



**Preliminary Ground Level Bat
Roost Assessment and
Badger Surveys**

**Turing House Free
School, Hospital Bridge
Road, Whitton**

For

Campbell Reith

Project No.: ACAM233/001

September 2017

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1. Summary and Main Recommendations

1.1 Summary

- 1.1.1** Education Funding Agency (EFA) is involved in the redevelopment of a plot of land in Whitton, London (see Figure 1). The proposals include the construction of Turing House Free School, to include a teaching block, sports block, hard and soft informal play areas and athletics and sports pitches.
- 1.1.2** Thomson Ecology Ltd. undertook an arboricultural survey and produced an Arboricultural Impact Assessment (AIA) of the site in January 2017 (Thomson Ecology, 2017). During the arboricultural survey, it was found that four of the trees that will be removed are Category C arboricultural features (trees of low quality). Therefore these removals should not have a significant detrimental effect on the arboricultural value of the site.
- 1.1.3** Campbell Reith undertook a Preliminary Ecological Appraisal (PEA), which included a desk study and an extended Phase 1 habitat survey of the site in June 2017 (Campbell Reith, 2017). As the proposed development is considering the removal of trees of the site, which could have potential for supporting bat roost, it was recommended a Preliminary Ground Level Roost Assessment (PGLRA) to determine the bat roosting potential within the existing trees. Although no records of badgers (*Meles meles*) were recorded within 2km of the site in the desk study, one potential badger sett was identified on the earth embankment to the east of the site. Therefore, a badger walkover survey was recommended on the site.
- 1.1.4** During the PGLRA survey three trees with moderate potential to support roosting bats (T10, T11 and T12) and one tree with low potential to support roosting bats (T6) were recorded. Current development proposals include the retention of these four trees.
- 1.1.5** During the badger walkover survey a disused outlier badger sett, showing no signs of current use, was recorded. In addition two potential fox earths or rabbit burrows were recorded. No other signs of badger activity were recorded during the survey.

1.2 Main Recommendations

- 1.2.1** The main recommendations are set out below:

Bats

- If development plans change and it is not possible to retain the trees with moderate potential for bats (T10, T11 and T12) then further bat surveys should be carried out to confirm whether the trees support roosting bats.
- If development plans change and it is not possible to retain the tree with low potential for bats (T6), this should be sectional felled conducted under ecological supervision by a licenced bat ecologist present during the clearance works;
- Ensure any retained trees are not indirectly impacted during construction works;
- As the northern, western and southern boundaries of the site may provide foraging and commuting habitat for bats, it is recommended that these areas are retained as a 'dark

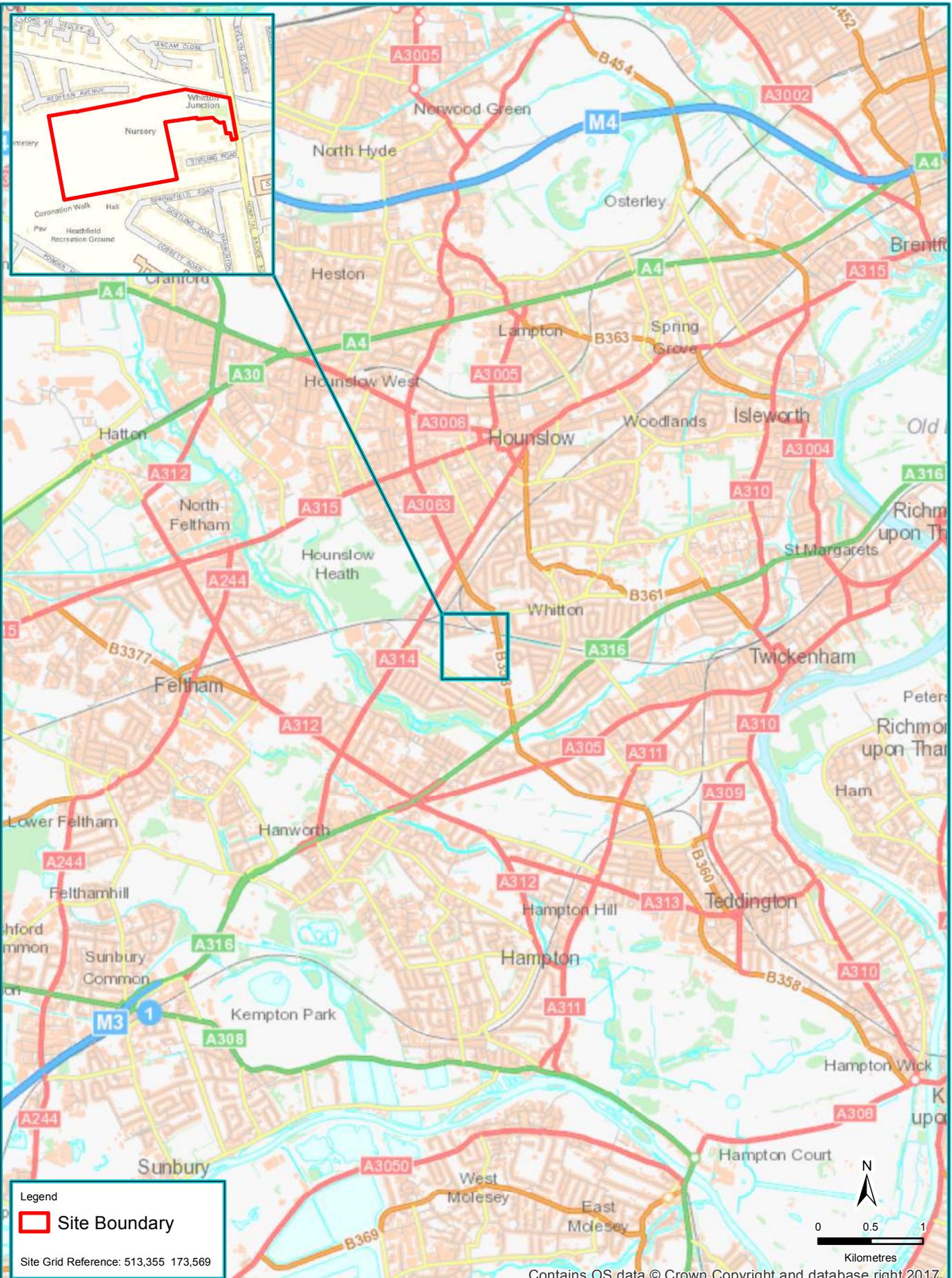
corridor'. This will ensure that no or at least minimal artificial lighting (i.e. street lighting) illuminates these habitats;

- For trees that are to be retained, with any level of bat potential, precautionary measures should be employed to protect individual bats from lighting which may use those trees transitionally as roosts at any point during the development both pre and post-construction.
- To comply with national and local planning policy, it is recommended that habitats important for foraging and commuting bats on the site be retained, enhanced and managed to maintain the present levels of biodiversity.

