/06/2017 | Hot and dry: Air Temperature: 23, Cloud Cover: 1, Wind: 1, Rain 0 |
| 27/06/2017 | Warm overcast day with sunny spells: Air Temperature: 18, Cloud Cover: 6, Wind: 1, Rain 0 |
| 29/06/2017 | Warm, light wind, dry, clear sky: Air Temperature: 17, Cloud Cover: 1, Wind: 1, Rain 0 |
| 04/07/2017 | Warm overcast day with sunny spells: Air Temperature: 18, Cloud Cover: 4, Wind: 1, Rain 0 |
| 05/07/2017 | Warm, light wind, dry, clear sky: Air Temperature: 17, Cloud Cover: 1, Wind: 1, Rain 0 |
| 11/07/2017 | Sunny spells after previous rain: Air Temperature: 17, Cloud Cover: 3, Wind: 1, Rain 0 |
| 07/09/2017 | Warm with sunny spells, light wind: Air Temperature: 19, Cloud Cover: 3, Wind: 3, Rain 0 |
| 18/09/2017 | Warm overcast morning with some water on grass: Air Temperature: 14, Cloud Cover: 4, Wind: 2, Rain 0 |
| 19/09/2017 | Overcast: Air Temperature: 12, Cloud Cover: 7, Wind: 2, Rain 0 |
| 22/09/2017 | Warm sunny spells: Air Temperature: 13, Cloud Cover: 2, Wind: 1, Rain 0 |
| 25/09/2017 | Warm overcast: Air Temperature: 16, Cloud Cover: 6, Wind: 1, Rain 0 |

3.5.3 Surveyors recorded details of all reptiles encountered during the survey, including GPS-derived grid coordinates, refugia number, species, number, life stage (adult, sub-adult, juvenile) and when possible, sex.

### Limitations

3.5.4 The survey visit on 15 June was undertaken when the air temperature was 23°C, which is above the recommended window of 10°C to 20°C. However, slow worm was recorded during this visit indicating that this was not a limitation to the survey results.

## 3.6 Great Crested Newt Surveys

3.6.1 The EWC conducted a series of great crested newt surveys at the golf course (including the adjacent HS2 Phase 1 site) in accordance with the HS2 FSMS between April 2017 and June 2018, in April and May 2019 and May 2020 as detailed in Table 6. The pond locations are shown on Figure 7.

Table 6. Great crested newt surveys undertaken by the EWC

| Survey Type(s) | Pond Number (s) | Date and Time | Weather and Pond Conditions |
|---|---|---|---|
| Habitat Suitability Index | 1-4 | 11/04/2017 | N/A |
| eDNA | 1 and 2 | 15/06/2017 | N/A |
| eDNA | 3 | 26/04/2018 | N/A |
| eDNA | 1 and 4 | 30/04/2019 | N/A |
| eDNA | 2 | 09/05/2019 | N/A |
| Three survey methods of; torching, bottle trapping, egg searching, refugia searching and netting | 3 | 09/05/2018 21:30-21:45 | Minimum Overnight Temperature: 9, Cloud Cover: 4, Wind: 2, Rain 0<br>Pond margin accessible: 55%, Turbidity: 5, Vegetation Cover: 2, Number of Traps: 10 |
| | | 17/05/2018 22:00-22:15 | Minimum Overnight Temperature: 8, Cloud Cover: 1, Wind: 2, Rain 0<br>Pond margin accessible: 55%, Turbidity: 4, Vegetation Cover: 2, Number of Traps: 15 |
| | | 23/05/2018 22:10-22:35 | Minimum Overnight Temperature: 10, Cloud Cover: 1, Wind: 1, Rain 0<br>Pond margin accessible: 55%, Turbidity: 4, Vegetation Cover: 2, Number of Traps: 15 |
| | | 31/05/2018 22:45-23:05 | Minimum Overnight Temperature: 9, Cloud Cover: 1, Wind: 1, Rain 0<br>Pond margin accessible: 55%, Turbidity: 4, Vegetation Cover: 2, Number of Traps: 20 |
| | | 05/06/2018 22:50-23:15 | Minimum Overnight Temperature: 14, Cloud Cover: 1, Wind: 0, Rain 0<br>Pond margin accessible: 55%, Turbidity: 2, Vegetation Cover: 2, Number of Traps: 20 |
| | | 14/06/2018 23:15-23:35 | Minimum Overnight Temperature: 13, Cloud Cover: 1, Wind: 1, Rain 0<br>Pond margin accessible: 55%, Turbidity: 2, Vegetation Cover: 2, Number of Traps: N/A as netting was carried out instead of bottle trapping |
| | | 04/04/2019 20:30-20:50 | Minimum Overnight Temperature: 5, Cloud Cover: 7, Wind: 1, Rain 0<br>Pond margin accessible: 10%, Turbidity: 3, Vegetation Cover: 0, Number of Traps: N/A as torching, egg searching and refugia searching carried out |
| | | 16/04/2019 21:00-21:25 | Minimum Overnight Temperature: 5, Cloud Cover: 8, Wind: 1, Rain 0<br>Pond margin accessible: 10%, Turbidity: 3, Vegetation Cover: 1, Number of Traps: N/A as torching, egg searching and refugia searching carried out |
| | | 23/04/2019 20:50-21:20 | Minimum Overnight Temperature: 11, Cloud Cover: 7, Wind: 0, Rain 0 |

| Survey Type(s) | Pond Number (s) | Date and Time | Weather and Pond Conditions |
|---|---|---|---|
| | | | Pond margin accessible: 10%, Turbidity: 3, Vegetation Cover: 1, Number of Traps: N/A as torching, egg searching and refugia searching carried out |
| | | 30/04/2019<br>20:55-21:30 | Minimum Overnight Temperature: 6, Cloud Cover: 1, Wind: 0, Rain 0<br>Pond margin accessible: 10%, Turbidity: 2, Vegetation Cover: 2, Number of Traps: N/A as torching, egg searching and refugia searching carried out |
| | | 09/05/2019<br>21:25-21:50 | Minimum Overnight Temperature: 6, Cloud Cover: 8, Wind: 0, Rain 0<br>Pond margin accessible: 10%, Turbidity: 2, Vegetation Cover: 1, Number of Traps: N/A as torching, egg searching and refugia searching carried out |
| | | 15/05/2019<br>21:05-21:45 | Minimum Overnight Temperature: 9, Cloud Cover: 4, Wind: 1, Rain 0<br>Pond margin accessible: 10%, Turbidity: 3, Vegetation Cover: 1, Number of Traps: N/A as torching, egg searching and refugia searching carried out |
| eDNA | 4 | 07/05/2020 | N/A |

## Habitat Suitability Index Survey

3.6.2 All of the ponds at the golf course were subject to Habitat Suitability Index (HSI) surveys[21] in 2017. During subsequent surveys, notes were made of factors/events that may have resulted in a significant change to the HSI score previously calculated.

## Presence/absence Environmental DNA Survey

3.6.3 The eDNA surveys involved taking a series of water samples from each accessible bank of the four ponds scoped in for survey. The samples were then sent off for laboratory analysis to test for great crested newt through the presence of environmental (e)DNA. During 2017, ponds 3 and 4 were unable to be eDNA sampled with ponds 1 and 2 as they were dry. Pond 3 was only sampled in 2018 and pond 4 was only sampled in 2019.

3.6.4 A total of 20 water samples were taken from each pond margin without entering the water in order to prevent the potential for disturbance of sediment. The locations of sub-samples were spaced evenly around the accessible sections of the pond margin. The samples were targeted to ensure they include both areas with vegetation and open water if possible. The percentage of each pond margin accessible for survey was recorded.

## Population Size Class Assessment Survey

3.6.5 Bottle trapping, torching, egg searching, refugia searching and netting were the chosen methods for assessing population size in the only pond with positive eDNA results, pond 3.

[21] Amphibian and Reptile Groups of the United Kingdom (2010); 'ARG UK Advice Note 5: Great Crested Newt Habitat Sustainability Index.' Amphibian and Reptile Groups of the United Kingdom.

Bottle trapping, torching and egg searching were carried out on the first five visits of 2018. During the last survey visit of 2018, the pond was full of froglets and smooth newtlets and so netting was carried out in replacement of bottle trapping. During the 2019 surveys, torching, refugia searching and either egg searching, or netting, were carried out. Bottle trapping was not carried out given the higher risk to amphibians and small mammals than other methods.

3.6.6 Bottle traps were created from clear plastic 2 litre round bottles and were secured using bamboo canes and positioned to ensure an air bubble was present within the bottle. The traps were positioned at a frequency of one every 2 metres in areas of suitable habitat where possible. Bottle trapping was only carried out on nights where the overnight temperature was 5°C or above (see Table 6).

3.6.7 All torching surveys were carried out using a 1 million candle powered torch and began at least 1 hour after sunset. Egg searching was halted when searches confirmed presence of great crested newt and no subsequent egg searches were carried out during the following survey visits. A net with a mesh size of 2-4mm was used at night, following torching surveys to avoid disturbing the pond and reducing visibility for torching. Refugia searching comprised checks of natural refuges, such as longs, bark, rocks and debris surrounding the pond.

### Limitations

3.6.8 During the population size class assessments, pond 3 was 55% inaccessible which limited the number and distribution of bottle traps that surveyors were able to put in the pond. However, a sufficient number of traps were used for each survey and were placed in suitable habitats, meaning that this was not considered to be a significant limitation.

3.6.9 During four of the six survey visits carried out in 2018, the pond had a high level of turbidity (4-5). Following the HS2 Phase 1 FSMS, an additional survey method should be used in addition to (turbidity level 4), or instead of (turbidity level 5) torching. However, no additional survey method was conducted as the surveyors determined that the lack of visibility at the time of survey did not impact on the validity of the survey results.

## 3.7 Terrestrial Invertebrate Survey

3.7.1 The survey was undertaken by Stephen Carter, an experienced Arup entomologist, and two Arup ecologists. The survey was undertaken in accordance with HS2 FSMS. Initially, the site was subject to a habitat suitability assessment and the locations for subsequent detailed survey visits were defined, which are shown on Figure 8. On subsequent visits, particular attention was given to surveying the marshy grassland and tall ruderal vegetation adjacent to the River Pinn along the north of the site. The weather conditions, date and time of the survey visits are provided in Table 7.

Table 7. Conditions during the terrestrial invertebrate survey visits

| Survey Type | Survey Date and Time | Weather Conditions |
|---|---|---|
| Habitat suitability assessment and direct searching | 29/06/2018<br>11:00 to 15:00 | F1 north-easterly, cloud cover 1/8, dry and from 25°C to 29°C. |
| Direct searching, sweep netting, beating, water trapping and pitfall trapping (for 3 nights) | 06/08/2018<br>11:00 to 15:00 | F1 south-westerly, cloud cover 1/8, dry and from 27°C to 30°C. |
| Direct searching | 10/08/2018<br>11:00 to 12:30 | F2 south-westerly, cloud cover 7/8, dry and 18°C. |
| Direct searching | 31/08/2018<br>10:30 to 12:00 | F1 southerly, cloud cover 4/8, dry and from 19°C. |
| Direct searching, sweep netting, beating, water trapping and pitfall trapping (for 10 nights) | 10/09/2018<br>10:30 to 14:30 | F2 south-westerly, cloud cover 4/8, dry and from 21°C to 23°C. |

3.7.2 Direct searching, sweep netting, water trapping and pitfall trapping were selected as suitable survey techniques to determine the presence of invertebrates including notable species. Light trapping to capture night flying insects, particularly adult moths, was not undertaken. Adult moths often disperse over several kilometres from their natal sites and are attracted to light at the ultraviolet end of the spectrum. The presence of captured adult moths does not necessarily confer that that species will frequent the site.

## Direct Searching

3.7.3 Surveyors walked across habitat with potential to support a diverse assemblage of invertebrates and actively searched for notable species by direct observation.

## Sweep-netting

3.7.4 Surveyors conducted timed samples of 30 minutes using sweep nets spaced over flower-rich grassland patches. Whilst walking at a moderate pace, the sweep net was swept low though forbs and grasses to dislodge and capture invertebrates. After approximately 15 sweeps of the net, the captured invertebrates were transferred on to a white plastic tray for close examination and identified to species level.

## Beating

3.7.5 Beating surveys involve tapping branches of shrubs and trees with a stick to dislodge and capture invertebrates on to dark blue cotton fixed frame beating collection sheet beneath. After approximately 15 taps of the stick, the captured invertebrates were then transferred on to a white plastic tray for close examination and identified to species level.

### Water Trapping

3.7.6 A pair of white and yellow plastic washing-up bowls were partially filled with water to a depth of at least 100mm and set on the ground at flower height approximately 2m apart. The washing-up bowls were deployed for 1 hour. Invertebrates captured within the washing-up bowls were then transferred on to a white plastic tray close examination and identified to species level.

### Pitfall Trapping

3.7.7 A plastic beaker was strategically placed within scrub edge to flower-rich grassland to sample for the ground-dwelling invertebrates. The straight-sided plastic beaker was sunk level with the surface of the ground and filled with an anti-freeze and water mixture to preserve captured invertebrates. The pitfall trap was deployed for survey periods of between 3 and 10 nights. Invertebrates captured within the beaker were then transferred on to a white plastic tray for close examination and identified to species level.

### Limitations

3.7.8 The terrestrial invertebrate survey took place between late-June and early-September 2018. As a consequence of the survey period, it is likely that terrestrial invertebrate species that are typically evident during the spring will not have been recorded.

3.7.9 The survey period included six weeks of continuous hot weather (with a daily maximum temperature of at least 25°C) with no rain, which soon desiccated vegetation adjacent to the River Pinn and reduced water level within the channel. It is considered that the hot dry weather altered terrestrial invertebrate foraging (and breeding) activity and caused some species to complete their life cycles unusually early. The absence of evidence of any particular species should not be taken as conclusive proof that the species is not present or that it will not be present in the future. Nevertheless, the survey findings and interpretation in this report do permit an assessment of the ecological value of the terrestrial invertebrate assemblage at the site.

## 3.8 Botanical Survey

3.8.1 A botanical survey was undertaken by an experienced botanist on 11th July 2018 to assess the potential for enhancing species diversity across specific areas of the site. The aim of the survey was to compile a list of species which were representative of the habitat types they were recorded within, to inform recommendations for enhancement and management.

3.8.2 Three key habitat types were identified due to their potential to support notable flora for survey, which are shown on Figure 9:

- West Ruislip Golf Course and Old Priory Meadows Site of Borough Importance for Nature Conservation (SBINC) Grade 1;
- Wetland/ditch habitat; and

- Semi-improved grassland habitat.

3.8.3 The methods used during the survey were as follows:

- At least two areas of each of these habitat types were sampled across the site to provide representative species lists;
- Each area was mapped using grid references and site maps and the species recorded at each location were then noted; and
- Plants were identified using Rose, 2006[22] and were each given a score according to the DAFOR system of recording abundance.

### Limitations

3.8.4 It is possible that plant species which are usually observed during the spring will not have been recorded. The weather preceding the survey date had also been very hot and dry which is likely to have had an effect on species present. Early (spring) and late (autumn) surveys would have been useful additional visits to provide further information on the flora at the site during different seasons. However, it is considered that the survey effort and interpretation of data provide a robust assessment of the flora present at the site.

## 3.9 Generic Limitations

3.9.1 No account can be made for the presence or absence of species during the survey periods, since fauna may change their spatial distribution at various scales over time. Species may also return to, or colonise new areas at any future time, particularly if there is a change in the habitat structure. However, the surveys adhered to appropriate current best practice guidance and the judgement of experienced surveyors to provide an assessment of likely presence/absence of protected species. The data collected provides a robust basis for the assessment of the ecological baseline of the site.

[22] Rose, F. (2006); 'The Wild Flower Key (Revised Edition).' Frederick Warne, Penguin Group, London.

# 4 Results

## 4.1 Bats

### Bat Scoping and Climb-and-Inspect Surveys

4.1.1 Of the total 102 trees that were surveyed for bats, there was one common ash *Franxinus excelsior* with a confirmed roost in Tree 65 (TQ 07796 87262, refer to Figure 2). A large west-facing cavity was recorded at approximately 4.5m that extends up into the tree in excess of 1m, with evidence of smoothing and staining and one bat of unknown species was found to be roosting. Furthermore, 31 trees with 'high' potential, 38 trees with 'moderate' potential, 27 with 'low' potential and 5 trees with 'negligible' potential were recorded. The results are displayed in Figure 2 and the full table of results can be found in Appendix A.

### Bat Back Tracking Surveys

4.1.2 The dawn and dusk back tracking surveys did not confirm any roosts within the trees surveyed. A common pipistrelle *Pipistrellus pipistrellus* was recorded at 21:55 on 3rd July 2017 as a possible emergence (TQ 08046 87411) on the northern edge of the woodland just west of the path intersection. This is shown on Figure 2 as point 'A', as this was not attributed to a specific tree. Species recorded foraging and commuting included common pipistrelle, soprano pipistrelle, noctule, *Myotis* species and one account of a brown long-eared bat, which was heard and not seen. One survey recorded high numbers of common pipistrelles (approximately 22 individuals) commuting along woodland edge in the north of the site, just south of the River Pinn (OS Grid Reference TQ 07676 87378), which is indicative behaviour of a nearby roost. The full table of results can be found in Appendix B.

### Dusk Emergence and Pre-dawn Re-entry Surveys

4.1.3 No roosts were confirmed during any of the surveys. The full table of results from the 2018 surveys carried out by the EWC can be found in Appendix C. Other bats were recorded foraging and commuting during these surveys, which include common pipistrelle, soprano pipistrelle, noctule, brown long eared bat and serotine *Eptesicus serotinus*. The 2019 surveys recorded common and soprano pipistrelle foraging activity along the woodland edge and the footpath within the woodland next to tree 41. Similar foraging activity by both these species was recorded over the area of semi-improved neutral grassland next to tree 51. The location of these trees is shown in Figure 2.

### Bat Activity Surveys (Walked Transect)

4.1.4 The following species were recorded during the walked transects:

- Common pipistrelle;
- Soprano pipistrelle;
- Noctule;

- Leisler's bat *Nyctalus leisleri*; and
- *Myotis* sp.

4.1.5 Most activity comprised pipistrelle bats foraging along woodland edges and tree lines and over Clacks Lane. This included the northern fenceline of the driving range, where there are occasional trees. This was mainly common pipistrelle, with soprano pipistrelle also confirmed. *Nyctalus* sp. bats were occasionally heard commuting across the site but were not seen. This was predominantly noctule, with a single Leisler's bat heard during the dusk survey in August. A key commuting route was observed during the September survey at the far western end of the site near to the River Pinn, high over the trees to the west, which was mainly common pipistrelle with a soprano pipistrelle bat also observed.

4.1.6 The results of each of the surveys are summarised below and Figure 3 shows key foraging areas and commuting corridors.

### *Dusk Survey 28 June*

4.1.7 Common and soprano pipistrelle bats were observed foraging over the fairway, along woodland edges and above trees along Clacks Lane, with frequent activity recorded between 21:52 and the end of the survey. Most pipistrelle foraging activity was recorded along transect 1 in the central part of the site along woodland edges, where prolonged foraging was recorded at stops 8 and 9. The woodland edges were also used for commuting. A *Nyctalus* sp. call was also recorded at the western end of the site at 23:09 but was not seen.

### *Dusk Survey 18 July*

4.1.8 High levels of activity were recorded during the majority of the dusk survey, mainly common pipistrelle foraging, with soprano pipistrelle and noctule also noted. Key areas of pipistrelle foraging activity were along and over Clacks Lane, the woodland edges around stop 19 to the north and between stops 10 and 9 in the central eastern part of the site, over the fairway north of stop 9, at the far western edge of the site. Soprano pipistrelle was also seen commuting southeast along the fairway near to stop 10. A common pipistrelle bat was seen foraging along the northern edge of the driving range, with *Myotis* sp. also recorded at this time, and the southern woodland edge and noctule was recorded but not seen commuting over the western part of the site.

