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Ecological Impact Assessment

**Reading Golf Club, 17 Kidmore End Road, Reading,
RG4 8SQ**

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1.4	OC		11/05/20	Latest proposed layout plan added	Rev 1.4
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Report Summary

1. Fairfax (Reading) Limited and Reading Golf Club Limited Limited instructed the Ecology Co-op to undertake an Ecological Impact Assessment of a proposed development at Reading Golf Club, Reading. Following a Preliminary Ecological Appraisal, including Phase 1 Habitat mapping, of the site by The Ecology Co-op on 21st & 22nd January 2018, further ecological surveys were undertaken, including protected species surveys and desk-top studies between April and September 2019 in order to provide sufficient baseline information for this assessment. This document presents the findings of these surveys and a full Ecological Impact Assessment in accordance with CIEEM Guidelines to inform a planning application for 347 residential units, a medical centre and associated access/landscaping within the site.

2. The site consists of the southern half of an active golf course. The site covers approximately 12ha (the entire course covers 43.5ha) and is located at the very northern end of Berkshire; adjacent to the county boundary with South Oxfordshire. Habitats contained within the site include short-sward grassland (greens and fairways), taller grassland (roughs lining the fairways), mature tree belts, native hedgerow and small amounts of semi-natural broadleaved woodland habitat. The clubhouse and a neighboring dwelling, located at the south-eastern corner of the site, are included within the current assessment.

3. Reading Golf Club (east) Local Wildlife Site (LWS) exists 100m to the north of the application site within the wider landholding of Reding Golf Course

4. The protected species surveys identified:

- Buildings with 'negligible' bat roost potential
- Trees with 'low-high' bat roost potential
- Common species of foraging bat (low –high activity)
- A rarer species of foraging bat (*barbastelle* *Barbastella barbastellus*) (low activity)
- Likely absence of reptiles
- Likely absence of active badger setts
- An active red kite nest
- Possible breeding by 4 red-list bird species
- Suitable habitat for notable invertebrates (moths and stag beetles)
- Confirmed presence of hedgehogs

5. Predicted impacts from the proposed development are provided in section 4 of this report. Most impacts upon protected and notable species and habitats are considered important at a site or local level only, however the potential for impacts to the Reading Golf Course (east) Local Wildlife Site are considered significant at a County Level.

6. A summary table of the conclusions from the assessment are provided in Section 7 for quick and easy interpretation.



CONTENTS PAGE

1	INTRODUCTION.....	1
1.1	Background.....	1
1.2	Purpose of this Report.....	3
1.3	Policy and Legislation	4
2	SURVEY METHODOLOGY.....	5
2.1	Desk Studies.....	5
2.2	Phase 1 Habitat Survey	5
2.3	Badgers.....	6
2.4	Bats	6
2.5	Breeding Birds	9
2.6	Dormice.....	11
2.7	Great Crested Newts	11
2.8	Reptiles	11
2.9	Other Notable Species.....	12
2.10	Invasive Non-native Species.....	12
2.11	Impact Assessment Methodology and Mitigation	12
2.12	Constraints/Limitations to Surveys.....	14
3	ECOLOGICAL BASELINE.....	15
3.1	Designated Sites.....	15
3.2	Habitats.....	19
3.3	Amphibians	27
3.4	Badgers.....	29
3.5	Bats	30
3.6	Breeding Birds	42
3.7	Dormice.....	45
3.8	Invertebrates	47
3.9	Reptiles	48
3.10	Other Notable Species	49
3.11	Invasive Non-native Species.....	50
4	IMPACT ASSESSMENT.....	51
4.1	Designated Sites.....	51
4.2	Priority Habitats.....	52
4.3	Badgers.....	52
4.4	Bats	53
4.5	Breeding Birds	54
4.6	Dormice.....	54
4.7	Invertebrates	55
4.8	Other Notable Species.....	55



4.9	Invasive Non-native Species	55
5	MITIGATION PROPOSALS	56
5.1	Designated Sites.....	56
5.2	Priority Habitats.....	56
5.3	Badgers.....	57
5.4	Bats	58
5.5	Breeding Birds	58
5.6	Other Notable Species.....	59
5.7	Invasive Non-native Species	59
6	BIODIVERSITY ENHANCEMENTS	60
7	CONCLUSIONS.....	60
8	APPENDIX 1 – LEGISLATION AND POLICY.....	62
9	APPENDIX 2 – IMPORTANCE OF ECOLOGICAL FEATURES.....	66
10	APPENDIX 3 – BREEDING BIRD SURVEY MAPS.....	67
11	APPENDIX 4 – GREAT CRESTED NEWT ‘HABITAT SUITABILITY INDEX’ VALUES	71
12	APPENDIX 5 – ARTIFICIAL LIGHTING AND WILDLIFE	72



1 INTRODUCTION

1.1 Background

The application site is located to the north of Reading, at the edge of Berkshire, with the northern boundary bordering Oxfordshire to the north. The full address for the site is at 17 Kidmore End Road, Reading RG4 8SQ. The central grid reference for the site is SU 7150 7689. Figure 2 shows the extent of the site within the wider landholding of Reading Golf Club which extends into Oxfordshire.

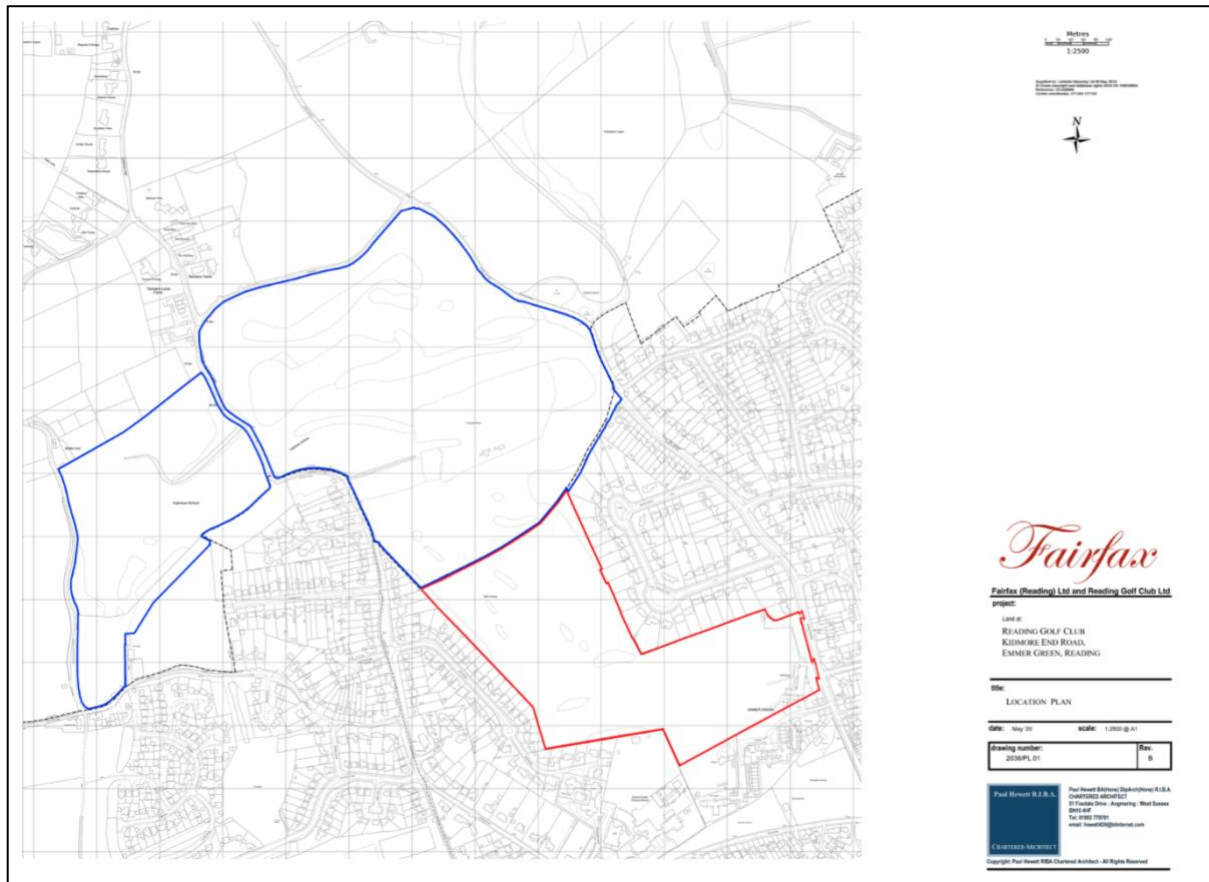


Figure 1. A plan showing the extent of the application site (outlined in bold red) within the wider landholding of Reading Golf Club (outlined in blue). Drawing Number 2036/PL.04 Rev B. Plan provided by Paul Hewett.

This Ecological Impact Assessment is concerned with land within the Reading Borough Council area of Reading Golf Club (Figure1; red outline) as a stand-alone proposed scheme (hereafter referred to as 'the application site' or 'the site'). At the time of this assessment, there are no formal proposals to develop the remaining part of the golf course, although it is possible that development may be proposed in the future. Any future development will require a separate EclA that takes into account the 'in-combination effects' of the impacts that are described in this document.

The application site covers approximately 12ha (the entire course covers approximately 43.5ha) and operates as an active golf course, containing: fairways, greens, tree belts. The clubhouse building and an adjacent dwelling, located at the south-eastern corner of the site, are included within the current



assessment.

The proposed development includes construction of 263 residential plots and a medical centre within the site along with associated soft and hard landscaping.

A Preliminary Ecological Appraisal, including Phase 1 Habitat mapping, of the site was undertaken by The Ecology Co-op on 21st & 22nd January 2018. Based on the findings of this assessment, species specific surveys for: badgers, bats, birds, selected invertebrates, reptiles were recommended as well as a detailed botanical survey of specific habitats, were recommended.



Figure 2. An aerial image showing the application site. The approximate site boundary is outlined in red. Images produced courtesy of Google maps (map data ©2019 Google).



Figure 3. Proposed scheme layout for the development at Reading Golf Club, reproduced from Paul Hewett (Drawing No. 2036/SK.04 Rev. J) (Date: May 2020).

1.2 Purpose of this Report

Following the recommendations of the PEA¹, The Ecology Co-op undertook further protected species surveys for badgers *Meles meles*, butterflies, common reptiles, and roosting/activity surveys for bats, as well as a detailed botanical survey of certain areas of grassland. The purpose of this report is to:

1. Present the findings of these surveys (baseline ecological information);
2. Identify and evaluate the most ecologically important features present on the application site and within the zone of influence of the proposed development;
3. Describe the effects of the proposed development and determine the significance of impacts on these ecologically important features;
4. Set out the proposed impact avoidance, mitigation, and compensation measures that will be undertaken to reduce these impacts to an acceptable level.
5. Finally, the habitat creation and enhancement measures that will be put into place during the development are highlighted. These are designed to ensure that it contributes to both local and national biodiversity objectives.

This report is intended to be submitted as part of the planning application for the development.

¹ The Ecology Co-op, 2019. *Reading Golf Club, 17 Kidmore End Road, Reading, RG4 8SQ – Preliminary Ecological Appraisal Report.*



The surveys and report were carried out and produced at the request of Fairfax (Reading) Limited and Reading Golf Club Limited and supervised by Owen Crawshaw BSc (Hons) ACIEEM.

1.3 Policy and Legislation

Legal protection applying to relevant bird, mammal, herpetofauna and invertebrate species and current nature conservation planning policy is outlined in Appendix 1 of this report.

Where possible, this report provides information on how the development proposal will be designed to meet the requirements of both the National Planning Policy Framework (NPPF) and local planning policy. Details of the NPPF and relevant local planning policy is provided in Appendix 1.



2 SURVEY METHODOLOGY

The following sections describe the methods used in the desk study and protected species/habitat survey(s). All survey methods are in accordance with current best practice guidance for the respective species/taxonomic group and any limitations encountered during the survey are explained in Section 2.12.

This document is written in accordance with the CIEEM Guidelines for Ecological Impact Assessment² and CIEEM Guidelines for Ecological Report Writing³. Details of the ecological assessment methods are provided within Section 2.11 below.

2.1 Desk Studies

A search for pre-existing records of protected species, priority species for conservation and invasive non-native species was requested from the Thames Valley Environmental Records Centre (TVERC) within a radius of 2km of the application site boundaries.

A search of on-line mapping resources was undertaken to identify the location of any features of potential ecological interest including ponds within 500 m (relevant to great crested newts), watercourses (relevant to riparian mammals and crayfish for example) and connectivity to woodland, scrub, and hedgerow networks (relevant to bats and dormice for example) in the wider landscape. The connectivity of the application site to these features, buildings and other semi-natural habitats are also relevant to species such as bats, great crested newts and reptiles.

The MAGIC website resource (www.magic.gov.uk) was used to identify the location of designated sites for nature conservation and European Protected Species (EPS) licences granted in relation to the application site.