Badgers and other mammals

- A disused outlier badger sett, showing no signs of current use, was recorded during the survey. A pre-construction badger survey should be carried out prior to construction activities commencing on site to confirm the status and usage of the badger sett.
- As two fox earths or rabbit burrows were found at the earth embankment to the east part of the site. If the fox earth or rabbit burrow cannot be retained then the earth/burrow should be destroyed when foxes or rabbit are not present and outside of the cub rearing season. This may be determined by further survey involving placing a stick across the earth entrance overnight or using wildlife cameras; and

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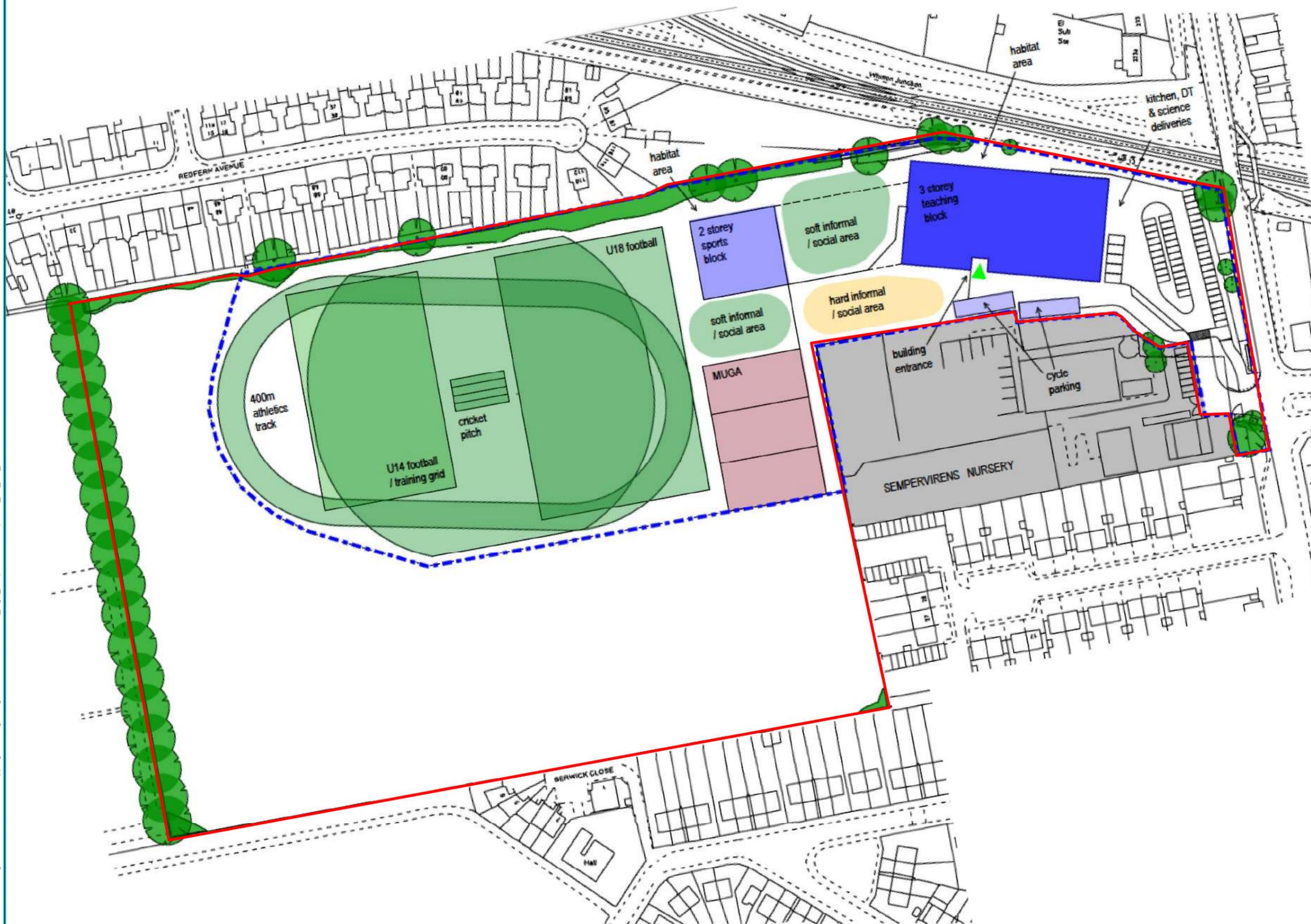
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Legend

Site Boundary



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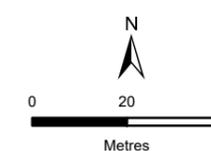
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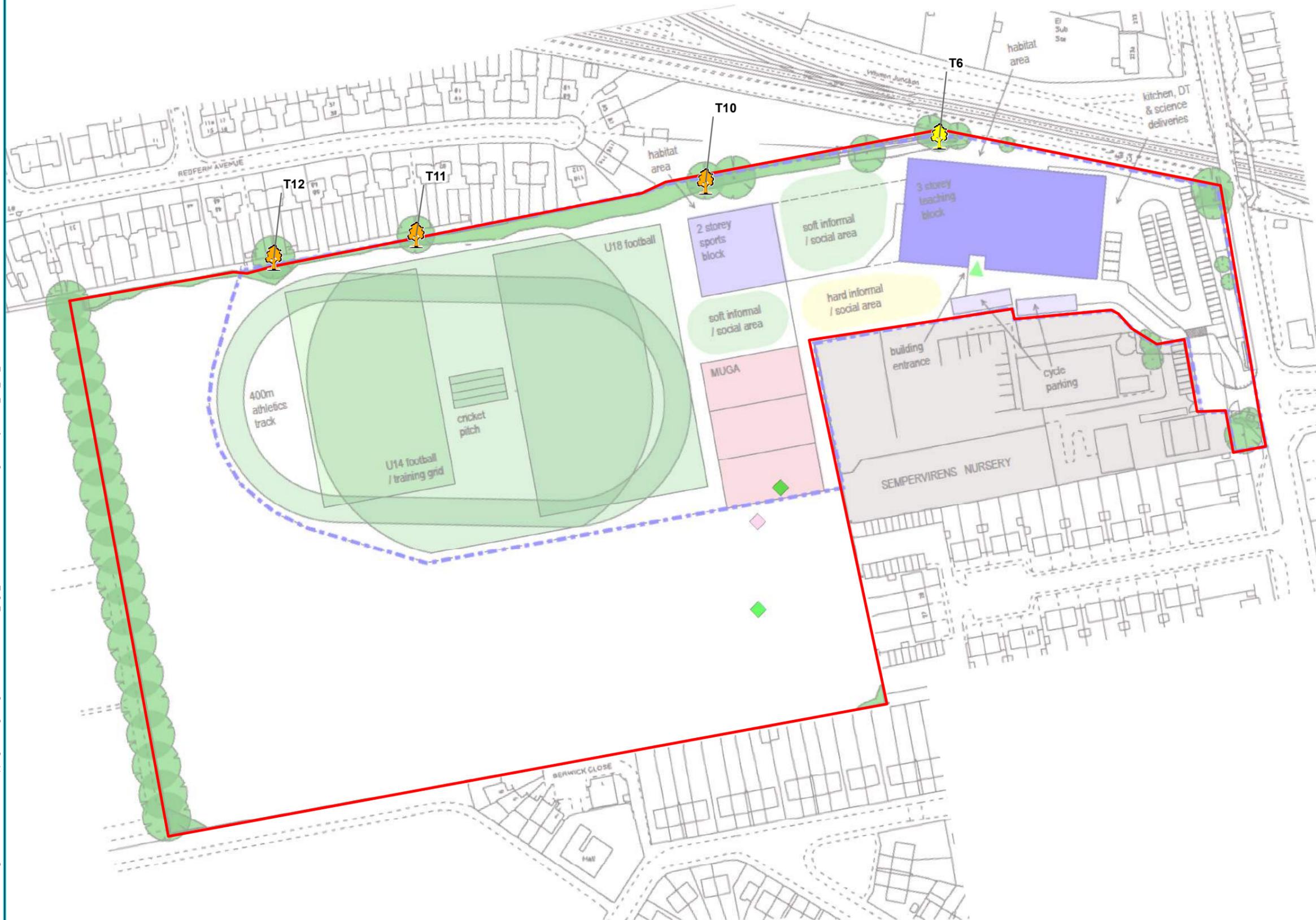
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Proposed Development



Legend

- ◆ Disused Badger Set
- ◆ Potential Fox/Rabbit Burrow
- Potential of Trees for Bats**
- 🌳 Low
- 🌳 Moderate
- Site Boundary



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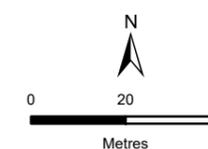
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Figure Title
Preliminary Ground
Level Roost
Assessment of Trees
and Badger Survey Results





Photograph 1:
Tree T6 located on the north part of the site. Low potential for supporting a bat roost.