### *Dawn Survey 19 July*

4.1.9 Low levels of activity were recorded, comprising occasional faint and brief common pipistrelle calls and foraging activity along woodland edges on transect 1 and over and along Clacks Lane. Noctule was also recorded at 02:48 and a *Nyctalus* sp. at 03:54 but these bats were not seen.

### *Dusk Survey 9 August*

4.1.10 Common pipistrelle, soprano pipistrelle, Leisler's bat and a *Nyctalus* sp. were recorded, with a lower level of activity than the July dusk surveys but similar patterns of activity along woodland edges and Clacks Lane, including around streetlights along Hill's Lane. Common pipistrelle was also seen foraging along the north eastern edge of the site and soprano and common pipistrelle and a *Nyctalus* sp. heard but not seen at the northern extent of the River Pinn. Soprano pipistrelle was observed foraging inside the northern fenceline of the driving range. There was a single Leisler's bat call heard, but not seen, west of stop 14.

### *Dusk Survey 5 September*

4.1.11 Common and soprano pipistrelle bats were observed foraging along the woodland forming the southern boundary of the site. Common pipistrelle bats were frequently recorded commuting mainly west but occasionally east at the far eastern boundary of the site, with 13 passes observed between 20:23 and 20:41 and an additional soprano pipistrelle pass at 20:42. These were observed high over the trees. Similar to previous surveys, up to two common pipistrelle bats were observed foraging along woodland edges in the central eastern part of the site, around stops 8 and 9, with continuous pipistrelle foraging activity heard along Clacks Lane and seen foraging around lights on the corner with Hill Lane.

## Automated Surveys

4.1.12 The following species were recorded by the static bat detectors:

- Common pipistrelle;
- Soprano pipistrelle;
- Nathusius' pipistrelle *Pipistrellus nathusii*;
- Brown long-eared bat;
- Noctule;
- Leisler's bat;
- Serotine; and
- *Myotis* sp.

4.1.13 The majority of bat activity was recorded by SD2 on the fairway, although SD4 at the Driving Range recorded the greatest diversity of species (all eight listed above). SD4 at the Driving Range recorded more bat activity than SD3 along Clacks Lane, although the cluttered location of SD3 is likely to have had an impact on the level of activity recorded here, with much activity above the trees not likely to have been recorded.

4.1.14 The results are summarised in Table 8 below and the full tables of results can be found in Appendix D. These tables provide the bat activity indices, calculated as the number of passes per species for each survey period, divided by the number of nights within that survey period.

Table 8 Bat activity indices for static detectors

| Species | SD1 – River Pinn | SD2 - Fairway | SD3 – Clacks Lane | SD4 – Driving Range | Site Averages |
|---|---|---|---|---|---|
| Common pipistrelle | 52.1 | 201.5 | 123.8 | 165.7 | 543.1 |
| Soprano pipistrelle | 23.3 | 115.0 | 41.2 | 75.4 | 254.9 |
| Nathusius' pipistrelle | 0.2 | 0.0 | 0.0 | 0.1 | 0.3 |
| *Pipistrellus* sp. | 1.2 | 13.8 | 74.5 | 7.1 | 96.6 |
| Noctule | 19.0 | 34.6 | 1.1 | 26.0 | 80.7 |
| Leisler's bat | 0.9 | 0.5 | 0.0 | 0.4 | 1.8 |
| *Nyctalus* sp. | 0.7 | 1.8 | 1.9 | 2.4 | 6.7 |
| Serotine | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 |
| *Myotis* sp. | 1.9 | 1.5 | 1.0 | 1.1 | 5.4 |
| Brown long-eared bat | 0.2 | 0.3 | 0.0 | 0.2 | 0.7 |
| Totals | 99.6 | 368.9 | 243.3 | 278.4 | 990.2 |

## 4.2 Otter and Water Vole

4.2.1 No evidence of otter, water vole or American mink were recorded during the survey. Suitable terrestrial habitat was recorded within the site including earth banks, dense bramble and ruderal vegetation. The site was found to be well connected with other areas of suitable habitat. Full details of the survey are in Appendix E.

## 4.3 Badger

4.3.1 The results of the badger survey are provided in Figure 4. One main sett was recorded at central grid reference TQ 08144 87406. Thirty-two entrance holes were recorded along a bank covered with dense scrub and broadleaved semi-natural woodland. Of these 32 holes, 15 were thought to be currently active, with fresh bedding and spoil present at several entrances. A further eight holes were considered to be partially disused and nine were considered to be disused. It is possible that there are additional entrance holes associated with the sett within

the dense scrub, with additional badger pathways noted along the bank that disappear into the scrub.

4.3.2 Minimal evidence of badgers was found elsewhere on the site, with the only other field signs noted being three mammal pathways and several 'snuffle holes' likely to be from foraging badgers.

## 4.4 Breeding Birds

4.4.1 A summary of the birds with legal protection/conservation status recorded at the site in 2018 and 2019 is provided in Table 9 below. The taxonomic sequence of species listed is in accordance with the British List[23]. The central location of the breeding territories of Red and Amber species are indicated on Figure 5.

Table 9. Birds with protection/conservation status recorded within the survey area in 2018 and 2019.

| Common Name | Scientific Name | Legal Protection & Conservation Status | Estimated Number of Breeding Territories |
|---|---|---|---|
| Common Gull | *Larus canus* | Amber List | Flyover records only |
| Dunnock | *Prunella modularis* | Amber List and species of Principal Importance | 7 |
| House Sparrow | *Passer domesticus* | Red List, Species of Principal Importance | Foraging only – likely to breed in suitable buildings close to the site. |
| Kestrel | *Falco tinnunculus* | Amber List | Foraging on one visit only |
| Lesser Black-backed Gull | *Larus fuscus* | Amber List | Flyover records only |
| Mallard | *Anas platyrhynchos* | Amber List | Flyover records only |
| Mistle Thrush | *Turdus viscivorus* | Red List | 2 |
| Red Kite | *Milvus milvus* | Schedule 1 | Flyover record only |
| Song Thrush | *Turdus philomelos* | Red List and Species of Principal Importance | 5 |
| Starling | *Sturnus vulgaris* | Red List & Species of Principal Importance | Foraging only – likely to breed in suitable buildings close to the site. |
| Stock Dove | *Columba oenas* | Amber List | 4 |
| Swift | *Apus apus* | Amber List | Foraging only – likely to breed in buildings close to the site. |
| Willow Warbler | *Phylloscopus trochilus* | Amber List | 5 |

4.4.2 A total of 42 bird species were recorded within the site and the 20m buffer. Of these, 32 were considered likely to breed within the site, and ten were either flyover records or species using the site for foraging and/or resting only. The most abundant species, with 14 breeding territories within the survey area, was robin *Erithacus rubecula*. This was followed by wren *Troglodytes troglodytes* (13) and great tit *Parus major* (11). Breeding territories of two Red

[23] British Ornithologists' Union (2018); 'The British List.'

listed species were recorded within the survey area: song thrush (five) and mistle thrush (two). Red Listed starling *Sturnus vulgaris* and house sparrow *Passer domesticus* were both recorded foraging at the site and are likely to breed close to the site in suitable structures. Eight Amber listed species were recorded within the survey area, but five of these were not considered to breed at the site. The remaining three, willow warbler *Phylloscopus trochilus*, dunnock *Prunella modularis*, and stock dove *Columba oenas*, were thought to hold five, seven, and four breeding territories respectively.

4.4.3 The full list of bird species recorded within the survey area is provided in Appendix F.

## 4.5 Reptiles

4.5.1 A total of 13 adult male and female slow worms were observed both on, and adjacent to the site to the south, between June and September 2017 (12 female and one male). Some of these were recorded under the same refugia on multiple visits and therefore are likely to be the same individual. The peak count was three individuals on 11 July 2017. The peak counts in each location are displayed in Figure 6. While no other reptiles were recorded during the reptile surveys, one gravid common lizard *Zootoca vivipara* was recorded incidentally approximately 20m south of the site boundary within the golf course, at OS grid reference TQ 07533 87165 (as shown in Figure 6).

4.5.2 The full results of the reptile surveys are provided in Appendix G.

## 4.6 Great Crested Newt

4.6.1 The HSI score for pond 1 was 0.84, pond 2 was 0.50, pond 3 was 0.87 and pond 4 was 0.56. Pond 3 was the only pond that tested positive for great crested newt DNA during surveys in 2017, 2018 and 2019.

4.6.2 During the 2018 population size class assessment, a total number of 28 great crested newts were recorded along with one egg at pond 3. A peak count of six adults was recorded on 31 May 2018 (four females and two males).

4.6.3 Estates management staff recorded two great crested newts (male and female) in an open irrigation box towards the western end of the golf course at OS grid reference TQ 07678 87312 on 14th May 2018.

4.6.4 In September and October 2018, the EWC implemented a mitigation strategy around pond 3 under the HS2 organisational GCN licence to facilitate construction of a haul road for HS2 Phase 1. Amphibian fencing was installed around the pond and pitfall trapping was undertaken, although no great crested newts were captured. Due to low temperatures, the destructive search could not be undertaken as planned in October 2018. The amphibian fencing was retained through the winter; however, a breach was recorded on 18 March 2019 and water was thought to have passed under the fencing both before and after this breach, which was repaired on the same day. Great crested newt eggs were subsequently recorded in

pond 3 within and outside the fencing, to the west and southwest of the pond respectively. During the 2019 population size class assessment, 15 great crested newts were recorded in pond 3. A peak count of eight adults was recorded on 23 April 2019 (four female, four male). In August and September 2019, destructive searches of the habitat surrounding pond 3 took place and no great crested newts were found. The fencing was removed following the destructive search.

4.6.5 As part of the mitigation strategy, in December 2019 and January 2020, pond 4 was enhanced to provide suitable habitat for breeding at the site until it needs to be removed to facilitate the Proposed Scheme from September 2021. This comprised the clearing of detritus and pond debris, removing overhanging branches to allow more light onto the pond and creating refugia to increase suitable terrestrial habitat for great crested newts. Egg strips were added in March 2020. Pond 3 was drawn down in the first two weeks of March 2020 and 94 great crested newts were recorded, indicating a medium population, rather than a small population as suggested by the population size class assessments conducted in 2018 and 2019. This comprised 45 females, 25 males and 24 juveniles. These were translocated to log piles and dense vegetation around pond 4. An eDNA survey was subsequently conducted on pond 4 and the result was positive.

4.6.6 Full details of the survey results are provided in Appendix H.

## 4.7 Terrestrial Invertebrates

4.7.1 A total of 55 terrestrial invertebrate species were recorded at the survey site. Two of the recorded invertebrate species are Nationally Scarce Notable B: Roesel's bush-cricket *Metrioptera roeselii* and hornet hoverfly, which were abundant and occasional at the survey site respectively. A full list of the terrestrial invertebrate species recorded at the survey site is provided in Appendix I.

## 4.8 Botanical

4.8.1 Appendix J lists all the species recorded within each habitat and the grid references of the plots sampled along with their DAFOR score. Figure 9 shows all plots of each habitat type sampled at the site, with the results at each location provided below.

### West Ruislip Golf Course and Old Priory Meadows Site of Borough Importance for Nature Conservation

4.8.2 The SBINC areas surveyed were typically shaded or semi-shaded areas characterised with woodland and scrub. The ground flora commonly included species such as: ground-elder *Aegopodium podagraria*; hairy brome *Bromus ramosus*; enchanter's-nightshade *Circaea lutetiana*; wood avens *Geum urbanum*; hedge woundwort *Stachys sylvatica*; hogweed *Heracleum sphondylium*; wood dock *Rumex sanguineus*; and sun spurge *Euphorbia helioscopia*. Around 15-20 specimens of broad-leaved helleborine *Epipactis helleborine* were located in woodland at TQ 08101 87068.

## Semi-improved Grassland

4.8.3 Several areas of grassland have been left to grow longer through the management of the golf course. These areas generally comprised taller and more diverse swards. Several common grass species were present, including: meadow foxtail *Alopecurus pratensis*; red fescue *Festuca rubra*; smooth meadow grass *Poa pratensis*; false oat-grass *Arrhenatherum elatius*; and Yorkshire fog *Holcus lanatus*. Tufted hair-grass *Deschampsia cespitosa* was also frequent in some areas sampled. Wild flowers such as: common knapweed *Centaurea nigra*; bird's-foot-trefoil *Lotus corniculatus*; yarrow *Achillea millefolium*; creeping cinquefoil *Potentilla reptans*; selfheal *Prunella vulgaris*; and various species of buttercup and clover were all commonly recorded. Among species less commonly noted were: goat's beard *Aruncus dioicus*, raspberry *Rubus idaeus* and lucerne *Medicago sativa*. Ruderal species included broad-leaved dock *Rumex obtusifolius*, common sorrel *Rumex acetosa* and bramble *Rubus fruticosus* agg.

## Ditch/Wetland Habitat

4.8.4 The main objective for these areas was to identify species specifically associated with the wetland areas of the site. However, some bankside species were also included to indicate the range of species present. In ditch areas, species commonly recorded were: amphibious bistort *Persicaria amphibian*; water plantain *Alisma plantago-aquatica*; fool's water-cress *Apium nodiflorum*; yellow iris *Iris pseudacorus*; soft-rush *Juncus effuses*; duckweed *Lemnoideae sp*, gypsywort *Lycopus europaeus*; purple-loosestrife *Lythrum salicaria*; and water mint *Mentha aquatica*. Less commonly encountered were: water figwort *Scrophularia auriculata*; horsetail *Equisetum* sp; and remote sedge *Carex remota*. Bankside species noted included: mugwort *Artemisia vulgaris*; pendulous sedge *Carex pendula*; great willowherb *Epilobium hirsutum*; meadowsweet *Filipendula ulmaria*; meadow cranesbill *Geranium pratense*; reed canary-grass *Phalaris arundinacea*; and tufted vetch *Vicia cracca*.

# 5 Summary and Discussion

## 5.1 Bats

### Roosts

5.1.1 Surveys found one confirmed roost in Tree 65 and one potential common pipistrelle roost in woodland in the north of the site (point 'A' on Figure 2). Tree 65 and the tree at point 'A' and would be retained as part of the development.

5.1.2 In addition, 32 trees were recorded with 'high' roost potential and 38 trees with 'moderate' roost potential. Three trees with 'high' potential, trees 22, 41 and 48, and three trees with 'moderate' potential, trees 45, 50 and 51, will need to be removed as they fall along the proposed re-alignment of the Ickenham Stream, within the new driving range or within or in close proximity to the ecological irrigation ponds.

### Foraging and Commuting

5.1.3 A total of eight species were recorded at the site during the activity and automated surveys, comprising common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, brown long-eared bat, noctule, Leisler's bat, serotine and a *Myotis* sp. Common pipistrelle was most commonly recorded at the site, followed by soprano pipistrelle and then noctule. Clacks Lane and the woodland edges, particularly where these are complemented with patches of rough grassland and scrub, provide valuable foraging habitat for pipistrelles. Furthermore, a key pipistrelle commuting corridors were recorded in the western and northern parts of the site. The other species were recorded rarely at the site, which is likely to reflect the importance of the site for these species, apart from brown long-eared bat. This species has a quiet call and is therefore likely to be more common at the site than suggested by the survey results.

5.1.4 It is likely that some of the *Myotis* sp. records were Daubenton's bat *Myotis daubentonii*, particularly given that most were recorded by SD1 located near to the River Pinn, as this species forages over water. Another likely species is Natterer's bat *Myotis nattereri*, which forages at woodland edges, open woodland and water bodies. Both of these species have been recorded within 2km of the site[24]. All eight species listed above are known to be present in London, particularly the outer boroughs[25], including Hillingdon. Most are common to locally common and widespread throughout the UK, with the exception of Nathusius' pipistrelle, serotine and Leisler's, which are rarer species. Serotine and Leisler's bat are mostly restricted to the south, although Leisler's also has a stronghold in Ireland and Nathusius' pipistrelle is rare but widespread throughout Great Britain. The species assemblage recorded during the surveys is typical for this type of suburban mosaic habitat.

[24] Greenspace Information for Greater London, (2018); 'An Ecological Data Search for West Ruislip Golf Course On behalf of Arup Report reference 12049. Prepared on 07 Jun 2018.'
[25] London Bat Group (no date);'Bats of London.' Available at: https://londonbats.org.uk/bat-cave/bats-of-london/

## 5.2 Otter and Water Vole

5.2.1 The scrub, grassland and woodland adjacent to the River Pinn offers suitable habitat for otters and water vole. However, the otter and water vole survey found no evidence indicating that these species are present along the River Pinn adjacent to the site. The survey concluded that at most, the river could be used as a commuting route for these two species moving through the wider landscape.

5.2.2 Water vole were recorded within 2km of the site in 2009; however, there are no nearby records of otter. Although very unlikely, it is possible that these two species may move into the site prior to the commencement of construction work in September 2021.

## 5.3 Badgers

5.3.1 One main sett was recorded within the site, which is large and very active. However, little other badger activity was recorded within the site, including latrines, indicating that the site does not form an important part of their territory. It is possible that management practices at the golf course are discouraging badgers from foraging at the site, such as the use of insecticides. Aerial imagery indicates the presence of suitable habitat north of the site, including grassland and woodland, which is likely to provide foraging habitat for the clan associated with the sett at the site.

5.3.2 Some of the site is covered with thick vegetation and other setts may be present. Badgers are also highly mobile and new setts can be created in a relatively short period of time. It is also possible that status of setts may change prior to works commencing and that new setts could be created.

## 5.4 Breeding Birds

5.4.1 A total of 42 bird species were recorded in the survey area in 2018 and 2019. Of these, 32 species were considered likely to be breeding within the site. The remaining ten were either foraging/resting within the site or flying over the area but not considered to be breeding within it.

5.4.2 There were 13 notable species recorded at the site consisting of four Red listed BoCC species and eight Amber listed species. The most significant species thought to be breeding on site are willow warbler *Phylloscopus trochilus,* song thrush and mistle thrush. Habitats containing trees, scrub, rough grassland and water were considered key areas for breeding birds, with the numbers and diversity of birds generally found to be higher in these areas.

5.4.3 All of the notable species recorded within the site are common and widespread and would be expected in this type of habitat. However, they are notable in that their breeding populations have declined significantly in Great Britain in recent decades. None of the populations of the species breeding within the survey area has any specific conservation significance. The site supports a good assemblage of species typically found in similar habitats across the UK.

## 5.5 Reptiles

5.5.1 The marshy grassland and scrub at the north of the site along the River Pinn and the woodland edges along the south of the site supports a population of slow worms. A total of 5 adults (four females, one male) were caught between June and July 2017. The peak count was three individuals (two females, one male) on 11th July 2017, which indicates a low population[26]. The results indicate that the population is centred along the railway corridor, with only one recorded along the woodland edge on the northern edge of the fairway.

5.5.2 The incidental recording of a gravid common lizard in the woodland approximately 20m south of the site boundary indicates there is likely to be a breeding population present at the golf course. The connected woodland edge habitat that runs along the south of the golf course, east of the location of this recording, is likely to support this species.

5.5.3 The woodland edges throughout the site provide suitable habitat for slow worm and common lizard, as they offer shelter from predators, foraging opportunities and open spaces for basking. However, areas of suitable habitat are fragmented and associated with narrow strips across large swathes of amenity grassland. As such, there is great potential to improve connectivity across the site for these species.

## 5.6 Great Crested Newt

5.6.1 It can be concluded that pond 4 within the site (see Figure 7) supports great crested newts given the positive eDNA result. However, further surveys are required to confirm whether they are breeding in the pond and determine the population. Great crested newts typically travel up to 500m to find new ponds throughout the breeding season (February to June), where there is connecting habitat, and this could include ponds 1 and 2.

5.6.2 Outside of the breeding season, great crested newts become terrestrial, foraging for insects at night and taking refuge under logs or buried in mud during the day. The site contains suitable terrestrial habitat for great crested newts including woodland, rough grassland and scrub. Great crested newts are likely to occur in suitable terrestrial habitat within 500m of ponds 3 and 4.

