# APPENDIX B: Photographs

Area 1: One of the better areas on the site in terms of the habitat for terrestrial invertebrates. Flower rich wet grassland and scrub, grading into wet woodland. Near the site entrance at TQ 04789 89047.

Area 1: Wide path bordered by flower rich wet grassland and scrub and backing onto wet woodland. Abundant plant species, nectar sources, dead wood and a warm, sheltered micro-climate. TQ 04789 89040

Area 1. Sunny scrub margin with some nectar sources at ground level and exposed substrate. TQ 04809 89068.

Area 2: Long path with lake to the north and Salix woodland on quicksand to the south. Mostly shaded, with some nectar resources, deadwood and lake margin habitat.

Area 3: Birch and Alder scrub on gravelly substrate. Another one of the better areas for terrestrial invertebrates. Warm, sheltered microclimate, with bareground, although substrate is hard. TQ 04715 89117

Area 3: Birch and Alder scrub on gravelly substrate, grading into Crack Willow woodland. TQ 04715 89143.

Area 4: Track leading through the site. Mostly *Buddleja* scrub on the East and Willow/Sallow scrub and woodland on the West. Some nectar sources on the track margin, including St John's Wort *Hypericum perforatum* and *Sedum* spp. Some bareground, but substrate quite hard. TQ 04738 89230

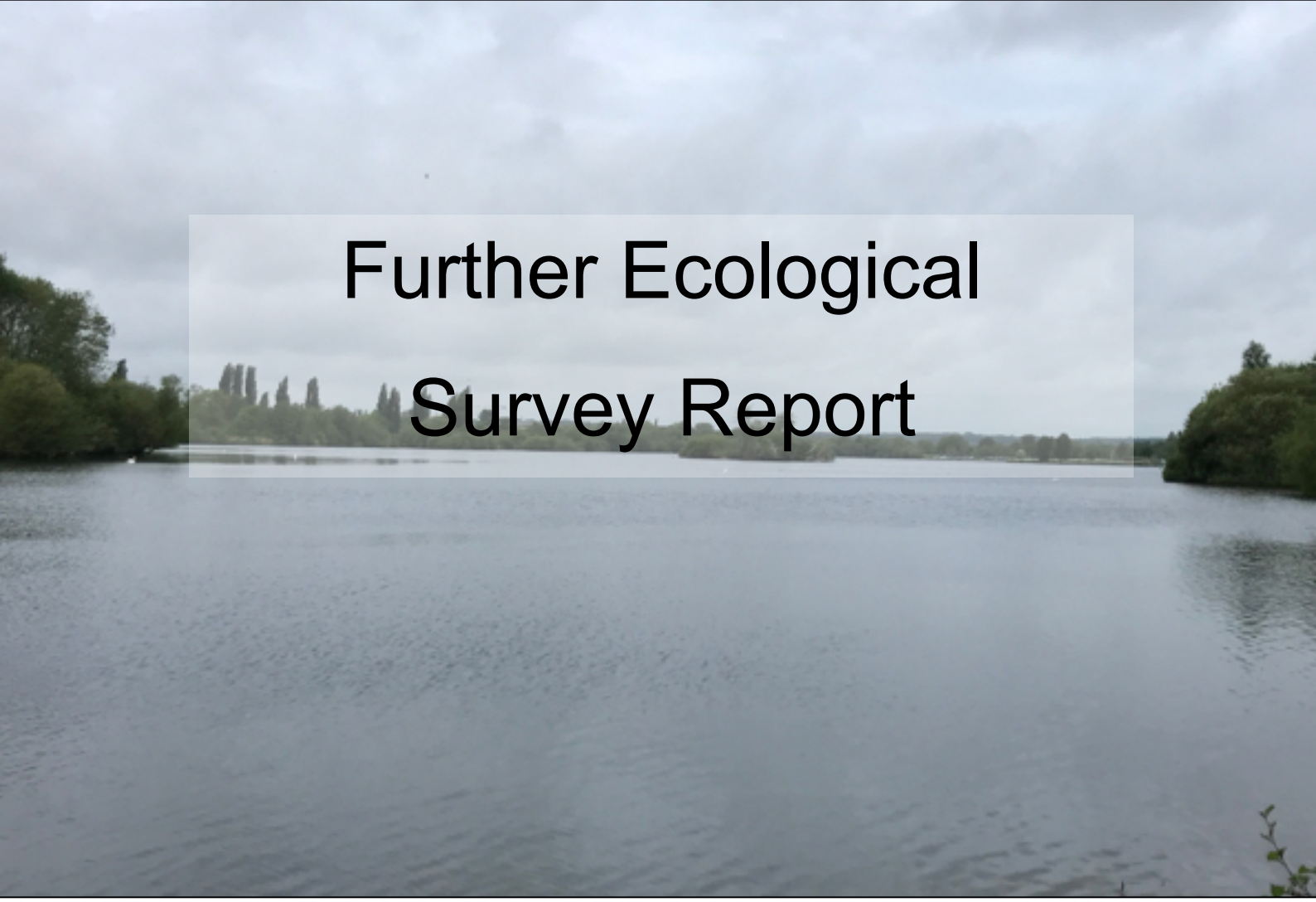
Area 5: Open area at the north of the site. Bramble and Buddleja scrub backing on to Willow and Sallow woodland. Some nectar sources in the sward. Lake margin to the North. TQ 04715 89318

Area 5. Lake margin at north of site with emergent vegetation and lakeside plants. TQ 04640 89310.

Track running along eastern boundary to Sailing Club. Mostly bramble and nettle in the understorey with poplars and willow above. TQ 04875 89107.

The Alder Leaf Beetle *Agelastica alni*. Once a great rarity, but now spreading rapidly in the UK and found throughout the site on its host-plant.

Area 4: Lake margin with emergent irises and egg masses of Long-jawed orb-web spiders *Tetragnatha* sp.



# Further Ecological Survey Report

Prepared for Broadwater Lake

On behalf of

November 2022


**Ecology by Design Ltd,**

**Hampden House, Monument Park, Chalgrove, Oxon OX44 7RW.**

**Tel 01865 893346** **www.ecologybydesign.co.uk**

| Project Code | Title | Date of Issue |
|---|---|---|
| EBD01959 | Broadwater Lake | 28 November 2022 |

| | Name | Date |
|---|---|---|
| Updated by | Kate Philpot MSc, BSc, ACIEEM | 25 November 2022 |
| Checked by | Laura Grant BSc (Hons), MCIEEM | 28 November 2022 |



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# Contents

# 1 Executive Summary

| | |
|---|---|
| **Report purpose** | This report presents the approach and findings of badger, otter, water vole, reptile, dormouse, bat activity transects, and bat fixed point automated surveys undertaken at Broadwater Lake in 2021 and 2022. |
| **Date and methods of survey** | Surveys undertaken:<br>• Reptile presence/likely absence surveys were conducted at the site during September 2021 and continued in May and June 2022.<br>• Hazel dormouse nest tube checks were conducted during September-November 2021, and May-August 2022.<br>• Bat activity transect surveys and bat fixed point automated surveys were conducted during August-October 2021 and April-July 2022.<br>• Otter and water vole surveys were conducted in May and August 2022.<br>• Badger walkover survey undertaken in May 2022. |
| **Key findings** | • No evidence of reptiles with the exception of anecdotal evidence of one grass snake has been identified.<br>• Hazel dormice are considered likely absent from the site.<br>• Evidence of otter was discovered along the canal and potentially in the north of the site, although DNA analysis of the spraint is required to confirm. No evidence of water vole was discovered.<br>• One badger latrine was discovered within woodland in the north of the site.<br>• Bat activity was considered to be moderate across the site with soprano pipistrelle the dominant species recorded. The site supports a good diversity of species and the lake edge is particularly important for foraging bats. |
| **Potential impacts and recommendations** | No specific mitigation with regards to reptiles and/or dormice is required on site but recommendations for enhancements are provided in section 5.<br>Due to the presence of otter in close proximity to the site and possibly on site, it is recommended a check for otter holts is undertaken once plans for the areas around the lake edge are finalised.<br>Due to the presence of a badger latrine, it is evident badger use the site to forage and could build setts in the future (although none were discovered and many parts of the site are unsuitable for sett building). Localised vegetation clearance to enable a detailed walkover of the site in areas to be impacted is recommended three months prior to the construction start date.<br>Due to the moderate levels of bat activity across the site of a variety of bat species, it will be necessary to ensure a sensitive lighting strategy is produced to ensure the lake and woodland is not illuminated by the new development. Any trees to be felled to facilitate the development will need to be inspected for bat roost potential.<br>If works do not start within a year of the surveys undertaken within this report, then update surveys will be required due to animals not previously discovered on site potentially colonising. |

# 2 Introduction

## 2.1 Background

2.1.1 Ecology by Design were commissioned by Mace Group to undertake water vole (*Arvicola amphibius*), otter (*Lutra lutra*), badger (*Meles meles*), reptile, hazel dormouse (*Muscardinus avellanarius*), bat activity transects and bat fixed-point automated surveys at Broadwater Lake, Uxbridge, UB9 6PE (approximate central grid reference: TQ 04719 89196); hereafter known as 'the site'.

2.1.2 Other consultancies have been instructed to undertake various other protected species surveys on site including, fish surveys, macro invertebrate surveys, terrestrial invertebrate surveys and breeding and wintering bird surveys in 2022. These additional reports should be read in conjunction with this report.

2.1.3 To Ecology by Design's knowledge, no surveys have been undertaken to date on the site for great crested newts or individual tree surveys for bat roosts; but these are recommended by Ecology by Design to be undertaken prior to a planning application submission. It is also recommended that all further species surveys, by all consultancies, are combined into an Ecological Impact Assessment (EcIA) which will assess the impacts for each species once plans are finalised.

2.1.4 Further to this a Biodiversity Impact Assessment (BIA) will also be required as part of the planning application, to assess the loss of biodiversity on site and identify how this will be mitigated.

## 2.2 Site Description

2.2.1 The site is 9.79ha in extent, forming part of the 44ha Mid Colne Valley SSSI, a lake notified for its important assemblage of breeding and wintering wetland birds. The site is in the south-east corner of the SSSI, comprising a peninsula supporting broadleaved woodland with scattered ponds and areas of bare ground and scrub, as well as marginal vegetation on the lake edge. The Grand Union Canal bounds the site on the eastern boundary although technically the canal is off-site.