Photograph 2:
Tree T10 located on the north part of the site. Moderate potential for supporting a bat roost.



Photograph 3:
Tree T11 located on the north part of the site. Moderate potential for supporting a bat roost.



Photograph 4:
Tree T12 located on the north part of the site. Moderate potential for supporting a bat roost.

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Photograph 5:
Potential badger sett located on the east part of the site.



Photograph 6:
Potential fox or rabbit burrow located on the east part of the site.



Photograph 7:
Potential fox or rabbit burrow located on the east part of the site.

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2. Introduction

2.1 Development Background

- 2.1.1** Campbell Reith is involved in the development proposals for a new free school, Turing House Free School, in Whitton, London (grid reference: TQ131735), see Figure 1. The proposed development will include a three-storey teaching block, two-storey sports block, hard and soft informal social areas, athletics and sports pitches (see Figure 2). The nursery will remain in its current operation. These proposals are hereafter referred to collectively as “the development”.
- 2.1.2** The proposed development will be situated within the London Borough of Richmond and is located within a predominantly residential area. The site covers approximately 6.7ha and is bounded to the north by residential gardens located off Redfern Avenue, to the north east by a railway line, to the east by Hospital Bridge Road and existing residential properties, to the south by residential properties and Heathfield Recreation Ground and to the west by Borough Cemetery. The area affected by the development is hereafter referred to as “the site”.
- 2.1.3** Planning permission for the proposed development is currently being sought.

2.2 Ecology Background

- 2.2.1** Thomson Ecology Ltd. was commissioned in January 2017 by Campbell Reith to undertake an arboricultural survey of up to 100 trees within and adjacent to the site, and to produce an Arboricultural Impact Assessment (AIA) to discuss the likely impact of the development proposals on the trees at the site (Thomson Ecology, 2017). The majority of trees on the site will be retained, however the development will result in the removal of three trees and three groups of trees from the site. During the arboricultural survey of the site, it was found that four of the trees that will be removed in order to facilitate the development are Category C trees. The arboricultural survey assessed that the removal of three Category C trees should not have a significant detrimental effect on the arboricultural value of the site.
- 2.2.2** Campbell Reith was commissioned in June 2017 by Turner and Townsend Project Management Ltd. to undertake a Preliminary Ecological Appraisal (PEA), which included a desk study and an extended Phase 1 habitat survey of the site (Campbell Reith, 2017). The extended Phase 1 habitat map is provided in Appendix 1 of this report.
- 2.2.3** As the proposed development includes the removal of trees on the site, it was recommended that a Preliminary Ground Level Roost Assessment (PGLRA) is undertaken on the site.
- 2.2.4** During the PEA, habitats were identified on the site which could support badgers, including scattered trees, hedgerows with scattered trees, semi-improved grassland, arable land, tall ruderal vegetation, scattered scrub and bare ground. No records of badger (*Meles meles*) were recorded within 2km of the site in the desk study carried out as part of the PEA. However, during the PEA survey, one potential badger sett was identified by Campbell Reith on the embankment to the east of the site and so a further badger walkover survey was recommended.
- 2.2.5** A summary of the biology, conservation status and legal protection of bats is provided in Appendix 2 and badgers are given in Appendix 3.

2.3 The Brief and Objectives

2.3.1 Campbell Reith commissioned Thomson Ecology in August 2017 to undertake a combined PGLRA of trees and a badger survey within the site. The brief was to:

- Undertake PGLRA of trees within the site. The survey method will be based on Bat Conservation Trust guidelines (3rd Edition) (Collins, J (ed), 2016). The PGLRA will consist of the inspection of trees from ground level to look for features with potential to support roosting bats.. A level of potential will be assigned to each tree to help determine the requirements for further survey;
- Undertake a badger survey within the site to look for evidence of badger activity. Any evidence of badger presence and activity including setts, footprints, hairs and latrines will be recorded. If any setts are recorded these will be classified based on definitions given in Clark (1988) and include information on their likely status, use and extent. The likely direction of the sett tunnels will also be recorded;
- Provide a combined report giving the methods and results of the surveys, discussion of the legal and planning policy issues and our recommendations, including opportunities for biodiversity enhancement; and
- Provide a digitised map of the survey results.

2.4 Limitations

2.4.1 The PGLRA and badger survey were undertaken in August, when the time of the year is considered optimal for carrying out these surveys.

2.4.2 This report is based on the development boundary (document ref: 1284/SK9/PG06-01-17) provided by Campbell Reith shown on Figure 1 and Figure 2. Subsequent changes to either may result in a requirement to reassess the potential impacts of the development and the requirements for avoidance, mitigation and enhancement.

2.4.3 Due to the changeable nature of species and habitats, if more than two years elapse between the commencement of works and the date of these surveys, updated surveys should be carried out.

2.5 Surveyors

2.5.1 The PGLRA and badger survey were undertaken by Assistant Ecologist Angela Polak, BSc (Hons) MSc, GradCIEEM.

3. Methodology

3.1 Preliminary Ground Level Roost Assessment of Trees

- 3.1.1** A Preliminary Ground Level Roost Assessment of trees was undertaken following the Bat Conservation Trust (BCT) *Bat Surveys for Professional Ecologists, Good Practice Guidelines* (Collins, 2016). Details of the methods used are presented below. The trees' potential to support maternity, hibernation and transitional roosts was identified.
- 3.1.2** During the PEA, undertaken by Campbell Reith, mature trees were identified within the site. A PGLRA was therefore undertaken of these trees. During the assessment a detailed and systematic inspection of the exterior of the trees was undertaken to look for potential roosting features (PRF) that could be used by bats. Close-focussing binoculars and a high-powered torch were used to undertake the assessment. Potential roosting opportunities searched for included:
- Natural crevices and holes;
 - Woodpecker and rot holes;
 - Loose bark, splits and cracks;
 - Bird and bat boxes; and
 - Presence or absence of dense ivy or dense epicormic growth.
- 3.1.3** The search for bats and evidence of bats focused on these roosting opportunities and the surfaces and ground beneath them.
- 3.1.4** A photograph of each tree with the potential to support a roosting bat and its location was recorded on a GPS-enabled mapping device. Information collected on the tree included: species, diameter at breast height, tree age and condition and tree height. All data were recorded on a mobile mapping device.
- 3.1.5** Details recorded regarding the PRF included a description of the PRF, height of the feature above the ground, orientation of the feature in relation to the trunk and the orientation of the access to the feature. Signs of bats were also recorded including bat droppings in and around the PRF, odours, audible squeaking and staining below the PRF.
- 3.1.6** Weather conditions during the survey were recorded.
- 3.1.7** Each tree was assigned a level of potential to support a bat roost as per Table 1 and the type of bat roost was identified as per Table 2.
- 3.1.8** The quality of the surrounding habitat on the site was evaluated for context, as per Table 3, for commuting and foraging habitat and placed into one of the following categories: high, moderate, low and negligible to give an idea of the likelihood that any potential roosts would be used by bats.
- 3.1.9** The trees were classified according to the highest suitability PRF identified during the assessment.
- 3.1.10** The PGLRA was undertaken on 22nd August 2017.