## 5.7 Terrestrial Invertebrates

5.7.1 The flower-rich marshy grassland and tall ruderal habitat types alongside the River Pinn were found to support a diverse assemblage of terrestrial invertebrates of mainly common species. Two nationally scarce species, Roesel's bush-cricket and hornet hoverfly, were also recorded. Terrestrial invertebrate surveys undertaken elsewhere along the River Pinn corridor[16] during May 2013 recorded the presence of four other nationally scarce terrestrial invertebrate species (two ground beetle species *Acupalpus exiguous* and *Anthracus consputus*), a leaf beetle

[26] Froglife, (1999); 'Froglife Advice Sheet 10; Reptile Survey. An Introduction to Planning, Conducting and Interpreting Surveys for Snake and Lizard Conservation.'

*Orsodacne humeralis* and umbellifer longhorn beetle *Phytoecia cylindrica*), which may occur at the survey site. The mature pedunculate oak and deadwood present on other parts of the survey site are also likely to be an important foraging and breeding resource for a range of terrestrial invertebrate species.

5.7.2 The survey site, particularly the flower-rich habitats alongside the River Pinn, mature pedunculate oaks and deadwood support a diverse assemblage of terrestrial invertebrate species.

## 5.8 Botanical

5.8.1 All of the species recorded within each habitat area sampled are common and widespread in the UK and contain species which would be expected in similar types of habitat in the UK. None of the flora recorded within the survey area has any specific conservation significance. However, each of these habitats provide foraging and nesting opportunities for birds and foraging opportunities for invertebrates, badgers and bats.

# 6 Recommendations

## 6.1 Further Survey Work

### Great Crested Newt Survey

6.1.1 The enhancement of pond 4 and translocation of great crested newts from pond 3 to pond 4 has altered the distribution and population of great crested newts within the site. There is also potential for great crested newts to naturally colonise other parts of the site, and potentially breed within ponds 1 and 2 outside the site. Further surveys are therefore required prior to the commencement of works to update the baseline conditions and inform requirements for mitigation. Repeat eDNA surveys and, if positive, population size class assessment surveys, should be undertaken on ponds within and outside the site.

## 6.2 Mitigation

### Bats

6.2.1 Precautionary mitigation measures are required with respect to works to trees with at least low potential to support roosting bats. Trees 22, 41 and 48 with 'high' potential and the three trees with 'moderate' roost potential should be subject to a climb-and-inspect survey by a licensed bat worker prior to being felled, to define any requirements for further mitigation. Trees with low potential should be soft felled, whereby the trees are cut in sections and lowered to the ground to allow any bats to escape, under the guidance of a licensed bat worker.

6.2.2 Lighting design for the driving range should minimise disturbance to foraging and commuting bats. The following measures are recommended[27]:

- The use of asymmetric beam floodlights (as opposed to symmetric) orientated so that the glass is parallel to the ground will ensure that the light is cast in a downward direction and avoids horizontal spill.
- All luminaires should lack UV elements when manufactured. Metal halide, fluorescent sources should not be used.
- LED luminaires should be used where possible due to their sharp cut-off, lower intensity, good colour rendition and dimming capability.
- A warm white spectrum (ideally <2700 Kelvin) should be adopted to reduce blue light component.
- Luminaires should feature peak wavelengths higher than 550nm to avoid the

[27] Bat Conservation Trust and the Institution of Lighting Professionals, (2018); 'Bat Guidance Note 08/18 Bats and artificial lighting in the UK. Bats and the Built Environment series.'

component of light most disturbing to bats.

- The use of specialist bollard or low-level downward directional luminaires to retain darkness above can be considered.
- Column heights should be carefully considered to minimise light spill.
- Only luminaires with an upward light ratio of 0% and with good optical control should be used
- Luminaires should always be mounted on the horizontal, i.e. no upward tilt.
- Any external security lighting should be set on motion-sensors and short (1min) timers.
- As a last resort, accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only to where it is needed.

## Otter and Water Vole

6.2.3 There are no works proposed to the River Pinn; however, there is potential for otter to occupy terrestrial habitat within the site and for water vole to occupy wet ditches, including sections of the Ickenham Stream, prior to the commencement of construction work. A pre-commencement survey for these species is therefore recommended to confirm the likely absence of these species and ensure compliance with legislation.

## Badgers

6.2.4 Given the protection afforded to badgers through the Protection of Badger Act 1996, it is recommended that the main sett is protected during the course of the Proposed Scheme. No heavy machinery will be permitted within 30m of any sett entrances. A suitably qualified ecologist should be consulted on any proposed works within 30m, to ascertain whether there is a potential for disturbance to badgers at the sett. If so, a method statement should be agreed with the ecologist to facilitate these works in the absence of a licence.

6.2.5 If the main sett requires closure or it is not possible to avoid disturbance to badgers, a Natural England licence will be required. This would include a method statement for minimising impacts, including provision of an artificial sett. This would need to be created prior to the commencement of construction works, which would need to be investigated by badgers prior to exclusion and sett destruction. Further survey work would be required to inform the licence application.

6.2.6 As there is potential for other setts to be present on site and for setts to be created prior to the commencement of clearance and construction, it is recommended that the site is monitored to identify any setts that may pose a constraint to development and highlight the need for a licence. A suitably qualified ecologist will also be required to supervise the clearance of vegetation where there is a risk of badger setts being present. Should any

additional setts be recorded, appropriate exclusion zones would need to be established to avoid the risk of disturbance and damage to the setts, or otherwise a licence would need to be applied for to facilitate the Proposed Scheme.

### Birds

6.2.7 Clearance and construction activities should ideally be undertaken outside the main breeding season (March to August inclusive). If this is not possible, pre-clearance nesting checks will be required no more than 48 hours prior to the start of clearance works to areas which may support nesting birds.

### Reptiles

6.2.8 During ground preparation, sensitive clearance should be undertaken under an ecological watching brief. This work will be carried out between March and October (weather conditions permitting), when reptiles are generally active and dispersing. Any individuals found will be placed in a suitable receptor site. Any potential hibernacula (log piles, fallen trees, rubble) within the works area will be subject to a destructive search by a suitably qualified ecologist between March and October (outside of hibernation period) and the vegetation cleared in stages to allow any reptiles that may be present to be captured or to leave the area.

### Great Crested Newt

6.2.9 A new breeding pond has been incorporated within the Proposed Scheme design that would need to be created at least a year prior to the commencement of works impacting pond 4 and suitable terrestrial habitats across the site, to allow the vegetation and invertebrate populations to become established prior to translocation. This would preserve the population at the site in the long-term, as great crested newts could migrate back onto the site naturally once works are complete and utilise the habitats proposed as part of the redevelopment.

6.2.10 Great crested newts should be translocated from pond 4 and suitable terrestrial habitat being impacted by the scheme to the proposed permanent pond within the site, prior to any construction works commencing in line with the HS2 Phase 1 Ecology Technical Standards and Ecological Principles of Mitigation under the HS2 Phase 1 organisational licence or standard EPS Mitigation licence. A mitigation strategy and method statement would be prepared.

### Terrestrial Invertebrates

6.2.11 The following habitat types/features which provide an important foraging and/or breeding resource for terrestrial invertebrates should be protected while site works take place on the golf course:

- Flower-rich marshy grassland and tall ruderal vegetation near the River Pinn; and
- Mature pedunculate oaks and deadwood (standing and fallen).

### Botanical

6.2.12 There are no requirements for mitigation with respect to flora recorded at the site.

## 6.3 Enhancements

### Bats

6.3.1 Bat boxes should be installed on retained trees, particularly in areas of high bat activity at the site, notably along Clacks Lane and semi-mature broadleaved woodland. The planting scheme should incorporate understorey planting, dense scrub and broader strips of rough grassland, to provide improved foraging opportunities.

### Birds

6.3.2 Bird boxes should be installed on retained trees within the site and habitats enhanced for foraging and breeding, including increasing the frequency and quality of wetland habitats and naturalising of edge areas of site and those around the woodland and scrub, including understorey. Habitat creation should include woodland and scrub and contain a diverse range of native plant species. Woodland should include trees of different ages, a mid and understory layer to create the greatest possible variety of nesting and foraging opportunities.

### Badgers

6.3.3 Suitable foraging habitats should be incorporated into the design of the proposed development including woodland, scrub and rough grassland. Earth banks, especially those in woodlands, should be created to allow the existing population to expand within the site and create new setts.

### Reptiles

6.3.4 Suitable habitats should be incorporated including woodland, scrub, rough grassland, grassy, south-facing banks and refugia such as log piles. These provide a variety of foraging, refuge and basking opportunities for slow worms, common lizards and potentially other reptiles.

### Terrestrial Invertebrates

6.3.5 Measures to enhance habitats for terrestrial invertebrates will be advised by a suitably experienced ecologist and include:

- Removing some of the woody vegetation that shades the River Pinn;
- Dredging silt from the River Pinn to expose the watercourse gravel; and
- Installation of a weir to help maintain a regular flow of water in the River Pinn.

6.3.6 Log piles should be created from felled trees/lopped branches in locations advised by a suitably experienced ecologist.

## Botanical

6.3.7 There is considerable potential for enhancing the diversity of flora on site. Some of this could be achieved through improved management, including reducing cutting regimes. The introduction of plug planting and seeding with appropriate species should also be considered in some areas.

# 7 Appendix A: Bat Scoping and Climbing Survey Results

Table 10. EWC results from the tree scoping and climbing surveys for potential roost features carried out in March and August 2017, and September 2018.

| Original Tree Number | Observation | New Feature Number | Easting | Northing | Common Name | Latin Name | Potential Roost Feature (PRF) | Height of PRF | Orientation of PRF | Scoping Result | Climbing Result |
|---|---|---|---|---|---|---|---|---|---|---|---|
| F004 | a | 1 | 508296 | 186943 | Pedunculate oak | *Quercus robur* | Split | 10 | NE | Moderate | High |
| F005 | A | 2 | 508266 | 186961 | Pedunculate oak | *Quercus robur* | callus roll | 4 | SE | Moderate | Low |
| F005 | B | 2 | 508266 | 186961 | Pedunculate oak | *Quercus robur* | Branch cavity | 7 | NW | Moderate | High |
| F008 | A | 3 | 508089 | 187139 | Willow - unknown/hybrid | *Salix sp.* | trunk cavity | 1 | W | Moderate | Low |
| F009 | A | 4 | 507943 | 187206 | Common ash | *Fraxinus excelsior* | branch cavity | 3 | N | Moderate | Negligible |
| F009 | B | 4 | 507943 | 187206 | Common ash | *Fraxinus excelsior* | woodpecker hole | 5 | SW | Moderate | Negligible |
| F009 | C | 4 | 507943 | 187206 | Common ash | *Fraxinus excelsior* | branch cavity | 3 | S | Moderate | Negligible |

| Original Tree Number | Observation | New Feature Number | Easting | Northing | Common Name | Latin Name | Potential Roost Feature (PRF) | Height of PRF | Orientation of PRF | Scoping Result | Climbing Result |
|---|---|---|---|---|---|---|---|---|---|---|---|
| F009 | D | 4 | 507943 | 187206 | Common ash | *Fraxinus excelsior* | branch cavity | 10 | E | Moderate | Negligible |
| F009 | E | 4 | 507943 | 187206 | Common ash | *Fraxinus excelsior* | branch cavity | 5 | NE | Moderate | Negligible |
| F009 | F | 4 | 507943 | 187206 | Common ash | *Fraxinus excelsior* | Ivy cover | 1 | N/A | Low | Low |
| F010 | A | 5 | 507913 | 187221 | Silver birch | *Betula pendula* | trunk cavity | 0.5 | S | Moderate | Low |
| F012 | A | 6 | 507834 | 187176 | Willow - unknown/hybrid | *Salix sp. Unknown/hybrid* | woodpecker hole | 5 | S | Moderate | Low |
| F012 | B | 6 | 507834 | 187176 | Willow - unknown/hybrid | *Salix sp. Unknown/hybrid* | woodpecker hole | 6 | S | Moderate | Low |
| F012 | C | 6 | 507834 | 187176 | Willow - unknown/hybrid | *Salix sp. Unknown/hybrid* | woodpecker hole | 5 | S | Moderate | Low |
| F014 | A | 7 | 507652 | 187184 | field maple | *Acer campestre* | split | 1 | W | Moderate | Moderate |
| F015 | A | 8 | 507601 | 187220 | Common ash | *Fraxinus excelsior* | split | 0.25 | E | Low | Low |

| Original Tree Number | Observation | New Feature Number | Easting | Northing | Common Name | Latin Name | Potential Roost Feature (PRF) | Height of PRF | Orientation of PRF | Scoping Result | Climbing Result |
|---|---|---|---|---|---|---|---|---|---|---|---|
| F016 | A | 9 | 507579 | 187236 | Common ash | *Fraxinus excelsior* | callus roll | 4 | SW | Low | Negligible |
| F016 | B | 9 | 507579 | 187236 | Common ash | *Fraxinus excelsior* | callus roll | 4.25 | S | Low | Negligible |
| F016 | C | 9 | 507579 | 187236 | Common ash | *Fraxinus excelsior* | split | 7 | NE | Moderate | Low |
| F017 | A | 10 | 507574 | 187285 | Common ash | *Fraxinus excelsior* | split | 6 | SE | Moderate | Negligible |
| F017 | B | 10 | 507574 | 187285 | Common ash | *Fraxinus excelsior* | split | 6 | E | Low | Moderate |
| F017 | C | 10 | 507574 | 187285 | Common ash | *Fraxinus excelsior* | woodpecker holes x4 | 3 | E | Moderate | Low |
| F017 | D | 10 | 507574 | 187285 | Common ash | *Fraxinus excelsior* | split | 4 | SE | Moderate | High |
| F018 | A | 11 | 507592 | 187296 | Hawthorn | *Crataegus monogyna* | split | 0.5 | NW | Moderate | Moderate |
| F019 | A | 12 | 508571 | 187102 | Pedunculate oak | *Quercus robur* | Woodpecker holes x2 | 6 | S | Moderate | Moderate |
| F019 | B | 12 | 508571 | 187102 | Pedunculate oak | *Quercus robur* | ivy cover | 1 | N/A | Moderate | Moderate |

| Original Tree Number | Observation | New Feature Number | Easting | Northing | Common Name | Latin Name | Potential Roost Feature (PRF) | Height of PRF | Orientation of PRF | Scoping Result | Climbing Result |
|---|---|---|---|---|---|---|---|---|---|---|---|
| F020 | A | 13 | 508383 | 187197 | Pedunculate oak | *Quercus robur* | Callus roll | 7 | S | Moderate | Low |
| F020 | B | 13 | 508383 | 187197 | Pedunculate oak | *Quercus robur* | woodpecker hole | 6 | N | Moderate | Low |
| F020 | C | 13 | 508383 | 187197 | Pedunculate oak | *Quercus robur* | woodpecker hole | 5.5 | N | Moderate | Negligible |
| F020 | D | 13 | 508383 | 187197 | Pedunculate oak | *Quercus robur* | woodpecker hole | 5 | N | Moderate | Low |
| F020 | E | 13 | 508383 | 187197 | Pedunculate oak | *Quercus robur* | woodpecker hole | 5 | E | Moderate | Moderate |
| F020 | F | 13 | 508383 | 187197 | Pedunculate oak | *Quercus robur* | woodpecker hole | 5 | E | Moderate | Moderate |
| F020 | G | 13 | 508383 | 187197 | Pedunculate oak | *Quercus robur* | woodpecker hole | 5 | E | Moderate | Moderate |
| F020 | H | 13 | 508383 | 187197 | Pedunculate oak | *Quercus robur* | woodpecker hole | 7.5 | S | Moderate | Moderate |
| F023 | A | 14 | 507586 | 187311 | Common ash | *Fraxinus excelsior* | branch cavity | 7 | S | Moderate | Low |
| F024 | A | 15 | 507586 | 187311 | Common ash | *Fraxinus excelsior* | callus roll | 9 | SW | Moderate | Low |

| Original Tree Number | Observation | New Feature Number | Easting | Northing | Common Name | Latin Name | Potential Roost Feature (PRF) | Height of PRF | Orientation of PRF | Scoping Result | Climbing Result |
|---|---|---|---|---|---|---|---|---|---|---|---|
| F024 | B | 15 | 507586 | 187311 | Common ash | *Fraxinus excelsior* | woodpecker hole | 9 | SW | Moderate | Low |
| F025 | A | 16 | 507586 | 187311 | Common ash | *Fraxinus excelsior* | trunk cavity | 1 | E | Moderate | Negligible |
| F026 | A | 17 | 507586 | 187311 | Common ash | *Fraxinus excelsior* | callus roll | 0.6 | SE | Moderate | Low |
| F026 | B | 17 | 507586 | 187311 | Common ash | *Fraxinus excelsior* | trunk cavity | 3 | SE | Moderate | High |
| F027 | A | 18 | 507763 | 187324 | Pedunculate oak | *Quercus robur* | trunk cavity | 5 | N | Moderate | Moderate |
| F027 | B | 18 | 507763 | 187324 | Pedunculate oak | *Quercus robur* | trunk cavity | 1 | N | Moderate | Low |
| F028 | A | 19 | 507763 | 187324 | Pedunculate oak | *Quercus robur* | Branch cavity | 8 | NW | Moderate | Moderate |
| F029 | A | 20 | 507763 | 187324 | Pedunculate oak | *Quercus robur* | callus roll | 9 | NE | Moderate | High |
| F029 | B | 20 | 507763 | 187324 | Pedunculate oak | *Quercus robur* | Callus roll | 2 | N | Moderate | High |

| Original Tree Number | Observation | New Feature Number | Easting | Northing | Common Name | Latin Name | Potential Roost Feature (PRF) | Height of PRF | Orientation of PRF | Scoping Result | Climbing Result |
|---|---|---|---|---|---|---|---|---|---|---|---|
| F031 | A | 21 | 507920 | 187377 | Willow - unknown/hybrid | *Salix sp. Unknown/hybrid* | trunk cavity | 2 | w | High | High |
| F031 | a | 22 | 508187 | 187072 | Pedunculate oak | *Quercus robur* | Woodpecker Hole | 6 | E | High | High |
| F031 | b | 22 | 508187 | 187072 | Pedunculate oak | *Quercus robur* | Other | 4 | N | High | Moderate |
| F031 | c | 22 | 508187 | 187072 | Pedunculate oak | *Quercus robur* | Ivy Cover | 6 | W | Moderate | Low |
| F031 | d | 22 | 508187 | 187072 | Pedunculate oak | *Quercus robur* | Other | 15 | W | High | N/A |
| F031 | e | 22 | 508187 | 187072 | Pedunculate oak | *Quercus robur* | Other | 8 | W | Moderate | Low |
| F031 | f | 22 | 508187 | 187072 | Pedunculate oak | *Quercus robur* | Woodpecker hole | 6 | E | High | High |
| F032 | A | 23 | 507974 | 187381 | Willow - unknown/hybrid | *Salix sp. Unknown/hybrid* | trunk cavity | 1 | NW | Moderate | Moderate |
| F033 | A | 24 | 508058 | 187388 | Pedunculate oak | *Quercus robur* | branch cavity | 10 | s | Moderate | Moderate |