## 2.3 Proposed Works

2.3.1 The proposals are for an outdoor activity centre with landside activities and supporting infrastructure in the south-east corner of the site including an activity and camping field. The northern edge of the lake will house various rowing huts, containers, workshops and boat

stands; carparking and staff accommodation is proposed in the southern part of the site. All or part of the lake will be used for waterside activities (sailing, canoeing, rowing etc). It is understood the site will not be publicly accessible and therefore the small islands to the north of the site will be out of bounds. It is also understood that activities on the lake will not take place after dark; although the centre may still be in use for groups camping on site.

## 2.4 Aims of Report

2.4.1 This report presents the approach and findings of water vole and otter, badger, reptile, dormouse, bat activity transects, and bat fixed point automated surveys undertaken at Broadwater Lake.

2.4.2 It is understood an Ecological Impact Assessment will be produced to encompass all further protected species surveys and likely impacts as well as a biodiversity impact assessment (BIA) to inform the planning application.

2.4.3 Due to the transitionary nature of many species and the suitability of the site to support a wide range of wildlife, it is recommended that if more than a year passes before works are undertaken that an update is carried out.

## 2.5 Personnel

2.5.1 Senior Ecologist Kate Philpot MSc, BSc, ACIEEM managed the day to day running of the project and undertook several of the surveys on site. Kate has over seven years' experience in ecological consultancy and is competent at undertaking all protected species surveys on sites of this size, as well as informing on mitigation measures required.

2.5.2 The project was overseen by Associate Laura Grant BSc (Hons) MCIEEM, who has been an ecological consultant for 15 years and who has also been to site.

# 3 Methods

## 3.1 Reptile Survey

3.1.1 Three of seven reptile surveys were conducted during September 2021 and an additional four reptile surveys were conducted in May and June 2022 to confirm presence or likely absence of reptiles following standard methodology (Froglife, 1999; Edgar *et al*., 2010).

3.1.2 Checks were conducted as detailed in Table 3.1 by Ecology by Design Director Ben Gardener, Senior Ecologists Emily Power and Kate Philpot, Assistant Ecologist Anna Kogioni, Graduate Ecologists Alys Cervetto and Seasonal Ecologists Aoife Sweeney, Pedro Freitas and Kat Hale, all of whom are suitably qualified and experienced to undertake reptile presence/absence surveys.

**Table 3.1:** *Reptile survey dates and survey conditions*

| Visit Number | Date and time | Weather Conditions | Surveyor |
|---|---|---|---|
| 1 | 20/09/2021; 12:30-13:00 | 18°C, cloud 2/8[1], wind BF3[2], no rain | Emily Power |
| 2 | 22/09/2021; 9:50-10:20 | 14-16°C, cloud 1/8, wind BF0, no rain | Anna Kogioni |
| 3 | 29/09/2021; 12:15-12:45 | 13-14°C, cloud 3/8, wind BF3, no rain | Anna Kogioni & Alys Cervetto |
| 4 | 13/05/2022; 10:30-11:30 | 14°C, cloud 2/8, wind BF0, no rain | Ben Gardner & Kate Philpot |
| 5 | 26/05/2022; 12:30-13:00 | 17°C, cloud 4/8, wind BF0, no rain | Emily Power & Kate Philpot |
| 6 | 09/06/2022; 08:43-09:49 | 16-17°C, cloud 0-5/8, wind BF2, no rain, sunny intervals | Pedro Freitas & Aoife Sweeney |
| 7 | 22/06/2022; 07:40-09:50 | 16-21°C, cloud 0/8, wind BF0, hot | Anna Kogioni & Kat Hale |

3.1.1 Artificial refugia were placed along areas of suitable reptile habitat: grassland, scrub, successional vegetation, bare ground and clearings. The artificial refugia comprised a mix of

[1] Cloud cover is measured using the system called oktas. The visible sky is divided into eight and cloud presence is determined within each section. A value of one to eight is then assigned (1 okta being cloudless to 8 oktas being total cloud cover).

[2] The Beaufort scale is an empirical measure from 0-12 which relates wind speed to observed conditions. . 0- Calm, 1- Light air, 2- Light breeze, 3- Gentle breeze, 4- Moderate breeze, 5- Fresh breeze, 6- Strong breeze, 7- Moderate gale, 8- Fresh gale, 9- Strong gale, 10- Whole gale, 11- Storm, 12- Hurricane force.

1m x 0.5m tiles of roofing felt, 0.5m x 0.5m squares of corrugated metal, and 0.5m x 0.5m square tiles of Onduline (see Figure 1). Refugia locations specifically targeted 'sun-traps' and suitable basking spots, adjacent to cover such as scrub and buddleja (*Buddleja davidii*) thickets.

3.1.2 A total of 100 refugia were distributed in areas of suitable reptile habitats. This equated to a total density of approximately 10 refugia per hectare of suitable habitat, which is in accordance with the recommended density of 5-10 refugia per hectare. All refugia were left on site for two weeks following deployment to 'bed in' and allow any reptiles that may be present to become accustomed to their presence.

3.1.3 After this two-week period, seven checks were made to inspect under and around the refugia in order to record any species utilising them. This included checking existing suitable basking areas and around and above any naturally existing refugia. Both visual observation and observations associated with artificial refugia were recorded. All checks were completed in optimum weather conditions (ambient temperature between 9°C and 18°C, dry, no extreme wind, sunny or sunny spells).

## 3.2 Hazel Dormouse Survey

3.2.1 Surveys for dormice (*Muscardinus avellanarius*) were undertaken based on techniques set out in the Dormouse Conservation Handbook (Bright *et al*, 2006) and Natural England Interim Guidance Document (Natural England, 2011[3]). Consideration was given to the index of probability of finding dormice present in nest tubes in any one month (based on 50 tubes deployed), as set out in table 3.2. All the monthly scores for the period over which the tubes were surveyed were added together. A minimum score of 20 must be reached to determine presence/likely absence. A score of 25 was reached at Broadwater.

**Table 3.2**: *Index of probability of finding dormouse within nest tubes*

| Month | Index of Probability |
|---|---|
| April | 1 |
| May | 4 |
| June | 2 |
| July | 2 |
| August | 5 |

[3] Whilst this 2011 guidance has been superseded by more recent government guidance (2015), the survey techniques remain the same.

| | |
|---|---|
| September | 7 |
| October | 2 |
| November | 2 |

3.2.2 On 3rd and 9th September 2021, 50 nest tubes were deployed at regular intervals within the suitable broadleaved woodland. The zone in which the nest tubes were deployed is shown in Figure 2 in Appendix 1. The tubes and boxes were inspected for dormice and/or their characteristic nests once per month, throughout September-November 2021 and May-August 2022, as detailed in Table 3.3 below.

**Table 3.3:** *Date, staff and weather conditions during dormouse surveys*

| Date | Surveyors* | Type |
|---|---|---|
| 29/09/21 | AC | 15°C, wind Bf 1, no rain |
| 29/10/21 | JH, OH | 13°C, wind Bf 4, no rain |
| 25/11/21 | OB, AK | 7°C, wind Bf 1, no rain |
| 26/05/22 | KP, EP | 18°C, wind Bf 2, no rain |
| 20/06/22 | BE, OH | 22°C, wind Bf 1, no rain |
| 26/07/22 | AS, MK | 21°C, wind Bf 1, no rain |
| 24/08/22 | BE, KH | 23°C, wind bf 1, no rain |

*Where, AC= Alys Cervetto, JH= James Howsam, OH= Olyvia Hall, OB= Oliver Bulpitt, AK= Anna Kogioni, KP= Kate Philpot, EP= Emily Power, BE= Beth England, AS= Aoife Sweeney, MK= Mollie Kirk, and KH= Kat Hale.

## 3.3 Bat Activity Walked Transect Survey

3.3.1 The site is considered to have moderate suitability for commuting and foraging bats, with walked transects required monthly April-October in appropriate weather conditions for bats (mild, still and dry) to observe and record bat activity. Surveys were undertaken in August-October 2021 and April-July 2022.

3.3.2 A pair of surveyors slowly walked a pre-determined transect route stopping at regular intervals to observe and record bat activity (using an Elekon Batlogger M) for five minutes before walking to the next stop. The seven surveys completed comprised dusk and dawn transects. The dusk surveys started at sunset and continued for at least two hours after sunset; the dawn

started two hours before sunrise and finished at sunrise. Flight paths were mapped, and notes were made on the behaviours observed (e.g. foraging / commuting / social interactions). The dusk transects were carried out on 1st August 2021, 9th September 2021, 5th October 2021, 21st April 2022 and the 29th June 2022 and the dawn surveys were undertaken on 26th May 2022 and 20th July 2022 as detailed in Table 3.4. See Appendix 1, Figure 3 for a map of the transect route.

**Table 3.4**: *Dates, surveyors and weather conditions of each walked transect survey*

| Date and time | Surveyors | Weather Conditions |
|---|---|---|
| 12/08/2021; 20:30 - 22:36 | Emily Power (bat class licence level 2 holder – 2017-32544-CLS-CLS), George Graham | Start: 21°C, cloud 1/8, wind BF1, no rain<br>End: 15°C, cloud 1/8, wind BF1, no rain |
| 09/09/2021; 19:40 - 21:30 | Emily Power (bat class licence level 2 holder),<br>Alys Cervetto | Start: 19°C, cloud 4/8, wind BF1, no rain<br>End: 17°C, cloud 1/8, wind BF1, no rain |
| 05/10/2021; 18:35 - 20:35 | Emily Power (bat class licence level 2 holder),<br>Olyvia Hall | Start: 13°C, cloud 8/8, wind BF4, light drizzle<br>End: 11°C, cloud 6/8, wind BF0, no rain |
| 21/04/2022; 20:09 - 22:09 | Olyvia Hall, Greg Holland | Start: 14°C, cloud 1/8, wind BF0, no rain<br>End: 11°C, cloud 1/8, wind BF0, no rain |
| 26/05/2022; 02:45 - 04:45 | James Howsam (bat class licence level 1 holder – 2019-43198-CLS-CLS), Tony Wells | Start: 11°C, cloud 1/8, wind BF1, no rain<br>End: 10°C, cloud 1/8, wind BF0, no rain |
| 29/06/2022; 21:10 - 23:25 | Anna Kogioni, Pedro Freitas | Start: 20°C, cloud 7/8, wind BF3, no rain<br>End: 17°C, cloud 8/8, wind BF2, light drizzle |
| 20/07/2022; 03:24 - 05:24 | Oli Bulpitt, Olyvia Hall | Start: 20°C, cloud 6/8, wind BF2, no rain<br>End: 19°C, cloud 8/8, wind BF2, no rain |

## 3.4 Bat Activity Fixed Point Automated Detector Surveys

Automated detectors were used to remotely record bat activity. Given the habitats within the site are of moderate suitability for bats, an AnaBat Swift bat detector is required to be deployed at two locations per transect collecting five consecutive nights of data per month (April to October). The detectors were deployed as required from August to October 2021 and April to July 2022, as set out in Table 3.5.