2.2 Phase 1 Habitat Survey

A walkover survey was undertaken over two days on 21st & 22nd January 2019 by Owen Crawshaw BSc ACIEEM and Emma Baker MSc GradCIEEM, during which the habitats contained within the application site were described and evaluated in accordance with standard Phase 1 Habitat Survey methodology⁴. The dominant species and indicators of important habitat types, such as ancient woodland or unimproved grassland, were recorded.

A Phase 1 habitat survey presents a standardised system for classifying and mapping wildlife habitats in all parts of Great Britain, including urban areas. The aim of Phase 1 survey is to provide, relatively

² CIEEM (2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine*. Chartered Institute of Ecology and Environmental Management, Winchester.

³ CIEEM (2017) *Guidelines for Ecological Report Writing, 2nd edition*. Chartered Institute of Ecology and Environmental Management, Winchester.

⁴ JNCC (2010) *Handbook for Phase 1 habitat survey: A technique for environmental audit*. Joint Nature Conservation Committee, Peterborough.



rapidly, a record of the vegetation and wildlife habitats present over large areas of countryside. The habitat classification is based principally on vegetation, augmented by reference to topographic and substrate features, particularly where vegetation is not the dominant component of the habitat.

Data was gathered through a walkover survey and use of on-line aerial photography to broadly categorise the habitats present using the JNCC Phase 1 classifications. The results are presented as a map showing the distribution of habitat categories across the site. Target notes are used to describe specific features of biodiversity interest and record indicator species where appropriate. In addition to this, notable habitats, such as local and national Biodiversity Action Plan habitats are highlighted.

The Phase 1 survey methodology is a recognised tool for initial scoping of potential ecological constraints and identifying potential impacts as part of the planning application process.

As part of the 'Extended' Phase 1 Habitat Survey, the site features were evaluated for their potential to support legally protected species and observations of any important plant communities, bird assemblages or other potentially valuable ecological features were recorded. Details of the preliminary survey methods for each legally protected species are detailed below and any specific limitations to the survey, such as access constraints, are recorded in Section 2.12.

2.3 Badgers

Badgers tend to live in family groups with clearly defined territories with the main sett, used throughout the year, as a focal point. The territory often also contains a number of 'annex', 'subsidiary' and outlier setts that are used intermittently. Badgers can exist in a variety of habitats, but a mixed farmland landscape containing pasture and arable land, studded with woodland, scrub and hedgerows support the highest population density.

Evidence of badger activity was recorded during the Phase 1 habitat survey, during which surveyors searched for badger setts, latrines, foraging marks, footprints and worn pathways, and trapped hairs on fences, with special attention paid to linear features.

Any setts identified were subject to on-going monitoring during other survey visits to determine the type of sett and current occupation by badgers. Where necessary, motion sensitive cameras 'trail cams', or other non-intrusive methods (e.g. laying soft damp sand, placing dead leaves or straw or sticky hair traps at entrances) were used to confirm occupation by badgers. This survey methodology is in accordance with Harris, et al (1989)⁵.

2.4 Bats

There are 18 species of bat resident in the UK, each with their own specific habitat requirements. Bats can use a wide range of features for roosting purposes including loft spaces, cavity walls, loose tiles, mortice joints and cracks/gaps in a variety of built structures. They can also be found in trees with holes,

⁵ Harris, S, Cresswell, P. and Jefferies, D. (1989) *Surveying Badgers*. Mammal Society.



splits, cracks, cavities, ivy and loose bark. Bats are generally active at night and utilise a wide range of habitats for foraging and commuting between roost sites, hibernation sites and foraging habitats. Linear features such as hedgerows, woodland edges, even fences can be important for navigation between roosting and foraging habitats.

2.4.1 Trees – Ground Based Scoping Assessment

All trees likely to be affected directly or indirectly by the proposed development were subject to a ground-based visual inspection during the Phase 1 habitat survey/PEA of 21st & 22nd January 2019. Surveyors used binoculars to identify potential roost features, trees were categorised for their potential to support roosting bats as shown in Table 1 in accordance with best practice guidance⁶.

Table 1. Assessing potential roost features in trees⁶.

Category	Description
Negligible	A tree with negligible roosting habitat features likely to be used by bats.
Low	A tree of sufficient size to potentially support roosting features, but with none seen from the ground or features identified of limited roosting potential.
Medium	A tree with one or more potential roost sites that could be used by bats due to their size, conditions and surrounding habitat, but unlikely to support a roost of high conservation status such as a maternity or hibernation roost.
High	Trees with one or more potential roost sites that appear suitable for large numbers of bats or use as maternity or hibernation roosts.

2.4.2 Trees – PRF Inspection Survey

A Potential Roost Feature (PRF) (tree climbing) survey was undertaken on 29th & 30th April 2019 by Owen Crawshaw BSc ACIEEM (Natural England Bat Licence Number: 2018-36986-CLS-CLS) and Ryan Walker MSc PhD MCIEEM (Natural England Bat Licence Number: 2015-16736-CLS-CLS). Both surveyors hold a certificate from the National Proficiency Test Council (NPTC) in Tree Climbing & Aerial Rescue.

Trees noted to contain PRFs were climbed using a ladder or ropes and harnesses in order to allow the climber to undertake a close-up inspection of the features using a torch and an endoscope. Any trees displaying significant damage/decay and/or specimens from which a suitable anchorage of ropes could not be established were subjected to a ground level assessment only.

Each PRF was assessed in terms of their suitability for roosting bats as having either: negligible, low, moderate or high roost potential (Table 1). The assessment of a tree's overall suitability for roosting bats is assigned in accordance with the assessment of the most suitable PRF present on the tree.

2.4.3 Built Structures

A detailed ground based visual assessment was carried out, looking for features with potential to support roosting bats (e.g. gaps under tiles, soffits, cracks or gaps in brickwork, cladding) and any evidence indicating the presence of bats, such as rub marks, staining or droppings beneath potential

⁶Collins, J.(ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn)*. The Bat Conservation Trust, London.



roost features. Where possible and safely accessible, internal inspections of potentially suitable enclosed loft spaces were made to search for evidence of use by bats (live bats, dead bats, dropping, rub marks or staining of timbers).

2.4.4 Bat Activity Surveys – Walked Transects

Bat activity surveys followed best practice guidelines⁶. Pre-determined transect routes were followed by surveyors (Figure 4), focussing on all linear features within the site boundary (tree-lines, woodland edge and hedgerows). The transect routes were walked at a slow pace during the period from sunset up to two hours after sunset by a team of surveyors. All surveys were undertaken during weather conditions suitable for bat activity and at ambient temperatures above 10°C. The surveyors recorded bat activity using 'Echo Meter Touch' bat detectors featuring auto-identification of bat species and automatically triggered recording for later review. The locations of all bat 'registrations' was recorded onto a field map during the survey to correspond with all sound recordings.



Figure 4. Transect routes walked during all bat activity surveys: Transect route 1 (yellow) and 2 (pink), listening stations along each transect route are numbered. Images produced courtesy of Google maps (map data ©2019 Google).

2.4.5 Bat Activity Surveys – Automated Static Detector Deployment

Two Elekon Batlogger A static bat detectors were deployed across the application site (Figure 5) on three separate occasions (in May, June and August/September) and left in the field for a minimum of five days; the expected maximum lifetime of the battery. Static bat detectors comprise a passive recording device with real-time full-spectrum calls that can be viewed in detail once downloaded on analysis software, allowing accurate identification of most bat calls to species level (or genus level in the case of *Myotis* and *Plecotus* spp.).

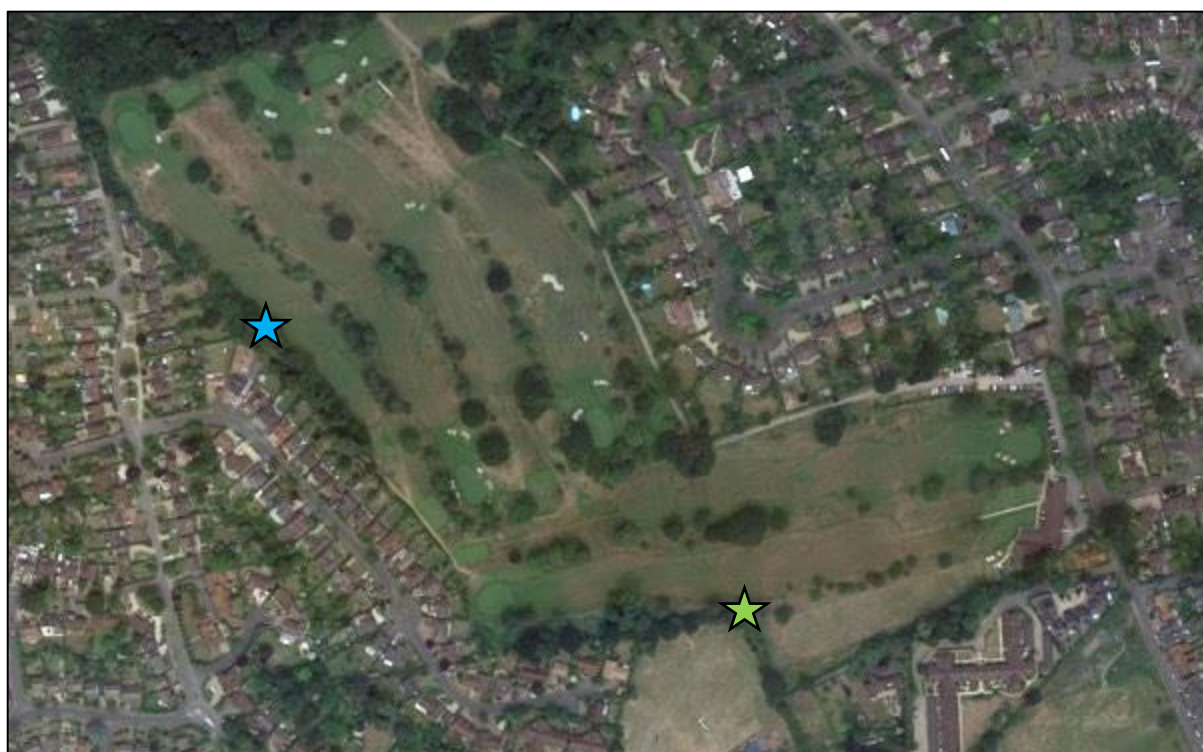


Figure 5. The position of static bat detectors when deployed are indicated as blue and green stars. Images produced courtesy of Google maps (map data ©2019 Google).

The data sets collected by the static bat detectors were interpreted using ECOBAT⁷: an online resource which is used to interpret static detector data by calculating percentiles through comparison of the data with a national database of bat activity. Levels of bat activity were qualified according to Table 2.

Table 2. Qualification of bat activity levels at Reading Golf Club detected by static bat detectors and using ECOBAT outputs.

Bat Activity Level	Bat passes/night (median percentile range)
Low	0-20 th Percentile
Low - Moderate	21 st -40 th Percentiles
Moderate	41 st -60 th Percentiles
Moderate - High	61 st -80 th Percentiles
High	81 st -100 th Percentiles

The walked transect and static bat detector ('bat logger') survey methods complement each other with the transect surveys providing information on foraging and commuting patterns, and distribution across the site, and automated static detector surveys giving more prolonged coverage through consecutive nights, thus increasing the likelihood of detecting scarce species.

2.5 Breeding Birds

The method used for the breeding bird survey was adapted from the Breeding Bird Survey (BBS)

⁷ <http://www.ecobat.org.uk>



methodology, designed by the British Trust for Ornithology (BTO)⁸ as an accessible means of monitoring British bird population trends over the UK using volunteers and frequently adapted for EclA. The original methodology requires two visits per season to be carried out over many seasons, allowing data sets to be built up. The number of visits has been increased to four for this survey to provide a more representative 'snapshot' of the bird assemblages present at the application site during one survey season.

A pre-determined transect (Figure 6) was walked on each visit, during which the observer recorded all birds encountered. As recommended in the BTO guidelines, all bird survey visits were carried out between 6am and 11am and were only undertaken during favourable weather conditions for bird activity, with periods of persistent or heavy rain, high winds or fog avoided. The transect route was walked at a constant slow pace by a competent bird observer, recording all birds detected either by sight or calls/song. Notes regarding the behaviour of birds identified were made, to determine their breeding status. Birds were said to be 'confirmed as breeding' if they were observed carrying nesting material, food or faecal pellets; or nests, eggs, or recently fledged young were discovered. Birds were recorded as 'likely breeding' if observed singing or displaying, repeatedly visiting the same locations and showing agitated or distraction behaviour. Each bird 'registration' was recorded on a field map of the survey site using standard BTO Common Birds Census (CBC) notation, which includes behaviours and flight movements.



Figure 6. The breeding bird survey transect route adopted at Reading Golf Club. Images produced courtesy of Google maps (Map data ©2019 Google).

8 <https://www.bto.org/about-birds/birdtrends/2018/methods/breeding-bird-survey>



2.6 Dormice

The site was broadly assessed for its potential to support hazel dormouse *Muscardinus avellanarius*. This included use of on-line mapping resources to assess the surrounding area for connectivity to large blocks of woodland, scrub and extensive hedgerow networks. Based on the results of this assessment, no further surveys were considered necessary.