| Original Tree Number | Observation | New Feature Number | Easting | Northing | Common Name | Latin Name | Potential Roost Feature (PRF) | Height of PRF | Orientation of PRF | Scoping Result | Climbing Result |
|---|---|---|---|---|---|---|---|---|---|---|---|
| F033 | B | 24 | 508058 | 187388 | Pedunculate oak | *Quercus robur* | branch cavity | 9 | S | Moderate | High |
| F033 | C | 24 | 508058 | 187388 | Pedunculate oak | *Quercus robur* | branch cavity | 8 | sw | Moderate | Negligible |
| F034 | A | 25 | 508047 | 187424 | Common ash | *Fraxinus excelsior* | branch cavity | 16 | Sw | Moderate | Moderate |
| F034 | B | 25 | 508047 | 187424 | Common ash | *Fraxinus excelsior* | woodpecker hole | 14 | sw | Moderate | Moderate |
| F034 | C | 25 | 508047 | 187424 | Common ash | *Fraxinus excelsior* | woodpecker hole | 13 | Sw | Moderate | Negligible |
| F034 | D | 25 | 508047 | 187424 | Common ash | *Fraxinus excelsior* | woodpecker hole | 12 | s | Moderate | Moderate |
| F034 | E | 25 | 508047 | 187424 | Common ash | *Fraxinus excelsior* | woodpecker hole | 7 | ne | Moderate | Moderate |
| F034 | F | 25 | 508047 | 187424 | Common ash | *Fraxinus excelsior* | woodpecker hole | 6 | ne | Moderate | Moderate |
| F034 | G | 25 | 508047 | 187424 | Common ash | *Fraxinus excelsior* | woodpecker hole | 5 | ne | Moderate | Moderate |
| F038 | a | 26 | 507585 | 187232 | Common ash | *Fraxinus excelsior* | Branch Cavity | 5.5 | S | High | Low |

| Original Tree Number | Observation | New Feature Number | Easting | Northing | Common Name | Latin Name | Potential Roost Feature (PRF) | Height of PRF | Orientation of PRF | Scoping Result | Climbing Result |
|---|---|---|---|---|---|---|---|---|---|---|---|
| F038 | b | 26 | 507585 | 187232 | Common ash | *Fraxinus excelsior* | Callus Roll | 6 | S | Moderate | Low |
| F039 | a | 27 | 507591 | 187312 | Common ash | *Fraxinus excelsior* | Trunk Cavity | 0.8 | E | Moderate | N/A |
| F039 | a | 28 | 507600 | 187215 | Common ash | *Fraxinus excelsior* | Callus roll | 4 | E | Moderate | Moderate |
| F040 | a | 29 | 507589 | 187317 | Common ash | *Fraxinus excelsior* | Trunk Cavity | 7 | S | Moderate | N/A |
| F040 | a | 30 | 507812 | 187147 | Field Maple | *Acer campestre* | Trunk cavity | 1.5 | NW | Moderate | Moderate |
| F041 | a | 31 | 507595 | 187302 | Common ash | *Fraxinus excelsior* | Woodpecker Hole | 9 | SE | High | N/A |
| F041 | a | 32 | 507806 | 187157 | Field Maple | *Acer campestre* | Trunk cavity | 2 | N | Moderate | Low |
| F042 | a | 33 | 507592 | 187289 | Common ash | *Fraxinus excelsior* | Trunk Cavity | 0.5 | N | High | N/A |
| F042 | a | 34 | 507940 | 187188 | Crack Willow | *Salix fragilis* | Trunk cavity | 2 | S | Moderate | Low |
| F043 | a | 35 | 507571 | 187277 | Common ash | *Fraxinus excelsior* | Callus Roll | 0.6 | SE | High | N/A |

| Original Tree Number | Observation | New Feature Number | Easting | Northing | Common Name | Latin Name | Potential Roost Feature (PRF) | Height of PRF | Orientation of PRF | Scoping Result | Climbing Result |
|---|---|---|---|---|---|---|---|---|---|---|---|
| F043 | b | 35 | 507571 | 187277 | Common ash | *Fraxinus excelsior* | Branch Cavity | 0.25 | SE | High | N/A |
| F043 | a | 36 | 507949 | 187192 | Common ash | *Fraxinus excelsior* | Woodpecker hole | 6 | SW | Moderate | Negligible |
| F043 | b | 36 | 507949 | 187192 | Common ash | *Fraxinus excelsior* | Branch cavity | 5 | N | High | Moderate |
| F043 | c | 36 | 507949 | 187192 | Common ash | *Fraxinus excelsior* | Trunk cavity | 0.5 | E | Moderate | Low |
| F043 | d | 36 | 507949 | 187192 | Common ash | *Fraxinus excelsior* | Branch cavity | 11 | E | Moderate | Negligible |
| F044 | a | 37 | 508473 | 187053 | Pedunculate oak | *Quercus robur* | Trunk Cavity | 1 | N | Moderate | Moderate |
| F044 | b | 37 | 508473 | 187053 | Pedunculate oak | *Quercus robur* | Ivy Cover | 6 | N | Moderate | Low |
| F045 | a | 38 | 507663 | 187388 | Crack Willow | *Salix fragilis* | Trunk cavity | 2 | S | Moderate | N/A |
| F045 | b | 38 | 507663 | 187388 | Crack Willow | *Salix fragilis* | Branch cavity | 4 | N | Moderate | N/A |
| F045 | c | 38 | 507663 | 187388 | Crack Willow | *Salix fragilis* | Loose bark | 3.5 | S | Moderate | N/A |

| Original Tree Number | Observation | New Feature Number | Easting | Northing | Common Name | Latin Name | Potential Roost Feature (PRF) | Height of PRF | Orientation of PRF | Scoping Result | Climbing Result |
|---|---|---|---|---|---|---|---|---|---|---|---|
| F045 | a | 39 | 508453 | 187080 | Pedunculate oak | *Quercus robur* | Ivy Cover | 7 | N | Low | N/A |
| F046 | a | 40 | 507683 | 187386 | Pedunculate oak | *Quercus robur* | Split | 7 | NW | High | N/A |
| F046 | a | 41 | 508169 | 187068 | Pedunculate oak | *Quercus robur* | Woodpecker Hole | 8 | S | High | High |
| F046 | b | 41 | 508169 | 187068 | Pedunculate oak | *Quercus robur* | Ivy Cover | N/A | N/A | Low | N/A |
| F046 | c | 41 | 508169 | 187068 | Pedunculate oak | *Quercus robur* | Branch Cavity | 9 | SE | High | High |
| F046 | d | 41 | 508169 | 187068 | Pedunculate oak | *Quercus robur* | Callus Roll | 6 | SE | N/A | Negligible |
| F046 | e | 41 | 508169 | 187068 | Pedunculate oak | *Quercus robur* | Branch Cavity | 5.5 | SE | N/A | Moderate |
| F047 | a | 42 | 507688 | 187388 | Common ash | *Fraxinus excelsior* | Other | 8 | All | Moderate | N/A |
| F047 | a | 43 | 508140 | 187133 | Common ash | *Fraxinus excelsior* | Ivy Cover | N/A | N/A | High | Low |
| F048 | a | 44 | 507799 | 187388 | Crack Willow | *Salix fragilis* | Branch cavity | 7.5 | NW | Low | N/A |

| Original Tree Number | Observation | New Feature Number | Easting | Northing | Common Name | Latin Name | Potential Roost Feature (PRF) | Height of PRF | Orientation of PRF | Scoping Result | Climbing Result |
|---|---|---|---|---|---|---|---|---|---|---|---|
| F048 | a | 45 | 508089 | 187133 | Crack willow | *Salix fragilis* | Other | 1 | W | Moderate | Moderate |
| F049 | a | 46 | 507913 | 187376 | Pedunculate oak | *Quercus robur* | Split | 6 | E | Moderate | N/A |
| F050 | a | 47 | 507917 | 187373 | Crack Willow | *Salix fragilis* | Trunk cavity | 2 | S | High | N/A |
| F050 | b | 47 | 507917 | 187373 | Crack Willow | *Salix fragilis* | Ivy Cover | 2 | All | Low | N/A |
| F050 | a | 48 | 508207 | 187072 | Pedunculate oak | *Quercus robur* | Branch Cavity | 10 | NW | High | High |
| F050 | b | 48 | 508207 | 187072 | Pedunculate oak | *Quercus robur* | Woodpecker Hole | 7 | E | High | Low |
| F050 | c | 48 | 508207 | 187072 | Pedunculate oak | *Quercus robur* | Branch Cavity | 5 | SE | High | Moderate |
| F050 | d | 48 | 508207 | 187072 | Pedunculate oak | *Quercus robur* | Trunk Cavity | 2 | W | High | Low |
| F051 | a | 49 | 507988 | 187379 | Crack Willow | *Salix fragilis* | Trunk cavity | 2 | S | Moderate | N/A |
| F051 | a | 50 | 508089 | 187133 | Crack willow | *Salix fragilis* | Trunk Cavity | 1 | W | Moderate | Moderate |
| F053 | a | 51 | 507623 | 187232 | Crack Willow | *Salix fragilis* | Trunk cavity | 8 | W | High | Moderate |
| F053 | b | 51 | 507623 | 187232 | Crack Willow | *Salix fragilis* | Trunk cavity | 8 | S | Moderate | Moderate |
| F054 | a | 52 | 507628 | 187229 | Crack Willow | *Salix fragilis* | Trunk cavity | 8 | E | Moderate | Low |

| Original Tree Number | Observation | New Feature Number | Easting | Northing | Common Name | Latin Name | Potential Roost Feature (PRF) | Height of PRF | Orientation of PRF | Scoping Result | Climbing Result |
|---|---|---|---|---|---|---|---|---|---|---|---|
| F055 | a | 53 | 507656 | 187280 | Common hawthorn | *Crataegus monogyna* | Trunk cavity | 2 | N | Moderate | N/A |
| F056 | a | 54 | 507673 | 187298 | Crack Willow | *Salix fragilis* | Trunk cavity | 2 | E | High | N/A |
| F057 | a | 55 | 507680 | 187331 | Crack Willow | *Salix fragilis* | Trunk cavity | 2 | W | High | N/A |
| F057 | b | 55 | 507680 | 187331 | Crack Willow | *Salix fragilis* | Branch cavity | 2 | N | Moderate | N/A |
| F057 | c | 55 | 507680 | 187331 | Crack Willow | *Salix fragilis* | Trunk cavity | 1.5 | E | High | N/A |
| F058 | a | 56 | 507685 | 187339 | Crack Willow | *Salix fragilis* | Trunk cavity | 1.5 | W | Moderate | N/A |
| F059 | a | 57 | 507760 | 187345 | Pedunculate oak | *Quercus robur* | Trunk cavity | 1.5 | W | Moderate | N/A |
| F060 | a | 58 | 507762 | 187342 | Pedunculate oak | *Quercus robur* | Branch cavity | 10 | S | Moderate | N/A |
| F061 | a | 59 | 507766 | 187331 | Field Maple | *Acer campestre* | Trunk cavity | 1 | S | Moderate | N/A |
| F062 | a | 60 | 507770 | 187323 | Common ash | *Fraxinus excelsior* | Woodpecker hole | 5 | W | High | N/A |
| F062 | b | 60 | 507770 | 187323 | Common ash | *Fraxinus excelsior* | Woodpecker Hole | 2 | W | High | N/A |
| F063 | a | 61 | 508019 | 187295 | Crack Willow | *Salix fragilis* | Flaking bark | 6 | SE | Low | N/A |

| Original Tree Number | Observation | New Feature Number | Easting | Northing | Common Name | Latin Name | Potential Roost Feature (PRF) | Height of PRF | Orientation of PRF | Scoping Result | Climbing Result |
|---|---|---|---|---|---|---|---|---|---|---|---|
| F064 | a | 62 | 507901 | 187267 | Crack Willow | *Salix fragilis* | Trunk cavity | 2 | E | Moderate | N/A |
| F065 | a | 63 | 507878 | 187265 | Black poplar | *Populus nigra* | Trunk cavity | 1.5 | N | High | Moderate |
| F066 | a | 64 | 507799 | 187255 | Pedunculate oak | *Quercus robur* | Trunk cavity | 5 | N | Moderate | Low |
| F066 | b | 64 | 507799 | 187255 | Pedunculate oak | *Quercus robur* | Woodpecker Hole | 8 | E | Moderate | Negligible |
| F066 | c | 64 | 507799 | 187255 | Pedunculate oak | *Quercus robur* | Woodpecker Hole | 8 | E | Moderate | Negligible |
| F066 | d | 64 | 507799 | 187255 | Pedunculate oak | *Quercus robur* | Other | 4 | N | Moderate | Negligible |
| F066 | e | 64 | 507799 | 187255 | Pedunculate oak | *Quercus robur* | Woodpecker Hole | 8 | E | Moderate | Low |
| F066 | f | 64 | 507799 | 187255 | Pedunculate oak | *Quercus robur* | Other | 5 | E | Moderate | Moderate |
| F066 | g | 64 | 507799 | 187255 | Pedunculate oak | *Quercus robur* | Other | 5 | W | Moderate | Moderate |
| F066 | h | 64 | 507799 | 187255 | Pedunculate oak | *Quercus robur* | Woodpecker hole | 4 | SE | High | Low |

| Original Tree Number | Observation | New Feature Number | Easting | Northing | Common Name | Latin Name | Potential Roost Feature (PRF) | Height of PRF | Orientation of PRF | Scoping Result | Climbing Result |
|---|---|---|---|---|---|---|---|---|---|---|---|
| F067 | a | 65 | 507796 | 187262 | Common ash | *Fraxinus excelsior* | Trunk cavity | 4.5 | W | High | Confirmed |
| F068 | a | 66 | 507704 | 187215 | Field Maple | *Acer campestre* | Trunk cavity | 0.5 | W | High | Low |
| F068 | b | 66 | 507704 | 187215 | Field Maple | *Acer campestre* | Trunk cavity | 1 | S | High | Low |
| F073 | a | 67 | 507827 | 187165 | Crack Willow | *Salix fragilis* | Woodpecker hole | 7 | W | Moderate | N/A |
| F074 | a | 68 | 507828 | 187173 | Crack Willow | *Salix fragilis* | Woodpecker hole | 6 | S | Moderate | N/A |
| F075 | a | 69 | 507837 | 187180 | Silver birch | *Betula pendula* | Woodpecker Hole | 2.5 | W | Moderate | N/A |
| F076 | a | 70 | 507875 | 187202 | Silver birch | *Betula pendula* | Split | 2.5 | SW | Low | N/A |
| F079 | a | 71 | 508032 | 187263 | Common hawthorn | *Crataegus monogyna* | Trunk cavity | 2.5 | S | Moderate | Moderate |
| F083 | a | 72 | 508213 | 187161 | Goat willow | *Salix caprea* | Trunk Cavity | 0.5 | S | Moderate | Low |
| F085 | a | 73 | 508453 | 187080 | Pedunculate oak | *Quercus robur* | Ivy Cover | 7 | N | Low | N/A |

| Original Tree Number | Observation | New Feature Number | Easting | Northing | Common Name | Latin Name | Potential Roost Feature (PRF) | Height of PRF | Orientation of PRF | Scoping Result | Climbing Result |
|---|---|---|---|---|---|---|---|---|---|---|---|
| F086 | a | 74 | 508451 | 187086 | Pedunculate oak | *Quercus robur* | Ivy Cover | 7 | N | Low | N/A |
| F087 | a | 75 | 508160 | 187231 | Common alder | *Alnus glutinosa* | Trunk Cavity | 1.7 | N | Low | N/A |
| F088 | a | 76 | 508071 | 187308 | Common ash | *Fraxinus excelsior* | Callus Roll | 5 | SW | High | N/A |
| F088 | b | 76 | 508071 | 187308 | Common ash | *Fraxinus excelsior* | Ivy Cover | 6 | SW | Moderate | N/A |
| F089 | a | 77 | 508053 | 187337 | Common ash | *Fraxinus excelsior* | Callus Roll | 3 | SW | High | N/A |
| F089 | b | 77 | 508053 | 187337 | Common ash | *Fraxinus excelsior* | Branch Cavity | 9 | SW | High | N/A |
| F090 | a | 78 | 508037 | 187381 | Pedunculate oak | *Quercus robur* | Branch Cavity | 12 | NE | Moderate | N/A |
| F090 | b | 78 | 508037 | 187381 | Pedunculate oak | *Quercus robur* | Callus Roll | 5 | NE | Low | N/A |
| F090 | c | 78 | 508037 | 187381 | Pedunculate oak | *Quercus robur* | Ivy Cover | 15 | S | Moderate | N/A |
| F091 | a | 79 | 508082 | 187304 | Field maple | *Acer campestre* | Trunk Cavity | 1.2 | E | Moderate | N/A |

| Original Tree Number | Observation | New Feature Number | Easting | Northing | Common Name | Latin Name | Potential Roost Feature (PRF) | Height of PRF | Orientation of PRF | Scoping Result | Climbing Result |
|---|---|---|---|---|---|---|---|---|---|---|---|
| F092 | a | 80 | 508085 | 187305 | Field maple | *Acer campestre* | Trunk Cavity | 3 | W | Moderate | N/A |
| F092 | b | 80 | 508085 | 187305 | Field maple | *Acer campestre* | Branch Cavity | 7 | N | High | N/A |
| F093 | a | 81 | 508238 | 187231 | Pedunculate oak | *Quercus robur* | Branch Cavity | 4 | W | Low | N/A |
| F093 | b | 81 | 508238 | 187231 | Pedunculate oak | *Quercus robur* | Other | 15 | N/A | Moderate | N/A |
| F093 | c | 81 | 508238 | 187231 | Pedunculate oak | *Quercus robur* | Callus Roll | 15 | W | High | N/A |
| F094 | a | 82 | 508237 | 187232 | Common ash | *Fraxinus excelsior* | Trunk Cavity | 5 | S | High | N/A |
| F094 | b | 82 | 508237 | 187232 | Common ash | *Fraxinus excelsior* | | 15 | E | High | N/A |
| F095 | a | 83 | 508245 | 187245 | Common ash | *Fraxinus excelsior* | Branch Cavity | 8 | S | High | N/A |
| F095 | b | 83 | 508245 | 187245 | Common ash | *Fraxinus excelsior* | Callus Roll | 9 | E | High | N/A |
| F095 | c | 83 | 508245 | 187245 | Common ash | *Fraxinus excelsior* | Woodpecker Hole | 15 | N | High | N/A |

| Original Tree Number | Observation | New Feature Number | Easting | Northing | Common Name | Latin Name | Potential Roost Feature (PRF) | Height of PRF | Orientation of PRF | Scoping Result | Climbing Result |
|---|---|---|---|---|---|---|---|---|---|---|---|
| F095 | d | 83 | 508245 | 187245 | Common ash | *Fraxinus excelsior* | Branch Cavity | 16 | N | Moderate | N/A |
| F096 | a | 84 | 508246 | 187224 | Common ash | *Fraxinus excelsior* | Loose Bark | 5 | E | Moderate | N/A |
| F096 | b | 84 | 508246 | 187224 | Common ash | *Fraxinus excelsior* | Woodpecker Hole | 6 | SE | High | N/A |
| F097 | a | 85 | 508276 | 187219 | Pedunculate oak | *Quercus robur* | Callus Roll | 0.5 | S | Moderate | N/A |
| F097 | b | 85 | 508276 | 187219 | Pedunculate oak | *Quercus robur* | Loose Bark | 9 | E | Moderate | N/A |
| F098 | a | 86 | 508315 | 187205 | Pedunculate oak | *Quercus robur* | Branch Cavity | 6 | W | High | N/A |
| F098 | b | 86 | 508315 | 187205 | Pedunculate oak | *Quercus robur* | Loose Bark | 9 | N | Moderate | N/A |
| F099 | a | 87 | 508326 | 187195 | Common ash | *Fraxinus excelsior* | Woodpecker Hole | 4 | S | Moderate | N/A |
| F100 | a | 88 | 508445 | 187105 | Pedunculate oak | *Quercus robur* | Branch Cavity | 9 | SW | Moderate | N/A |
| F100 | b | 88 | 508445 | 187105 | Pedunculate oak | *Quercus robur* | Branch Cavity | 8 | S | Moderate | N/A |