**Table 3.5:** *Automated detector monitoring*

| Month | Location A recording period | Location B recording period |
|---|---|---|
| August | 12th-16th (5 nights) | 12th-16th (5 nights) |
| September | 20th-24th (4 nights) | 20th-24th (5 nights) |
| October | 5th-9th (5 nights) | 11th-15th (5 nights) |
| April | 22nd-26th (5 nights) | 22nd-26th (5 nights) |
| May | 26th-30th (5 nights) | 26th-30th (5 nights) |
| June | 2nd-6th (5 nights) | 22nd-26th (5 nights) |
| July | 20th -24th (5 nights) | 25th and 27th-30th (5 nights) |

3.4.1 Detectors were placed on trees within the centre of the site (location A) facing east and the north-western corner of the site (location B) directed out north west towards the lake and set to record from 30 minutes before sunset until 30 minutes after sunrise (see locations on Figure 3).

## 3.5 Bat Call Analysis

3.5.1 Data was analysed using automated bat sonogram analysis software: Sonobat v.4.5.4 on default settings in 2021 and then by using Anabat Insight which Ecology by Design had changed to using in 2022. The 'Accepted Species' (the species for which Sonobat and Anabat Insight returns an ID with the highest likelihood) was taken at face value for common pipistrelle (*Pipistrellus pipistrellus*) and soprano pipistrelle (*Pipistrellus pygmaeus*). Any registrations labelled as anything other than common pipistrelle or soprano pipistrelle were also assessed manually as per the methodology below using Sonobat's and Anabat insights vetting table, sonogram viewer and manual classifiers. Registrations that were identified as a 'Leaning Species' (a likely species decision as per 'Accepted Species' but which trigger an indicator of potential misclassification) other than common pipistrelle or soprano pipistrelle were also analysed manually to see if that species was indeed present, in which case they were added to the dataset. See Limitations and Constraints section below for commentary on the validity of using automated ID software.

3.5.2 All files auto identified as being noise (ie: not a bat) were taken at face value - although random checks were undertaken on some of these calls, to ensure the vast majority were indeed noise.

3.5.3 Sonogram analysis was undertaken by suitably experienced ecologists with reference to known sonogram parameters for each species (Russ, 2012; Middleton, *et al.* 2014; Barataud, 2015), once identified, calls were exported into a report to be analysed. Within each file, each species of bat identified was considered to represent one registration of that species.

3.5.4 Where possible, recorded bat calls were identified to species level. The following categories were used for calls which could not be identified with confidence, due to the overlap in call characteristics between species or species groups:

- *Pipistrellus* sp. (Soprano / common pipistrelle)
- SL: Serotine / Leisler's bat
- NSL: Noctule / serotine / Leisler's bat
- *Nyctalus* sp.: Noctule/Leisler's bat
- *Myotis* sp. covers all Myotis species, as this genus cannot reliably be attributed to species level.

3.5.5 However, professional judgement was made where possible to refine identification to species level using factors such as: associated habitats and geographical location as well as other records throughout the survey period/season and desk study data.

3.5.6 The data were exported into a spreadsheet in order to interpret the recordings and work out the number of bat calls per hour. The timing of passes after sunset and before sunrise was calculated in order to interpret any patterns in bat activity. For the purpose of this report a bat pass is the minimum number of bats of a certain species recorded within a single sound file.

## 3.6 Otter and Water Vole Surveys

3.6.1 Surveys for otter and water vole were undertaken in May and August 2022 as follows:

- May survey completed by Senior Ecologist Kate Philpot and Ecologist Beth England on 23rd May 2022. Weather conditions at the time of survey were warm and dry (17°C, cloud 3/8 oktas, wind Beaufort 1 and no rain).
- August survey completed by Assistant Ecologist Olyvia Hall and Seasonal Ecologist Kat Hale on 12th August 2022. Weather conditions at the time of survey were cool/warm and dry/wet (28°C, cloud 1/8 oktas, wind Beaufort 0 and no rain).

**Otter**

3.6.2 A detailed assessment of the banks of the lake (where access was possible) and c.100m of the adjacent canal was conducted to search for evidence of otter (*Lutra lutra*) including holts,

slides, feeding remains, footprints and spraints. Any evidence was described, photographed and marked with a GPS waypoint. The banks of islands within the lake were inspected from a distance using binoculars.

**Water Vole**

3.6.3 The banks of the lake were walked carefully (where access was possible) and c.100m of the adjacent canal, making a search for signs of water vole activity. Water vole signs searched for included: footprints, burrows, runs through vegetation, latrines, lawns, nests and characteristic feeding remains (Strachan *et al*, 2011). Any evidence was described, photographed and marked with a GPS waypoint.

3.6.4 During the visit, an assessment was carried out to identify the suitability of habitat for water voles and to look for any evidence of water vole. The following features were considered:

- Water quality;
- Water regime;
- Extent and character of the water channel;
- Bank structure and substrate;
- Types of vegetation present;
- Level of cover and shading;
- Potential for predation and competition; and
- Any management in place.

3.6.5 A decision was made on the suitability of the habitat for water voles using the following classification:

- Excellent – Habitat with optimum features present to support a population of water voles through all seasons.
- Suitable – Habitat with all appropriate features to support water voles throughout the summer and possibly all year round.
- Marginal – Habitat with some of the features suitable for water vole, but with limitations.
- Unsuitable – Habitat that lacks one or more of the essential features for habitation by water voles (does not preclude the habitat being used for commuting animals).

## 3.7 Limitations/Constraints

3.7.1 The wildlife and wider ecological interest of a site can change. The report presented here is a statement of the findings of surveys carried out during August-November 2021 and April-

August 2022. Any appreciable delay in making reference to this report may necessitate a re-survey.

3.7.2 Use of automated bat sonogram analysis software is not 100% accurate. While Sonobat v.4.5.4 and Anabat Insight purports high levels of accuracy, it is known to be fallible, particularly with registrations where multiple bats are recorded. As such, manual quality control was undertaken as outlined in Section 3.5. Consequently, the only calls that were not subject to manual quality control were those identified by Sonobat and Anabat Insight to contain only common pipistrelle and/or soprano pipistrelle. This approach is suggested as a good possible approach in the industry standard guidelines to analysing large data sets (Collins, 2016; Section 10.2) and is considered sufficient to inform an assessment of the site.

3.7.3 During September 2021 (Location A) the detector only recorded for four nights (instead of five), however this is not considered to have affected the assessment of the species assemblage using the site as Ecology by Design have collected considerable amounts of data over the survey period. The static bat detector failed to record at location B during October, as such the detector was redeployed to record during October dates 11th- 15th. Data failed to be collected on the 26th July at location B and therefore the night before (25th) has been used to complete the five nights of data as this was available. The data has also been analysed to show bat passes per hour for each location to show the relative levels of bat activity.

3.7.4 The winter of 2020 to 2021 was particularly mild and there was a prolonged cold and wet spell in spring 2021. This may have caused mortality amongst bat populations over winter and/or pregnant mothers to abort embryos and therefore not establish maternity colonies. Across the board, ecological consultants have reported many long-established significant roosts have not been present throughout the maternity season in 2021. Anecdotally, Ecology by Design has also noted generally far lower bat activity than typically expected at suitable sites in 2021. This is considered to be of relevance to the site, where lower levels of activity were recorded than would be expected for a woodland site adjacent to a lake. Interestingly, numbers increased considerably in 2022.

3.7.5 The site is heavily overgrown and large portions were not accessible. The areas of the lake edge not accessible for the water vole ad otter survey have been highlighted on the associated map. The pond in the centre of the site is also not accessible due to the very dense stands of buddleja surrounding it. Recommendations are given below with respect to this limitation.

3.7.6 There were densely vegetated areas of the site which were not accessible and therefore could not be surveyed for badger. Recommendations are given below with respect to this limitation.

3.7.7 A small area to the south of the site was omitted from the survey effort in 2022, due to the client's concern over the proximity of the quicksand, therefore the bat transect route was altered to not include this area and three of the dormouse tubes located in this area were not checked. As this area is small and of similar composition to the rest of the site (in respect of habitat for bats and dormice), it is not considered this will have any impact on the results or assessment of potential impacts of the proposals.

# 4 Results

## 4.1 Reptile Survey Results

4.1.1 No reptiles were identified within the site during the surveys completed in 2021 and 2022. A single juvenile smooth or palmate newt was identified and anecdotal evidence from a nearby landowner indicated that a grass snake (*Natrix helvetica*) had been seen on site before.

## 4.2 Dormouse Survey Results

4.2.1 No dormice or mammal nests were encountered within the nest tubes during the surveys conducted in 2021 and 2022. Evidence of birds in the form of droppings were found in some tubes. It is considered therefore, that dormice are likely absent from the site.

## 4.3 Bat Activity Walked Transects

**Transect 12th August 2021**

4.3.1 There was generally a low level of activity on the site. The first bat was recorded at 20:48 (18 minutes after sunset), comprising a soprano pipistrelle commuting north from stop point two to three on the eastern boundary of the site. Further soprano and common pipistrelle were recorded foraging at the south-eastern corner of the site (20:54-21:06) and the southwestern corner between stop points seven to eleven (21:12-21:39). On the lower western boundary soprano pipistrelle and Daubenton's bat (*Myotis daubentonii*) passes were recorded by the water's edge at stop point eleven (21:39-21:41). Further passes of these species were recorded, with individuals foraging between stop points 12 to 14 in the centre of the site. Many soprano pipistrelle passes were recorded on the upper western boundary foraging at the water's edge at stopping point 16 (22:12-22:17). Foraging common and soprano pipistrelle were also noted to the north of the site. Occasional Nathusius' pipistrelle (*Pipistrellus nathusii*) passes were heard throughout the survey.