2.7 Great Crested Newts

A desk study was undertaken to identify ponds and wet ditches within 500m of the application site that might support breeding great crested newts *Triturus cristatus* and other amphibians. Where access permission was granted, or ponds could be viewed from public roads or footpaths, the ponds were assessed for their potential to support great crested newts using the Habitat Suitability Index (H.S.I.) (Oldham et al 2000)⁹ (ARG UK 2010)¹⁰. The value of the site for terrestrially foraging great crested newts and any features that might be used by hibernating newts have also been assessed. Based on the results of these surveys, no further surveys were considered necessary.

2.8 Reptiles

Presence/likely absence survey for reptiles were undertaken within the application site as part of a wider study encompassing the entire landholding of Reading Golf Club. The common lizard *Zootoca vivipara*, slow-worm *Anguis fragilis*, grass snake *Natrix helvetica* and adder *Vipera berus* are widespread species that can be found in many semi-natural habitats, such as rough grassland, scrub, heathland and open woodland where there is good vegetation cover, an abundance of invertebrate, amphibian or small mammal prey and areas of open ground for basking.

Standard reptile presence/likely absence surveys involve setting out artificial refugia (reptile 'mats' or 'tins') in potentially suitable habitat. Reptile mats are pieces of roofing bitumen felt and reptile tins are pieces of corrugated metal sheet approximately 1m x 0.5m in size, which absorb heat from the sun more rapidly than the surrounding vegetation and provide cover and basking places attractive to reptiles. These are then checked for presence of animals under suitable weather conditions. They are placed in areas of potentially suitable habitat approximately 5m apart along linear features. There are no up-to-date best practice guidelines for reptile surveys, but a minimum of seven survey visits under suitable weather conditions is generally considered to be adequate when determining their presence/likely absence, and 15–20 visits are used to calculate a 'peak count' for population size class assessment.

A total of 123 artificial refugia were set out in areas of suitable reptile habitat across the entire landholding of Reading Golf Club, including 14 refugia within the application site (see Figure 7). The refugia were left *in situ* for a minimum of two weeks to 'bed in' and allow reptiles to locate them before

⁹ Oldham, R.S., Keeble, J., Swan, M.J.S. and Jeffcote, M. (2000) Evaluating the suitability of habitat for the great crested newt (*Triturus cristatus*). *Herpetological Journal* 10, 143-155.

¹⁰ ARG UK (2010). ARG UK Advice Note 5: Great Crested Newt Habitat Suitability Index. Amphibian and Reptile Groups of the United Kingdom.



the first check. The refugia were checked at least seven times over the period April-May and all observations of reptiles were recorded, together with the weather conditions, temperature and time of day.



Figure 7. Location of reptile refugia (indicated by white dots) within the application site (outlined in red) and the wider landholding of Reading Golf Club (outlined in blue). Images produced courtesy of Google maps (map data ©2019 Google).

2.9 Other Notable Species

The application site's habitats were broadly assessed for their potential to support species of principal importance for nature conservation (Section 41 NERC Act 2006) and other notable species. This includes mammals such as harvest mouse *Micromys minutus*, hedgehog *Erinaceus europaeus*, brown hare *Lepus europaeus*, and many bird species. The site was broadly assessed for its potential to support important invertebrate assemblages with specific attention paid to features such as standing dead-wood, wet flushes, bare earth banks and botanically rich areas.

2.10 Invasive Non-native Species

No specific surveys for invasive non-native species (INNS) were undertaken. However, the presence of any invasive non-native species encountered during other fieldwork, was recorded.

2.11 Impact Assessment Methodology and Mitigation

The assessment of ecological impacts and mitigation recommendations in this report follow CIEEM



Guidelines for Ecological Impact Assessment (EcIA)². This involves evaluating the importance of an 'ecological feature' (habitat, vegetation community, population of a single species or assemblages of species) in terms of nature conservation priority, followed by the application of the 'Mitigation hierarchy'.

2.11.1 Importance of Ecological Features

A level of importance was assigned to all existing ecological features, through consideration of the rarity and distribution of a habitat or species, the population size, ecological function, and trends (declining/expanding), together with any designations, legal status, or conservation policies. CIEEM recommend that the importance of an ecological feature, in terms of nature conservation priority, should be considered within a defined geographical context (for definitions used by The Ecology Co-op, see Appendix 2):

- International and European
- National
- Regional
- County
- Local or District
- Site/negligible

Where protected species are present and there is the potential for a breach of the legislation as a result of the development proposals, those species are considered as 'important' features and included in the EcIA. However, the level of importance assigned to the affected population of a protected species will vary depending on contextual information about the population size, distribution, abundance and trends across the range of geographical scales.

Similarly, irreplaceable habitats such as ancient broadleaved woodland are considered as 'important' features and included in the EcIA. The level of importance will vary depending on the size of the habitat parcel, its distribution and abundance at different geographical scales.

Features that are considered to be important at site level only, or are of negligible importance, (such as paved ground or amenity grassland) are excluded from this EcIA and it should be reasonable to assume that if a feature is not mentioned, it is not ecologically important.

2.11.2 Significance of Impacts and Effects

In accordance with EcIA (CIEEM 2018)², a significant effect is defined as "an effect that either supports or undermines biodiversity conservation objectives for important ecological features". Conservation objectives may be specific (e.g. for a designated site) or broad (e.g. national/local nature conservation policy). The effects may be described as significant at a range of geographic scales as defined above.

The impacts are identified and described in relation to the following characteristics:

- *Adverse or positive* – does the impact result in the loss or gain in biodiversity/quality of the environment?
- *Extent, magnitude* – the spatial area over which the impact may occur, the area of habitat lost,



or the number of individuals/populations affected.

- *Timing* – in relation to the life cycle of the ecological feature (e.g. nesting bird season)
- *Duration, frequency* – is the impact temporary or permanent, frequently repeated or a one-off event?
- *Reversibility* – is the impact temporary or permanent? Would the ecological feature recover after the impact?
- *Cumulative impacts* – in combination with other plans/projects

This report has only sought to describe in detail the impacts that are likely to be significant. Impacts that are either unlikely to occur, or if they did occur are unlikely to have a significant effect have been discounted or 'scoped out' at an earlier stage. Effects on the conservation status of ecological features are only assessed in detail if they have a high enough value (local or above) and impacts upon them may be a material consideration in decision-making in terms of legislation and planning policy. Impacts on features below local value are categorised as of neutral significance and are not considered further. However, where it has not been possible to robustly conclude that there is no significant effects (due to insufficient survey data or scientific research for example), then the precautionary principle will be applied and a significant effect is assumed.

2.11.3 The 'Mitigation Hierarchy'

The assessment of the significance of an impact is made initially in the absence of mitigation. This is followed by a sequential process of determining the most appropriate way to remove or minimise significant impacts and effects. The preferred option is to avoid impacts in the first place, for example by redesigning the scheme to retain an important area of habitat, or timing works sensitively. Mitigation measures such as translocation or displacement of populations is only applied as a last resort where significant impacts and effects are unavoidable.

When residual significant adverse impacts and effects remain after all practicable measures to avoid and/or minimise these have been applied, compensation measures are required. Compensation measures include habitat creation in alternative locations that offset unavoidable habitat loss.

Finally, enhancements are proposed that do not relate to a specific impact and effect but provide net gains in biodiversity – taking advantage of opportunities in the design and operation of the development. These measures are intended to ensure that the proposed development contribute towards national and local biodiversity objectives.

2.12 Constraints/Limitations to Surveys

Surveys record any flora or fauna that is present at the time of the survey visits. It is therefore possible that some species may not have been present during the survey but may be evident at other times of the year and may appear or disappear from the site if habitat conditions change. For this reason, the surveys are considered valid for up to eighteen months for badgers and bats and two years for reptiles. If the habitat conditions change significantly in the intervening period, then it is recommended that the surveys be updated.



At the time of the issue of this report (20th June 2019), surveys for bats and invertebrates are ongoing and therefore a complete assessment of all impacts and appropriate mitigation measures cannot yet be made.

3 ECOLOGICAL BASELINE

3.1 Designated Sites

Details of designated sites within 2km of Reading Golf Club are listed in Table 3 below, Figure 8 provides a map of the designated sites in relation to the application site.

Table 3. Designated sites within 2km of Reading Golf Club.

Site name	Designation	Features listed on citation	Proximity
Reading Golf Course (east)	Local Wildlife Site	Habitats: Lowland Mixed Deciduous Woodland Lowland Calcareous Grassland Species: Red Kite <i>Milvus milvus</i> Saintfoin <i>Onobrychis viciifolia</i>	200m N
Chilterns Dipslope and Plateau	Conservation Target Area	Chalk valleys within Chiltern hills containing a variety of notable habitats (e.g. chalk grassland, woodland, hedgerows, arable field margins, traditional orchards)	100m N
Furzeplat	Local Wildlife Site	Habitats: Lowland Mixed Deciduous Woodland Species: Bluebell <i>Hyacinthoides non-scripta</i>	320m SW
Highdown Wood	Local Wildlife Site	Habitats: Lowland Beech & Yew Woodland Species: Bluebell Red kite Lesser spotted woodpecker <i>Dendrocopus minor</i> Bullfinch <i>Pyrrhula pyrrhula</i>	350m S
Chambers Copse	Proposed Local Wildlife Site	Habitats: Woodland (not classified)	430m N
Hemdean Bottom	Local Wildlife Site	Habitats: Lowland Meadow (with calcareous influences)	500m SW
Rotherfield Way Copse	Local Wildlife Site	Habitats: Lowland Mixed Deciduous Woodland Species: Bluebell Butcher's-Broom <i>Ruscus aculeatus</i>	600m S
Reading Golf Course (west)	Local Wildlife Site	Habitats: Species-rich grassland (not classified)	700m NW
Clayfield Copse	Local Wildlife Site/Local	Habitats: Woodland (not classified)	750m E



Reading Golf Club – ECOLOGICAL IMPACT ASSESSMENT

	Nature Reserve		
Blackhouse Wood	Local Wildlife Site	Habitats: Woodland (not classified)	1.1km E
Old Cemetery, Victoria Road	Local Wildlife Site	Habitats: Urban greenspace with mature trees	1.8km S
Tanker's Table Field	Local Wildlife Site	Habitats: Lowland Mixed Deciduous Woodland Lowland Meadow Lowland Calcareous Grassland	>2km NW
The Warren Woodlands Complex	Local Wildlife Site	Habitats: Lowland Mixed Deciduous Woodland Lowland Beech & Yew Woodland Wet Woodland Fen Species: Badger Bluebell <i>Hyacinthoides non-scripta</i> White helleborine <i>Cephalanthera damasonium</i> Loddon lily <i>Leucojum aestivum</i>	>2km SW
Pages Shaw	Proposed Local Wildlife Site	Habitats: Lowland Mixed Deciduous Woodland Lowland Beech & Yew Woodland	>2km W
Chilterns Escarpment South	Conservation Target Area	Chalk escarpment within Chiltern Hills containing chalk grassland and woodland	>2km W

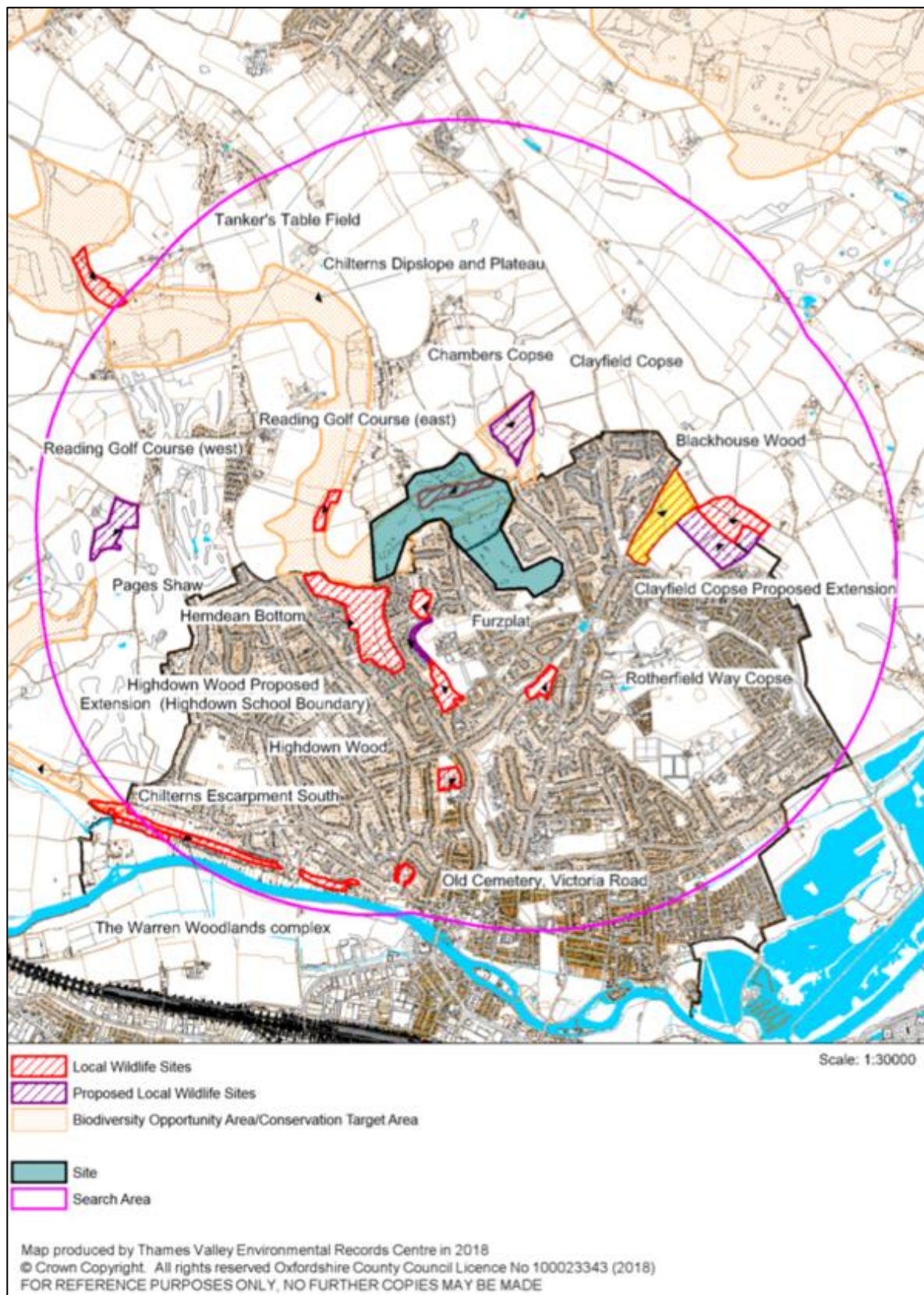


Figure 8. Designated sites within a radius of 2km of Reading Golf Club. ©Thames Valley Environmental Records Centre.