| Original Tree Number | Observation | New Feature Number | Easting | Northing | Common Name | Latin Name | Potential Roost Feature (PRF) | Height of PRF | Orientation of PRF | Scoping Result | Climbing Result |
|---|---|---|---|---|---|---|---|---|---|---|---|
| F100 | c | 88 | 508445 | 187105 | Pedunculate oak | *Quercus robur* | Woodpecker Hole | 8 | SE | High | N/A |
| F101 | a | 89 | 508440 | 187117 | Pedunculate oak | *Quercus robur* | Branch Cavity | 9 | SW | High | N/A |
| F101 | b | 89 | 508440 | 187117 | Pedunculate oak | *Quercus robur* | Ivy Cover | | | High | N/A |
| F102 | a | 90 | 508418 | 187140 | Pedunculate oak | *Quercus robur* | Ivy Cover | 8 | N | Moderate | N/A |
| F103 | a | 91 | 508384 | 187207 | Pedunculate oak | *Quercus robur* | Other | 4 | NE | Low | N/A |
| F103 | b | 91 | 508384 | 187207 | Pedunculate oak | *Quercus robur* | Branch Cavity | 3.8 | NW | Moderate | N/A |
| F104 | a | 92 | 508384 | 187207 | Pedunculate oak | *Quercus robur* | Loose Bark | 6 | NW | Moderate | N/A |
| F105 | a | 93 | 508385 | 187199 | Pedunculate oak | *Quercus robur* | Woodpecker Hole | 8 | N | High | N/A |
| F105 | b | 93 | 508385 | 187199 | Pedunculate oak | *Quercus robur* | Branch Cavity | 8 | S | Moderate | N/A |
| F105 | c | 93 | 508385 | 187199 | Pedunculate oak | *Quercus robur* | Loose Bark | 8 | E | Moderate | N/A |

| Original Tree Number | Observation | New Feature Number | Easting | Northing | Common Name | Latin Name | Potential Roost Feature (PRF) | Height of PRF | Orientation of PRF | Scoping Result | Climbing Result |
|---|---|---|---|---|---|---|---|---|---|---|---|
| F105 | d | 93 | 508385 | 187199 | Pedunculate oak | *Quercus robur* | Callus Roll | 10 | SW | High | N/A |
| F106 | a | 94 | 508395 | 187232 | Pedunculate oak | *Quercus robur* | Branch Cavity | 5 | E | Moderate | N/A |
| F107 | a | 95 | 508401 | 187236 | Pedunculate oak | *Quercus robur* | Ivy Cover | 10 | N/A | Low | N/A |
| F107 | b | 95 | 508401 | 187236 | Pedunculate oak | *Quercus robur* | Loose Bark | 8 | NE | Moderate | N/A |
| F110 | a | 96 | 508393 | 187241 | Pedunculate oak | *Quercus robur* | Other | 12 | NW | Moderate | N/A |
| F111 | a | 97 | 508390 | 187234 | Pedunculate oak | *Quercus robur* | Trunk Cavity | 1 | NE | Moderate | N/A |
| F111 | b | 97 | 508390 | 187234 | Pedunculate oak | *Quercus robur* | Ivy Cover | 6 | | Moderate | N/A |
| F112 | a | 98 | 508462 | 187184 | Silver birch | *Betula pendula* | Trunk Cavity | 3 | N | High | N/A |
| F113 | a | 99 | 508575 | 187103 | Pedunculate oak | *Quercus robur* | Branch Cavity | 8 | SW | Moderate | N/A |
| F113 | b | 99 | 508575 | 187103 | Pedunculate oak | *Quercus robur* | Ivy Cover | 1 | N/A | Low | N/A |

| Original Tree Number | Observation | New Feature Number | Easting | Northing | Common Name | Latin Name | Potential Roost Feature (PRF) | Height of PRF | Orientation of PRF | Scoping Result | Climbing Result |
|---|---|---|---|---|---|---|---|---|---|---|---|
| F113 | c | 99 | 508575 | 187103 | Pedunculate oak | *Quercus robur* | Branch Cavity | 6 | SW | High | N/A |
| F113 | d | 99 | 508575 | 187103 | Pedunculate oak | *Quercus robur* | Woodpecker Hole | 9 | SE | High | N/A |
| F114 | a | 100 | 508299 | 187100 | Pedunculate oak | *Quercus robur* | Trunk Cavity | 2 | E | High | Moderate |
| F114 | b | 100 | 508299 | 187100 | Pedunculate oak | *Quercus robur* | Branch Cavity | 2.5 | S | High | Moderate |
| F114 | c | 100 | 508299 | 187100 | Pedunculate oak | *Quercus robur* | Branch Cavity | 5 | SW | Moderate | Moderate |
| F115 | a | 101 | 508295 | 187104 | Pedunculate oak | *Quercus robur* | Trunk Cavity | 2.5 | S | Moderate | Low |
| F116 | a | 102 | 508266 | 187106 | English elm | *Ulmus procera* | Loose Bark | 1 | SW | Moderate | Low |

Table 11. Results of the climbing surveys undertaken by Sylvatica Ecology Limited in May 2019.

| Original Tree Number | Observation | New Feature Number | Easting | Northing | Common Name | Latin Name | Potential Roost Feature (PRF) | Height of PRF | Orientation of PRF | Scoping Result | Climbing Result |
|---|---|---|---|---|---|---|---|---|---|---|---|
| F014 | a | 7 | 507652 | 187184 | Field maple | *Acer campestre* | Split | 1 | W | Moderate | Negligible |
| F040 | a | 30 | 507812 | 187147 | Field maple | *Acer campestre* | Trunk Cavity | 1.5 | NW | Moderate | Negligible |
| F048 | a | 45 | 508089 | 187133 | Crack willow | *Salix fragilis* | Split | 1 | W | Moderate | Moderate |
| F051 | a | 50 | 508089 | 187133 | Crack willow | *Salix fragilis* | Trunk Cavity | 1 | W | Moderate | Moderate |
| F053 | a | 51 | 507623 | 187232 | Crack willow | *Salix fragilis* | Trunk Cavity | 8 | W | High | Moderate |
| F053 | b | 51 | 507623 | 187232 | Crack willow | *Salix fragilis* | Trunk Cavity | 8 | S | Moderate | Moderate |
| F065 | a | 63 | 507878 | 187265 | Black poplar | *Populus nigra* | Trunk Cavity | 1.5 | N | High | Low |
| F075 | a | 69 | 507837 | 187180 | Silver birch | *Betula pendula* | Woodpecker hole | 2.5 | W | Moderate | Negligible |
| F079 | a | 71 | 508032 | 187263 | Common hawthorn | *Crataegus monogyna* | Trunk Cavity | 2.5 | S | Moderate | Low |
| F114 | a | 100 | 508299 | 187100 | Pedunculate oak | *Quercus robur* | Trunk Cavity | 2 | E | High | Negligible |
| F114 | b | 100 | 508299 | 187100 | Pedunculate oak | *Quercus robur* | Branch cavity | 2.5 | S | High | Low |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| F114 | c | 100 | 508299 | 187100 | Pedunculate oak | *Quercus robur* | Branch cavity | 5 | SW | Moderate | Negligible |

# 8 Appendix B: Bat Back Tracking Survey Results

Table 12. Full results from the bat back tracking surveys carried out in July 2017

| Date of Survey | Easting | Northing | Orientation | Time | Latin Name | Common Name | Number of Bats | Seen/ Not Seen | Activity Type | Direction of Flight | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 03/07/2017 | 508002 | 187371 | Northern edge, between TP 9 +10, just west of path paths intersection | 21:30 | *N.noc* | Noctule | 1 | S | F - Foraging | S | Circling, appeared to come from North |
| 03/07/2017 | 508002 | 187371 | Northern edge, between TP 9 +10, just west of path paths intersection | 21:45 | *N.noc* | Noctule | 3 | S | F - Foraging | N/A | Circling over trees south of position, coming and going and occasionally disappearing from view. |
| 03/07/2017 | 508046 | 187411 | Northern edge, between TP 9 +10, just west of path paths intersection | 21:55 | *P.pip* | Common pipistrelle | 1 | S | Other (state in notes) | N/A | Flying around tree, unsure if emerged or not, then foraging. |
| 03/07/2017 | 508002 | 187371 | Northern edge, between TP 9 +10, just west of path paths intersection | 21:58 | *N.noc* | Noctule | 1 | S | S - Socialising | N/A | Appeared to be almost constant Noctule activity in early part of survey but may have had a social call? |
| 03/07/2017 | 508002 | 187371 | Northern edge, between TP 9 +10, just west of path paths intersection | 22:00 | *P.pip* | Common pipistrelle | 1 | S | F - Foraging | N/A | Foraging around tree |

| Date of Survey | Easting | Northing | Orientation | Time | Latin Name | Common Name | Number of Bats | Seen/ Not Seen | Activity Type | Direction of Flight | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 03/07/2017 | 508002 | 187371 | Northern edge, between TP 9 +10, just west of path paths intersection | 22:10 | *P.pip* | Common pipistrelle | 2 | S | F - Foraging | N/A | Foraging around tree |
| 03/07/2017 | 508002 | 187371 | Northern edge, between TP 9 +10, just west of path paths intersection | 22:21 | *P.pip* | Common pipistrelle | 2 | S | Other (state in notes) | N/A | Chasing and foraging, interaction for 2-3 mins |
| 03/07/2017 | 508002 | 187371 | Northern edge, between TP 9 +10, just west of path paths intersection | 22:25 | *P.pip* | Common pipistrelle | 1 | S | F - Foraging | N/A | Foraging around tree |
| 03/07/2017 | 507852 | 187312 | Along northern boundary (TQ 07877 87368) | 21:32 | *N.noc* | Noctule | 1 | S | F - Foraging | E | Foraging high over line of trees in centre of site (target note 1) |
| 03/07/2017 | 507852 | 187312 | Along northern boundary (TQ 07877 87368) | 21:32 | *N.noc* | Noctule | 1 | S | F - Foraging | E | Foraging high over line of trees in centre of site (target note 1) |
| 03/07/2017 | 507852 | 187312 | Along northern boundary (TQ 07877 87368) | 21:32 | *N.noc* | Noctule | 1 | S | F - Foraging | E | Foraging high over line of trees in centre of site (target note 1) |
| 03/07/2017 | 507852 | 187312 | Along northern boundary (TQ 07877 87368) | 21:32 | *N.noc* | Noctule | 1 | S | F - Foraging | E | Foraging high over line of trees in centre of site (target note 1) |

| Date of Survey | Easting | Northing | Orientation | Time | Latin Name | Common Name | Number of Bats | Seen/ Not Seen | Activity Type | Direction of Flight | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 03/07/2017 | 507852 | 187312 | Along northern boundary (TQ 07877 87368) | 21:36 | *N.noc* | Noctule | 2 | S | F - Foraging | W | Foraging high over line of trees in centre of site (target note 1) |
| 03/07/2017 | 507814 | 187273 | Along northern boundary (TQ 07877 87368) | 21:39 | *N.noc* | Noctule | 3 | S | F - Foraging | W | Foraging high over line of trees in centre of site (target note 2). |
| 03/07/2017 | 507861 | 187385 | Along northern boundary (TQ 07877 87368) | 22:03 | *P.pyg* | Soprano pipistrelle | 1 | S | F - Foraging | E | Foraging along hedgerow and over open area of grassland (target note 3) |
| 03/07/2017 | 507861 | 187385 | Along northern boundary (TQ 07877 87368) | 22:21 | *P.pip* | Common pipistrelle | 1 | S | F - Foraging | E | Target note 4 |
| 03/07/2017 | 507861 | 187385 | Along northern boundary (TQ 07877 87368) | 22:24 | *P.pip* | Common pipistrelle | 2 | S | F - Foraging | E | N/A |
| 03/07/2017 | N/A | N/A | Along northern boundary (TQ 07877 87368) | 22:16 | *P.pyg* | Soprano pipistrelle | 1 | NS | F - Foraging | N/A | No grid ref or direction of flight as I couldn't see bat. |
| 03/07/2017 | N/A | N/A | Along northern boundary (TQ 07877 87368) | 22:19 | *N.noc* | Noctule | 1 | NS | C - Commuting | N/A | No grid ref or direction of flight as I couldn't see bat. |
| 03/07/2017 | N/A | N/A | Along northern boundary (TQ 07877 87368) | 22:30 | *P.pyg* | Soprano pipistrelle | 1 | NS | F - Foraging | N/A | No grid ref or direction of flight as I couldn't see bat. |
| 03/07/2017 | N/A | N/A | Along northern boundary (TQ 07877 87368) | 22:33 | *P.pip* | Common pipistrelle | 1 | NS | F - Foraging | N/A | No grid ref or direction of flight as I couldn't see bat. |

| Date of Survey | Easting | Northing | Orientation | Time | Latin Name | Common Name | Number of Bats | Seen/ Not Seen | Activity Type | Direction of Flight | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 03/07/2017 | N/A | N/A | Along northern boundary (TQ 07877 87368) | 22:41 | *P.pip* | Common pipistrelle | 1 | NS | F - Foraging | N/A | No grid ref or direction of flight as I couldn't see bat. |
| 03/07/2017 | N/A | N/A | Along northern boundary (TQ 07877 87368) | 22:41 | *P.pyg* | Soprano pipistrelle | 1 | NS | F - Foraging | N/A | No grid ref or direction of flight as I couldn't see bat. |
| 03/07/2017 | N/A | N/A | Along northern boundary (TQ 07877 87368) | 22:51 | *M.sp.* | Myotis sp. | 1 | NS | C - Commuting | N/A | No grid ref or direction of flight as I couldn't see bat. |
| 03/07/2017 | 507606 | 187311 | Golf Course, along the fairway on the Western boundary of the site | 21:45 | *N.noc* | Noctule | 2 | S | F - Foraging | N/A | All directions |
| 03/07/2017 | 507606 | 187311 | Golf Course, along the fairway on the Western boundary of the site | 21:49 | *N.noc* | Noctule | 1 | S | F - Foraging | W | N/A |
| 03/07/2017 | 507606 | 187311 | Golf Course, along the fairway on the Western boundary of the site | 21:49 | *N.noc* | Noctule | 1 | S | F - Foraging | E | N/A |
| 03/07/2017 | 507606 | 187311 | Golf Course, along the fairway on the Western boundary of the site | 21:53 | *P.pip* | Common pipistrelle | 1 | NS | N/A | N/A | N/A |
| 03/07/2017 | 507606 | 187311 | Golf Course, along the fairway on the Western boundary of the site | 21:53 | *P.pip* | Common pipistrelle | 1 | S | C - Commuting | W | N/A |

| Date of Survey | Easting | Northing | Orientation | Time | Latin Name | Common Name | Number of Bats | Seen/ Not Seen | Activity Type | Direction of Flight | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 03/07/2017 | 507606 | 187311 | Golf Course, along the fairway on the Western boundary of the site | 21:55 | *N.noc* | Noctule | 2 | S | F - Foraging | W | N/A |
| 03/07/2017 | 507606 | 187311 | Golf Course, along the fairway on the Western boundary of the site | 21:56 | *N.noc* | Noctule | 2 | S | F - Foraging | W | N/A |
| 03/07/2017 | 507606 | 187311 | Golf Course, along the fairway on the Western boundary of the site | 21:57 | *P.pip* | Common pipistrelle | 1 | S | C - Commuting | E | N/A |
| 03/07/2017 | 507606 | 187311 | Golf Course, along the fairway on the Western boundary of the site | 21:58 | *N.noc* | Noctule | 1 | S | F - Foraging | E | N/A |
| 03/07/2017 | 507606 | 187311 | Golf Course, along the fairway on the Western boundary of the site | 22:00 | *P.pip* | Common pipistrelle | 1 | NS | C - Commuting | N/A | Brief pass |
| 03/07/2017 | 507606 | 187311 | Golf Course, along the fairway on the Western boundary of the site | 22:00 | *N.noc* | Noctule | 1 | S | F - Foraging | E | N/A |
| 03/07/2017 | 507606 | 187311 | Golf Course, along the fairway on the Western boundary of the site | 22:02 | *N.noc* | Noctule | 1 | S | F - Foraging | W | N/A |

| Date of Survey | Easting | Northing | Orientation | Time | Latin Name | Common Name | Number of Bats | Seen/ Not Seen | Activity Type | Direction of Flight | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 03/07/2017 | 507606 | 187311 | Golf Course, along the fairway on the Western boundary of the site | 22:04 | *N.noc* | Noctule | 2 | S | F - Foraging | W | N/A |
| 03/07/2017 | 507606 | 187311 | Golf Course, along the fairway on the Western boundary of the site | 22:08 | *N.noc* | Noctule | 1 | NS | N/A | N/A | N/A |
| 03/07/2017 | 507606 | 187311 | Golf Course, along the fairway on the Western boundary of the site | 22:09 | *N.noc* | Noctule | 1 | S | F - Foraging | W | N/A |
| 03/07/2017 | 507606 | 187311 | Golf Course, along the fairway on the Western boundary of the site | 22:11 | *P.pip* | Common pipistrelle | 1 | NS | N/A | N/A | N/A |
| 03/07/2017 | 507606 | 187311 | Golf Course, along the fairway on the Western boundary of the site | 22:15 | *N.noc* | Noctule | 1 | S | F - Foraging | W | N/A |
| 03/07/2017 | 507606 | 187311 | Golf Course, along the fairway on the Western boundary of the site | 22:19 | *N.noc* | Noctule | 1 | NS | N/A | N/A | N/A |
| 03/07/2017 | 507606 | 187311 | Golf Course, along the fairway on the Western boundary of the site | 22:21 | *N.noc* | Noctule | 1 | S | F - Foraging | W | N/A |

| Date of Survey | Easting | Northing | Orientation | Time | Latin Name | Common Name | Number of Bats | Seen/ Not Seen | Activity Type | Direction of Flight | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 03/07/2017 | 507606 | 187311 | Golf Course, along the fairway on the Western boundary of the site | 22:21 | *P.pip* | Common pipistrelle | 1 | NS | N/A | N/A | N/A |
| 03/07/2017 | 507606 | 187311 | Golf Course, along the fairway on the Western boundary of the site | 22:22 | *P.pip* | Common pipistrelle | 1 | S | C - Commuting | E | N/A |
| 03/07/2017 | 507606 | 187311 | Golf Course, along the fairway on the Western boundary of the site | 22:22 | *N.noc* | Noctule | 1 | NS | N/A | N/A | N/A |
| 03/07/2017 | 507606 | 187311 | Golf Course, along the fairway on the Western boundary of the site | 22:28 | *P.pyg* | Soprano pipistrelle | 1 | NS | N/A | N/A | N/A |
| 03/07/2017 | 507606 | 187311 | Golf Course, along the fairway on the Western boundary of the site | 22:32 | *P.pip* | Common pipistrelle | 1 | S | C - Commuting | W | N/A |
| 03/07/2017 | 507779 | 187380 | Along northern boundary (TQ 07794 87377) | 21:28 | *N.noc* | Noctule | 3 | S | F - Foraging | N/A | Flying high above ground in open space, approximately 15m above ground until about 22:00, error with recorder, sound files corrupted. |

| Date of Survey | Easting | Northing | Orientation | Time | Latin Name | Common Name | Number of Bats | Seen/ Not Seen | Activity Type | Direction of Flight | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 03/07/2017 | 507779 | 187380 | Along northern boundary (TQ 07794 87377) | 22:13 | Unknown | Unknown | 1 | S | F - Foraging | N/A | Foraging very close to the ground, error with recorder, sound files corrupted. |
| 03/07/2017 | 507779 | 187380 | Along northern boundary (TQ 07794 87377) | 22:19 | *N.noc* | Noctule | 1 | S | C - Commuting | W | Flying very high above ground, error with recorder, sound files corrupted. |
| 03/07/2017 | 507779 | 187380 | Along northern boundary (TQ 07794 87377) | 22:22 | *P.pip* | Common pipistrelle | 1 | S | C - Commuting | N | Flying 4m above ground, error with recorder, sound files corrupted. |
| 03/07/2017 | N/A | N/A | See map - Along northern boundary (TQ 07676 87378) | 21:36 | *N.noc* | Noctule | 1 | NS | C - Commuting | N/A | Heard not seen |
| 03/07/2017 | 507659 | 187370 | See map - Along northern boundary (TQ 07676 87378) | 21:39 | *N.noc* | Noctule | 3 | S | F - Foraging | N/A | See 'A' map for direction of flight |
| 03/07/2017 | 507744 | 187357 | See map - Along northern boundary (TQ 07676 87378) | 21:43 | *N.noc* | Noctule | 3 | S | F - Foraging | N/A | See 'B' map for direction of flight |
| 03/07/2017 | 507715 | 187357 | See map - Along northern boundary (TQ 07676 87378) | 21:44 | *N.noc* | Noctule | 3 | S | F - Foraging | N/A | See 'C' map for direction of flight |
| 03/07/2017 | 507659 | 187370 | See map - Along northern boundary (TQ 07676 87378) | 21:45 | *N.noc* | Noctule | 3 | S | F - Foraging | N/A | See 'A, D, B' map for direction of flight |
| 03/07/2017 | 507659 | 187370 | See map - Along northern boundary (TQ 07676 87378) | 21:52 | *P.pyg* | Soprano pipistrelle | 1 | NS | C - Commuting | N/A | N/A |