**Transect 9th September 2021**

4.3.2 There was generally a low level of activity on the site, comprising predominantly foraging common and soprano pipistrelle along the transect route. The first bat heard was at 20:03 (23 minutes after sunset) comprising a foraging soprano pipistrelle at stopping point 16 in the northwest of site. Along the centre of the site, approximately stop point 12, common pipistrelle, soprano pipistrelle and noctule (*Nyctalus noctula*) passes were noted. By the water's edge to the southwestern corner of site (stop point 11), passes from these species were noted in addition to a single Leisler's bat (*Nyctalus leisleri*) pass. Further common pipistrelle

and soprano pipistrelle passes were recorded in the central-northern portion of the site (stop points 10-9), along the southern boundary (stop points 8-5) and the eastern boundary (stop points 4-1). Along the southern boundary additional passes were noted from *Myotis* sp., and noctule, with a brown long-eared (*Plecotus auritus*) bat pass also noted along the eastern boundary. Occasional Nathusius' pipistrelle calls were noted towards the end of the survey.

**Transect 5th October 2021**

4.3.3 This survey was quiet, with foraging passes of predominantly soprano pipistrelle (as well as common pipistrelle and occasional noctule) heard infrequently throughout the transect route, with the first bat heard at 18:46 (11 minutes after sunset) comprising a soprano pipistrelle continually foraging around stopping points 3-4 along the eastern boundary of the site.

**Transect 21st April 2022**

4.3.4 Moderate levels of soprano pipistrelle and common pipistrelle were recorded throughout the survey at most points, with the exception of the route along the canal being very quiet; although this may have been due to this stretch being walked just after sunset when some bats may have not yet emerged. The first bat, a soprano pipistrelle, was heard at 20:26 (17 minutes after sunset). Soprano pipistrelle were observed foraging above the treeline at point 7, 8 and 10. Soprano pipistrelle and common pipistrelle were also observed foraging over the lake edge at 21:07. Constant soprano pipistrelle and common pipistrelle activity was noted between 21:33-21-37 at stopping point 15 which is close to the northern edge of the site, in close proximity to the lake. Four serotine, three *Myotis* sp. and two NSL calls were recoded throughout the survey. All other calls were either soprano or common pipistrelle of which there were just over 400 calls recorded.

**Transect 26th May 2022**

4.3.5 A similar number of calls to the April transect were recorded in May, with the vast majority being either common pipistrelle or soprano pipistrelle. Bats were regularly heard throughout the survey across the site, with constant foraging by common and soprano pipistrelle and *Myotis* sp. above the water of the lake, noted at point 16 at 02:45-02:50. At 03:04-03:09 common and soprano pipistrelle and *Myotis* sp. were noted foraging over the water of the lake at point 14 and then flying down the woodland track. At 4:10-04:17 both common and soprano pipistrelle bats were observed foraging up and down the track adjacent to the canal path at point 4; showing interest in a poplar tree. One serotine call was recorded, thirty-one Myotis calls and just under 400 calls of soprano and common pipistrelle bats.

**Transect 29th June 2022**

4.3.6 Slightly less calls were recorded on this survey compared with April and May; 301 calls in total were recorded. Three of these calls were *Myotis* sp. with all others either common or soprano pipistrelle with the vast majority being soprano pipistrelle. Bats were observed foraging at most points along the transect including over the lake at point 14, 15 and 16.

**Transect 20th July 2022**

4.3.7 The surveyor noted that the transect has moderate activity and bat calls recorded are similar to the numbers recorded in both April and May. The majority of bats were heard and not seen but were recorded at most stops throughout the transect. At 04:04 a soprano pipistrelle bat was recorded foraging over the lake at stop 9; soprano pipistrelle were also observed foraging within the treeline at points 10, and 13. At 04:41 a soprano pipistrelle was observed foraging over the lake at stopping point 14.

**Conclusion**

4.3.8 The transect surveys in 2021 detected low levels of bat activity across the site. During the three transect surveys at least six different bat species were recorded: common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, noctule, Leisler's bat, brown long-eared bat and *Myotis* sp. Many of the passes were noted at the water's edge on the north-western and south-western corners of the site (stopping points 16 and 11 respectively), and along the southern and eastern boundaries. Bats were also noted utilising the central areas of the site, including along the central path from stop point 12-14 and along the path spanning stop point 9-11. The highest levels of bat activity were recorded during the first and second transects, although these transects are still regarded as having generally lower than anticipated activity levels.

4.3.9 The first and third surveys were undertaken from stopping points 1-18 and the second survey was undertaken from stopping points 18-1. All three surveys were undertaken at sunset.

4.3.10 The transect surveys undertaken in 2022 found moderate levels of activity with, like the previous year's surveys, the vast majority of passes to have been from either common or soprano pipistrelle bats. It was noted on all surveys in 2022 that bats were regularly observed foraging over the lake, although bats were noted at all stopping points throughout the site on most occasions.

4.3.11 With all surveys combined we conclude that the site supports a moderate level of bat activity with suitable bat habitat throughout, although particular suitability along the lake edges. Species diversity is also considered to be moderate, although it is clear that soprano and common pipistrelle bats are the dominant species currently present on site.

## 4.4 Fixed Point Automated Detector Surveys

4.4.1 All data represents the number of bat passes (n) rather than the number of bats. One bat could pass the detector hundreds of times during the night; therefore, the numbers are an indication of activity level and the relative value of particular habitats and features of the site rather than the actual numbers of bats.

**Detector location A – August 2021**

4.4.2 Overall activity levels recorded at location A in August were moderate, with 2,236 passes recorded in total during the five nights of recording (equating to 43.5 passes per hour). Across the sampling period, Pipistrelle sp., comprised 92.3% of all bat passes, of which 80.4% comprised soprano pipistrelle (n = 1,797), and 10.8% comprised common pipistrelle (n = 242) and 0.8% comprised Nathusius' pipistrelle (n = 17), with remaining calls classified as unidentified pipistrelle species). All other species comprised a low percentage of bat passes, in descending order of percentage occurrence; *Myotis* sp. (1.70%; n=38), *Nyctalus* sp. including noctule and Leisler's bat (1.70%; n=38), whilst serotine (*Eptesicus serotinus*) and brown long-eared bat and *Plecotus* sp. comprising 1.39% of passes each (n= 31).

**Detector location B – August 2021**

4.4.3 Overall activity levels recorded at detector location B in August were moderate, with 4,471 passes recorded in total during the five nights of recording (equating to 86.95 passes per hour). Across the sampling period, Pipistrelle sp., comprised 97.4% of all bat passes, of which 95.8% comprised soprano pipistrelle passes (n = 4,284) and 1.1% comprised common pipistrelle passes (n = 48) and 0.4% comprised Nathusius' pipistrelle (n=18). Brown long-eared bat comprised 1.7% (n=74) of passes, *Myotis* sp. comprised 0.8% of passes (n = 34), serotine (n = 5) comprised 0.1% passes, with noctule calls comprising ~0.04% of passes (n = 2).

**Detector location A – September 2021**

4.4.4 Overall activity levels recorded at detector location A in September were very low, with 593 passes recorded in total during the four nights of recording (equating to 11.9 passes per hour). Across the sampling period, Pipistrelle sp., comprised 92.9% of all bat passes, of which 80.1% comprised soprano pipistrelle passes (n = 475) and 9.1% comprised common pipistrelle passes (n = 54) and 3.4% comprised Nathusius' pipistrelle (n=20). *Myotis* sp. comprised 2.2% of passes (n = 13) and brown long-eared bat comprised 2.0% (n=12) of passes. Serotine (n = 3) comprised 0.5% passes, with noctule calls comprising ~0.2% of passes (n = 1).

**Detector location B – September 2021**

4.4.5 Overall activity levels recorded at location B during September was moderate, with 2,305 passes recorded in total during the five nights of recording (equating to 35.9 passes per hour). Across the sampling period, Pipistrelle sp., comprised 80.8% of all bat passes, of which 68.1% comprised soprano pipistrelle (n = 1,570), 10.8% comprised Nathusius' pipistrelle (n = 247) and 1.8% comprised common pipistrelle (n = 41) and, with remaining calls classified as unidentified pipistrelle species). Brown long-eared bat calls comprised 7.4% of passes (n = 171), and *Myotis* sp. comprised 6.9% of passes (n=158). All other species comprised a low percentage of bat passes, in descending order of percentage occurrence such that *Nyctalus* sp. comprised 1.8% (n=42), and serotine comprised 1.3% of passes (n=29).

**Detector location A – October 2021**

4.4.6 Overall activity levels recorded at detector location A during October was low, with 1,044 passes recorded in total during the five nights of recording (equating to 15.4 passes per hour). Across the sampling period, Pipistrelle sp., comprised 84.7% of all bat passes, of which 64.3% comprised soprano pipistrelle (n = 671), 14.5% comprised Nathusius' pipistrelle (n = 151), and 5.6% comprised common pipistrelle (n = 58), with remaining calls classified as unidentified pipistrelle species). All other species comprised a low percentage of bat passes, in descending order of percentage occurrence; *Myotis* sp. (6.2%; n=65), brown long-eared bat (4.7%; n=49) serotine (1.7%; n= 18) and noctule (1.3%; n=14).

**Detector location B – October 2021**

4.4.7 Overall activity levels recorded at detector location B during October was low, with 896 passes recorded in total during the five nights of recording (equating to 12.6 passes per hour). Across the sampling period, Pipistrelle sp., comprised 75.9% of all bat passes, of which 67.5% comprised soprano pipistrelle (n = 605), 6.9% comprised Nathusius' pipistrelle (n = 62) and 1.3% comprised common pipistrelle (n = 12), with remaining calls classified as unidentified pipistrelle species). *Myotis* sp. comprised 15.7% of passes (n=141), and brown long-eared comprised 5.7% of passes (n=51), whilst *Nyctalus* and serotine comprising less than 1% of passes each (n=7 and n=1 respectively).

**Detector location A – April 2022**

4.4.8 Overall activity levels recorded at detector location A during April was moderate, with 3,578 passes recorded in total during the five nights of recording (equating to 68.3 passes per hour). Across the sampling period, Pipistrelle sp., comprised 95% of all bat passes, of which 23.95% (n=857) were common pipistrelle and 71.02% (n=2541) were soprano pipistrelle. The other 5%

comprised a mixture of NSL (130), serotine (n=10), *Myotis* (n=13), noctule (n=23), brown long-eared bat (n=2) and serotine/Leisler's bat (n=2).