There are 5 granted European Protected Species Mitigation Licences (EPSLs) within 1km of the



application site (Figure 9). A summary of details available for these granted EPSLs are provided in Table 4.

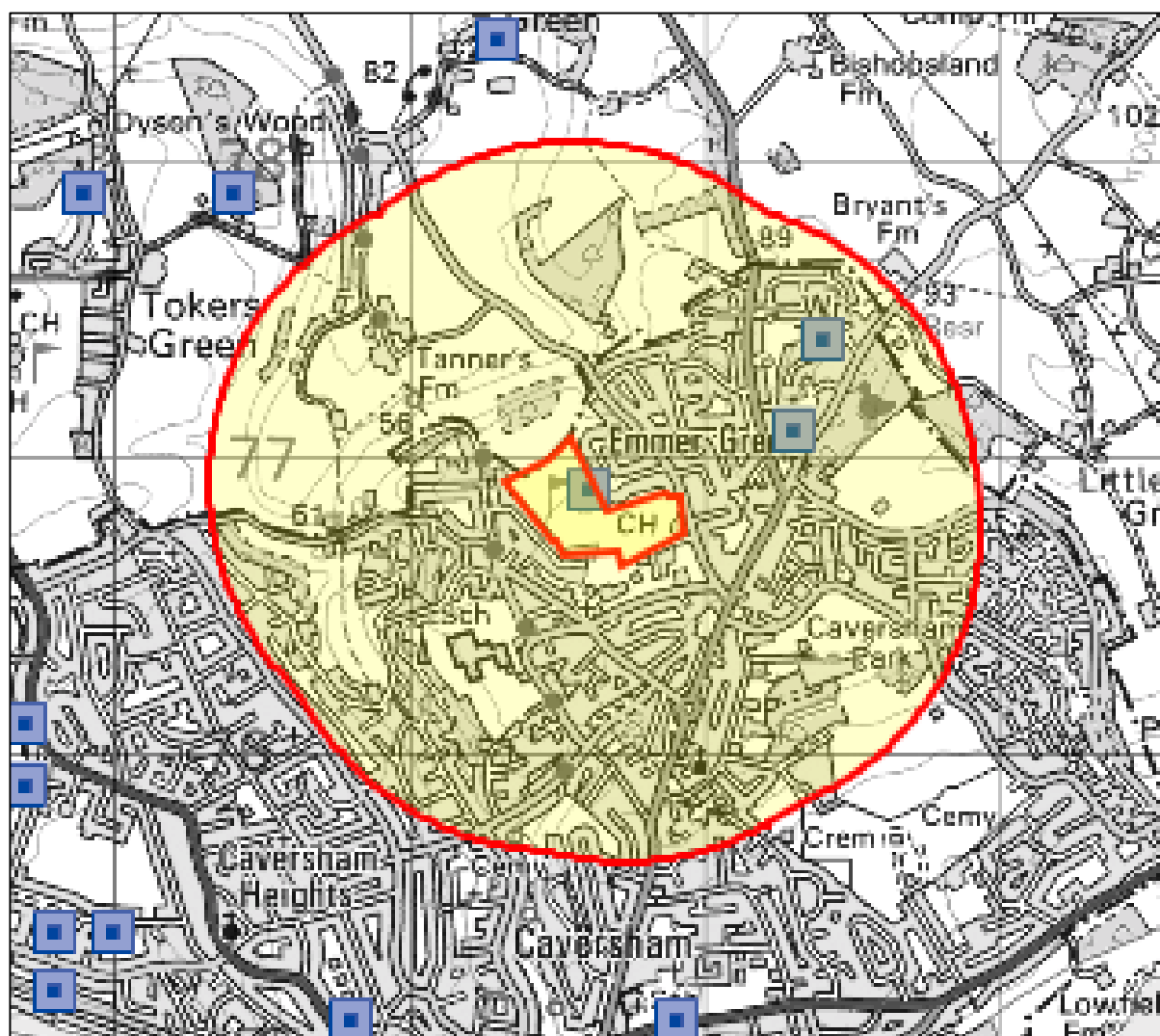


Figure 9. Granted European Protected Species Mitigation Licences (EPSLs) within 1km of Reading Golf Club. Images produced courtesy of Magic maps (<http://www.magic.gov.uk/>), contains public sector information licensed under the Open Government Licence v3.0).

Table 4. Summary of information for granted European Protected Species (EPS) within 1km of Reading Golf Club.

Reference Number	Proximity to Study Site	Species Covered	Period Covered	Other Information
EPSM2013-6025	Immediately adjacent to site	Brown long-eared bat <i>Plecotus auritus</i>	26/07/2013 – 31/12/2013	Destruction of a resting place
EPSM2012-4078	400m NE	Brown long-eared bat Daubenton's bat <i>Myotis daubentonii</i> Natterer's bat <i>M. nattereri</i>	05/10/2012 – 30/01/2014	Unknown
2017-32046-EPS-MIT	650m NE	Soprano pipistrelle <i>Pipistrellus pygmaeus</i>	01/11/2017 – 30/04/2018	Destruction of a resting place



3.2 Habitats

Much of the application site is covered by short-sward amenity grassland which serves as fairways and greens of the golf course. The grassland is regularly mown to maintain a very short sward height, some taller areas of grassland are present toward the peripheries of the course. The fairways within site are flanked by planted tree belts. The boundaries are marked by a combination of tree belts, hedgerows, dense scrub and garden hedges. Other habitats present within the site include buildings and hardstanding.

Table 5 below lists the Phase 1 Habitat Survey categories found at the site, with target notes on specific features of interest and the general species composition. The Phase 1 Habitat Map for the site and key to the standard mapping symbols used is presented in Figure 10. Photographs of important areas of habitat are presented below.

Table 5. Habitats contained within Reading Golf Club.

Habitat type	JNCC Code	Area(ha)/ Length(m)	Target note including general species composition	Assessment of Ecological Value (CIEEM 2017)
Buildings	J3.6	0.1ha	A modern clubhouse and dwelling are present at the south-eastern corner of the site. Both buildings are constructed from solid red brick with roofs of modern interlocking concrete tiles. Both buildings contain loft voids, however only the space within the clubhouse was accessed during the survey. See Table 7 for discussion of bat roost potential.	Site
Bare Ground/Hard-standing	J4	0.7ha	A carpark of concrete hard-standing exists at the south-eastern corner of the site. A pathway of bare ground, used as a vehicle trackway, extends up the eastern edge of the site.	Site
Amenity Grassland	J1.2	9.2ha	Extensive areas of short-sward amenity grassland are present in the site's northern and southern halves. The grassland is regularly mown to <3cm. The fairways and greens of the course are totally devoid of herbaceous plant and are likely to receive regular spraying with herbicide. Areas of less managed amenity grassland are present towards the peripheries of the course, although taller relative to the fairways and green, the sward is still maintained at a short height (approximately 5cm). Herbaceous plants are present in low abundance within peripheral areas. The habitat is described as species-poor and contains the following species: white clover <i>Trifolium repens</i>, herb Robert <i>Gernaium</i>	Site



			<i>robertianum</i>, dove's-foot crane's-bill <i>G. mole</i>, sorrel <i>Rumex acetosa</i>, ground ivy <i>Glechomka hederacea</i>, creeping buttercup <i>Ranunculus repens</i>, creeping thistle <i>Cirsium arvense</i>, hogweed <i>Heracleum sphondylium</i>, ribwort plantain <i>Plantago lanceolata</i> and creeping cinquefoil <i>Potentilla reptans</i>.	
Species-poor Semi-improved Grassland	B6	0.3ha	Areas of species-poor semi-improved grassland are created by roughs, including an area fringing the driving range at the southern edge of the site and two strips lining the access track running along the northern edge of the site The habitat is dominated by cock's foot <i>Dactylis glomerata</i>, rough meadow grass <i>Poa trivialis</i>, perennial rye <i>Lolium perenne</i>, Yorkshire fog <i>Holcus lanatus</i>, Timothy grass <i>Phleum pratense</i> and false oat-grass <i>Arrhenatherum elatius</i> which create tall sward. Herbaceous species were recorded within the grassland including: bird's-foot trefoil <i>Lotus corniculatus</i>, dove's-foot crane's-bill <i>Geranium molle</i>, common vetch <i>Vicia sativa</i>, bulbous buttercup <i>Ranunculus bulbosus</i>, greater stitchwort <i>Stellaria holostea</i>. The semi-improved grassland is not considered to qualify as priority habitat such as Lowland Calcareous Grassland (Section 41, NERC Act 2006)	Site
Broadleaved Semi-natural Woodland	A1.1.1	0.2ha	The site includes a very small section of woodland at the northern boundary of the site, the area forms part of a larger area of woodland which extend beyond the site boundaries. The woodland contains: silver birch <i>Betula pendula</i>, willow <i>Salix</i> sp., oak <i>Quercus robur</i>, holly <i>Ilex aquifolium</i>, apple <i>Malus domestica</i>, ash <i>Fraxinus excelsior</i>, hawthorn <i>Crataegus monogyna</i> and hazel <i>Corylus avellana</i>. <u>The site's broadleaved semi-natural woodland is considered to qualify as priority under Lowland Mixed Deciduous Woodland (Section 41, NERC Act 2006).</u>	District
Intact Hedge (species-poor)	J2.1.2	730m	A native species-poor hedgerow exists along southern boundary. The hedgerow contains. oak, rose <i>Rosa</i> sp. blackthorn, bramble, willow <i>Salix</i> sp., beech and fir <i>Abies</i> species with sections of	District (native hedge)



			dense bramble. Sections of the north-eastern and south-western boundaries of the site's southern half are created by non-native garden hedgerows. Species present within the garden hedges include: cotoneaster <i>Cotoneaster</i> spp., garden privet <i>Ligustrum ovalifolium</i>, pampas grass <i>Cortaderia selloana</i> and other ornamental species. <u>The native species-poor hedgerow is considered likely to qualify as priority habitat under Hedgerows (Section 41, NERC Act 2006). The garden hedges do not qualify as priority hedgerow habitat.</u>	Site (garden hedges)
Hedge with trees (species-poor)	J2.3.2	120ha	The eastern edge of the site, where the golf club is accessed off the adjacent road, is marked by a beech hedge with a planted row of semi-mature lime <i>Tilia x europaea</i> .	Site
Broadleaved Parkland/Scattered Trees	A3.1	0.42ha	Broadleaved tree belts exist along the fairways of the course. Species recorded include oak, ornamental? cherry <i>Prunus</i> sp., cherry laurel <i>P. laurocerasus</i> , willow <i>Salix</i> sp., hawthorn and silver birch.	Local
Mixed Parkland/Scattered Trees	A3.3	2.78ha	Tree belts containing a mixture of broadleaved and coniferous tree line the fairways within the southern half of the site. Species present include ash, cherry <i>Prunus</i> sp., elm, hazel, beech, willow <i>Salix</i> sp., lime, horse chestnut, oak, hawthorn, scots pine <i>Pinus sylvestris</i> and cedar <i>Cedrus</i> species	Local
Scrub (dense continuous)	A2.1	0.1ha	A small area of dense bramble exists at the western edge of the site.	Site
Dry Ditch	J2.6	90m	A dry ditch runs between fairways in the site half, the ditch is covered by amenity grassland and is lined by a tree belt.	Site
Fence	J2.4	60m	A wooden garden fence exists along a short section of the north-eastern edge of the site.	Site



Figure 10. Phase 1 map and key for the application site, with the boundary is outlined in red. Images prepared using the Phase ONE Habitat Survey Toolkit PRO, Department of Biological and Medical Sciences, Oxford Brookes University Version 1.4.0. Images produced courtesy of Google maps (map data ©2019 Google).