| Date of Survey | Easting | Northing | Orientation | Time | Latin Name | Common Name | Number of Bats | Seen/ Not Seen | Activity Type | Direction of Flight | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 03/07/2017 | 507659 | 187370 | See map - Along northern boundary (TQ 07676 87378) | 21:54 | *N.noc* | Noctule | 2 | S | F - Foraging | N/A | See 'A' map for direction of flight |
| 03/07/2017 | N/A | N/A | See map - Along northern boundary (TQ 07676 87378) | 21:56 | *P.pyg* | Soprano pipistrelle | 1 | NS | C - Commuting | N/A | Heard not seen |
| 03/07/2017 | 507741 | 187346 | See map - Along northern boundary (TQ 07676 87378) | 21:56 | *N.noc* | Noctule | 1 | S | F - Foraging | N/A | See 'D' map for direction of flight |
| 03/07/2017 | 507672 | 187374 | See map - Along northern boundary (TQ 07676 87378) | 21:58 | *N.noc* | Noctule | 1 | S | F - Foraging | N/A | See 'F' map for direction of flight |
| 03/07/2017 | 507659 | 187370 | See map - Along northern boundary (TQ 07676 87378) | 22:00 | *N.noc* | Noctule | 1 | S | F - Foraging | N/A | See 'A' map for direction of flight |
| 03/07/2017 | 507669 | 187362 | See map - Along northern boundary (TQ 07676 87378) | 22:04 | *N.noc* | Noctule | 2 | S | F - Foraging | N/A | See 'G' map for direction of flight |
| 03/07/2017 | N/A | N/A | See map - Along northern boundary (TQ 07676 87378) | 22:07 | *N.noc* | Noctule | 1 | NS | C - Commuting | N/A | Heard not seen |
| 03/07/2017 | N/A | N/A | See map - Along northern boundary (TQ 07676 87378) | 22:09 | *P.pip* | Common pipistrelle | 1 | NS | C - Commuting | N/A | Heard not seen |
| 03/07/2017 | N/A | N/A | See map - Along northern boundary (TQ 07676 87378) | 22:14 | *P.pyg* | Soprano pipistrelle | 1 | NS | C - Commuting | N/A | Heard not seen |
| 03/07/2017 | N/A | N/A | See map - Along northern boundary (TQ 07676 87378) | 22:15 | *P.pip* | Common pipistrelle | 2 | NS | C - Commuting | N/A | Heard not seen |

| Date of Survey | Easting | Northing | Orientation | Time | Latin Name | Common Name | Number of Bats | Seen/ Not Seen | Activity Type | Direction of Flight | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 03/07/2017 | 507670 | 187389 | See map - Along northern boundary (TQ 07676 87378) | 22:18 | *P.pip* | Common pipistrelle | 22 | S | C - Commuting | N/A | See 'H' map for direction of flight. Probably about 22 individuals commuting down hedge |
| 03/07/2017 | 507670 | 187389 | See map - Along northern boundary (TQ 07676 87378) | 22:19 | *N.noc* | Noctule | 1 | S | C - Commuting | N/A | See 'H' map for direction of flight |
| 03/07/2017 | 507670 | 187389 | See map - Along northern boundary (TQ 07676 87378) | 22:50 | *P.pyg* | Soprano pipistrelle | 1 | NS | C - Commuting | N/A | Heard not seen |
| 03/07/2017 | N/A | N/A | See map - Along northern boundary (TQ 07676 87378) | 23:05 | *P.pip* | Common pipistrelle | 7 | S | C - Commuting | N/A | See 'H' map for direction of flight. Probably about 7 individuals commuting down hedge |
| 03/07/2017 | N/A | N/A | See map - Along northern boundary (TQ 07676 87378) | 23:10 | *P.pyg* | Soprano pipistrelle | 1 | NS | C - Commuting | N/A | Heard not seen |
| 03/07/2017 | N/A | N/A | See map - Along northern boundary (TQ 07676 87378) | 23:12 | *P.aur* | Brown long eared bat | 1 | NS | C - Commuting | N/A | Heard not seen |
| 03/07/2017 | N/A | N/A | See map - Along northern boundary (TQ 07676 87378) | 23:12 | *M.sp.* | Myotis sp. | 1 | NS | C - Commuting | N/A | Heard not seen |
| 03/07/2017 | N/A | N/A | See map - Along northern boundary (TQ 07676 87378) | 23:15 | *P.pip* | Common pipistrelle | 2 | NS | C - Commuting | N/A | Heard not seen |

| Date of Survey | Easting | Northing | Orientation | Time | Latin Name | Common Name | Number of Bats | Seen/ Not Seen | Activity Type | Direction of Flight | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 04/07/2017 | 508002 | 187371 | Northern edge, between TP 9 +10, just west of path paths intersection | 03:00 | *P.pyg* | Soprano pipistrelle | 1 | NS | C - Commuting | N/A | Unseen, poss foraging |
| 04/07/2017 | 508002 | 187371 | Northern edge, between TP 9 +10, just west of path paths intersection | 03:00 | *P.pip* | Common pipistrelle | 1 | NS | F - Foraging | N/A | N/A |
| 04/07/2017 | 508002 | 187371 | Northern edge, between TP 9 +10, just west of path paths intersection | 03:10 | *P.pyg* | Soprano pipistrelle | 1 | NS | C - Commuting | N/A | distant pass |
| 04/07/2017 | 508002 | 187371 | Northern edge, between TP 9 +10, just west of path paths intersection | 03:16 | *P.pip* | Common pipistrelle | 1 | NS | C - Commuting | N/A | N/A |
| 04/07/2017 | 508046 | 187411 | Northern edge, between TP 9 +10, just west of path paths intersection | 03:29 | Unknown | Unknown | 1 | NS | F - Foraging | N/A | Foraging around tree, pip species |
| 04/07/2017 | 508002 | 187371 | Northern edge, between TP 9 +10, just west of path paths intersection | 03:39 | Unknown | Unknown | 1 | NS | F - Foraging | N/A | Foraging around tree |
| 04/07/2017 | 508002 | 187371 | Northern edge, between TP 9 +10, just west of path paths intersection | 03:46 | *P.pyg* | Soprano pipistrelle | 2 | NS | C - Commuting | N/A | N/A |

| Date of Survey | Easting | Northing | Orientation | Time | Latin Name | Common Name | Number of Bats | Seen/ Not Seen | Activity Type | Direction of Flight | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 04/07/2017 | 508002 | 187371 | Northern edge, between TP 9 +10, just west of path paths intersection | 04:08 | *N.noc* | Noctule | 1 | NS | C - Commuting | N/A | N/A |
| 04/07/2017 | 507606 | 187311 | Golf Course, along the fairway on the Western boundary of the site | 03:37 | *P.pyg* | Soprano pipistrelle | 1 | NS | N/A | N/A | N/A |
| 04/07/2017 | 507606 | 187311 | Golf Course, along the fairway on the Western boundary of the site | 03:47 | *N.noc* | Noctule | 1 | NS | N/A | N/A | N/A |
| 04/07/2017 | 507606 | 187311 | Golf Course, along the fairway on the Western boundary of the site | 03:50 | *P.pip* | Common pipistrelle | 1 | NS | N/A | N/A | N/A |
| 04/07/2017 | 507606 | 187311 | Golf Course, along the fairway on the Western boundary of the site | 03:59 | *P.pyg* | Soprano pipistrelle | 1 | NS | N/A | N/A | N/A |
| 04/07/2017 | 507606 | 187311 | Golf Course, along the fairway on the Western boundary of the site | 04:02 | *P.pip* | Common pipistrelle | 1 | S | F - Foraging | N/A | All directions |
| 04/07/2017 | 507779 | 187380 | Ruislip race course | 03:55 | *P.pip* | Common pipistrelle | 1 | S | C - Commuting | E | Flying 2m above ground , error with recorder, sound files corrupted. |

| Date of Survey | Easting | Northing | Orientation | Time | Latin Name | Common Name | Number of Bats | Seen/ Not Seen | Activity Type | Direction of Flight | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 04/07/2017 | 507779 | 187380 | Ruislip race course | 04:25 | *N.noc* | Noctule | 1 | S | C - Commuting | S | Flying very high above ground , error with recorder, sound files corrupted. |
| 04/07/2017 | 507670 | 187389 | See map | 03:03 | *P.pip* | Common pipistrelle | 1 | NS | C - Commuting | N/A | N/A |
| 04/07/2017 | 507670 | 187389 | See map | 03:44 | *P.pyg* | Soprano pipistrelle | 1 | S | C - Commuting | N/A | See 'A' on map |
| 04/07/2017 | 507670 | 187389 | See map | 03:44 | *P.pip* | Common pipistrelle | 1 | S | C - Commuting | N/A | See 'A' on map |
| 04/07/2017 | 507670 | 187389 | See map | 03:49 | *N.noc* | Noctule | 1 | NS | C - Commuting | N/A | N/A |
| 04/07/2017 | 507670 | 187389 | See map | 03:50 | *P.pip* | Common pipistrelle | 1 | NS | C - Commuting | N/A | N/A |
| 04/07/2017 | 507670 | 187389 | See map | 03:54 | *P.pip* | Common pipistrelle | 2 | S | C - Commuting | N/A | See 'A' on map. At least 2 individuals |
| 04/07/2017 | 507684 | 187370 | See map | 04:07 | *N.noc* | Noctule | 1 | S | C - Commuting | N/A | See 'B' on map |
| 04/07/2017 | 507615 | 187339 | See map | 04:18 | *N.noc* | Noctule | 1 | S | C - Commuting | N/A | See 'C' on map |

# 9 Appendix C: Bat Emergence/Re-entry Survey Results

Table 13. Full results of the bat emergence/re-entry surveys undertaken by EWC surveyors in June 2018

| Date of Survey | Easting | Northing | Surveyor Orientation | Time | Latin Name | Common Name | Number of Bats | Seen/ Not seen | Activity Type | Direction of Flight | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 14/06/2018 | 508169 | 187068 | N | 21:52 | *P.pip* | Common pipistrelle | 1 | S | Unknown | W | Possible emergence from behind, bat flew past me circled and went NE |
| 14/06/2018 | 508169 | 187068 | N | 21:56 | *P.pip* | Common pipistrelle | 3 | S | C - Commuting | NE | Flew along the path |
| 14/06/2018 | 508169 | 187068 | N | 21:59 | *N.noc* | Noctule | 1 | S | C - Commuting | S | N/A |
| 14/06/2018 | 508169 | 187068 | N | 22:03 | *E.ser* | Serotine | 1 | NS | C - Commuting | N/A | N/A |
| 14/06/2018 | 508169 | 187068 | N | 22:05 | *E.ser* | Serotine | 1 | S | C - Commuting | N | N/A |
| 14/06/2018 | 508169 | 187068 | N | 22:07 | *P.pyg* | Soprano pipistrelle | 1 | NS | C - Commuting | N/A | N/A |
| 14/06/2018 | 508169 | 187068 | N | 22:09 | *P.pip* | Common pipistrelle | 1 | NS | C - Commuting | N/A | Came from behind |
| 14/06/2018 | 508169 | 187068 | N | 22:23 | *P.pyg* | Soprano pipistrelle | 1 | NS | C - Commuting | N/A | N/A |
| 14/06/2018 | 508169 | 187068 | N | 22:24 | *P.pip* | Common pipistrelle | 1 | NS | C - Commuting | N/A | N/A |
| 14/06/2018 | 508169 | 187068 | N | 22:26 | *P.pip* | Common pipistrelle | 1 | NS | C - Commuting | N/A | Came from behind |
| 14/06/2018 | 508169 | 187068 | N | 22:28 | *P.pip* | Common pipistrelle | 1 | NS | C - Commuting | N/A | N/A |
| 14/06/2018 | 508183 | 187078 | SW | 21:54 | *P.pip* | Common pipistrelle | 1 | NS | N/A | N/A | HNS |
| 14/06/2018 | 508183 | 187078 | SW | 21:56 | *P.pip* | Common pipistrelle | 1 | NS | N/A | N/A | HNS |

| Date of Survey | Easting | Northing | Surveyor Orientation | Time | Latin Name | Common Name | Number of Bats | Seen/ Not seen | Activity Type | Direction of Flight | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 14/06/2018 | 508183 | 187078 | SW | 21:59 | *N.noc* | Noctule | 1 | NS | N/A | N/A | HNS |
| 14/06/2018 | 508207 | 187072 | SE | 21:49 | *P.pip* | Common pipistrelle | 1 | NS | Unknown | Unknown | HNS |
| 14/06/2018 | 508207 | 187072 | SE | 21:51 | *P.pip* | Common pipistrelle | 1 | NS | Unknown | Unknown | HNS |
| 14/06/2018 | 508207 | 187072 | SE | 21:54 | *P.pip* | Common pipistrelle | 1 | NS | Unknown | Unknown | HNS |
| 14/06/2018 | 508207 | 187072 | SE | 21:56 | *P.pip* | Common pipistrelle | 1 | S | C - Commuting | SW | Flying NE to SW |
| 14/06/2018 | 508207 | 187072 | SE | 21:56 | *P.pip* | Common pipistrelle | 1 | S | F - Foraging | N/A | Circling 5m SW of the tree |
| 14/06/2018 | 508207 | 187072 | SE | 22:03 | *P.pip* | Common pipistrelle | 1 | S | C - Commuting | SW | Flying overhead SW |
| 14/06/2018 | 508207 | 187072 | SE | 22:08 | *P.pip* | Common pipistrelle | 1 | NS | C - Commuting | Unknown | HNS |
| 14/06/2018 | 508207 | 187072 | SE | 22:14 | *P.pip* | Common pipistrelle | 1 | NS | C - Commuting | Unknown | HNS |
| 14/06/2018 | 508207 | 187072 | SE | 22:22 | *P.pip* | Common pipistrelle | 1 | NS | Unknown | Unknown | HNS very faint |
| 29/06/2018 | 508166 | 187058 | W | 03:19 | *P.pip* | Common pipistrelle | 1 | NS | N/A | N/A | N/A |
| 29/06/2018 | 508166 | 187058 | W | 03:20 | *P.pip* | Common pipistrelle | 1 | S | C - Commuting | NE | Flew through tree cluster |
| 29/06/2018 | 508166 | 187058 | W | 03:22 | *P.pip* | Common pipistrelle | 1 | NS | N/A | N/A | N/A |
| 29/06/2018 | 508166 | 187058 | W | 03:24 | *P.aur* | Brown long eared bat | 1 | NS | N/A | N/A | N/A |
| 29/06/2018 | 508166 | 187058 | W | 03:28 | *P.pip* | Common pipistrelle | 1 | NS | F - Foraging | N/A | N/A |

| Date of Survey | Easting | Northing | Surveyor Orientation | Time | Latin Name | Common Name | Number of Bats | Seen/ Not seen | Activity Type | Direction of Flight | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 29/06/2018 | 508166 | 187058 | W | 03:31 | *P.pip* | Common pipistrelle | 1 | NS | N/A | N/A | N/A |
| 29/06/2018 | 508166 | 187058 | W | 03:36 | *P.pip* | Common pipistrelle | 1 | S | F - Foraging | N/A | N/A |
| 29/06/2018 | 508166 | 187058 | W | 03:37 | *P.pip* | Common pipistrelle | 1 | NS | C - Commuting | NW | N/A |
| 29/06/2018 | 508166 | 187058 | W | 03:38 | *P.pip* | Common pipistrelle | 1 | NS | N/A | N/A | N/A |
| 29/06/2018 | 508166 | 187058 | W | 03:40 | *P.pip* | Common pipistrelle | 1 | S | C - Commuting | NW | N/A |
| 29/06/2018 | 508166 | 187058 | W | 03:42 | *P.pip* | Common pipistrelle | 1 | NS | N/A | N/A | N/A |
| 29/06/2018 | 508166 | 187058 | W | 03:45 | *P.pip* | Common pipistrelle | 1 | NS | N/A | N/A | N/A |
| 29/06/2018 | 508166 | 187058 | W | 03:48 | *P.pip* | Common pipistrelle | 1 | S | F - Foraging | NE | N/A |
| 29/06/2018 | 508166 | 187058 | W | 03:50 | *P.pyg* | Soprano pipistrelle | 1 | NS | N/A | N/A | N/A |
| 29/06/2018 | 508166 | 187058 | W | 03:52 | *P.pip* | Common pipistrelle | 1 | NS | N/A | N/A | N/A |
| 29/06/2018 | 508166 | 187058 | W | 03:54 | *P.pip* | Common pipistrelle | 1 | S | C - Commuting | NE | N/A |
| 29/06/2018 | 508166 | 187058 | W | 03:55 | *P.pip* | Common pipistrelle | 1 | NS | N/A | N/A | N/A |
| 29/06/2018 | 508166 | 187058 | W | 03:56 | *P.pip* | Common pipistrelle | 2 | S | F - Foraging | N/A | Foraging up and down hedgeline for 3 mins |
| 29/06/2018 | 508166 | 187058 | W | 04:02 | *P.pip* | Common pipistrelle | 1 | S | C - Commuting | NW | N/A |
| 29/06/2018 | 508166 | 187058 | W | 04:11 | *P.pip* | Common pipistrelle | 1 | S | C - Commuting | NW | N/A |

| Date of Survey | Easting | Northing | Surveyor Orientation | Time | Latin Name | Common Name | Number of Bats | Seen/ Not seen | Activity Type | Direction of Flight | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 29/06/2018 | 508183 | 187070 | NW | 03:21 | *P.pip* | Common pipistrelle | 1 | NS | F - Foraging | N/A | Foraging passes close to position |
| 29/06/2018 | 508183 | 187070 | NW | 03:27 | *P.pip* | Common pipistrelle | 1 | NS | F - Foraging | N/A | Brief foraging passes |
| 29/06/2018 | 508183 | 187070 | NW | 03:35 | *P.pip* | Common pipistrelle | 1 | NS | C - Commuting | N/A | Pass x3 |
| 29/06/2018 | 508183 | 187070 | NW | 03:40 | *P.pyg* | Soprano pipistrelle | 1 | NS | C - Commuting | N/A | Brief pass |
| 29/06/2018 | 508183 | 187070 | NW | 03:41 | *P.pip* | Common pipistrelle | 1 | NS | C - Commuting | N/A | Brief pass |
| 29/06/2018 | 508183 | 187070 | NW | 03:48 | *P.pyg* | Soprano pipistrelle | 1 | NS | C - Commuting | N/A | Brief pass |
| 29/06/2018 | 508183 | 187070 | NW | 03:54 | *P.pip* | Common pipistrelle | 1 | NS | F - Foraging | N/A | Foraging passes x5 |
| 29/06/2018 | 508183 | 187070 | NW | 03:56 | *P.pip* | Common pipistrelle | 1 | S | F - Foraging | S | Foraging around trees to south |
| 29/06/2018 | 508183 | 187070 | NW | 04:01 | *P.pip* | Common pipistrelle | 1 | NS | C - Commuting | N/A | Brief commuting pass |
| 29/06/2018 | 508183 | 187070 | NW | 04:11 | *P.pip* | Common pipistrelle | 1 | S | C - Commuting | W | Commuting passes trees to west |
| 29/06/2018 | 508219 | 187086 | SW | 03:28 | *P.pip* | Common pipistrelle | 1 | NS | N/A | N/A | HNS very faint call, probably in woodland area |
| 29/06/2018 | 508219 | 187086 | SW | 03:29 | *P.pip* | Common pipistrelle | 1 | NS | N/A | N/A | HNS very faint call, probably in woodland area |
| 29/06/2018 | 508219 | 187086 | SW | 03:35 | *P.pip* | Common pipistrelle | 1 | NS | N/A | N/A | HNS but loud call |
| 29/06/2018 | 508219 | 187086 | SW | 03:38 | *P.pip* | Common pipistrelle | 1 | NS | N/A | N/A | HNS faint call |
| 29/06/2018 | 508219 | 187086 | SW | 03:41 | *P.pip* | Common pipistrelle | 1 | NS | N/A | N/A | HNS faint call |

| Date of Survey | Easting | Northing | Surveyor Orientation | Time | Latin Name | Common Name | Number of Bats | Seen/ Not seen | Activity Type | Direction of Flight | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 29/06/2018 | 508219 | 187086 | SW | 03:50 | *P.pip* | Common pipistrelle | 1 | NS | N/A | N/A | HNS very faint call, probably in woodland area |
| 29/06/2018 | 508219 | 187086 | SW | 03:52 | *P.pip* | Common pipistrelle | 1 | S | C - Commuting | S | Commuting south over grassland area (1) |
| 29/06/2018 | 508219 | 187086 | SW | 03:54 | *P.pip* | Common pipistrelle | 1 | NS | N/A | N/A | HNS faint call |
| 29/06/2018 | 508219 | 187086 | SW | 03:56 | *P.pip* | Common pipistrelle | 1 | S | F - Foraging | S | Foraging over driving range long grass area (2) |
| 29/06/2018 | 508219 | 187086 | SW | 03:58 | *P.pip* | Common pipistrelle | 1 | NS | N/A | N/A | HNS faint call |
| 29/06/2018 | 508219 | 187086 | SW | 04:11 | *P.pip* | Common pipistrelle | 1 | NS | N/A | N/A | HNS faint call |