**Detector location B – April 2022**

4.4.9 Overall activity levels recorded at detector location B during April was moderate (but much higher than at location A), with 16,904 passes recorded in total during five nights of recording (equating 322.80 passes per hour). Across the sampling period, Pipistrelle sp., comprised 71.7% of all bat passes, of which 17.5% (n=2,949) were common pipistrelle and 54.3% (n=9,170) were soprano pipistrelle. *Myotis* sp. comprised 20.8% (n=3,517) of the calls and NSL 6.5% (n=1,106). The other 1% comprised a mixture of serotine (n=7), noctule (n=22), brown long-eared bat (n=131) and serotine/Leisler's bat (n=2).

**Detector location A – May 2022**

4.4.10 Overall activity levels recorded at detector location A during May was moderate but considerably higher than the previous month at the same location, with 8,678 passes recorded in total during the five nights of recording (equating to 198.88 passes per hour). Across the sampling period, Pipistrelle sp., comprised 97.8% of all bat passes, of which 52.4% (n=4,548) were common pipistrelle and 45.38% (n=3,938) were soprano pipistrelle. The other 2.2% comprised a mixture of *Myotis sp.* (n=5), NSL[4] (n=186) and brown long-eared bat (n=1).

**Detector location B – May 2022**

4.4.11 Overall activity levels recorded at detector location B during May was moderate, with 14,113 passes recorded in total during five nights of recording (equating 323.45 passes per hour). Across the sampling period, Pipistrelle sp., comprised 88.1% of all bat passes, of which 34.5% (n=4,864) were common pipistrelle and 53.7% (n=7,574) were soprano pipistrelle. *Myotis* sp. comprised 10.9% (n=1,534) of the calls and the other 1% comprised a mixture of NSL (n=135), brown long-eared bat (n=4) and *Pipistrellus* sp. (n=2).

**Detector location A – June 2022**

4.4.12 Overall activity levels recorded at detector location A during June was moderate, more than in April but less than May, with 5,111 passes recorded in total during the five nights of recording (equating to 120.07 passes per hour). Across the sampling period, Pipistrelle sp., comprised 97.7% of all bat passes, of which 59% (n=3,017) were common pipistrelle and 38.7% (n=1,977) were soprano pipistrelle. The other 2.3% comprised a mixture of *Myotis* (n=6), NSL (n=103) and brown long-eared bat (n=8).

[4] NSL is an abbreviation used for calls which could be attributed to a big bat: noctule / serotine or Leisler's bat

**Detector location B – June 2022**

4.4.13 Overall activity levels recorded at detector location B during June was moderate, with 9,300 passes recorded in total during five nights of recording (equating 224.10 passes per hour). Across the sampling period, Pipistrelle sp., comprised 97.9% of all bat passes, of which 22.3% (n=2,079) were common pipistrelle and 75.6% (n=7,030) were soprano pipistrelle. The other 2.1% comprised a mixture of *Myotis* sp. (n=53), NSL (n=130), brown long-eared bat (n=4), noctule (n=2), serotine (n=1) , noctule (n=2) and Leisler's bat (n=1).

**Detector location A – July 2022**

4.4.14 Overall activity levels recorded at detector location A during July was moderate, with 5,658 passes recorded in total during five nights of recording (equating 124.90 passes per hour). Across the sampling period, Pipistrelle sp., comprised 95.6% of all bat passes, of which 22.85% (n=1,293) were common pipistrelle and 72.71% (n=4,114) were soprano pipistrelle. The other 4.4% comprised a mixture of *Myotis* sp. (n=12), NSL (n=208), brown long-eared bat (n=9), noctule (n=21) and serotine (n=1).

**Detector location B – July 2022**

4.4.15 Overall activity levels recorded at detector location B during July was moderate but much higher than at location A, with 11,116 passes recorded in total during five nights of recording (equating 238.37 passes per hour). Across the sampling period, Pipistrelle sp., comprised 98.1% of all bat passes, of which 40.5% (n=6,398) were common pipistrelle and 57.6% (n=6,398) were soprano pipistrelle. The other 1.9% comprised a mixture of Myotis sp. (n=28), Serotine (n=1), noctule (n=27), NSL (n=156) brown long-eared bat (n=3) and Nathusius' pipistrelle (n=1).

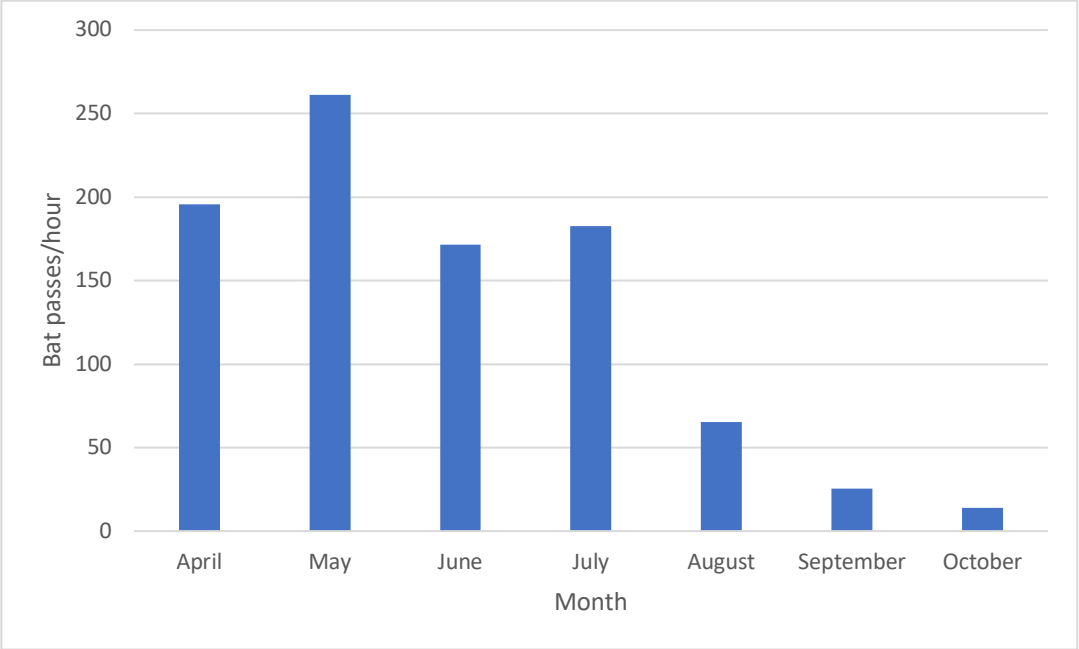
**Conclusion**

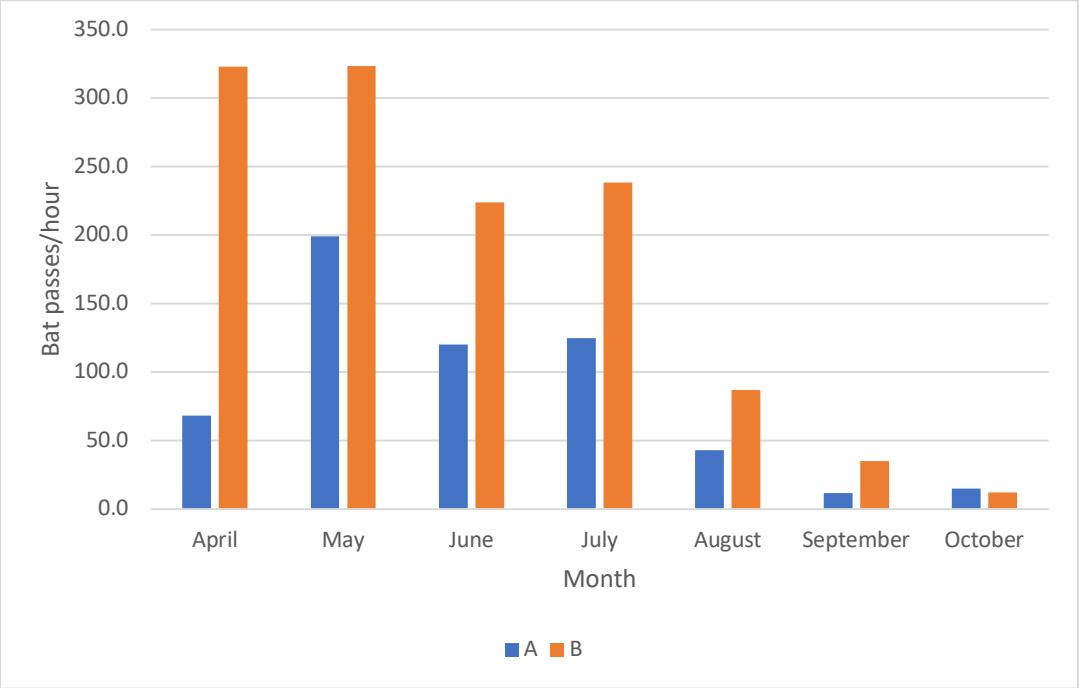
4.4.16 The site is used by at least nine species of foraging and/or commuting bats. The majority of activity comprises *Pipistrelle* sp. passes which exceeds 93% of recorded passes at detector location A and 87% of recorded passes at detector location B during the sampling periods. Occasional passes from *Myotis* sp., serotine, brown long-eared bat, *Nyctalus* sp. were also recorded.

4.4.17 The bat passes (registrations) per hour for each detector location during the sampling periods is outlined in Table 4.1.