Photograph 1. The clubhouse at Reading Golf Club viewed from the east.



Photograph 2. The western elevation of the clubhouse.



Photograph 3. The loft space within the clubhouse.



Photograph 4. The western elevation of the dwelling.



Photograph 5. Amenity grassland fairways of the golf course.



Photograph 6. Species-poor semi-improved grassland (photographed in January) fringing the amenity grassland driving range at the southern edge of the site.



Photograph 7. Species-poor semi-improved grassland (photographed in June) located towards the northern edge of the site.



Photograph 8. Tree belts extending along the fairways of the golf course. Note that the ground layer is covered by mown amenity grassland of similar composition to the fairways.



3.3 Amphibians

3.3.1 Survey Results

There are no ponds within the application site or immediately adjacent to the site boundary. A single large pond was identified approximately 250m to the south of the site (Figure 11).



Figure 11. The location of the pond (indicated by the blue circle) in relation to the site at Reading Golf Club (outlined in red). Images produced courtesy of Google maps (Map data ©2019 Google).

This pond is described as a “community duck pond” within an area of public open space and surrounded by busy roads and residential development. At the time of the survey a large number of waterfowl were present on the pond. The banks are engineered along the northern edge of the ponds and are bordered by bankside vegetation (mature weeping willow *Salix babylonica* and bramble scrub) along its southern and eastern edges. The water within the pond is described as being of ‘poor quality’ as a result of heavy disturbance and pollution caused by waterfowl. No aquatic vegetation was visible within pond.



Photograph 9. The duck pond located approximately 250m to the south of the site. The pond is assessed as having 'Poor' suitability for great crested newts.

The HSI assessment of the pond concluded that the waterbody is of 'Poor' suitability for supporting a breeding population of great crested newts. This output is largely a consequence of high numbers of waterfowl leading to poor water quality and an absence of aquatic vegetation. Full results of the assessment are provided in Appendix 4.

3.3.2 Pre-existing Records

The TVERC holds no records of the great crested newt from within 2km of the application site. The records centre provided 44 records of other amphibian species in the search area. This included 5 records for smooth newt *Lissotriton vulgaris*, 15 records for common frog *Rana temporaria* and 24 records for common toad *Bufo bufo*. Individual historic records (both from 1986) exist of common frog and common toad within the site. Amphibians, including the great crested newt, are considered to be absent from the site.

3.3.3 Interpretation

Based on the lack of suitable ponds within 250m of the application site boundaries, lack of recent pre-existing records, no further surveys were considered necessary and it is concluded that the presence of great crested newts or other amphibian are not a material consideration for the proposed development.



3.4 Badgers

3.4.1 Survey Results

A possible badger sett was found within an area of woodland to the immediate north of the application site during the Phase 1 survey of 21st & 22nd January 2019 (pictured in Photograph 10 with location shown in Figure 12). The single entrance hole was monitored by a trail 'cam' from 29th May – 11th June. No badgers were recorded by the trail 'cam' during its deployment within the site. Inspection of the entrance hole in June revealed it was largely obscured by nettles and did not appear to have been used recently.



Figure 12. The location of the inactive badger sett (indicated by the white star) subjected to monitoring by a remote trail cam at Reading Golf Club (application site outlined in red).



Photograph 10. The inactive badger sett entrance located to the immediate north of the application site.

3.4.2 Pre-existing Records

The TVERC provided 47 records of badger in the search area. One record from 2009 refers to a sett located approximately 240m to the west of the application site boundary.

3.4.3 Interpretation

A single entrance is indicative of an outlier sett: a refuge used intermittently by individual animals within their home range. The trail 'cam' survey of the entrance hole located to the immediate north of the site indicates the sett is not currently being used by badgers. However, badgers may forage within the site and may use this sett or establish new setts at any other time. Habitats within the site are considered to be of value to badgers at the site level only.

3.5 Bats

3.5.1 Natural Roost Features – Trees

The ground-based scoping assessment identified 10 trees requiring detailed PRF inspections using endoscopes. All other trees present on the application site were rated as having negligible potential for roosting bats. The locations of these trees are shown in Figure 13; results of the survey are set out in Table 6 below.



Table 6. Trees with potential roost features for bats.

Tree Number (Figure 13)	Details	Potential Roost Features/evidence of bats	Assessment of potential (Collins 2016)	Climbed/Inspected	Revised Assessment
T13	Semi-mature cherry	Several rot holes	Moderate potential	Y	Negligible
T14	Semi-mature silver birch	Several rot holes	Moderate potential	Y	Negligible
T15	Semi-mature poplar	Several rot holes	High potential	Y	Low
T16a	Semi-mature poplar	Multiple woodpecker holes	High potential	N	High
16b	Semi-mature poplar	Woodpecker hole	Not previously assessed	Y	Negligible
T17	Semi-mature poplar	Woodpecker hole Broken limb	Moderate potential	Y	Negligible
T18	Veteran oak	Multiple rot holes Pruning scars	Low/Moderate potential	Y	High
T19	Mature oak	Hazard beam	Moderate potential	Y	Moderate
T20	Semi-mature cherry	Some flaking bark	Low potential	Y	Low
T21	Dead tree	Multiple woodpecker holes	Moderate potential	N	Moderate



Figure 13. Trees included within the Potential Roost Feature Assessment (tree climbing survey) at Reading Golf Club. Images produced courtesy of Google maps (map data ©2019 Google).



3.5.2 Built Structures

The location of buildings included within the current study are shown in (Figure 14). Results of the building inspection and assessment are provided in Table 7.



Figure 14. Locations of buildings included within the application site at Reading Golf Club. Images produced courtesy of Google maps (map data ©2019 Google).

Table 7. Description and assessment of bat roost potential for buildings and trees at Reading Golf Club.

Building/ Tree Number (Figure 14)	Details	Potential Roost Features/evidence of bats	Assessment of potential (Collins 2016)
B1	Clubhouse	No potential roost features identified. No evidence of roosting bats noted within the loft space of the building.	Negligible potential
B2	Dwelling	No potential roost features identified. No evidence of roosting bats noted within the loft space of the building.	Negligible potential

3.5.3 Bat Activity Surveys – Walked Transects

Survey conditions and timings are presented in Table 8. The results of each walked transect survey are summarised in Figure:16. This shows the distribution of all bat ‘observations’ on each walked transect.



Table 8. Bat activity walked transect metadata: dates, times, temperature, weather conditions at Reading Golf Club.

Date	Survey start time/end time	Weather conditions	Surveyors
30/04/19	20:25-22:05 Sunset: 20:25	Max/Min temp.: 16–13°C 80% cloud cover, calm (BS 0), dry.	Owen Crawshaw, BSc ACIEEM, (Class Licence Level 2) Ryan Walker MSc PhD MCIEEM, (Class Licence Level 2) Charlie Gardiner BSc Richard Angliss BSc
28/05/19	21:09-22:39 Sunset: 21:09	Max/Min temp.: 13–11°C 0% cloud cover, calm (BS 0), dry.	Owen Crawshaw Charlie Gardiner Lydia Dowell BSc Ben Nesbitt
26/06/19	21:10-23:10 Sunset: 21:10	Max/Min temp.: 16°C 100% cloud cover, light breeze (BS 2), dry.	Paul Whitby BSc MCIEEM CEcol (Class Licence Level 2) Kate Lewis MSc Lydia Dowell Charlie Gardiner
24/07/19	21:04-22:34 Sunset: 21:04	Max/Min temp.: 22–17°C 20% cloud cover, calm (BS 0), dry.	Xenia Snowman BSc (Class Licence Level 2) Charlie Gardiner Lydia Dowell Richard Angliss
20/08/19	20:16-21:45 Sunset: 20:16	Max/Min temp.: 17–15°C 0% cloud cover, calm (BS 0), dry.	Owen Crawshaw Charlie Gardiner Lydia Dowell Ben Nesbitt
17/09/19	19:14-20:44 Sunset: 19:14	Max/Min temp.: 13–12°C 40% cloud cover, calm (BS 0), dry.	Owen Crawshaw Charlie Gardiner Lydia Dowell Ben Nesbitt
15/10/19	18:11-19:41 Sunset: 18:11	Max/Min temp.: 13–12°C 50% cloud cover, light air (BS 1), dry.	Xenia Snowman Charlie Gardiner Federico Ghittoni Richard Angliss

Four species of bat were recorded during the walked transect of 28th April 2019, these were: common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *P. pygmaeus*, noctule *Nyctalus noctula* and serotine *Eptesicus serotinus*. Some sustained foraging by common pipistrelles was recorded at the southern corner of the site and by a serotine around the clubhouse and car park at the eastern site boundary. Regular foraging activity was also recorded amongst the scattered trees at the northern corner of the site. Other recordings were largely restricted to individual foraging/commuting passes by individual bats.

Five species of bat were recorded within the site during the walked transect of 30th May 2019, consisting of the four species previously recorded and a *Myotis* species. All recordings were limited to <5 passes, with no sustained foraging behaviour recorded during the survey.