# 10 Appendix D: Automated Bat Survey Results

Table 14. SD1 River Pinn Bat Activity Indices

| Species | 28/06-03/07 (5 nights) | 18/07 – 21/07 (3 nights) | 09/08 – 14/08 (5 nights) | 05/09 – 10/09 (5 nights) | Average |
|---|---|---|---|---|---|
| Common pipistrelle | 53.4 | 80.3 | 46 | 28.8 | 52.1 |
| Soprano pipistrelle | 15 | 20.0 | 39 | 19.2 | 23.3 |
| Nathusius' pipistrelle | 0 | 0.3 | 0.4 | 0 | 0.2 |
| *Pipistrellus* sp. | 1.8 | 0.7 | 0.4 | 2 | 1.2 |
| Noctule | 17.8 | 9.3 | 45.4 | 3.6 | 19.0 |
| Leisler's bat | 1.6 | 0.3 | 1.8 | 0 | 0.9 |
| *Nyctalus* sp. | 0.6 | 1.3 | 0.8 | 0 | 0.7 |
| *Myotis* sp. | 2.8 | 0.7 | 1.8 | 2.2 | 1.9 |
| Brown long-eared bat | 0 | 0.3 | 0 | 0.6 | 0.2 |
| Totals | 93 | 113.3 | 135.6 | 56.4 | 99.6 |

Table 15. SD2 Fairway Bat Activity Indices

| **Species** | **28/06-02/07 (4 nights)** | **18/07-20/07 (2 nights)** | **09/08 – 11/08 (2 nights)** | **07/09 – 08/09 (less than one night[28])** | **Total** |
|---|---|---|---|---|---|
| Common pipistrelle | 502 | 86.5 | 16 | - | 201.5 |
| Soprano pipistrelle | 86 | 228.5 | 30.5 | - | 115.0 |
| *Pipistrellus* sp. | 38 | 3 | 0.5 | - | 13.8 |
| Noctule | 60.2 | 28.5 | 15 | - | 34.6 |
| Leisler's bat | 0.4 | 0.5 | 0.5 | - | 0.5 |
| *Nyctalus* sp. | 0.4 | 1 | 4 | - | 1.8 |
| *Myotis* sp. | 0.4 | 2 | 2 | - | 1.5 |
| Brown long-eared bat | 0.4 | 0.5 | 0 | - | 0.3 |
| Totals | 687.8 | 350.5 | 68.5 | - | 368.9 |

[28] The static detector collected less than one night of data as the microphone was damaged. As such, bat activity indices could not be calculated for September.

Table 16. SD3 Clacks Lane Bat Activity Indices

| **Species** | **28/06-03/07 (5 nights)** | **18/07-23/07 (5 nights)** | **09/08 – 14/08 (5 nights)** | **05/09 – 10/09 (5 nights)** | **Average** |
|---|---|---|---|---|---|
| Common pipistrelle | 180.2 | 142.6 | 89.6 | 82.6 | 123.8 |
| Soprano pipistrelle | 65.8 | 23.2 | 18.2 | 57.4 | 41.2 |
| *Pipistrellus* sp. | 106.4 | 5.2 | 95.6 | 90.8 | 74.5 |
| Noctule | 0.2 | 1.8 | 2.2 | 0.2 | 1.1 |
| *Nyctalus* sp. | 0 | 2 | 4.6 | 0.8 | 1.9 |
| *Myotis* sp. | 0.4 | 2.2 | 0.8 | 0.4 | 1.0 |
| Totals | 353 | 177 | 211 | 232.2 | 243.3 |

Table 17. SD4 Driving Range Bat Activity Indices

| **Species** | **28/06-01/07 and 02-04/07 (5 nights)** | **18/07-22/07 (4 nights)** | **10/08 – 15/08 (5 nights)** | **05/09 – 10/09 (5 nights)** | **Average** |
|---|---|---|---|---|---|
| Common pipistrelle | 289.6 | 268.25 | 84.8 | 20.2 | 165.7 |
| Soprano pipistrelle | 159.2 | 90 | 49.4 | 3 | 75.4 |
| Nathusius' pipistrelle | 0.4 | 0 | 0 | 0 | 0.1 |
| *Pipistrellus* sp. | 24.6 | 1.75 | 0 | 2 | 7.1 |
| Noctule | 6.8 | 9.5 | 41.4 | 46.2 | 26.0 |
| Leisler's bat | 1.2 | 0.25 | 0.2 | 0 | 0.4 |
| *Nyctalus* sp. | 0 | 2.5 | 4.6 | 2.4 | 2.4 |
| Serotine | 0 | 0.25 | 0 | 0 | 0.1 |
| *Myotis* sp. | 1 | 1.75 | 1.2 | 0.4 | 1.1 |
| Brown long-eared bat | 0.6 | 0 | 0 | 0.2 | 0.2 |
| Totals | 483.4 | 374.25 | 181.6 | 74.4 | 278.4 |

# 11 Appendix E: Riparian Habitat Survey Results

Table 18. Riparian habitat assessment survey results

| | | | |
|---|---|---|---|
| **Date** | 01/08/2018 | | |
| Easting (X)<br>at start of survey | 507281 | Northing (Y)<br>at start of survey | 186640 |
| Easting (X)<br>at end of survey | 508192 | Northing (Y)<br>at end of survey | 187608 |
| Estimated average depth (m) | 0-5 | | |
| Estimated flow | Low | | |
| Estimated width (m) | 2.5-3 | | |
| Habitat type | River | Description of habitat type | Low to medium flow, occasional drying nothing. Pebble and earth substrate, changing over rivers course. Width 2-4m. |
| Is suitable terrestrial habitat present? | Yes | Description of terrestrial habitat | Earth, sometimes brick banks, dense bramble, nettle, Himalayan balsam, scattered trees, ruderal, grasses and dock. |
| Level of Cover | >50% of the area | Food Supply | Low |
| Presence of any barriers to dispersal | Roads | | |
| Adjoining land use | Golf course, residential and farming | | |
| Level of disturbance | Regular disturbance | | |
| Connectivity with other areas of suitable habitat | High | | |
| Pollution | Low | | |
| Other relevant notes | Himalayan Balsam (extensive to dominant) and potentially giant hogweed (single example) found on site. | | |

# 12 Appendix F: Full List of Birds Recorded within the Survey Area

Table 19. All bird species recorded during the 2018 and 2019 breeding bird surveys within the site.

| Common Name | Scientific Name | Legal Protection & Conservation Status | Estimated Number of Breeding Territories |
|---|---|---|---|
| Blackbird | *Turdus merula* | - | 10 |
| Blackcap | *Sylvia atricapilla* | - | 7 |
| Blue Tit | *Cyanistes caeruleus* | - | 6 |
| Buzzard | *Buteo buteo* | - | Flyover record only |
| Carrion Crow | *Corvus corone* | - | 4 |
| Chaffinch | *Fringilla coelebs* | - | 4 |
| Chiffchaff | *Phylloscopus collybita* | - | 6 |
| Coal Tit | *Periparus ater* | - | 2 |
| Common Gull | *Larus canus* | Amber List | N/A |
| Dunnock | *Prunella modularis* | Amber List and species of Principal Importance | 7 |
| Goldcrest | *Regulus regulus* | - | 1 |
| Goldfinch | *Carduelis carduelis* | - | 4 |
| Great Spotted Woodpecker | *Dendrocopos major* | - | 3 |
| Great Tit | *Parus major* | - | 11 |
| Green Woodpecker | *Picus viridis* | - | 3 |
| Greenfinch | *Chloris chloris* | - | 3 |
| Grey Heron | *Ardea cinerea* | - | Flyover record only |
| House Sparrow | *Passer domesticus* | Red List, Species of Principal Importance | Foraging only – likely to breed in suitable buildings close to the site. |
| Jackdaw | *Corvus monedula* | - | 3 |
| Jay | *Garrulus glandarius* | - | 3 |
| Kestrel | *Falco tinnunculus* | Amber List | Foraging on one visit only. |
| Lesser Black-backed Gull | *Larus fuscus* | Amber List | N/A |
| Lesser Whitethroat | *Sylvia curruca* | - | 1 |
| Long-tailed Tit | *Aegithalos caudatus* | - | 4 |
| Magpie | *Pica pica* | - | 7 |
| Mallard | *Anas platyrhynchos* | Amber List | Flyover records only |
| Mistle Thrush | *Turdus viscivorus* | Red List | 2 |
| Moorhen | *Gallinula chloropus* | - | 1 |
| Nuthatch | *Sitta europaea* | - | 2 |
| Pied Wagtail | *Motacilla alba* | - | 2 |
| Red Kite | *Milvus milvus* | Schedule 1 | Flyover record only |

| Common Name | Scientific Name | Legal Protection & Conservation Status | Estimated Number of Breeding Territories |
|---|---|---|---|
| Ring-necked Parakeet | *Psittacula krameri* | - | 3 |
| Robin | *Erithacus rubecula* | - | 14 |
| Song Thrush | *Turdus philomelos* | Red List and Species of Principal Importance | 5 |
| Starling | *Sturnus vulgaris* | Red List & Species of Principal Importance | Foraging only – likely to breed in suitable buildings close to the site. |
| Stock Dove | *Columba oenas* | Amber List | 4 |
| Swift | *Apus apus* | Amber List | Foraging only – likely to breed in buildings close to the site. |
| Treecreeper | *Certhia familiaris* | - | 1 |
| Whitethroat | *Sylvia communis* | - | 3 |
| Willow Warbler | *Phylloscopus trochilus* | Amber List | 5 |
| Woodpigeon | *Columba palumbus* | - | 7 |
| Wren | *Troglodytes troglodytes* | - | 13 |

# 13 Appendix G: Reptile Survey Results

Table 20. Full results from the reptile refugia surveys from May to September 2017

| Date of Survey | Start Time | End Time | Reptiles Observed | Refuge ID Number | Refuge Type | Easting | Northing | Species | Number | Sex | Life Stage | Estimate of Size | Other Information |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25/05/2017 | 10:30:00 | 12:45:00 | No | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 08/06/2017 | 11:00:00 | 15:00:00 | Yes | 1 | Felt | 508011 | 187028 | Slow worm | 1 | Female | Adult | 20 | N/A |
| 15/06/2017 | 10:15:00 | 11:00:00 | Yes | 8 | Felt | 508082 | 187049 | Slow worm | 1 | Female | Adult | 50 | N/A |
| 27/06/2017 | 10:45:00 | 11:45:00 | No | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 29/06/2017 | 10:30:00 | 10:45:00 | No | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 04/07/2017 | 10:50:00 | 11:30:00 | Yes | 1 | Felt | 508067 | 187005 | Slow worm | 1 | Female | Adult | 30 | N/A |
| 05/07/2017 | 10:00:00 | 10:30:00 | No | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 11/07/2017 | 10:30:00 | 11:30:00 | Yes | 2 | Tin | 507790 | 187381 | Slow worm | 1 | Female | Adult | 25 | N/A |
| 11/07/2017 | 10:30:00 | 11:30:00 | Yes | 1 | Tin | 507994 | 187031 | Slow worm | 2 | Male and Female | Adult | 30 | N/A |
| 07/09/2017 | 10:00:00 | 11:00:00 | Yes | 1 | Tin | 507994 | 187031 | Slow worm | 2 | Female | Adult | 25 | 1 adult female, 1 sub-adult |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18/09/2017 | 09:30:00 | 09:15:00 | No | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 19/09/2017 | 11:20:00 | 11:50:00 | Yes | 1 | Tin | 508016 | 187044 | Slow worm | 2 | Female | Adult | 30 | N/A |
| 22/09/2017 | 09:50:00 | 10:30:00 | Yes | 1 | Tin | 507994 | 187031 | Slow worm | 2 | Female | Adult | 25 | N/A |
| 25/09/2017 | 13:45:00 | 15:30:00 | Yes | 1 | Tin | 508016 | 187044 | Slow worm | 1 | Female | Adult | 30 | N/A |

# 14 Appendix H: Great Crested Newt Survey Results

Table 21. All great crested newt survey results for the four ponds surveyed

| Pond Number | Location | HSI Score (and date undertaken) | Survey Type and Limitations | Peak Count | Description |
|---|---|---|---|---|---|
| 3 | Within HS2 land take – pond to be lost | 0.87 (2017) | Population size class assessment 2018 and 2019<br><br>eDNA survey April 2018 (pond was dry in 2017 so eDNA survey could not be undertaken) | 2018 peak 6, 2019 peak 8Positive eDNA | Oval shaped pond with willow scrub edge, partly shaded, shallow banks which lead to deeper water at centre. Dries annually but supports egg-laying vegetation. Smooth newts and tadpoles were also recorded in the pond. |
| 1 | 480 m south east of pond 010-AH1- 024004 and outside the site. | 0.84 (2017) | eDNA survey June 2017 and April 2019 | Negative eDNA for both 2017 and 2019 surveys | The pond is large with a small island in the middle. It has a small amount of shading. |
| 2 | 680 m south each of pond 24004 and outside the site. | 0.50 (2017) | Presence/absence survey 2017. Incomplete survey- only one visit was undertaken due to access constraints<br><br>eDNA survey June 2017 and May 2019 | Negative eDNA for both 2017 and 2019 surveys | Swampy depression, heavy shading, little vegetation for egg-laying, shallow water, silt based. Smooth newts were recorded within the pond. |

| Pond Number | Location | HSI Score (and date undertaken) | Survey Type and Limitations | Peak Count | Description |
|---|---|---|---|---|---|
| 4 | 420 m east of pond 24004 - will be lost during the golf course remodelling. | 0.56 (2017) | eDNA survey April 2019 (pond was dry in 2017 and 2018 when eDNA surveys were undertaken)<br><br>eDNA survey May 2020 following the implementation of the mitigation strategy | Negative eDNA in 2019<br><br>Positive eDNA in 2020 | 2019 - circular pond, heavily shaded, fairly shallow in centre, limited open water. Adjacent to a stream with waterfowl.<br><br>2020 – update following enhancements between December 2019 and March 2020. The pond was deepened through the clearing of detritus and pond debris and is now less shaded following the removal of overhanging branches. Refugia were added around the pond to increase suitable terrestrial habitat for great crested newts and egg strips were added to provide breeding habitat. |

# 15 Appendix I: Terrestrial Invertebrates Recorded

Table 22. Terrestrial invertebrate species recorded between 29 June and 10 September 2018 within survey area

| Common Name | Scientific Name | Legal Protection & Conservation Status | Relative Abundance[29] |
|---|---|---|---|
| **Spiders** | | | |
| Garden spider | *Araneus diadematus* | None | Frequent |
| Crab spider | *Misumena vatia* | None | Occasional |
| A hunting spider | *Pardosa pullata* | None | Frequent |
| Wasp spider | *Argiope bruennichi* | None | Occasional |
| A money spider | *Microlinyphia pusilla* | None | Occasional |
| A harvestman | *Phalangium opilio* | None | Frequent |
| **Millipedes** | | | |
| White-legged Millepede | *Tachpodoiulus niger* | None | Occasional |
| **Dragonflies & damselflies** | | | |
| Emperor dragonfly | *Anax imperator* | None | Occasional |
| Southern hawker | *Aeshna cyanea* | None | Occasional |
| Migrant hawker | *Aeshna mixta* | None | Occasional |

[29] Key: Abundant = > 15 individuals, Frequent = 5 to 15 individuals and Occasional = < 5 individuals.

| Common Name | Scientific Name | Legal Protection & Conservation Status | Relative Abundance[29] |
|---|---|---|---|
| Common darter | *Sympetrum striolatum* | None | Frequent |
| Common blue damselfly | *Enallagma cyathigerum* | None | Frequent |
| Azure damselfly | *Coenagrion puella* | None | Frequent |
| **Bush-crickets** | | | |
| Roesel's bush-cricket | *Metrioptera roeselii* | Nationally scarce Notable B | Abundant |
| Short-winged conehead | *Conocephalus dorsalis* | None | Abundant |
| **Earwigs** | | | |
| Common earwig | *Forficula auricularia* | None | Frequent |
| **Bugs** | | | |
| Common froghopper | *Philaenus spumarius* | None | Frequent |
| Leafhopper | *Cicadella viridis* | None | Frequent |
| A stiltbug | *Berytinus minor* | None | Occasional |
| Dock bug | *Coreus marginatus* | None | Abundant |
| Green shieldbug | *Palomena prasina* | None | Occasional |
| Red-legged shieldbug | *Pentatoma rufipes* | None | Frequent |
| Bishop's mitre shieldbug | *Aelia acuminata* | None | Frequent |
| Tortoise shieldbug | *Eurygaster testudinaria* | None | Abundant |

| Common Name | Scientific Name | Legal Protection & Conservation Status | Relative Abundance[29] |
|---|---|---|---|
| **Beetles** | | | |
| Black clock | *Pterostichus madidus* | None | Occasional |
| A ground beetle | *Pterostichus niger* | None | Occasional |
| A ground beetle | *Abax parallelepipedus* | None | Occasional |
| Devil's coach-horse | *Ocypus oleus* | None | Occasional |
| Common red soldier beetle | *Rhagonycha fulva* | None | Frequent |
| 2-spot ladybird | *Adalia bipunctata* | None | Occasional |
| 10-spot ladybird | *Adalia decempunctata* | None | Occasional |
| 14-spot ladybird | *Propylea quatuordecimpunctata* | None | Occasional |
| 22-spot ladybird | *Psyllobora vigintiduopunctata* | None | Frequent |
| 24-spot ladybird | *Subcoccinella vigintiquatuorpunctata* | None | Occasional |
| Harlequin ladybird | *Harmonia axyridis* | None | Occasional |
| A weevil | *Apion frumentarium* | None | Occasional |
| **Butterflies & moths** | | | |
| Large skipper | *Ochlodes sylvanus* | None | Occasional |
| Large white | *Pieris brassicae* | None | Abundant |
| Small white | *Pieris rapae* | None | Abundant |

| Common Name | Scientific Name | Legal Protection & Conservation Status | Relative Abundance[29] |
|---|---|---|---|
| Green-veined white | *Pieris napi* | None | Frequent |
| Holly blue | *Celastrina argiolus* | None | Occasional |
| Common Blue | *Polyommatus icarus* | None | Occasional |
| Red Admiral | *Vanessa atalanta* | None | Occasional |
| Small tortoiseshell | *Aglais urticae* | None | Occasional |
| Peacock | *Inachis io* | None | Occasional |
| Comma | *Polygonia c-album* | None | Occasional |
| Speckled wood | *Pararge aegeria* | None | Abundant |
| Gatekeeper | *Pyronia tithonus* | None | Occasional |
| Meadow brown | *Maniola jurtina* | None | Abundant |
| Ringlet | *Aphantopus hyperantus* | None | Frequent |
| Elephant Hawk-moth | *Deilephila elpenor* | None | Occasional |
| Pale Tussock Moth | *Calliteara pudibunda* | None | Occasional |
| **Flies** | | | |
| Marmalade hoverfly | *Episyrphus balteatus* | None | Abundant |
| Hornet hoverfly | *Volucella zonaria* | Nationally scarce Notable B | Occasional |
| Broad centurion soldier fly | *Chloromya formosa* | None | Frequent |