**Table 4.1:** *Bat registrations (passes) per hour throughout the site*

| Location | Bat Registrations per Hour (BRPH) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Common pipistrelle | Soprano pipistrelle | Nathusius' pipistrelle | Unidentified pipistrelle (~50 kHz) | Serotine | Leisler' s bat | *Nyctalus* sp. | Brown long-eared bat | *Myotis* sp. | Serotine or Leisler' s bat | Noctule | NSL | Total |
| August- A | 4.71 | 34.95 | 0.33 | 0.04 | 0.60 | 0.12 | 0.74 | 0.60 | 0.74 | 0 | 0 | 0 | 42.83 |
| August- B | 0.93 | 83.31 | 0.35 | 0.04 | 0.10 | 0 | 0.04 | 1.44 | 0.66 | 0 | 0 | 0 | 86.87 |
| September- A | 3.56 | 31.29 | 1.31 | 0.07 | 0.20 | 0 | 0.07 | 0.66 | 0.85 | 0 | 0 | 0 | 38.01 |
| September- B | 0.63 | 24.4 | 3.85 | 0.03 | 0.45 | 0.02 | 0.65 | 2.67 | 2.46 | 0 | 0 | 0 | 35.16 |
| October- A | 0.85 | 9.86 | 2.21 | 0.03 | 0.26 | 0 | 0.21 | 0.72 | 0.95 | 0 | 0 | 0 | 15.09 |
| October- B | 0.17 | 8.51 | 0.87 | 0.01 | 0.01 | 0 | 0.10 | 0.71 | 1.98 | 0 | 0 | 0 | 12.36 |
| April - A | 16.37 | 48.52 | 0 | 0 | 0.19 | 0 | 0 | 0.04 | 0.25 | 0.04 | 0.44 | 2.48 | 68.33 |
| April - B | 56.31 | 175.11 | 0 | 0 | 0.13 | 0 | 0 | 2.50 | 67.16 | 0.04 | 0.42 | 21.12 | 322.80 |
| May - A | 104.23 | 90.25 | 0 | 0 | 0 | 0 | 0 | 0.02 | 0.11 | 0 | 0 | 4.26 | 198.88 |
| May - B | 111.47 | 173.58 | 0 | 0.05 | 0 | 0 | 0 | 0.09 | 35.16 | 0 | 0 | 3.09 | 323.5 |
| June - A | 70.88 | 46.44 | 0 | 0 | 0 | 0 | 0 | 0.19 | 0.14 | 0 | 0 | 2.42 | 120.07 |
| June - B | 50.10 | 169.40 | 0 | 0 | 0.02 | 0.02 | 0 | 0.10 | 1.28 | 0 | 0.05 | 3.13 | 224.10 |
| July - A | 28.54 | 90.82 | 0 | 0 | 0.02 | 0 | 0 | 0.20 | 0.26 | 0 | 0.46 | 4.59 | 124.90 |
| July - B | 96.48 | 137.20 | 0.02 | 0 | 0.02 | 0 | 0 | 0.06 | 0.6 | 0.06 | 0.58 | 3.35 | 238.37 |
| **Total** | 545.23 | 1123.64 | 8.94 | 0.27 | 2 | 0.16 | 1.81 | 10 | 112.6 | 0.14 | 1.95 | 44.44 | **1851.27** |
| **Average** | 38.95 | 80.26 | 0.64 | 0.02 | 0.14 | 0.01 | 0.13 | 0.71 | 8.04 | 0.01 | 0.14 | 3.17 | **132.23** |




4.4.18 More passes we recorded at both locations A and B during August compared to September and October 2021. Significantly more passes were recorded at location B compared to A during August 2021; a similar level of activity was recorded at both location A and B in September and October 2021, with activity lowest in October at both locations.

4.4.19 Data from 2022 shows much higher levels of activity than in 2021. In April, activity at location A was similar to the previous year in August, whereas as location B the activity was significantly higher with over 16,000 calls, as opposed to 3,578 at location A. During May activity increased

considerably at location A with 8,678 calls in total; over 5,000 more than the previous month. Again, location B in May was much busier than location A with over 14,000 calls.

4.4.20 In June activity appears to reduce slightly with 5,111 calls at location A and 9,300 at location B; however, the same pattern of location B recording higher activity levels is still evident. It is difficult to understand this slight dip in activity as without several years of data, it will not be clear whether this was an anomaly or a frequent occurrence. Dips in activity can be for many reasons, including weather, humidity, mothers staying with their dependant young for longer periods and invertebrate emergence patterns, all of which may impact bat activity from month to month. In July activity remains similar at location A with 5,658 calls recorded but increases dramatically to 11,116 calls at location B.

4.4.21 Overall, the vast majority of calls recorded were from pipistrelle bats with a significantly higher number of soprano pipistrelle calls recorded throughout most months and locations. The site also provides commuting and foraging opportunities along the water's edge and foraging and commuting opportunities within the centre of the site for various other species in relatively small numbers; these included *Myotis*. sp, *Nyctalus* sp., brown long-eared bat and the occasional serotine.

4.4.22 There is no published guidance on what rates of bat activity are considered to be high / medium / low. However, based on thousands of hours of bat data analysed across a wide range of sites by Ecology by Design personnel, high rates are considered to be where tens of thousands of bat passes are recorded per detector per recording period, and low where low hundreds are recorded per detector. Therefore, activity levels are considered to be low to moderate in 2021 and rise to moderate in 2022.

## 4.5 Otter and Water Vole Surveys

4.5.1 No evidence of otter or water vole was recorded during the survey conducted in May 2022.

4.5.2 During the August survey an otter spraint was discovered on the banks of the Grand Union Canal which runs parallel to the site (see fig 5. in appendix 1). A potential otter spraint next to signal crayfish (*Pacifastacus leniusculus*) remains was also located on the northern bank of the lake (see fig 5. appendix 1). Due to the recent heatwave the sample was very dried out and not typical of otter, therefore it was collected for DNA analysis which is recommended to confirm otter presence on site. Several crayfish remains were also identified on the banks of the lake which are likely to be from otter, although birds such as gulls and herons may also predate crayfish, leaving their remains. No otter holts were discovered on site. As otter evidence was

present along the canal, which is very close proximity to the site and due to the suitable habitat on site, it is considered highly likely that otter are present within the site.

4.5.3 No evidence of water vole was found on site and the lake was considered to offer only very marginal habitat as there is very little bank; the lake edge slopes into pebbly beach-like areas rather than steep banks in most areas, which leaves little opportunity for water vole to form burrows. There is some vegetation along the lake edge, although the beach-like areas are sparsely covered in vegetation and offer little protection to water vole. A few holes were discovered on the northern edge of the lake, although these appeared disused and likely from common rat as no other evidence was present. The pond (TN1) in the centre of the site may provide suitable habitat, however, the buddleja was in such densities it was not possible to access the water's edge in this area.

4.5.4 The nearside bank of the canal was piled and therefore apart from sporadic outflow pipes there was no suitable places for burrowing water vole. The far side bank of the canal did open up in places to form reed bed areas (TN2), which may be highly suitable but this area was not accessible to the surveyors.

## 4.6 Badger Survey

4.6.1 No evidence of badger setts were discovered on site. One relatively fresh badger latrine was discovered within the woodland in the north west of the site, although no other evidence was found. There were significant areas of the site which were densely vegetated and impenetrable and therefore may have concealed evidence of badger.

# 5 Discussion and recommendations

## 5.1 Reptiles

5.1.1 No reptiles were recorded during the site visits in 2021 or 2022. Anecdotal evidence from a local resident indicated that a grass snake had been seen on site previously. Grass snake is a wide-ranging species therefore it is considered that there is likely to be a low population of grass snake, which, due to the sufficient habitat for them on site and within the local landscape, were not discovered during the surveys. Ecology by Design are confident that if a significant population existed, they would have been recorded incidentally during the many site visits that have taken place throughout 2021 and 2022. It is therefore recommended that any site clearance should be undertaken in a phased and careful manner towards areas of the site to be retained; allowing reptiles the chance to escape freely into other suitable areas of the site.

## 5.2 Dormice

5.2.1 No dormouse or evidence of them have been located during nest tube checks during surveys in 2021 and 2022. It is therefore considered that dormice are likely absent from the site. No further mitigation is required with regard to dormice; however, enhancements have been suggested below.

## 5.3 Water Vole and Otter

5.3.1 No evidence of water vole was discovered on site and the lake is considered to be of marginal suitability for water vole. The pond (TN3) in the centre of the site may be suitable for water vole but was inaccessible at the time of survey. Proposals involve clearing vegetation on the western side of the pond and therefore it is recommended that some vegetation is cleared in stages and a water vole check undertaken once access is possible (between April-September). Clearance should be undertaken under an ecological clerk of works (ECoW) to ensure initially only minimal amounts of vegetation are removed, to allow an ecologist sufficient access to check for water vole evidence; if no evidence is discovered the vegetation can then be cleared as per the design proposals. If evidence is discovered, works would need to stop and a licence applied for. Alternatively, this pond could be left undisturbed and would then not need to be surveyed any further.

5.3.2 Due to the suitability of the site for otter and the nearby presence and potential presence on site of otter, it is recommended that once plans are finalised, a check for otter holts is conducted 3 months prior to works commencing. So that, if present, appropriate mitigation can be followed.

## 5.4 Badger

5.4.1 No badger setts were discovered on site. One relatively fresh badger latrine was discovered within woodland in the north west of the site. This evidence suggests that badger are active across the site but it is considered that the site is not optimal for sett building. Large areas of the site are not considered suitable for badger, due to the level of the water table and semi-aquatic vegetation present indicating that certain areas are prone to flooding or seasonal inundation which would not be suitable for sett building. Other areas along the western edge of the lake and along the main track through the site appear to have had concrete deposited in the past making the ground very hard in many places and not suitable for badger to dig. Due to the densely vegetated areas however, there were large areas of the site that were not possible to survey and evidence of badger could have been concealed here; albeit the majority of this area will be retained and not impacted by the development. Due to lack of access across the whole site a precautionary approach is therefore recommended. Once development plans are fixed a 30m buffer zone will be drawn around all areas of the site that require ground works; this buffer zone will then be thoroughly checked which will involve careful phased clearance so that the areas are accessible for surveying. It is recommended that this survey is undertaken at least three months before works start so that if any badger setts are discovered they can be adequately surveyed and a licence applied for, if required.

## 5.5 Bats

5.5.1 Data collected over seven months in both 2021 and 2022 indicate a low to moderate level of bat activity across the site in both the woodland edge and lakeside areas. Activity varied across months quite considerably; however generally speaking, activity across most months would still be considered to be moderate. The vast majority of bat calls recorded were *Pipistrellus* species with significantly more being soprano pipistrelle. However, many other species were also recorded, albeit in much smaller numbers, including *Myotis* sp., *Nyctalus* sp., serotine, and brown long-eared bat, indicating a good diversity present across the site.

5.5.2 Soprano pipistrelle, are known to hunt over water and woodland edges and therefore it is understandable why they were recorded as the most dominant bat species on site. Location B recorded significantly more bat calls during most months, and this is likely attributed to its location close to the lake edge. Many insects are associated with water and insects such as mosquitoes and midges which soprano pipistrelle (and most bats) prey upon breed within the water or at its edges and therefore location B (and any area around the water's edge on site)

provides ideal hunting ground for emerging insects, which is thought to be the main reason for significantly higher activity at this location.