Table 1 Habitat suitability for roosting bats

Suitability	Roosting Habitat (adapted from Collins ed 2016)
Negligible	<ul style="list-style-type: none"> • A tree with negligible habitat features likely to be used by roosting bats.
Low	<ul style="list-style-type: none"> • A tree with one or more potential roosting sites that can be used by individual bats opportunistically. The tree would generally be of a sufficient size and age to contain PRFs but none are seen from the ground. PRFs would be seen as having limited roosting potential. • Habitat connectivity from the PRFs to the wider landscape is generally poor. • The roosting habitat is generally located in an area with high disturbance or lighting.
Moderate	<ul style="list-style-type: none"> • A tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, condition and surrounding habitat, but unlikely to support a roost of high conservation status (i.e. maternity or hibernation roost). Based on these conditions, the PRFs would be of a sufficient size, shelter, protection and connectivity to foraging and commuting habitat to support bats. • Connectivity from the roost site to the wider landscape would be moderate, as would the level of disturbance and lighting.
High	<ul style="list-style-type: none"> • A tree with one or more PRFs that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, condition and surrounding habitat. The tree would generally be veteran, senescing or dead and would have multiple PRFs that would be relatively large and sheltered. • Connectivity to the landscape, with particular reference to foraging and commuting habitat would be high.

Table 2 Roost type definitions

Roost Type	Definition
Transitional	<p>Day roosts: Where bats shelter as individuals or small groups of males but are rarely found at night.</p> <p>Night roosts: Where bats shelter at night by individuals or a whole colony, rarely used in the day.</p> <p>Feeding roost: Used by individuals or small groups for feeding, rarely used during the day.</p> <p>Occasional roost: Used by a few individuals or small groups for generally short periods of time on waking from hibernation or in the period prior to hibernation.</p> <p>Satellite roost: An alternative roost found in close proximity to the main nursery colony used by a few individual breeding females to small groups of breeding females throughout the breeding season.</p>
Maternity roost	Mainly dominated by females where they give birth to young and raise them. Maternity roost characteristic preferences differs between species, however warm conditions are generally favoured.
Hibernation roost	Where bats are found individually or in groups during winter. These need to have cool temperature and high humidity.

Table 3 Commuting and Foraging Habitat Quality

Suitability	Commuting and Foraging Habitat (adapted from Collins ed 2016)
Negligible	Negligible habitat features on site likely to be used by commuting or foraging bats. This includes less than 1% broadleaved woodland, scrub/scrub mosaic, wetland and heathland and less than 20% coniferous woodland. Typical habitats of negligible potential include arable and improved grassland areas, hard-standing and exposed upland and coastal habitats.
Low	Commuting and foraging habitat of low to moderate quality and poor connectivity to the wider landscape. Such habitats would often be isolated or heavily managed. Medium-aged coniferous plantation offers few foraging and commuting opportunities for bats.
Moderate	Commuting and foraging habitat of moderate to high quality and good connectivity. The habitat would provide continuous connectivity to the wider landscape and would include trees, scrub, grassland and water. The habitat would also be over a hectare and would include some infrequently managed areas that offer a mosaic of habitat types. Wetland habitat or connectivity to wetland habitat would be present.

Suitability	Commuting and Foraging Habitat (adapted from Collins ed 2016)
High	Commuting and foraging habitat of high quality and excellent connectivity. This includes high quality habitat that is dominated by infrequently managed broadleaved woodland, tree-lined watercourses, grazed parkland, continuous hedgerow and lines of trees. Proximity and connectivity to wetland habitat is important. Habitat parcels will generally be over 1ha.

3.2 Badger Survey

General Approach

3.2.1 Since badgers are principally nocturnal, the surveyor concentrated on searching for evidence of badgers. The whole of the Site was searched where possible; however, survey effort was concentrated on sloping ground within woodland, scrub and along hedgerows, since these are the most likely locations for badger setts.

3.2.2 The classification of badger setts used in this survey is based on definitions given in Clark (2007).

Field Survey

3.2.3 The survey comprised a search for signs of badger including the following:

- Setts and day nests;
- Paw prints;
- Paths and “squat-marking”;
- Latrines, droppings and urine;
- Hairs caught on fences and vegetation;
- Scratching posts;
- Feeding signs and “snuffle-holes” in grassland;
- Broken up wasp nests; and
- Badger bones.

3.2.4 When a sett was encountered, the location of sett entrances was recorded on a mobile mapper. Each of the entrances and the sett itself was then classified as:

- Well-used;
- Partially-used (showing signs of current use);
- Partially-used (not showing signs of current use); or
- Disused.

- 3.2.5 For those setts assessed as partially used, an additional assessment was made to determine whether the sett displayed signs of badgers and therefore met the definition of current use.
- 3.2.6 The setts were then classified as either a main, annexe, subsidiary or outlier sett based on the number of entrances, apparent level of use and proximity to other setts.
- 3.2.7 The locations of all other badger signs were recorded on a mobile mapper and geo-referenced photographs were taken of any badger signs encountered.

Definition of Badger Setts

- 3.2.8 A badger sett is defined under the Protection of Badgers Act, 1992, as '*any structure or place which displays signs indicating current use by a badger*'. There are four categories of badger sett (main, annexe, subsidiary and outlier), depending on a variety of factors such as level occupancy and usage.

Main

- 3.2.9 Main setts usually form the nucleus of a badger social group and territory. They normally consist of several burrows, which are well used. Chambers are used for breeding. Large spoils heaps may be present with well eroded and connected badger paths interlinking between different sett entrances.

Annexe

- 3.2.10 Annexe setts are close to the main sett but not connected to it. They are normally less than 50m from the main sett, comprise several holes, and they may not be in use all of the time.

Subsidiary

- 3.2.11 Subsidiary setts are usually at least 100m from the main sett with no obvious interlinking paths. They may not be in use all of the time. They have very similar characteristics to 'Annexe' setts but are generally located further away from the main sett.

Outlier

- 3.2.12 Outlier setts are intermittently occupied and usually have only one entrance. They can be used as an emergency refuge or territory border.

Date of Survey

- 3.2.13 The badger survey was undertaken on 22nd August 2017.

4. Results

4.1 Preliminary Ground Level Roots Assessment of Trees

4.1.1 Three trees were identified as having moderate potential, and one tree as having low potential to support roosting bats. The moderate potential trees (Tree T10, Tree T11 and Tree T12) were all pedunculate oak (*Quercus robur*) trees which supported dense ivy. The low potential tree (Tree T6) was a Lombardy poplar (*Populus nigra*) with minor deadwood in the crown and a woodpecker hole. These results are summarised in Table 4 and the tree locations are shown in Figure 3. Photographs of the moderate and low potential trees are given in Figure 4a, Photograph 1 to 4.

4.1.2 No bats or evidence of bats were recorded during the PGLRA.

Environmental factors

4.1.3 The northern boundary of the site is adjacent to residential gardens located off Redfern Avenue, with hedgerows and scattered middle-age and mature trees, which could provide suitable foraging and commuting opportunities for bats.

4.1.4 The western boundary is bounded by Borough Cemetery, with scattered mature trees in line, which could provide suitable foraging, commuting opportunities for bats and good connectivity into the wider area, particularly to Hounslow Heath, located to the west of the site, which comprises areas of deciduous woodland and Lowland Heathland.