# 16 Appendix J: Plant Species Recorded

Table 23. Plant species recorded in each habitat sampled and DAFOR scores

| **Semi-improved grassland (Grid References: TQ08656 87192, TQ08674 87168, TQ08647 87148, TQ08516 87161, TQ0849287146)** | | |
|---|---|---|
| Common Name | Scientific Name | DAFOR Score |
| Yarrow | *Achillea millefolium* | F |
| Creeping bent | *Agrostis stolonifera* | A |
| Black grass | *Alopecurus myosuroides* | F |
| Meadow foxtail | *Alopecurus pratensis* | F |
| Sweet vernal grass | *Anthoxanthum odoratum* | F |
| False oat-grass | *Arrhenatherum elatius* | A |
| Goats beard | *Aruncus dioicus* | R |
| Hedge bindweed | *Calystegia sepium* | O |
| False fox-sedge | *Carex otrubae* | O |
| Common knapweed | *Centaurea nigra* | A |
| Creeping thistle | *Cirsium arvense* | F |
| Cock's foot | *Dactylis glomerata* | A |
| Tufted hair-grass | *Deschampsia cespitosa* | F |
| Great willowherb | *Epilobium hirsutum* | O |

| | | |
|---|---|---|
| Meadow fescue | *Festuca pratensis* | A |
| Red fescue | *Festuca rubra* | A |
| Hogweed | *Heracleum sphondylium* | O |
| Yorkshire fog | *Holcus lanatus* | A |
| Meadow barley | *Hordeum secalinum* | O |
| Perennial rye-grass | *Lolium perenne* | F |
| Bird's-foot-trefoil | *Lotus corniculatus* | A |
| Black medick | *Medicago lupulina* | F |
| Lucerne | *Medicago sativa* | O |
| Smaller cat's-tail | *Phleum bertolonii* | F |
| Timothy-grass | *Phleum pratense* | O |
| Annual meadow-grass | *Poa annua* | F |
| Smooth meadow-grass | *Poa pratensis* | A |
| Creeping cinquefoil | *Potentilla reptans* | A |
| Selfheal | *Prunella vulgaris* | F |
| Pedunculate oak | *Quercus robur* | O |
| Meadow buttercup | *Ranunculus acris* | A |
| Creeping buttercup | *Ranunculus repens* | A |

| | | |
|---|---|---|
| Blackthorn | *Prunus spinosa* | O |
| Raspberry | *Rubus idaeus* | O |
| Bramble | *Rubus fruticosus agg.* | F |
| Common sorrel | *Rumex acetosa* | F |
| Broad-leaved dock | *Rumex obtusifolius* | F |
| Common ragwort | *Senecio jacobaea* | F |
| Dandelion | *Taraxacum agg.* | F |
| Red clover | *Trifolium pratense* | A |

**SBINC (Grid references: TQ08271 87193, TQ08101 87068)**

| Common Name | Scientific Name | DAFOR Score |
|---|---|---|
| Ground-elder | *Aegopodium podagraria* | O |
| Greater burdock | *Arctium lappa* | O |
| Hairy brome | *Bromus ramosus* | O |
| Hedge bindweed | *Calystegia sepium* | F |
| Sedge sp. | *Carex Sp.* | O |
| Enchanter's-nightshade | *Circaea lutetiana* | F |
| Great willlowherb | *Epilobium hirsutum* | O |
| Broad-leaved helleborine | *Epipactis helleborine* | R |

| | | |
|---|---|---|
| Sun spurge | *Euphorbia helioscopia* | R |
| Cleavers | *Galium aparine* | A |
| Wood avens | *Geum urbanum* | A |
| Hogweed | *Heracleum sphondylium* | F |
| Holly | *Ilex aquifolium* | O |
| Perennial rye-grass | *Lolium perenne* | F |
| Raspberry | *Rubus idaeus* | O |
| Wood dock | *Rumex sanguineus* | F |
| Perennial sow-thistle | *Sonchus arvensis* | A |
| Hedge woundwort | *Stachys sylvatica* | F |
| Dandelion | *Taraxacum agg.* | F |
| Yew | *Taxus baccata* | O |

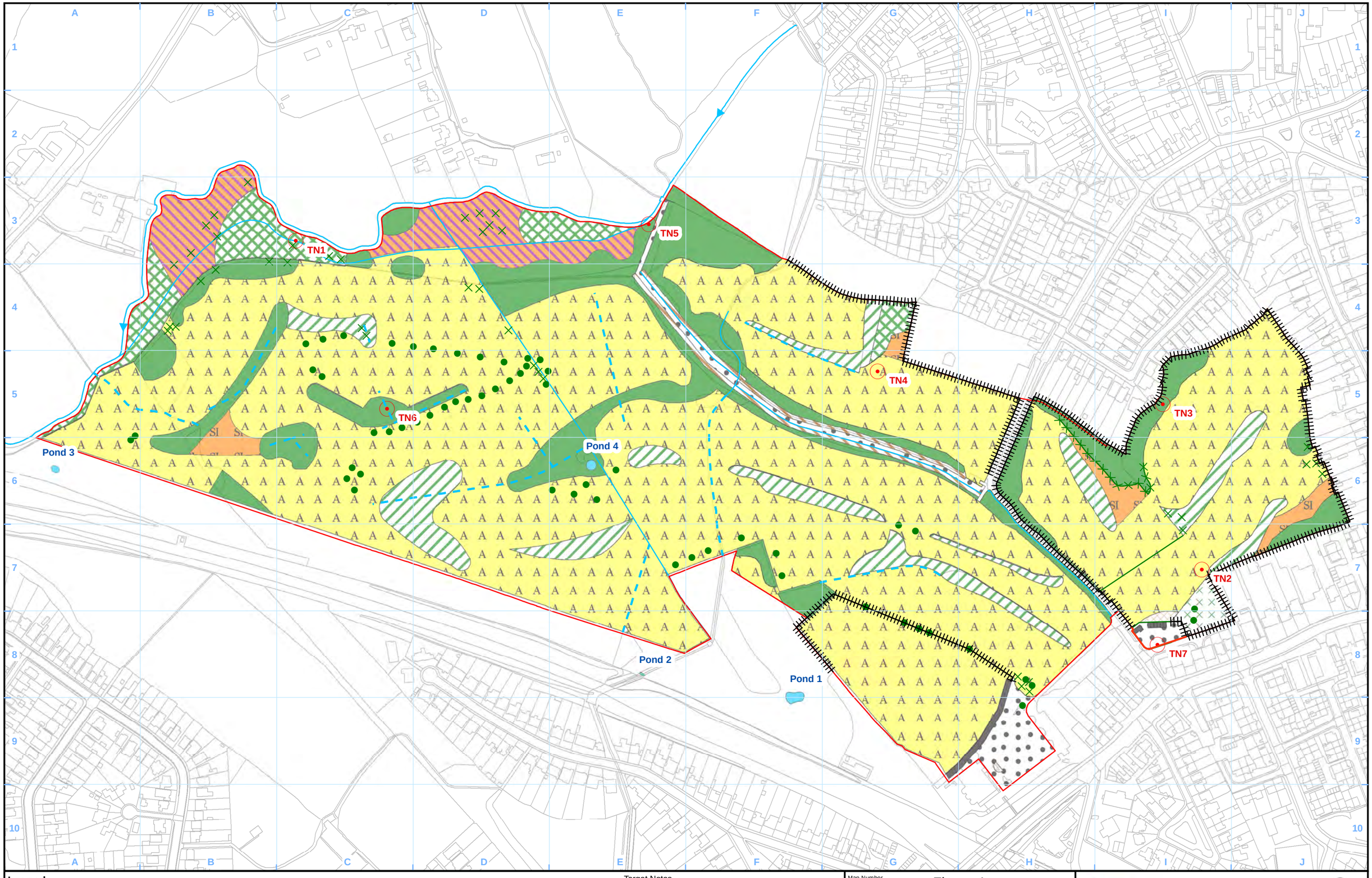
**Ditch/wetland habitat (Grid references: TQ0827187193, TQ0810187068)**

| Common Name | Scientific Name | DAFOR Score |
|---|---|---|
| Amphibious bistort | *Persicaria amphibia* | F |
| Water plantain | *Alisma plantago-aquatica* | F |
| Fool's water-cress | *Apium nodiflorum* | F |
| Mugwort (Bankside) | *Artemisia vulgaris* | F |

| | | |
|---|---|---|
| Bitter-cress | *Cardamine hirsuta* | A |
| Pendulous sedge | *Carex pendula* | F |
| Remote sedge | *Carex remota* | O |
| Great willowherb | *Epilobium hirsutum* | O |
| Horsetail | *Equisetum sp.* | F |
| Meadowsweet | *Filipendula ulmaria* | A |
| Meadow cranesbill (Bankside) | *Geranium pratense* | O |
| Yorkshire fog | *Holcus lanatus* | A |
| Common hop (Bankside) | *Humulus lupulus* | R |
| Yellow iris | *Iris pseudacorus* | O |
| Soft-rush | *Juncus effusus* | F |
| Duckweed | *Lemnoideae sp.* | A |
| Bird's-foot-trefoil (Bankside) | *Lotus corniculatus* | F |
| Gypsywort | *Lycopus europaeus* | F |
| Purple-loosestrife | *Lythrum salicaria* | A |
| Water mint | *Mentha aquatica* | O |
| Reed canary-grass (Bankside) | *Phalaris arundinacea* | R |
| Smaller cat's-tail (Bankside) | *Phleum bertolonii* | F |

| | | |
|---|---|---|
| Timothy-grass (Bankside) | *Phleum pratense* | F |
| Selfheal (Bankside) | *Prunella vulgaris* | F |
| Common sorrel (Bankside) | *Rumex acetosa* | A |
| Water figwort | *Scrophularia auriculata* | R |
| Common reedmace | *Typha latifolia* | F |
| Tufted vetch (Bankside) | *Vicia cracca* | O |

# 17 Figures




**Legend**

- Site Boundary
- Scrub - scattered
- Broadleaved Parkland/scattered tress
- Target note
- Intact hedge - species-poor
- Fence
- Wall
- Dry ditch
- Running Water
- Broadleaved woodland - semi-natural
- Broadleaved woodland - plantation
- Dense scrub
- Scattered scrub
- Neutral grassland - semi-improved
- Marsh/marshy grassland
- Other tall herb and fern - ruderal
- Standing water
- Cultivated/disturbed land - amenity grassland
- Introduced shrub
- Buildings
- Bare ground

Target Notes

1. Giant hogweed
2. Oak with bat potential, dense ivy growing up the trunk and woodpecker holes
3. Broadleaved woodland containing mature tress with likely bat potential
4. Oak with bat potential, crack below broken branch
5. Giant hogweed
6. Oak with bat potential, callus roll holes
7. Virginia Creeper growing on wall

Map Number

Figure 1

Map Name

Phase 1 Habitat Map

Community Forum Area:
South Ruislip to Ickenham



Scale at A3: 1:3,300

0 30 60 90 120
Metres

**Doc Number:**

**Date:** 23/10/19


**Legend**

- Site boundary
- Potential emergence
- Confirmed roost
- High
- Moderate
- Low

Map Number: Figure 2

Map Name: Trees with Potential Bat Roost Features

Community Forum Area: South Ruislip to Ickenham



Registered in England. Registration number 06791686.
Registered office: 2 Snowhill, Queensway, Birmingham B4 6GA.

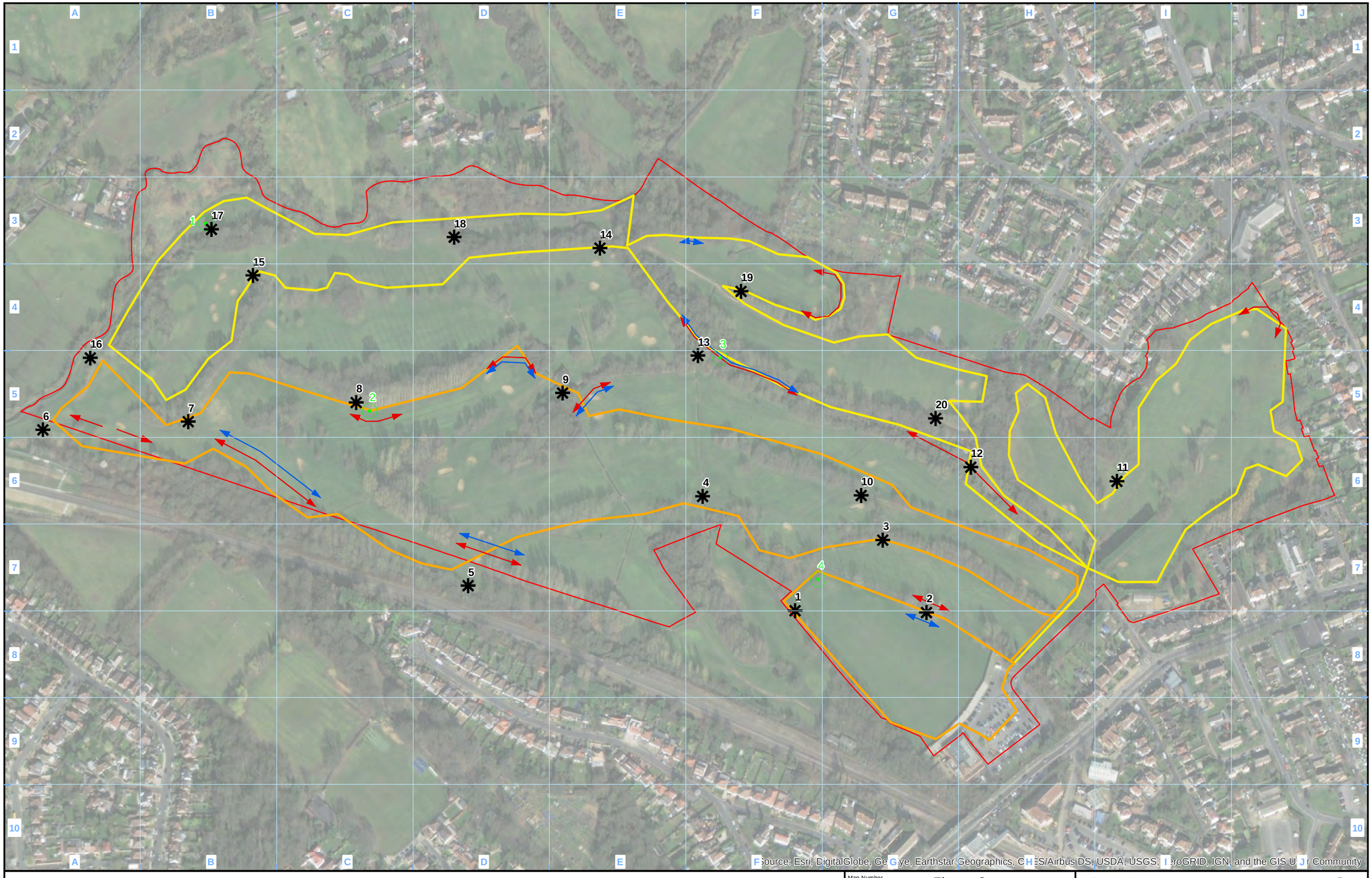


Scale at A3: 1:3,300

0 30 60 90 120 Metres

**Doc Number:**

**Date:** 23/10/19




**Legend**

- Site Boundary
- Transect 1
- Transect 2
- Static bat detector
- Listening stations
- Soprano pipistrelle - foraging
- Common pipistrelle - foraging
- Common pipistrelle - commuting

Map Number

Figure 3

Map Name

Bat Activity and Automated Survey

Community Forum Area:
South Ruislip to Ickenham



Registered in England. Registration number 06791686.
Registered office: 2 Snowhill, Queensway, Birmingham B4 6GA.



Scale at A3: 1:3,300

0 30 60 90 120
Metres

**Doc Number:**

**Date:** 23/10/19


**Legend**

- Site Boundary
- Badger Sett
- Approximate 30m buffer zone

**Badger Field Signs**

- Possible snuffle holes
- Mammal path

Map Number: Figure 4

Map Name: Badger Setts and Field Signs

Community Forum Area:
South Ruislip to Ickenham



Registered in England. Registration number 06791686.
Registered office: 2 Snowhill, Queensway, Birmingham B4 6GA.



Scale at A3: 1:3,300

0 30 60 90 120
Metres

**Doc Number:**

**Date:** 23/10/19


**Legend**

- Site Boundary
- Birds of conservation concern (BoCC) red listed
- Birds of conservation concern (BoCC) amber listed

Bird Code:
ST - Song Thrush
D. - Dunnock
SD - Stock Dove
M. - Mistle Thrush
WW - Willow Warbler

Map Number
Figure 5

Map Name
Breeding Bird Territories

Community Forum Area:
South Ruislip to Ickenham



Registered in England. Registration number 06791686.
Registered office: 2 Snowhill, Queensway, Birmingham B4 6GA.



Scale at A3: 1:3,300

0 30 60 90 120
Metres

**Doc Number:**

**Date:** 23/10/19


**Legend**

- Site Boundary
- Reptile survey mats
- Incidental sighting – 1 gravid common lizard
- 1 Slow worm present
- 2 Slow worms present

Map Number: Figure 6

Map Name: Reptile Survey Results

Community Forum Area:
South Ruislip to Ickenham



Registered in England. Registration number 06791686.
Registered office: 2 Snowhill, Queensway, Birmingham B4 6GA.



Scale at A3: 1:3,300

0 30 60 90 120 Metres

**Doc Number:**

**Date:** 23/10/19


**Legend**

- Site Boundary
- Absent
- Present
- 500m zone of likely great crested newt dispersal
- Incidental sighting – 1 female and 1 male great crested newt

Map Number: Figure 7

Map Name: Great Crested Newt Survey Results

Community Forum Area: South Ruislip to Ickenham



Registered in England. Registration number 06791686.
Registered office: 2 Snowhill, Queensway, Birmingham B4 6GA.



Scale at A3: 1:3,300

0 30 60 90 120 Metres

**Doc Number:**

**Date:** 23/10/19


**Legend**

- Site Boundary
- Pitfall Trap
- Water Trap
- Flower-rich grassland

Map Number: Figure 8

Map Name: Invertebrate Survey Locations

Community Forum Area:
South Ruislip to Ickenham



Registered in England. Registration number 06791686.
Registered office: 2 Snowhill, Queensway, Birmingham B4 6GA.



Scale at A3: 1:3,300

0 30 60 90 120
Metres

**Doc Number:**

**Date:** 23/10/19


**Legend**

Site Boundary

**Habitat Types for Botanical Survey Locations**

- Ditch/wetland
- Semi-improved grassland
- West Ruislip Golf Course and Old Priory Meadows Site of Borough Importance for Nature Conservation Grade 1

Map Number: Figure 9

Map Name: Botanical Survey Locations

Community Forum Area: South Ruislip to Ickenham



Registered in England. Registration number 06791686.
Registered office: 2 Snowhill, Queensway, Birmingham B4 6GA.



Scale at A3: 1:3,300

0 30 60 90 120 Metres

**Doc Number:**

**Date:** 23/10/19