5.5.3 Numbers for brown long-eared bat are particularly low considering they are a relatively common bat species and that they are suited to woodland environments; however, their calls are particularly quiet and therefore often not picked up by the detector and it is considered their activity on site is likely under-represented.

5.5.4 Bat calls were recorded close to emergence and re-entry times for bats to and from their roosts on multiple occasions and therefore it is likely the site itself may support bat roosts or at least somewhere very close by. Species recorded close to their emerging/re-entering times included the examples below:

- Soprano pipistrelle regularly recorded close to sunset.
- Common pipistrelle occasionally recorded close to sunset.
- NSL recorded within ten minutes of sunrise on sporadic occasions.
- Brown long-eared bat recorded occasionally within 40 mins of sunset during April and May.

5.5.5 Tables 5.1 and 5.2 below, detail the scoring criteria for commuting and foraging bats. Each species found on site is assigned a IEEM Geographic Frame of Reference score (scores based on Appendix 3); results are based upon the level of activity recorded and the areas where bats were identified using a combination of the data from the walked transects and static detectors to make the assessment below. Following this approach, the site is categorised as being of 'county' importance due to the likelihood that soprano pipistrelle bats are roosting on site due to multiple calls being recorded around their typical emergence times. This may also be the case for Nyctalus sp. common pipistrelle and brown long-eared bats, although due to less frequent calls recorded at typical emergence times they have not been included below.

**Table 5.1:** *Scoring Values for commuting routes*

| Species | Species Value | Number of bats | Roosts/ Potential Roosts | Type and complexity of linear features | Geographic Frame of Reference and score |
|---|---|---|---|---|---|
| Common pipistrelle | Common (2) | Small number of bats (10) | None (1) | Complex network of mature well-established hedgerows, small fields and rivers/streams (5) | District/ Local/ Parish (18) |

| | | | | | |
|---|---|---|---|---|---|
| Soprano pipistrelle | Common (2) | Small number of bats (10) | Moderate number/Not known (4) | Complex network of mature well-established hedgerows, small fields and rivers/streams (5) | County (21) |
| Brown long-eared bat | Common (2) | Individual bats (5) | None (1) | Complex network of mature well-established hedgerows, small fields and rivers/streams (5) | District/ Local/ Parish (13) |
| Noctule | Rarer (5) | Individual bats (5) | None (1) | Complex network of mature well-established hedgerows, small fields and rivers/streams (5) | District/ Local/ Parish (16) |
| Nathusius' pipistrelle | Rarer (5) | Individual bats (5) | None (1) | Complex network of mature well-established hedgerows, small fields and rivers/streams (5) | District/ Local/ Parish (16) |
| Myotis sp. | Rarer (5) | Individual bats (5) | None (1) | Complex network of mature well-established hedgerows, small fields and rivers/streams (5) | District/ Local/ Parish (16) |
| Serotine | Rarer (5) | Individual bats (5) | None (1) | Complex network of mature well-established hedgerows, small fields and rivers/streams (5) | District/ Local/ Parish (16) |
| Leisler's bat | Rarer (5) | Individual bats (5) | None (1) | Complex network of mature well-established hedgerows, small fields and rivers/streams (5) | District/ Local/ Parish (16) |

**Table 5.2:** *Scoring Values for foraging*

| **Species** | **Species Value** | **Number of bats** | **Roosts/ Potential Roosts** | **Type and complexity of linear features** | **Geographic Frame of Reference and score** |
|---|---|---|---|---|---|
| Common pipistrelle | Common (2) | Small number of bats (10) | None (1) | Mosaic of pasture, woodlands and wetland areas (5) | District/ Local/ Parish (18) |
| Soprano pipistrelle | Common (2) | Small number of bats (10) | Moderate number/Not known (4) | Mosaic of pasture, woodlands and wetland areas (5) | County (21) |

| | | | | | |
|---|---|---|---|---|---|
| Brown long-eared bat | Common (2) | Individual bats (5) | None (1) | Mosaic of pasture, woodlands and wetland areas (5) | District/ Local/ Parish (13) |
| Noctule | Rarer (5) | Individual bats (5) | None (1) | Mosaic of pasture, woodlands and wetland areas (5) | District/ Local/ Parish (16) |
| Nathusius' pipistrelle | Rarer (5) | Individual bats (5) | None (1) | Mosaic of pasture, woodlands and wetland areas (5) | District/ Local/ Parish (16) |
| Myotis sp. | Rarer (5) | Individual bats (5) | None (1) | Mosaic of pasture, woodlands and wetland areas (5) | District/ Local/ Parish (16) |
| Serotine | Rarer (5) | Individual bats (5) | None (1) | Mosaic of pasture, woodlands and wetland areas (5) | District/ Local/ Parish (16) |
| Leisler's bat | Rarer (5) | Individual bats (5) | None (1) | Mosaic of pasture, woodlands and wetland areas (5) | District/ Local/ Parish (16) |

5.5.6 Once plans have been produced to indicate which trees are proposed for removal, further survey work will be necessary to establish whether or not roosts are present; as well as within the derelict outbuildings on site.

5.5.7 Due to the levels of activity across the site it will be very important that a specialist lighting strategy is designed for the site, to strictly avoid illuminating the lake and its edges as well as the woodland. Lighting should only illuminate the new building areas and these lights will also need to be carefully designed to ensure minimum impact across the site. It is recommended that any buildings that will require lighting during the evenings or camping areas are sited as far away from the lake edges as possible.

5.5.8 A detailed lighting strategy will be required and should be produced with advice from an ecologist to ensure all ecological features are protected and this report further updated once plans have evolved.

5.5.9 Due to the levels of activity across the site it is recommended that the lighting strategy is produced as part of the planning application, to ensure an ecologist can provide specialist input. Any lighting for the development will need to be designed sensitively in accordance with industry standard guidance (BCT & ILP, 2018) and the following principles will need to be adopted:

- Maintaining dark corridors alongside the lake edge and woodland and in proximity to roosts (once/if identified);
- Not illuminating any trees on site; strictly no uplighting;
- Where lighting is required, ensuring:
    - Light levels are less than 3 Lux;
    - LED luminaires with a warm white spectrum ideally <2700 Kelvin (to avoid blue / UV elements);
    - Bollard or low-level downward directional luminaires are used and mounted on the horizontal (with no upward tilt); and
    - Security lighting, if required, is motion-activated with short (< 1 minute) timers.

## 5.6 Other

5.6.1 A large area of Japanese Knotweed (*Fallopia japonica*) was discovered in the woodland in the north west of the site during the surveys as well as a smaller stand near the entrance to the site. Japanese Knotweed is a schedule 9 invasive species which means it is illegal to allow it to spread in the wild. It is of Ecology by Design's understanding that some areas have already been treated but it appears that the treatment may have not been successful and therefore it is recommended that further treatment applications are undertaken before it spreads any further.

# 6 Enhancements

## 6.1 Reptiles

6.1.1 It is recommended that log piles from trees felled to facilitate the development are stacked around edges of the woodland and lake edge. Two hibernacula should also be installed within the retained woodland area where they will remain undisturbed (see appendix 2). This will not only provide habitat for hibernating and sheltering reptiles but also for invertebrates and small mammals.

## 6.2 Dormice

6.2.1 Hazel (*Corylus avellana*), willow (*Salix* sp.) and honeysuckle (*Lonicera periclymenum*) could be used within the landscape design to provide suitable vegetation for dormice which may encourage then into the area; other small mammals, birds and insects will also benefit from these species being planted.

## 6.3 Water Vole and Otter

6.3.1 No particular enhancements for these species are required however, it is recommended that the northern edge of the lake is not completely cleared and that stands of marginal vegetation are planted between the pontoons to provide some ground cover in this area; species should include native rushes and reeds. An additional enhancement that could be considered, would be installation of an artificial otter holt in an area of the site to remain undisturbed along the western lake edge.

## 6.4 Badger

6.4.1 It is recommended that native berry and fruit producing trees are included within the landscape plan to provide food for badgers and other species. Species should include hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*), elder (*Sambucus nigra*), dog rose (*Rosa canina*), bramble (*Rubus fruticosus*), crab apple (*Malus sylvestris*), damson (*Prunus domestica insititia*) and cherry (*Prunus avium*). These species could be planted in areas of the site where Japanese Knotweed currently exists which will require removal.

## 6.5 Bats

6.5.1 At least ten bat boxes (see examples in appendix 2) should be installed across the site. These should include a mixture of different brands/styles but should all be woodcrete/woodstone to ensure longevity (wooden boxes rot quickly and therefore need replacing often). The boxes should be positioned on the south/west aspect of mature trees at the edges of the lake and

edges of the woodland/in clearings, on tree trunks that are free from dense vegetation as bats will not fly through a cluttered (densely vegetated) area to roost. Boxes will be attached using aluminium nails or screws only, the use of copper, zinc or steel affixers in particular must be avoided on trees.

6.5.2 Bat boxes should also be included within the new buildings on site and should be installed within the fabric of the building, using such designs as Habibat boxes which are discreet and designed to fit any type of building.

# 7 Relevant Legislation and Policy

## 7.1 Natural Environment & Rural Communities Act 2006

7.1.1 The Natural Environment and Rural Communities (NERC) Act came into force on 1st October 2006. Section 41 (S41) of the Act require the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England. The list has been drawn up in consultation with Natural England as required by the Act. In accordance with the Act the Secretary of State keeps this list under review and will publish a revised list if necessary, in consultation with Natural England.

7.1.2 The S41 list is used to guide decision-makers such as public bodies, including local authorities and utilities companies, in implementing their duty under Section 40 of the NERC Act 2006, to have regard to the conservation of biodiversity in England, when carrying out their normal functions, including development control and planning. This is commonly referred to as the 'Biodiversity Duty.'

7.1.3 Guidance for public authorities on implementing the Biodiversity Duty has been published by Defra. One of the key messages in this document is that 'conserving biodiversity includes restoring and enhancing species populations and habitats, as well as protecting them.' In England the administration of the planning system and licensing schemes are highlighted as having a 'profound influence on biodiversity conservation.' Local authorities are required to take measures to "promote the preservation, restoration and re-creation of priority habitats, ecological networks and the protection and recovery of priority species. The guidance states that 'the duty aims to raise the profile and visibility of biodiversity, clarify existing commitments with regard to biodiversity, and to make it a natural and integral part of policy and decision making.'