4.1.5 The southern boundary is bounded by residential properties and Heathfield Recreation Ground, with scattered middle-age and mature trees. There is some disturbance from artificial lighting coming from the residential properties and street which surround the Heathfield Recreation Ground, Artificial lighting could affect the foraging opportunities for bats and their use of commuting routes.

4.1.6 The east part of the site is bounded east by a railway line, Hospital Bridge Road and existing residential properties, with scattered young and mature trees. There is significant disturbance from regular traffic from Hospital Bridge Road and artificial lighting coming from the surroundings which could affect the foraging opportunities for bats and their use of commuting routes.

4.1.7 Overall, on the site the commuting and foraging habitat available to bats is considered to be of moderate quality.

Table 4: Summary of trees with potential to support roosting bats

Tree No.*	Species	Height (m)	Age class	Potential access/ egress points and roost locations	Potential to support roosting bats			Overall potential
					Maternity	Hibernation	Transitional	
T6	Lombardy poplar; (<i>Populus nigra</i>)	19	Mature	Minor deadwood in crown and a woodpecker hole	Negligible	Negligible	Low	Low
T10	Pedunculate oak (<i>Quercus robur</i>)	9	Mature	Dense ivy to half height of the tree	Negligible	Negligible	Moderate	Moderate
T11	Pedunculate oak (<i>Quercus robur</i>)	17	Mature	Dense ivy to half height of the tree	Negligible	Negligible	Moderate	Moderate
T12	Pedunculate oak (<i>Quercus robur</i>)	15	Mature	Dense ivy to half height of the tree	Negligible	Negligible	Moderate	Moderate

*Numbering of the trees in accordance with Arboricultural Survey and Arboricultural Impact Assessment (Thomson Ecology, 2017)

4.2 Badger Survey

Field Survey

- 4.2.1** During the field survey, a total of one badger sett, a disused outlier with no signs of current use, was found to be present on the east part of the site, as detailed in and on Figure 4b, Photograph 5. No other signs of badger were found during the field survey.

Other Mammal Activity

- 4.2.2 Two potential fox (*Vulpes vulpes*) earth or rabbit (*Oryctolagus cuniculus*) burrow were identified on the east part of the site in an earth embankment (see Table 5 and Figure 4b, Photograph 6 and 7).

Table 5: Potential fox earth or rabbit burrow

Burrow Number	Usage	Description	Photograph Number
Burrow 1	Disused	A single entrance in the east part of the site which has been blocked up by vegetation and has significantly reduced in size as a result of sand compaction and erosion.	Figure 4b, Photograph 6
Burrow 2	Disused	A single entrance in the east part of the site which has been reduced in size as a result of sand compaction and erosion.	Figure 4b, Photograph 7

Habitat Assessment

- 4.2.3 The majority of the site is comprised of grassland, with areas of tall ruderal vegetation and scattered scrub. In addition, an earth embankment found to the east of the site has been colonised by tall ruderal vegetation which has created good burrow creation habitat for badger, fox and rabbit due to the mechanical properties of the soil and the shade provided by the tall ruderal vegetation. In addition, there is foraging potential on the site and connectivity for dispersal to other foraging areas as gaps on the fence to the west of the site were found during the badger survey.

5. Legal and Planning Policy Considerations

5.1 Background

5.1.1 The content of the legislation and planning policy section is the legislation and planning policy issues that we know are relevant based on this PGLRA and badger survey.

5.2 Preliminary Ground Level Roost Assessment of Trees

5.2.1 As set out in Appendix 2, all bats and their roosts are strictly protected by a range of legislation.

5.2.2 The National Planning Policy Framework (NPPF) gives further direction with respect to biodiversity conservation and land use change / development. The NPPF encourages “*local planning authorities to identify, conserve and restore, ecological networks, which should benefit bats, and it also states that planning permission should be refused if significant harm to biodiversity cannot be avoided, mitigated or compensated*”. In addition, the Government Circular 06/05, which relates to biodiversity conservation states that all protected species, such as bats, are a material consideration for the planning authority when considering proposed developments. Policy CP4 Biodiversity of London Borough of Richmond upon Thames (local development framework, core strategy, 2009) encourages biodiversity enhancements in areas of new development.

5.2.3 A total of four trees were assessed as having the potential to support roosting bats, including three moderate potential trees and one low potential tree. The development will result in the removal of three trees and three groups of trees from the site. However, the trees assessed as having the potential to support roosting bats will be retained. Therefore, the development proposals are compliant with the legislation set out in Appendix 2 and there is currently no need for further bat surveys. Should the final plans change and require the felling of trees with bat potential, further surveys of these trees will be needed to confirm the potential to support roosting bats.

5.3 Badger

5.3.1 As set out in Appendix 3, badger is protected under the Protection of Badgers Act 1992.

5.3.2 A disused outlier badger sett not showing any signs of current use was recorded during the survey. As no active badger setts have been identified there should be no legal or planning policy considerations with regards to badgers. However, badgers sometimes resume using previously abandoned setts in which case it would become a protected feature.

6. Recommendations

6.1 Preliminary Ground Level Roost Assessment of Trees

6.1.1 If the current development proposals change and it is not possible to retain the trees with moderate roosting potential (T10, T11 and T12) or T6 with low roosting potential then further bat surveys should be carried out to confirm the presence or likely absence of roosting bats.

6.1.2 During the construction stage, care should be taken to ensure that the trees with bat roost potential (and others) are not indirectly impacted by the proposed development as individual bats may use those trees transitionally as roosts at any point during the development.

The Control of Light Pre- and Post-Development

6.1.3 Bats are highly sensitive to light disturbance during construction and operational phase of a development. The northern, western and southern boundaries of the site (see Figure 3) were identified as suitable foraging and commuting habitat for bats. In order to maintain this area of the site as a foraging and commuting habitat for bats, it is recommended that the northern, western and southern boundaries of the site are designated as a 'dark corridor'. This dark corridor could be created by ensuring that no or at least minimal artificial lighting (i.e. street lighting) illuminates the edge of the hedgerows and scattered trees at the north part of the site, scattered trees in line at the west part of the site and scattered trees at the south part of the site. Thus, the extent and quality of foraging habitat and commuting routes in the wider area can be maintained.

6.1.4 Furthermore, trees that are to be retained, with any level of bat potential, precautionary measures should be employed to protect individual bats from lighting which may use those trees transitionally as roosts at any point during the development. Thus, construction and operational lighting could be controlled throughout the site during development and within the final build so as to avoid potential spillage of artificial lighting onto trees. It is recommended that best practice measures are adopted during construction and operational phase of the development to minimise impacts to bats utilising the site. Such precautionary measures would include the following:

- Minimise the spread of light onto boundary habitats through the use of hoods and directional louvers;
- The height of lighting columns should be as low as legally possible;
- Limit the times that lights are on to provide some dark periods;
- Use low intensity bulbs, that emit minimal ultra-violet light;
- Use lights that peak higher than 550 nm;
- Avoid white and blue wavelengths of the light spectrum to reduce insect attraction. Where white light sources are required they should be of a warm / neutral colour temperature <4,200 kelvin;
- No lighting to be installed directly beneath a tree or tree canopy;

- Ensuring any other lighting installed during the development is directional, sensor controlled and directed away from trees with bat potential; and
- Ensuring working hours on site stop before dusk to prevent disturbance from operational lighting during the emergence period.

6.1.5 Further information for designing the lighting scheme can be found in the Bat Conservation Trust's '*Recommendations to help minimise the impact of artificial lighting*' (BCT, 2014) and the Institution of Lighting Professionals '*Guidance Notes for the Reduction of Obtrusive Light*' (ILP, 2011).