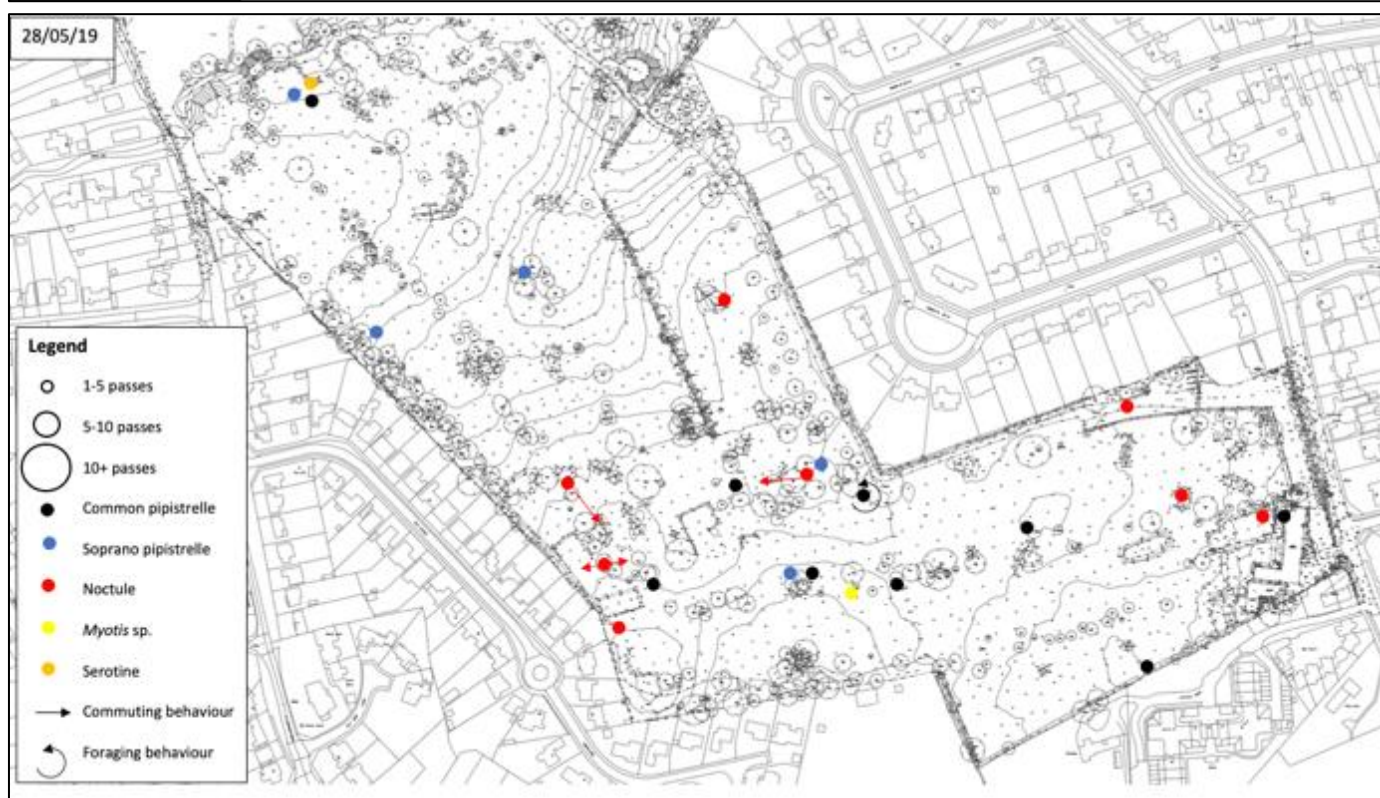


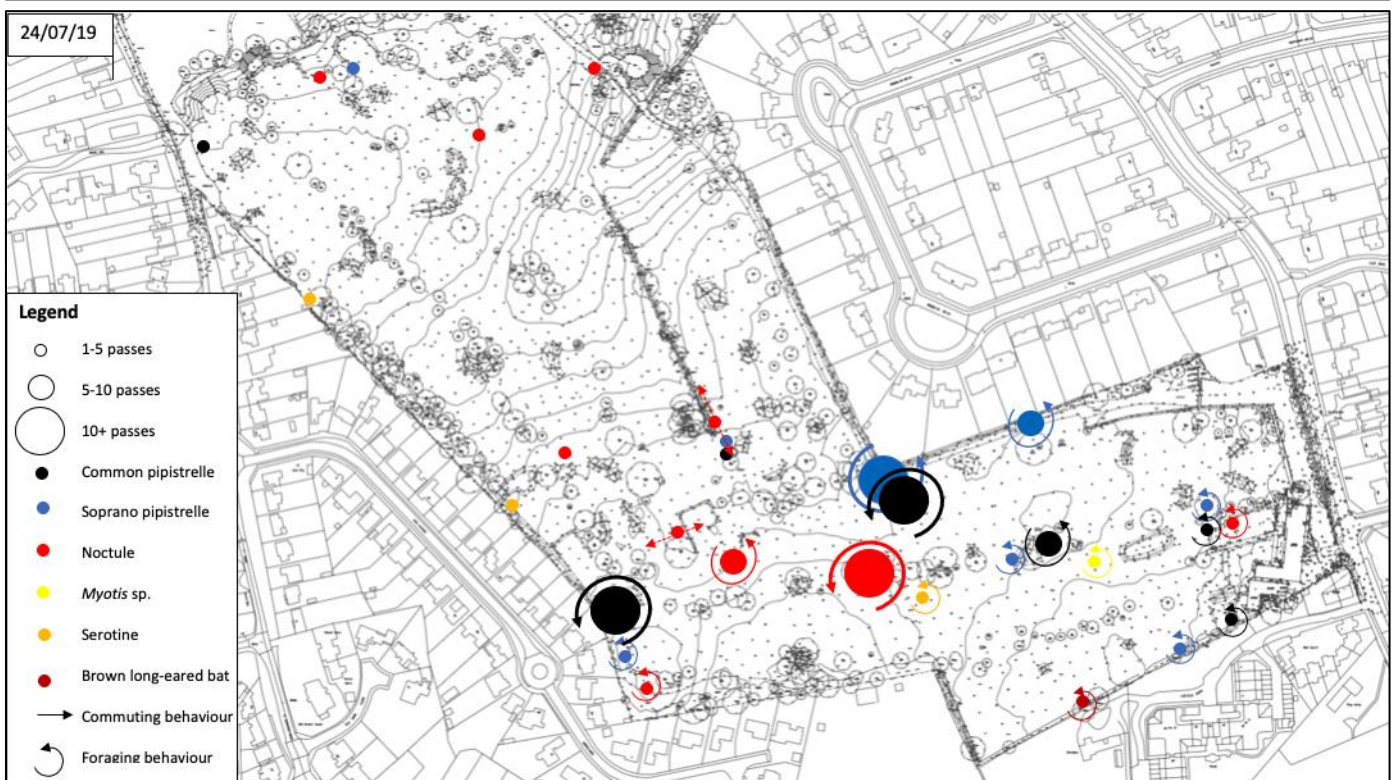
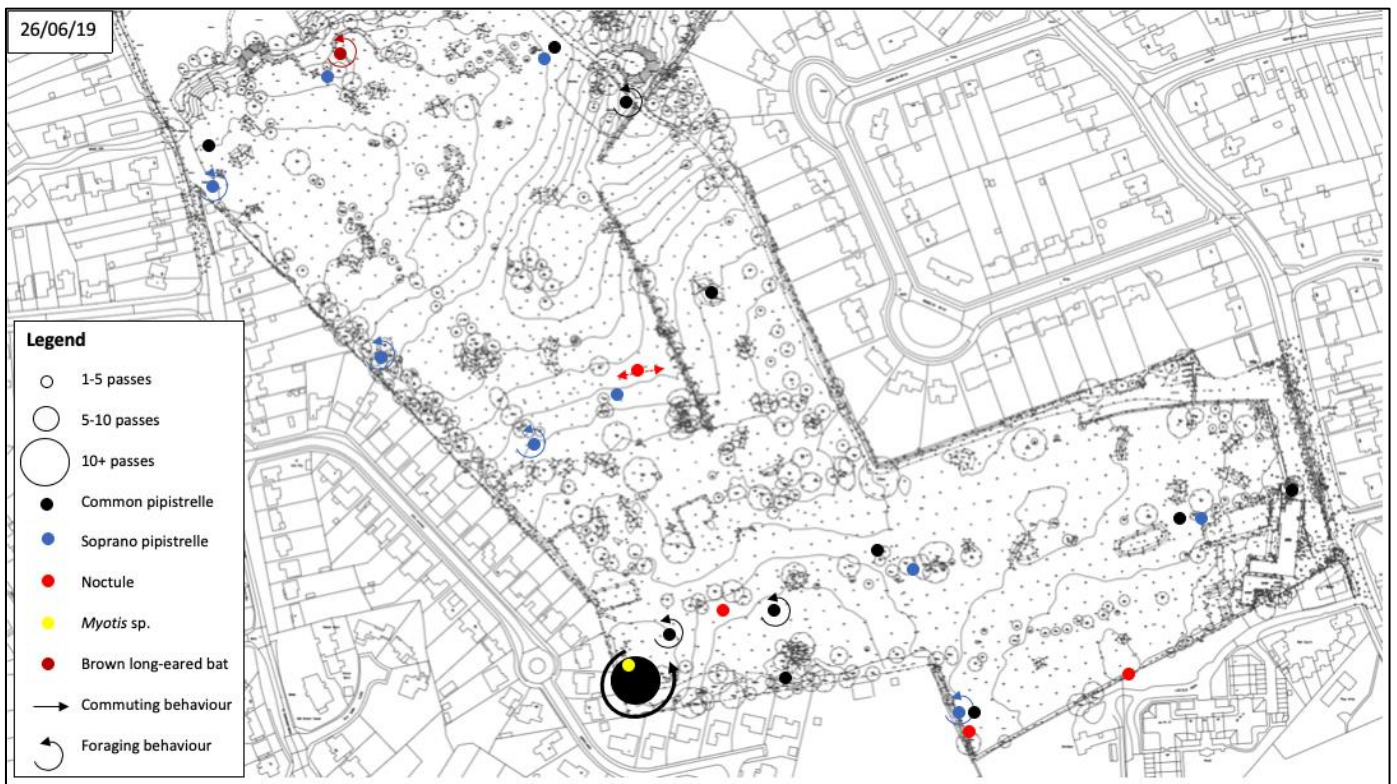
Five species of bat were recorded within the site during the walked transect of 26th June 2019. Some sustained foraging by common pipistrelles was recorded at the southern corner of the site and by a serotine around the clubhouse and car park at the eastern site boundary. Other recordings were largely restricted to individual foraging/commuting passes by individual bats.

Six species of bat were recorded within the site during the walked transect of 24th July 2019, consisting of the five species previously recorded and serotine *Eptesicus serotinus*. Sustained foraging by common pipistrelle, soprano pipistrelle and noctule was recorded within the site at the south-western boundary and towards the norther corner of the site.

Five species of bat were recorded within the site during the walked transect of 28th August 2019. Sustained foraging by common pipistrelle, soprano pipistrelle and noctule was recorded within the site at the south-western boundary and towards the norther corner of the site.

Reduced levels of bat activity were recorded during the final transects of 17th September & 10th August 2019, with five species and three species recorded on the respective dates. Recordings were largely restricted to individual foraging/commuting passes by individual bats with limited sustained foraging behaviour recorded.







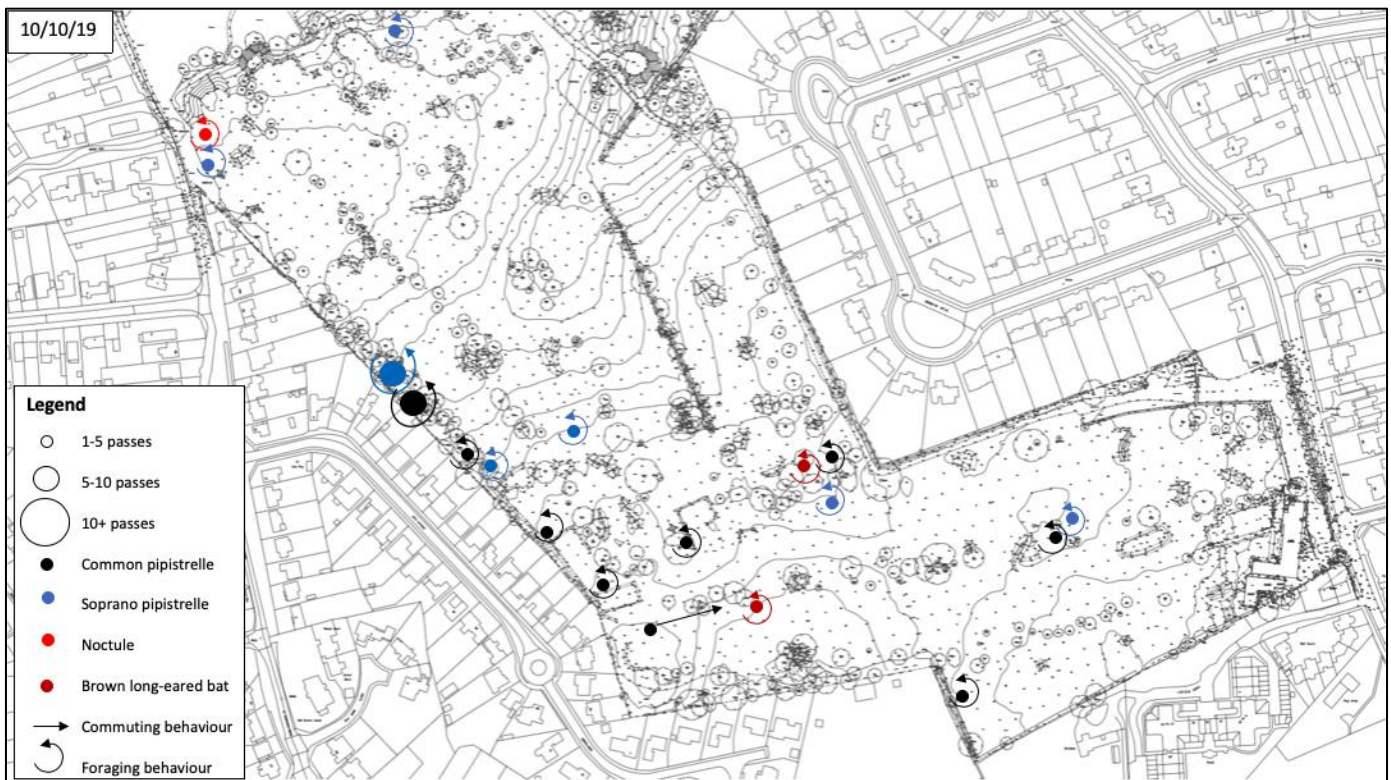


Figure 15. Approximate distribution of bats detected during each walked transect survey at Reading Golf Club.



3.5.4 Bat Activity Surveys – Automated Static Detector Deployment

A total of 3191 bat passes by at least 8 species of bat were recorded within the site over 17 nights between 3rd May and 3rd September 2019.

15 nights of high – moderate/high activity by common pipistrelle and soprano pipistrelle was recorded at the southern corner of the site. Activity by these species was moderate/high – moderate at the south-western site boundary.

Moderate/high – moderate/low activity by *Myotis* spp. was recorded at the southern corner of the site, whilst only low levels of activity by these species was recorded at the south-western boundary.

Activity by serotine, *Plecotus* spp. Nathusius' pipistrelle and barbastelle *Barbastella barbastellus* was restricted to moderate/low – low levels.

Table 9. A table showing the number of nights different levels of bat activity were recorded for each species by each detector at Reading Golf Club. (Green = detector deployed at southern corner, Blue = detector deployed at south-western boundary).

Detect or ID	Species	Nights of High Activity	Nights of Moderate /High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity
Blue	Serotine <i>Eptesicus serotinus</i>	0	0	0	0	1
Blue	<i>Myotis</i> spp.	0	0	0	0	4
Blue	Noctule <i>Nyctalus noctula</i>	0	1	4	3	0
Blue	Common pipistrelle <i>Pipistrellus pipistrellus</i>	0	8	2	1	0
Blue	Soprano pipistrelle <i>P. pygmaeus</i>	0	5	3	0	3
Blue	<i>Plecotus</i> spp.	0	0	0	2	1
Green	Barbastelle <i>Barbastella barbastellus</i>	0	0	0	0	2
Green	Serotine	0	0	0	4	4
Green	<i>Myotis</i> spp.	0	6	8	1	1
Green	Noctule	0	2	6	4	0
Green	Nathusius' pipistrelle <i>Pipistrellus nathusii</i>	0	0	0	2	1
Green	Common pipistrelle	6	9	1	0	1
Green	Soprano pipistrelle	7	8	0	1	0



Green	<i>Plecotus</i> spp.	0	0	0	1	1
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3.5.5 Pre-existing Records

The TVERC provided 492 bat records in the search area comprising 11 identified species within the search area, these are summarised in Table 10.