7.1.4 In 2007, the UK Biodiversity Action Plan (BAP) Partnership published an updated list of priority UK species and habitats covering terrestrial, freshwater and marine biodiversity to focus conservation action for rarer species and habitats in the UK. The UK Post-2010 Biodiversity Framework , which covers the period from 2011 to 2020, now succeeds the UK BAP. The UK priority list contained 1150 species and 65 habitats requiring special protection and has been used as a reference to draw up the lists of species and habitats of principal importance in England.

7.1.5 In England, there are 56 habitats of principal importance and 943 species of principal importance on the S41 list. These are all the habitats and species found in England that were

identified as requiring action in the UK BAP and which continue to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework.

## 7.2 Wildlife and Countryside Act 1981 (as amended)

7.2.1 All UK reptiles are protected under the Wildlife and Countryside Act 1981 (as amended). It is illegal to kill or injure them. It is not illegal to capture, disturb or to damage the habitats of the four 'widespread' species; however, the reptiles themselves are protected so any works to damage their habitat could risk causing harm to reptiles and hence could be illegal.

## 7.3 National Planning Policy Framework

7.3.1 The National Planning Policy Framework (NPPF) was updated in July 2021 (MHCLG, 2021) thereby replacing the older version of February 2019. The new framework sets out in section 15 that to protect and enhance biodiversity and geodiversity, plans should:

7.3.2 identify, map and safeguard components of local wildlife-rich habitats and wider ecological networks, including the hierarchy of international, national and locally designated sites of importance for biodiversity; wildlife corridors and stepping stones that connect them; and areas identified by national and local partnerships for habitat management, enhancement, restoration or creation and

7.3.3 promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity.

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

7.3.5 if significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;

7.3.6 development on land within or outside a Site of Special Scientific Interest, and which is likely to have an adverse effect on it (either individually or in combination with other developments), should not normally be permitted. The only exception is where the benefits of the development in the location proposed clearly outweigh both its likely impact on the features of the site that make it of special scientific interest, and any broader impacts on the national network of Sites of Special Scientific Interest;

7.3.7 development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists; and

7.3.8 development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to incorporate biodiversity improvements in and around developments should be encouraged, especially where this can secure measurable net gains for biodiversity.

7.3.9 The following should be given the same protection as habitats sites:

7.3.10 potential Special Protection Areas and possible Special Areas of Conservation;

7.3.11 listed or proposed Ramsar sites; and

7.3.12 sites identified, or required, as compensatory measures for adverse effects on habitats sites, potential Special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites.

7.3.13 The presumption in favour of sustainable development does not apply where the plan or project is likely to have a significant effect on a habitats site (either alone or in combination with other plans or projects), unless an appropriate assessment has concluded that the plan or project will not adversely affect the integrity of the habitats site.

## 7.4 Government Circular ODPM 06/2005 Biodiversity and Geological Conservation

7.4.1 Paragraph 98 of Government Circular 06/2005 advises that “the presence of a protected species is a material consideration when a planning authority is considering a development proposal that, if carried out, would be likely to result in harm to the species or its habitat. Local authorities should consult Natural England before granting planning permission. They should consider attaching appropriate planning conditions or entering into planning obligations under which the developer would take steps to secure the long-term protection of the species. They should also advise developers that they must comply with any statutory species’ protection provisions affecting the site concerned...”

7.4.2 Paragraph 99 of Government Circular 06/2005 advises that “it is essential that the presence or otherwise of protected species, and the extent that they may be affected by the proposed development, is established before the planning permission is granted, otherwise all relevant material considerations may not have been addressed in making the decision. The need to ensure ecological surveys are carried out should therefore only be left to coverage under

planning conditions in exceptional circumstances, with the result that the surveys are carried out after planning permission has been granted".

## 7.5 Local Planning Policy

7.5.1 The Hillingdon Local Plan was adopted in November 2012, which contains the planning strategy and vision for the Borough. The following policies are of relevance to this development:

Policy EM7: Biodiversity and Geological Conservation

*7.5.2 "The Council will review all the Borough grade Sites of Importance for Nature Conservation (SINCs). Deletions, amendments and new designations will be made where appropriate within the Hillingdon Local Plan: Part 2- Site Specific Allocations Local Development Document. These designations will be based on previous recommendations made in discussions with the Greater London Authority.*

*7.5.3 Hillingdon's biodiversity and geological conservation will be preserved and enhanced with particular attention given to:*

1. *The conservation and enhancement of the natural state of:*
    - *Harefield Gravel Pits*
    - *Colne Valley Regional Park*
    - *Fray's Farm Meadows*
    - *Harefield Pit*
2. *The protection and enhancement of all Sites of Importance for Nature Conservation. Sites with Metropolitan and Borough Grade 1 importance will be protected from any adverse impacts and loss. Borough Grade 2 and Sites of Local Importance will be protected from loss with harmful impacts mitigated through appropriate compensation.*
3. *The protection and enhancement of populations of protected species as well as priority species and habitats identified within the UK, London and the Hillingdon Biodiversity Action Plans.*
4. *Appropriate contributions from developers to help enhance Sites of Importance for Nature Conservation in close proximity to development and to deliver/ assist in the delivery of actions within the Biodiversity Action Plan.*
5. *The provision of biodiversity improvements from all development, where feasible.*
6. *The provision of green roofs and living walls which contribute to biodiversity and help tackle climate change.*

7. *The use of sustainable drainage systems that promote ecological connectivity and natural habitats. "*

## 7.6 European Protected Species

7.6.1 European Protected Species of potential relevance to this assessment are bats and hazel dormouse.

7.6.2 The Conservation of Habitats and Species Regulations 2017 (as amended) transpose the EC Habitats Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (Council Directive 92/43/EEC) into national law.

7.6.3 "European protected species" (EPS) of animal are those which are shown on Schedule 2 of The Conservation of Habitats and Species Regulations 2017 (as amended). They are subject to the provisions of Regulation 43 of those Regulations. All EPS are also protected under the Wildlife and Countryside Act 1981 (as amended)[1]. Taken together, these pieces of legislation make it an offence to:

- intentionally or deliberately capture, injure or kill any wild animal included amongst these species;
- possess or control any live or dead specimens or any part of, or anything derived from these species;
- deliberately disturb wild animals of any such species;
- deliberately take or destroy the eggs of such an animal; or
- intentionally, deliberately or recklessly damage or destroy a breeding site or resting place of such an animal, or obstruct access to such a place

7.6.4 For the purposes of the above, disturbance of animals includes in particular any disturbance which is likely:

- to impair their ability –
    - To survive, to breed or reproduce, or the rear or nurture their young; or
    - In the case of animals of a hibernating or migratory species, to hibernate or migrate; or
- to affect significantly the local distribution of the species to which they belong.

7.6.5 Although the law provides strict protection to these species, it also allows this protection to be set aside (derogated) through the issuing of licences. The licences in England are currently determined by Natural England (NE) for development works. In accordance with the

requirements of The Conservation of Habitats and Species Regulations 2017 (as amended), a licence can only be issued where the following requirements, known as the "Three Tests", are satisfied:

- the proposal is necessary 'to preserve public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment';
- 'there is no satisfactory alternative'; and
- the proposals 'will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range.

## 7.7 Reptiles

7.7.1 All native reptile species receive legal protection in Great Britain under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). Viviparous lizard, slow-worm, grass snake and adder are protected against killing, injuring and unlicensed trade only. Sand lizard and smooth snake receive additional protection as "English Protected Species" under the provisions of The Conservation of Habitats and Species Regulations 2017 (as amended) and are fully protected under the Wildlife and Countryside Act 1981 (as amended).

7.7.2 All six native species of reptile are included as 'species of principal importance' for the purpose of conserving biodiversity under Section 41 (England) of the NERC Act 2006 and Section 7 of the Environment (Wales) Act 2016.

7.7.3 Current Natural England Guidelines for Developers states that 'where it is predictable that reptiles are likely to be killed or injured by activities such as site clearance, this could legally constitute intentional killing or injuring.' Further the guidance states: 'Normally prohibited activities may not be illegal if 'the act was the incidental result of a lawful operation and could not reasonably have been avoided'. Natural England 'would expect reasonable avoidance to include measures such as altering development layouts to avoid key areas, as well as capture and exclusion of reptiles.'

7.7.4 The Natural England Guidelines for Developers state that 'planning must incorporate two aims where reptiles are present:

- to protect reptiles from any harm that might arise during development work; and
- to ensure that sufficient quality, quantity and connectivity of habitat is provided to accommodate the reptile population, either on-site or at an alternative site, with no net loss of local reptile conservation status.'

## 7.8 Badger

7.8.1 Badger is protected under the Protection of Badgers Act 1992. It is not permitted to wilfully kill, injure, take, possess or cruelly ill-treat a badger, or to attempt to do so; or to intentionally or recklessly interfere with a sett. Sett interference includes disturbing badgers whilst they are occupying a sett, as well as damaging or destroying a sett or obstructing access to it. A badger sett is defined in the legislation as "a structure or place, which displays signs indicating current use by a badger".

7.8.2 ODPM Circular 06/2005 (ODPM, 20005) provides further guidance on statutory obligations towards badger within the planning system. Of particular note is paragraph 124, which states that "The likelihood of disturbing a badger sett, or adversely affecting badgers' foraging territory, or links between them, or significantly increasing the likelihood of road or rail casualties amongst badger populations, are capable of being material considerations in planning decisions."

7.8.3 Natural England provides Standing Advice (Gov.uk, 2015), which is capable of being a material consideration in planning decisions. Natural England recommends mitigation to avoid impacts on badger setts, which includes maintaining or creating new foraging areas and maintaining or creating access (commuting routes) between setts and foraging/watering areas.

## 7.9 Water Vole

7.9.1 Water vole is protected under the Wildlife and Countryside Act 1981 (as amended). This makes it an offence to kill, injure or take any water vole, damage, destroy or obstruct access to any place of shelter or protection that the animals are using, or disturb voles while they are using such a place. Water vole is listed as a Species of Principal Importance under the provisions of the NERC Act 2006 in England and under the provisions of the Environment (Wales) Act 2016.

## 7.10 Otter

7.10.1 Otter are protected under The Conservation of Habitats and Species Regulations 2017 (as amended) and are therefore protected against capturing, disturbing, killing or injury. Their breeding sites and resting places are also protected from damage or destruction.

# 8 References

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# Appendix 1 - Figures

Figure 1: Reptile refugia locations

Figure 2: Dormouse survey methods

Figure 3: Bat survey methods

Figure 4: Badger survey

Figure 5: Water vole and Otter survey

Next pages