6.1.6 Provided that the recommendations stated above are followed, the development should be compliant with legislation and planning policy with respect to bats.

6.2 Opportunities for Enhancement

Providing Additional Roosting Habitat

1.1.1 In order to comply with national and local planning policy, it is recommended that habitats important for foraging and commuting bats on the site be retained and managed to maintain the present levels of biodiversity. The recommendations outlined below will provide appropriate enhancement natural features beneficial to bats:

- The installation of bat boxes on suitable mature trees within the site, which are to be retained to provide additional potential roosting sites for bats;
- Integrated bat boxes could be built into the new building units;
- The treelines and hedgerows should be enhanced to ensure that commuting and foraging habitat is maintained, including filling any gaps in the hedgerows with berry-bearing and flowering species to enhance site connectivity and foraging opportunities; and
- Other planting on site could include plant species which attract night flying moths and insects e.g. honeysuckle (*Lonicera periclymenum*).

6.3 Badgers

6.3.1 As a disused outlier badger sett was found on the earth embankment to the east part of the site, (see Figure 3) this sett is showing no signs of current use by badger and so is not currently a protected feature. However, it may become used by badgers in the future so a pre-construction survey should be carried out in advance of construction to confirm the status of the sett. This could include the use of camera traps.

6.3.2 Provided that the recommendations above are followed, the development should be compliant with legislation and planning policy with respect to badgers.

Other Animal Activity - Recommendations

6.3.3 As two fox earths or rabbit burrows were found at the earth embankment to the east part of the site. If it is assessed that the fox earth or rabbit burrow cannot be retained then the earth/burrow

should be destroyed when foxes or rabbit are not present and outside of the cub rearing season. This may be determined by further survey involving placing a stick across the earth entrance overnight or using camera traps.

6.4 Further Survey

6.4.1 Due to the changeable nature of species and habitats, if more than two years elapse between the commencement of works and the date of these surveys, an updated badger walkover survey and PGLRA survey for bats should be carried out.

6.4.2 A pre-construction survey for badgers should be carried out in advance of construction to confirm the status and usage of the currently disused badger sett on site.

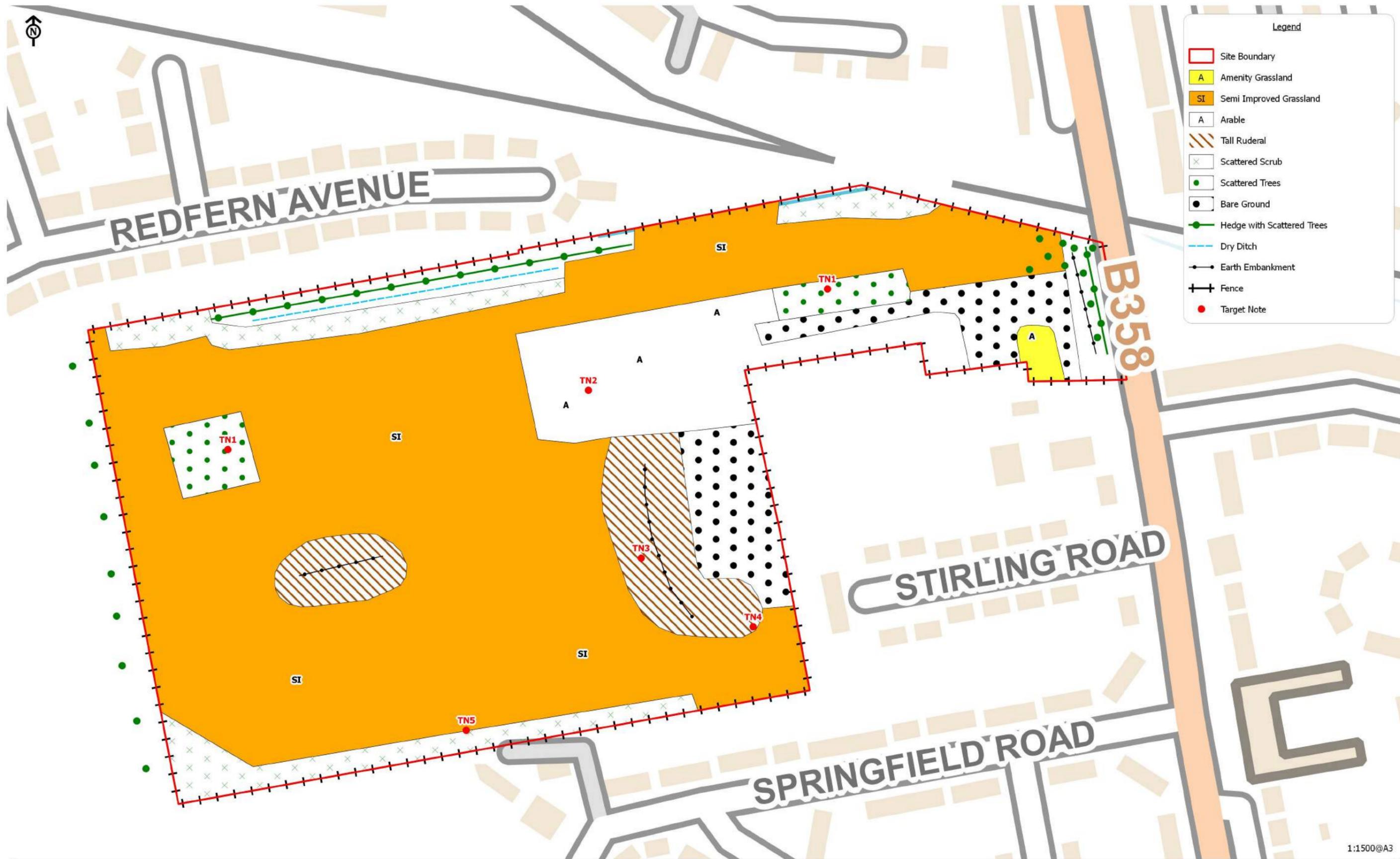
7. Conclusion

- 7.1.1** A total of four trees were assessed as having potential to support roosting bats on the northern boundary of the site. This includes three trees with moderate potential and one tree with low potential.
- 7.1.2** As it is an offence to disturb a bat or its roost, or to obstruct access to a bat roost, mitigation has been recommended. If the development plans change and the felling of trees with moderate bat potential, further surveys should be conducted to determine the presence or likely absence of roosting bats. If changes in the development plans require the felling of the low potential tree this should be conducted using section felling under ecological supervision by a licenced bat ecologist during the period November to February inclusive.
- 7.1.3** Provided that the recommendations for further survey in Section 6 are followed, the development should be compliant with legislation and planning policy with respect to bats.
- 7.1.4** A disused outlier badger sett was recorded during the survey. A pre-construction badger survey should be carried out in advance of construction commencing on site to confirm the status and usage of the badger sett.
- 7.1.5** Provided that the recommendations for a pre-construction survey in Section 6 are followed, the development should be compliant with legislation and planning policy with respect to badgers.