Table 10. Bat records held by TVERC within a 2km radius of the Reading Golf Club.

Species	Number of Records
Common pipistrelle <i>Pipistrellus pipistrellus</i>	131
Soprano pipistrelle <i>P. pygmaeus</i>	105
Nathusius' pipistrelle <i>P. nathusii</i>	6
Brown long-eared <i>Plecotus auritus</i>	48
Serotine <i>Eptesicus serotinus</i>	6
Noctule <i>Nyctalus noctule</i>	71
Leisler's bat <i>N. leisleri</i>	6
Daubenton's bat <i>Myotis daubentonii</i>	26
Natterer's bat <i>M. nattereri</i>	4
Whiskered bat <i>M. mystacinus</i>	1
Western barbastelle <i>Barbastella barbastellus</i>	1
Unidentified bat species	87

The nearest record of a known roost is of an unknown number of brown long-eared bats roosting within a property located to the immediate east of the site in 2012. This record relates to EPSL Mitigation Licence EPSM2013-6025 referred to in Table 4.

3.5.6 Interpretation

All buildings within the application site have been assessed as having 'negligible' roost potential and roosting bats are considered likely to be absent. The buildings' unsuitability for roosting bats are largely due to their good condition and the modern materials used in their construction.

Opportunities for roosting bats have been identified within a few trees contained within the site. Two trees have been assessed as having 'high' roost potential, with another two specimens assessed as having 'moderate' potential and a single tree was assessed as having 'low' bat roost potential. Further survey work (emergence/re-entry survey) would be required to precisely assess the value of the sites tree roost resource, however with the use of trees by bats changing quite regularly as trees age and decay, this data may be better gathered for a detailed planning application, nearer to the time of the proposed development.

The activity surveys conducted to date have demonstrated that the habitats contained within the development site do support foraging bats. High levels of activity by both the common pipistrelle and soprano pipistrelle were recorded within the site. These species are the most common and widespread of all British species, occur in a wide variety of habitats and are relatively tolerant of human activity. Other common and widespread species include noctule and brown long-eared bat.



The serotine bat is only found in southern England and the very southern edge of Wales and this site is close to the northern range for this species.

Myotis bats are extremely difficult to distinguish to species level from calls, however there are no records for the rare bechsteins *Myotis bechsteinii* or alcahloe *M. alcahloe* within 2km of the site and Alcahloe bats have never been recorded in Berkshire. *Myotis* bats using the site are most likely to be Natterer's bat *M. Nattereri* and/or whiskered bat *M. mystacinus* which are relatively common and widespread.

The recording of Nathusius' pipistrelle and barbastelle within the site is considered significant as these species are uncommon/rare within Berkshire. Nathusius' pipistrelle is a migratory species, whears barbastelle is a woodland species restricted to the south of England.

Given the above information the site is assessed as being of value to foraging/commuting bats at the local level

The site's hedgerows and tree belts provide linear foraging/commuting corridors for all species recorded to date and are considered to be the features of greatest value to bats within the site.

3.6 Breeding Birds

3.6.1 Survey Results

Survey conditions and timings are presented in Table 11.

Table 11. Breeding bird transect metadata: dates, times, temperature, weather conditions.

Date	Survey start time/end time	Temp. degrees centigrade, weather conditions	Surveyors
08/04/19	07:00 – 09:25	Cool (8°C), dry (wet underfoot), overcast (cloud cover 100%), calm (BS 0)	Owen Crawshaw BSc ACIEEM
01/05/19	06:30 – 08:40	Mild (9°C), dry, clear (cloud cover 20%), calm (BS 0)	Owen Crawshaw BSc ACIEEM
29/05/19	06:45-08:45	Mild (11°C), dry, light cloud (90% cloud coverage), calm (BS 0)	Owen Crawshaw BSc ACIEEM
17/06/19	06:55-09:05	Mild (14°C) dry, clear (cloud cover 00%), light breeze (BS 2)	Owen Crawshaw BSc ACIEEM

To date, 33 species of bird were recorded during the survey; of these, 5 species are 'red' listed under



the Birds of Conservation Concern (BoCC) and a further 5 are 'amber' listed. The following species recorded during the survey are also listed under Section 41 of the NERC Act (2006): house sparrow *Passer domesticus*, bullfinch *Pyrrhula pyrrhula*, starling *Sturnus vulgaris*, dunnoek *Prunella modularis* and herring gull *Larus argentatus*. A single Schedule 1 species (red kite) was recorded during each breeding bird survey and an active nest of this species was recorded. Due to the sensitive nature of this information, the exact location of the red kite nest is not provided, however you may contact the Ecology Co-op if more details are required.

Table 12 presents the bird survey results combined for all four visits. Breeding bird maps (showing the spatial distribution of species) are presented in Appendix 3. Table 11 presents the dates, times and survey conditions recorded for each visit.

Table 12. Results of the breeding bird surveys undertaken at Reading Golf Club in 2019.

Common Name	Scientific Name	NERC	Sch 1	BoCC. Status	Count				Breeding Status
					April	May (1)	May (1)	June	
Robin	<i>Erithacus rubecula</i>				3	3	1	1	Likely
House sparrow*	<i>Passer domesticus</i>	✓			0	0	0	0	Likely
Goldfinch	<i>Carduelis carduelis</i>				3	0	3	0	Possible
Bullfinch	<i>Pyrrhula pyrrhula</i>	✓			0	1	0	0	Possible
Blue tit	<i>Cyanistes caeruleus</i>				6	6	2	1	Confirmed
Great tit	<i>Parus major</i>				4	1	1	1	Confirmed
Coal tit	<i>Periparus ater</i>				0	0	1	0	Possible
Long-tailed tit	<i>Aegithalos caudatus</i>				0	6	0	5	Likely
Chiffchaff	<i>Phylloscopus collybita</i>				4	0	1	0	Likely
Blackbird	<i>Turdus merula</i>				1	5	4	4	Likely
Song thrush	<i>T. philomelos</i>				0	1	0	0	Possible
Mistle thrush	<i>T. viscivorus</i>				0	1	0	0	Possible
Wren	<i>Troglodytes troglodytes</i>				0	5	1	3	Likely
Dunnoek	<i>Prunella modularis</i>	✓			0	0	1	0	Likely
Starling	<i>Sturnus vulgaris</i>	✓			8	14	7	7	Possible
Pied wagtail	<i>Motacilla alba</i>				1	2	1	1	Non-breeding



Swift	<i>Apus apus</i>				0	0	14	0	Non-breeding
Great-spotted woodpecker	<i>Dendrocopus major</i>				1	0	0	2	Possible
Green woodpecker	<i>Picus viridis</i>				1	0	2	0	Possible
Magpie	<i>Pica pica</i>				4	9	4	10	Likely
Jackdaw	<i>Corvus monedula</i>				2	1	2	1	Possible
Carrion crow	<i>C. corone</i>				2	3	2	1	Possible
Jay*	<i>Garrulus glandarius</i>				0	0	0	0	Possible
Woodpigeon	<i>Colomba palumbus</i>				15	18	6	7	Likely
Red kite	<i>Milvus milvus</i>		✓		5	1	4	2	Confirmed
Herring gull	<i>Larus argentatus</i>	✓			3	4	0	0	Non-breeding
Lesser black-backed gull	<i>L. fuscus</i>				2	0	0	0	Non-breeding
Black-headed gull	<i>Chroicocephalus ridibundus</i>				0	0	2	1	Non-breeding
Mallard	<i>Anas platyrhynchos</i>				0	1	0	2	Possible
Feral duck	<i>A. sp.</i>				0	1	0	0	Possible
Feral pigeon	<i>Columba livia domestica</i>				0	2	0	0	Non-breeding
Common pheasant	<i>Phasianus colchicus</i>				0	1	0	0	Non-breeding
Red-legged partridge*	<i>Alectoris rufa</i>							0	Non-breeding
*Incidental observations not made during BBS									

3.6.2 Pre-existing Records

The TVERC provided numerous bird records for the search area concerning a total of 44 species. Most of these species are relatively common and widespread, but the list includes 17 species of principle importance for conservation (Section 41, NERC Act 2007), and 15 species listed on Schedule 1 of the Wildlife and Countryside Act. In addition, 21 species are red listed on the Birds of Conservation Concern

3.6.3 Interpretation

The breeding bird surveys have confirmed that the application site's breeding bird assemblage consists largely of common and widespread species typical for suburban environments. A total of 3 red list species (bullfinch, starling, song thrush and mistle thrush) may 'possibly' breed within the site, with



individuals recorded within suitable nesting habitat during the breeding bird surveys. House sparrows (also a red list species) are likely to breed within the site.

Of particular note is the confirmed presence breeding red kites. Historically the red kite was persecuted to the brink of extinction in the UK and was later the subject of a reintroduction program based in the Chiltern Hills (Oxfordshire, Buckinghamshire, Hertfordshire and Bedfordshire) during the 1990's. The species has experienced significant breeding success in recent years and is now very common within the locality of Reading and beyond. The species remains relatively localised in its distribution, but the population is considered to be continuing to expanding its range¹¹.

Based on these findings, the breeding bird assemblage supported by Reading Golf Club is considered to be important for the conservation of birds at local level.

3.7 Dormice

3.7.1 Pre-existing Records

The TVERC holds no records of dormice from within 2km of the application site.

3.7.2 Interpretation

Although significant woodland hedgerow habitat exists within Reading Golf Course much of this exists beyond (to the north) of the application site boundary. A very limited amount of hedgerow (230m) (Photograph 11 & Photograph 12) and woodland (0.2ha) (Photograph 13) exists within the site.

Although woodland and hedgerow habitat provide opportunities for dormice within the site, these features are considered to be sub-optimal for the species. The context of the site and the limited connectivity of those habitats within the site to areas of substantial woodland with an established understory are considered to reduce the likelihood of dormice being present.

¹¹ <https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/bird-a-z/red-kite/conservation/>



Photograph 11. A section of the hedgerow along the southern site boundary.



Photograph 12. A section of the hedgerow along the southern site boundary.



Photograph 13. A section of the woodland located immediately beyond the northern corner of the site.

The TVERC holds no records of the species within 2km of the site and the suburban context of the site within Reading is considered to further reduce the likelihood of the species being present. It is therefore considered highly unlikely that dormice are present within the site and the site is considered to be of negligible importance with regard to dormice.

3.8 Invertebrates

3.8.1 Incidental Observations

Although not observed within the application site, glow worm *Lampyris noctiluca* were recorded elsewhere on the golf course, to the north of the site. The glow worm is listed as a priority species within the Reading Biodiversity Action Plan.

3.8.2 Pre-existing Records

The TVERC holds 397 records of notable/protected invertebrates from within the search area. Of these records, 93 records concern stag beetles *Lucanus cervus* from within the local area.

Notable species of butterfly recorded within the local area include: small heath *Coenonympha pamphilus*, wall *Lasiommata megera*, small blue *Cupido minimus*, white-letter hairstreak *Satyrus alba* and purple emperor *Apatura iris*. All of the butterfly records returned within the data search are >20 years old and are unlikely to provide accurate information regarding the current status of the species within the local area.



The TVERC holds 265 records of 33 species of notable moth from within the search area. Species of moth recorded within the local area include: ghost moth *Hepialus humuli*, forester *Adscita statices*, oak hook-tip *Watsonia binaria*, lackey *Malacosoma neustria*, blood-vein *Timandra comae*, spinach *Eulthis mellinata*, small phoenix *Ecliptopera silaceata*, grey dagger *Acronicta psi* and various other species.

3.8.3 Interpretation

Stag beetles are saproxylic: requiring partially buried deadwood habitat or tree stumps in dappled shade to complete their lifecycle. The woodland habitat contained within the application site is suitable for stag beetles because of the presence of dead wood which may support this species in their larval stage.

Although not recorded within the site, the presence of glow worm within the immediate surroundings may suggest that areas of species-poor semi-improved grassland and woodland within the application site support this species.

Small heath, wall and small blue occur in species-rich grassland habitat, whereas as white-letter hairstreak and purple emperor occur in areas of deciduous woodland, or broadleaved parkland and scattered trees. The wall butterfly and small blue prefer unimproved grasslands and have specific habitat requirements that are not represented on the application site. Given the relatively small amount of woodland and highly managed grassland habitats within the site, notable species of butterfly are likely to be absent from the site.

Many of the moth species listed on Section 41 remain common and widespread but are suspected to have suffered population declines. Research on this issue is on-going and the recorded species are likely to include many of these species where the status is uncertain. The site is likely to support a rich variety of moths including a number of species of principal importance.