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9. Appendix 1 - Extended Phase 1 Habitat Survey Map



- Legend**
- Site Boundary
 - A Amenity Grassland
 - SI Semi Improved Grassland
 - A Arable
 - Tall Ruderal
 - Scattered Scrub
 - Scattered Trees
 - Bare Ground
 - Hedge with Scattered Trees
 - - - Dry Ditch
 - Earth Embankment
 - +— Fence
 - Target Note

1:1500@A3

Turing House, Hounslow
 Client: Turner and Townsend Project Management Ltd

Phase 1 Habitat Survey

Scale: 1:1500@A3
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 Job Number: 11677-14
 Drawn by - Checked by: RP - AH
 Drg No - Status/Revision: G15008 - A
 File location: N:\11500 - 11749\11677 L - Free Schools Framework\14 - Turing House, Hounslow\Project_Workspaces\PEA (pdf in Outputs)
 Date (Revision History): 16/06/2017 (A, First Issue, 16/06/17, RP)

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10. Appendix 2 - British Bats

10.1 Introduction

10.1.1 A summary of the biology of British bats and the legislation and policy that protects them is provided below.

10.2 Biology

10.2.1 There are 18 British species of bats, belonging to two families; the horseshoe bats (*Rhinolophidae*) and vesper bats (*Vespertilionidae*). Of the 18 species, two species are horseshoe bats and belong to the genus *Rhinolophus*. The remaining 16 species are vesper bats and are sub-divided between six genera; *Myotis*, *Eptesicus*, *Nyctalus*, *Pipistrellus*, *Plecotus* and *Barbastella*. Whilst there are many differences in the biology of the different species, all share certain characteristics and these are described below.

Roosting

10.2.2 Bat species utilise roost sites of varying character; some preferring tree roosts whilst others are thought to be almost entirely dependent on built structures. Most bats will have a number of available roosting sites within their range, which they move between throughout the year. They are generally faithful to their roosts and a colony of bats may use the same roost site(s) year after year.

10.2.3 Bats hibernate during the winter and will often gather to hibernate communally, remaining in the same hibernation roost from November to February/March. Hibernation roost sites typically have a constant low temperature and high humidity levels. Sites include caves, mines, thick walled buildings and hollow trees. With the arrival of spring, the ambient temperature and day length increase and bats begin to leave their hibernation roosts, either moving immediately to summer roost sites or occasionally, to a transitional roost.

10.2.4 By June, breeding females will begin to congregate in maternity roost sites where they will give birth to, and nurture their young. Male bats are also occasionally found roosting in maternity roosts but during this period they mostly roost alone. Maternity roost sites include hollowed out trees, buildings and bridges. Male bats may use similar sites but also cracks and crevices in trees, under loose tiles or even amongst dense ivy growth during the summer period. Similar sites may be used by bats for brief periods during the night when they are resting or feeding on recently caught prey. In autumn, male bats establish mating roosts and are visited by females. A variety of roost sites may be used until the bats return to their hibernation roosts.

Foraging

10.2.5 All British bat species feed on invertebrates, with flies, beetles, moths and other insects making up much of their diet. Areas with an abundance of insect prey, such as woodlands, scrub, wetlands, river corridors and flower rich grasslands are therefore favoured foraging sites for bats. Habitats such as intensively farmed arable land, and amenity grassland support a much lower invertebrate abundance and are therefore less favoured foraging habitats for bats.

Commuting

10.2.6 Bats favour roost sites in close proximity to suitable foraging habitat, however, given variation in prey availability, land-use change, and competition with other bats, for at least part of the year bats must commute between their roosts and foraging habitat.

10.2.7 Commuting routes tend to follow linear features in the landscape such as hedgerows, woodland edges, rivers and other watercourses, particularly when crossing areas of less favourable habitat. The distance that bats commute between roost sites and foraging areas is dependent on local geography and also the species of bat. Some species will travel up to 18km, though shorter distances are more typical.

10.3 Site Designation

10.3.1 All bat roosts in the UK receive protection under the following legislation:

- Conservation of Habitats and Species (Amendment) Regulations 2012 (which replaces the Conservation (Habitats &c) Regulations 1994 as amended)
- Wildlife and Countryside Act 1981, as amended;
- The Countryside and Rights of Way Act 2000 (which amends the Wildlife and Countryside Act); and
- Natural Environment and Rural Communities Act 2006 (which amends the Wildlife and Countryside Act).

10.3.2 This is described in more detail under 'Species Protection' below. In addition, the most important sites for certain bat species in the UK receive further statutory protection through designation of Special Areas of Conservation (SACs) and/or Sites of Special Scientific Interest (SSSIs).

10.3.3 Four UK bat species, the greater and lesser horseshoe, barbastelle and Bechstein's bats, are included on Annex II of the European Community Directive of the Conservation of Natural Habitats and of Wild Fauna and Flora, referred to as the Habitats Directive. The Habitats Directive is transposed into UK law by the Conservation of Habitats and Species (Amendment) Regulations 2012. This legislation requires that areas are designated as Special Areas of Conservation (SACs) to protect populations of these 4 bat species. To date, 26 SACs have been designated specifically to protect these species, and these sites are of international importance for the populations of bats that they support. A further 5 SACs have been designated, where the presence of at least one of the 4 bat species is a qualifying feature but not the primary reason for the statutory designation.

10.3.4 Sites designated under the Wildlife and Countryside Act 1981 (WCA) are known as Sites of Special Scientific Interest (SSSIs). SSSIs received further protection under the Countryside and Rights of Way Act 2000 (CRoW) and the Natural Environment and Rural Communities (NERC) Act 2006.

10.3.5 Some SSSIs are designated for the population(s) of bats that they support. The criteria for selecting SSSIs on the basis of their bat populations are provided in Guidelines for the Selection of Biological SSSIs (NCC, 1989):

- Greater horseshoe bat - all main breeding roosts and all winter roosts with 50 or more adult bats;
- Lesser horseshoe bat - all main breeding roosts containing 100 or more adult bats and all winter roosts containing 50 or more bats;
- Barbastelle, Bechstein's and grey long-eared bats - any traditional breeding roosts;
- Natterer's, Daubenton's whiskered, Brandt's, serotine, noctule and Leisler's bats - only exceptionally large breeding roosts or those with a long history of use; and
- Mixed Roost sites - all hibernacula containing four or more species and more than 50 individuals or three species and 100 or more individuals or two species and 150 or more individuals, though these criteria may be lower in some parts of the UK.

10.3.6 Sites that qualify as SSSIs for the bat populations they support are considered to be of at least national importance.

10.3.7 Sites designated for nature conservation at the county level may also include bat populations as part of the site qualifying criteria, although the criteria used may vary from county to county. Such sites are protected through the planning system and there is generally a presumption against development that affects such sites in local authority development plans.

Planning Policy

10.3.8 The National Planning Policy Framework (NPPF), 2012, gives further direction with respect to biodiversity conservation and land use change / development. The NPPF encourages local planning authorities to identify, conserve and restore, ecological networks, which should benefit amphibians, and it also states that planning permission should be refused if significant harm to biodiversity cannot be avoided, mitigated or compensated. In addition, the Government Circular 06/05, which relates to biodiversity conservation, states that all protected species, such as otters, are a material consideration for the planning authority when considering proposed developments.

10.4 Species Protection

Legislation

10.4.1 All bat species are protected by the Conservation of Habitats and Species (Amendment) Regulations 2012. The Regulations make it an offence, with very few exceptions, to:

- Deliberately capture, injure or kill a bat;
- Deliberately disturb a bat in such a way as to be likely:
 - i. to impair its ability to survive, to breed or reproduce, or to rear or nurture its young; or
 - ii. to impair its ability to hibernate or migrate; or
 - iii. to affect significantly the local distribution or abundance of the species to which they belong.

- Damage or destroy a breeding site or resting place of a bat; or
- Keep, transport, sell or exchange, or offer for sale or exchange, any live or dead bat, or any part of, or anything derived from a bat.

10.4.2 In addition to the protection given to bats under the Conservation of Habitats and Species (Amendment) Regulations 2012 already described, bats are also partially protected in England under the WAC, which adds the following offences (with certain exceptions):

- Disturbance while it is occupying a structure or place which it uses for shelter or protection; or
- Obstructing access to any structure or place used for shelter or protection.

10.4.3 A roost is any structure or place used by bats for shelter or protection. As bats tend to re-use the same roosts year after year, the roost is protected whether bats are present or not, at the time.

10.4.4 In this context of the legislation, 'damage' would include such operations as treatment of wood with toxic preservatives or use of rodenticides near roosting bats while 'disturbance' includes any work in or affecting a bat roost.

10.4.5 If proposed actions, such as redevelopment of an existing building may lead to an offence under the above legislation, appropriate mitigation which seeks to avoid these impacts should be devised and implemented under licence from Natural England to allow the activity to proceed legally.

10.4.6 In addition to the above legislation, all bats are protected under the Bonn Convention, within which the Agreement on the Conservation of Bats in Europe (1991) or EUROBAT, establishes a mechanism for international collaboration to conserve bats and their habitats, including foraging habitats. All European bat species are covered under Appendix II of the Conservation of Migratory Species of Wild Animals (CMS).

10.4.7 The Hedgerow Regulations 1997 provide for the conservation of 'important' hedgerows and their constituent trees. The presence of a protected species such as bats is included in the assessment of whether a hedgerow is considered 'important' and applications to remove such hedgerows must be made to the planning authority.

10.5 UK Post-2010 Biodiversity Framework and Species of Principal Importance

10.5.1 Published by the Joint Nature Conservation Committee (JNCC) and the Department for Environment, Farming and Rural Affairs (Defra) in July 2012, the UK Post-2010 Biodiversity Framework identifies UK-scale activities and priority works that are required to deliver the EU Biodiversity Strategy. Following a process of devolution, the framework is underpinned by country level strategies which are now largely responsible for continuing the work carried out under the former UK Biodiversity Action Plans (UK BAP). JNCC guidance dictates that UK BAP background information on priority species and habitats still remains relevant and it now forms the basis of country specific priority lists, which for England, are specified under Section 41 of the NERC Act

2006. Targets for England's biodiversity strategy 'Biodiversity 2020': A strategy for England's wildlife and ecosystem services, are informed by this list.

10.5.2 Seven species of bats (Barbastelle, Bechstein's, greater and lesser horseshoe, brown long-eared, noctule and soprano pipistrelle) have been adopted as Species of Principal Importance for the Conservation of Biodiversity in England. This places a duty on all government departments to have regard for the conservation of these species and on the Secretary of State to further, or promote others to further, the conservation of these species. Furthermore, the NPPF states that local planning authorities should promote the protection and recovery of priority species populations linked to national and local targets, which presumably means those listed under the Section 41 of the NERC Act, the former UK BAP and on Local or Regional priorities species lists.

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11. Appendix 3 - Badgers

11.1 Introduction

11.1.1 A summary of badger biology and the legislation and policy that protect this species is provided below.

11.2 Biology

11.2.1 Badgers (*Meles meles*) mostly live in family or social units of between 5 and 12 individuals that share a particular home range or territory, the boundary of which is marked with latrines. Within each territory, the social group is likely to have a number of setts, which are occupied during the day. Typically, badger setts are a series of inter-linked burrows and chambers created in a wooded embankment or hedgerow.

11.2.2 The setts vary in size, complexity and level of use and there is also variation in the number and types of sett occupied per social group. Commonly, a social group will have one main sett used for breeding that is occupied throughout the year. Close to this may be one or more annexe setts, which are smaller and not necessarily used all year round. Two further sett types have been identified, namely, subsidiary and outlying setts. Both of these sett types have few entrances and are usually some distance from the main sett. Occasionally, badgers rest above ground during the day using 'day nests' comprised of bedding material amongst dense vegetation. Badgers do not hibernate, but often spend long periods during the winter below ground, especially in very cold and wet weather.

11.2.3 Female badgers mainly become pregnant in December, though cubs may be born from January to April, but generally peaking in February. Cubs are tended by the females until April or May, when they first emerge from the sett, however, they are not considered independent until the beginning of July (hence the "closed season" for development near a sett).

11.2.4 Badgers tend to live in areas of countryside that encompass a mixture of agricultural types and land uses, as a means to ensure that access is available throughout the year to a reliable and adequate food supply. A territory would ideally include a mixture of deciduous woodland and both pasture and arable land. Badgers are omnivorous; however, the majority of their diet is comprised of earthworms, which are usually plentiful on short improved grassland. During certain times of the year they can vary their diet to include fruits and berries, or agricultural crops such as grain or maize.

11.2.5 This species is common and widespread throughout the British Isles. Badgers are abundant in south and south-west England and south Wales, less common in upland areas, East Anglia and Northern England and least common in central and western Scotland. In total there are approximately 309,000 adult badgers in mainland Britain, and this figure is believed to have remained stable over the past few years, though local variations have occurred.

11.3 Site Designation

11.3.1 Sites supporting badgers are not afforded statutory protection under national or international legislation, as badgers are not considered to be of sufficient conservation importance. However, in an urban context, the presence of badgers, say in a local nature reserve, may well be considered of local nature conservation importance.

11.4 Species Protection

11.4.1 The principal law protecting badgers is The Protection of Badgers Act 1992. The Act is primarily based upon the need to protect badgers from baiting and deliberate harm or injury. This statute makes it an offence to:

- wilfully kill, injure, take, possess or cruelly ill-treat a badger, 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.

11.4.2 A sett is defined as 'any structure or place which displays signs indicating current use by a badger'. Field signs of badger presence are likely to last a period of weeks, depending on weather, soil type, habitat etc. Field signs indicating current use include prints, hairs, bedding, absence of debris at sett entrance, smooth tunnel edges at sett entrance, and fresh dung pits. The term 'current use' covers any sett within an occupied badger territory regardless of when it may have last been used.

11.4.3 On development sites, this effectively means that no construction activities or earthworks that would cause disturbance to badgers or active setts should take place within the close vicinity (<30m) of active badger setts without licence. This zone should be extended for works causing severe disturbance (for example, pile-driving). Badgers appear to be able to withstand significant amounts of noise or activity near to their setts without apparently being disturbed, i.e. building setts under roads and railways and urban gardens. As such, Natural England has taken the view that a licence is not required for low or moderate levels of disturbance akin to what badgers can generally tolerate. In cases of major disturbance, a licence can only be obtained for sett disturbance between 1st July and 30th November so to avoid the time of year when cubs are present in the sett. Where significant areas of foraging grounds are to be lost, a licence may be required as this can constitute disturbance and cruelty.

11.5 UK Post-2010 Biodiversity Framework and Species of Principal Importance

11.5.1 Published by the Joint Nature Conservation Committee (JNCC) and the Department for Environment, Farming and Rural Affairs (Defra) in July 2012, the UK Post-2010 Biodiversity Framework identifies UK-scale activities and priority works that are required to deliver the EU Biodiversity Strategy. Following a process of devolution, the framework is underpinned by country level strategies which are now largely responsible for continuing the work carried out under the former UK Biodiversity Action Plans (UK BAP). JNCC guidance dictates that UK BAP background information on priority species and habitats still remains relevant and it now forms the basis of

country specific priority lists, which for England, are specified under Section 41 of the NERC Act 2006. Targets for England's biodiversity strategy "Biodiversity 2020: A strategy for England's wildlife and ecosystem services" are informed by this list.

11.5.2 The badger is not a species of conservation concern nationally, and accordingly, is not considered a priority species. In an urban context and on the edges of its range, however, this species may be of local conservation concern.

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