The site is considered valuable at a local level in terms of the invertebrate assemblage it supports.

3.9 Reptiles

3.9.1 Survey Results

No reptiles were recorded within the application site or within the wider landholding of Reading Golf Club. The dates and conditions are presented in Table 13.

Table 13. Survey results for the reptile survey undertaken at Reading Golf Club in 2019.

Date	Start/end time	Air temp. °C	Refugia temp. °C	Weather conditions	Results
17/04/2019	12:25-14:23	18	24	Warm, dry, broken cloud (50% cloud coverage), calm (BS 0)	No reptiles recorded
24/04/2019	08:39-09:55	14	16	Warm, dry, cloudy (70% cloud coverage), calm (BS 0)	No reptiles recorded



Date	Start/end time	Air temp. °C	Refugia temp. °C	Weather conditions	Results
29/04/2019	10:24-11:45	14	14	Warm, dry, sunny with broken cloud (20% cloud coverage), Light Air (BS 1)	No reptiles recorded
10/05/2019	13:04-14:20	9	25	Warm, dry, overcast breaking during survey (80% cloud coverage 35% coverage by end), calm (BS 0)	No reptiles recorded
17/05/19	10:48-13:00	10	15	Warm, dry, overcast (100% cloud coverage), light breeze (BS 2)	No reptiles recorded
21/05/19	10:00-11:35	16	25	Warm, dry, clear (5% cloud coverage), calm (BS 0)	No reptiles recorded
28/05/19	15:30-17:15	16	21	Warm, dry (light rain before survey/wet underfoot), overcast (90 % cloud coverage) light breeze (BS 2)	No reptiles recorded

3.9.2 Pre-existing Records

The TVERC returned 24 reptile records in the search area, including: 12 records of slow worm, 11 of grass snake and a single adder record. The closest of these was a slow worm recorded at a location 750m from the boundary of the site in 1992.

3.9.3 Interpretation

Based on the survey results and the absence of recent pre-existing records nearby, the site is considered to be of negligible importance with regard to reptiles.

3.10 Other Notable Species

3.10.1 Incidental Observations

A dead hedgehog was observed within the site on 10th June 2019.

3.10.2 Pre-existing Records

A hedgehog *Erinaceus europaeus* has been recorded from a location to the immediate north of the application site (within the wider landholding of Reading Golf Club).



3.10.3 Interpretation

Hedgerows and woodland provide suitable foraging habitat for hedgehogs and the woodland also creates suitable hibernation opportunities for the species. The site is considered to be of value to hedgehogs at the local level.

Habitats within the site are unsuitable for other protected/notable species of wildlife.

3.11 Invasive Non-native Species

3.11.1 Survey Results

A number of cotoneaster *Cotoneasters* spp. were found within garden hedgerows at the site boundaries during the ecological surveys of the site. Several species of cotoneaster and rhododendron are listed under Schedule 9, Section 14, WCA.

3.11.2 Pre-existing Records

The TVERC provided 24 records of non-native/invasive plants and 1 non-native/invasive mammal (American mink *Neovision vision*) in the search area. The closest of these is a record of *Rhododendron ponticum* from a location 75m to the south of the site, dated from 1985.

3.11.3 Interpretation

Given the context of invasive/non-native species within the site (i.e. planted within adjacent ornamental garden hedges), these species pose relatively low-level threat to native species within the site (see Section 4.9) and are considered to be important at the site level only.



4 IMPACT ASSESSMENT

In this section, the predicted impacts and effects of the proposed scheme are described for each important ecological feature in turn. This is based on the best available information, both on the baseline ecological condition and on the method of construction, timescale and other development/planning constraints known at the time. The significance of the impact on nature conservation is recorded in accordance with CIEEM guidance and the degree of uncertainty relating to the occurrence and severity of an impact is discussed.

This assessment is based on the most up to date available plan shown on “Reading Golf Club, Kidmore End Road, Emmer Green, Reading – Indicative Site Layout” (Drawing number 1903/PA.04 Rev B), as supplied by Fairfax (Reading) Limited and Reading Golf Club Limited Ltd on 12th June 2019.

The proposed scheme comprises redevelopment of approximately 12ha of the golf course into residential housing with a medical centre and associated: access roads, hard and soft landscaping, private garden space and areas of public open space. The scheme makes use of existing vehicle access off Kidmore End Road.

Activities that will occur during the proposed construction and operational phases that could give rise to significant ecological impacts include:

Construction:

- Direct harm from pollution, noise, lighting, vibration and the movement of people and construction machinery
- Soil compaction
- Habitat severance caused by construction works on-site
- Habitat destruction during site clearance activities

Post construction/Operation:

- Permanent habitat loss
- Chronic disturbance from noise, lighting, vibration and the movement of people, vehicles on-site;
- Increased recreational use of adjacent habitats leading to soil compaction, human/dog disturbance, littering, physical damage to trees.
- Increase in numbers of people and pets on site.

4.1 Designated Sites

4.1.1 Impact Characterisation

Reading Golf Course (east) LWS exists within the application site's immediate zone of influence and within the landholding of the wider golf course. The proposed development will not result in any foreseeable direct impacts on the LWS during the construction phase, given the distance between the application site and the LWS (200m). However, the increased levels of human activity within the application site have the potential to indirectly impact on the LWS, particularly in combination with other potential development projects across the remaining area of golf course that may be proposed in future.



Increased human recreational activity could lead to a degradation of Lowland Mixed Deciduous Woodland and Lowland Calcareous Grassland habitats through damage to vegetation, compaction and erosion of soils, localised nutrient enrichment (deposition of dog waste), disturbance to wildlife and litter accumulation/fly tipping.

To a lesser extent, the above potential impact also applies to the Chilterns Dipslope and Plateau CTA, however the CTA is designated primarily as an area identified for potential landscape-wide targeted biodiversity enhancement as opposed to existing ecological features and is therefore less susceptible to damage.

There are no foreseeable impacts on other statutory/non-statutory sites of nature conservation importance (SNCIs)

4.1.2 Significance of Impacts

In the absence of mitigation the potential impacts of the proposed development represent **possible adverse** effects on designated sites, considered to be significant at the **county** level.

4.2 Priority Habitats

4.2.1 Impact Characterisation

The priority hedgerow habitat at the southern site boundary is retained as part of the scheme design. However, there remains potential risk of damage to this habitat to occur through construction activities nearby affecting the root systems and compaction of the surrounding soils.

During the operational phase of the development the hedgerow will form the curtilage boundaries for residential gardens and gardens surrounding the medical centre and will form part of the screening for the site. There are no foreseeable direct impacts on the priority hedgerows during the operation of the site, although there is an increased risk of litter accumulation/fly tipping.

With the retention and protection of the priority Lowland Mixed Deciduous Woodland at the northern corner of the site there will no direct impacts on this habitat during the construction phase.

The increased levels of human activity within the site will result in increased usage of the footpath bisecting the woodland at the northern corner of the site. The increased human activity has the potential to result in the degradation of the priority woodland habitat for the same reasons as set out in 4.1.1.

4.2.2 Significance of Impacts

Based on the above, in the absence of mitigation, the proposed development represents **possible adverse** effects on priority woodland habitat, considered to be significant at the **local** level.

4.3 Badgers

4.3.1 Impact Characterisation

Given the likely absence of active badger setts within the site and the immediate surroundings the



proposed development will not result in any foreseeable impacts on sheltering badgers or their setts. There is no proposed hard-landscaping within 30m of the inactive outlier badger sett identified at the northern corner of the site. Should this sett become active in the future it is situated a sufficient distance from the construction zone that disturbance as a result of noise/vibration is unlikely to occur.

Without the adoption of precautionary measures there is potential for badgers to become trapped/injured/killed by uncovered excavations during construction.

The scheme will result in the temporary loss of grassland habitats that are potentially important to badgers for foraging. However, suitable foraging habitat for badgers exists all around the construction zone and this loss represents a small proportion of the total resource available. Following completion of the construction, new foraging opportunities will become available through soft landscaping (e.g. public open spaces and domestic gardens).

4.3.2 Significance of Impacts

Uncovered excavations pose a risk of **possible adverse** effects on individual badgers as a result on entrapment/killing/injury which is likely to be significant at the **site** level.

Badgers are generally quite adaptable to some degree of human disturbance, with foraging, commuting routes and occupation or establishment of new setts, constantly adjusting in response to new food sources and disturbance, so this impact is considered to be **neutral**.

4.4 Bats

4.4.1 Impact Characterisation

Demolition of existing buildings within the site will have no foreseeable impacts on bats given the unsuitability of the structures to function as roosts. Furthermore, with the retention of all trees identified as having roost potential there are no direct foreseeable impacts on bat roosts in trees.

In the absence of mitigation, artificial light-spillage onto trees identified as having bat roost potential could deter roosting bats. Light-spillage onto linear features (hedgerows and tree belts) also has the potential to impact upon bat activity within the site.

4.4.2 Significance of Impacts

Light-spillage onto trees identified as having bat roost potential present a **possible adverse** impact significant at the **site/local** level (dependant on the species affected and the nature of any roosts impacted upon, if any).

Increased artificial lighting is considered to affect foraging/commuting bats and will predominantly affect common and widespread species. The survey effort has confirmed moderate/low – low activity of rarer bat species (Nathusius' pipistrelle and barbastelle) within the site. As such, this impact represents a **likely adverse** effect significant at the **local** level.



4.5 Breeding Birds

4.5.1 Impact Characterisation

Without sensitive timing to works, the proposed development has the potential to result in the disturbance to a pair of nesting red kites during the construction phase as a result of increased noise, human activity and construction traffic.

Increased human activity during the operational phase of the development has the potential to permanently deter a pair of red kites from returning to the existing nest site.

Any vegetation removal during the breeding bird season has the potential to result in the destruction of active bird nests and the killing/injury of eggs/young.

The bird assemblage supported by the application site comprises common and widespread species only. This bird assemblage is likely to be partially displaced during construction, but many of these species are also found in suburban habitats similar to that resulting from the proposed scheme and are likely to return to some degree (e.g. robin, dunnock, song thrush) once construction is completed and the soft landscaping matures.

4.5.2 Significance of Impacts

Destruction of active bird nests and the disturbance of a species listed on Schedule 1 of the Wildlife & Countryside Act, 1981 would result in a **certain adverse** effect significant at the **local** level and would be in contravention of UK wildlife legislation.

Suitable alternative nesting habitat for red kites exists within woodland contained within the wider landholding of the golf course and around the application site. The species is common and widespread within Oxfordshire and Berkshire. Increased human activity presents a **likely adverse** effect on breeding birds considered to be significant at the **site** level only.

The addition of buildings, garden and landscape planting will potentially provide enhanced opportunities for nesting birds and is **likely** to result in a **positive** effect significant at the **site** level.

4.6 Dormice

4.6.1 Impact Characterisation

Given that dormice are considered highly unlikely to be present within the site and the fact that all hedgerow and woodland habitat will be retained and protected within the site, there are no foreseeable impacts on this species as a result of the development.

4.6.2 Significance of Impacts

Impacts on dormice are considered to be **negligible**.



4.7 Invertebrates

4.7.1 Impact Characterisation

The proposed development will result in the temporary loss of extensive areas of amenity grassland and small areas of semi-improved grassland. These habitats are unlikely to support important invertebrate assemblages. The hedgerows, scattered semi-mature/mature trees and woodland that has higher potential value to invertebrates is retained within the development.

The creation of new residential gardens and areas of public open space will potentially create new habitat for a variety of invertebrates through the soft landscaping scheme and domestic gardens.

4.7.2 Significance of Impacts

The adverse effects resulting from the temporary loss of low-value amenity grassland and semi-improved grassland habitat within the site is considered to be outweighed by the likely positive effects resulting from new habitat creation within the developed site. The proposed development will **likely** result in an overall **positive** effect on invertebrate assemblages and populations at the **site** level.

4.8 Other Notable Species

4.8.1 Impact Characterisation

Without the adoption of precautionary measures there is potential for hedgehogs to become trapped/injured/killed by uncovered excavations.

Small-scale loss of semi-improved grassland will result in the temporary loss of foraging habitat for hedgehogs. This habitat will be replaced by residential development and the associated mosaic of private gardens and greenspace created would, in time, become suitable for hedgehogs and largely replace the habitat lost. In the absence of mitigation, there remains a risk of direct harm to hedgehogs during construction activities. In the long term, the proposed development could result in fragmentation of hedgehog foraging and resting areas as fencing between properties could restrict the movement of hedgehogs.

4.8.2 Significance of Impacts

The hedgehog has suffered dramatic declines in population in recent decades, although it remains fairly widespread and has declined less in urban areas than rural areas¹² Without appropriate mitigation the development would **likely** cause an **adverse** effect on hedgehogs at the **local level**.

4.9 Invasive Non-native Species

4.9.1 Impact Characterisation

Cotoneaster will remain within adjacent garden hedges (not within the site ownership) at the edge of

¹² (Warwick, H. (2016) Britain's Hedgehogs: research and the conservation effort in the face of serious decline. British wildlife Vol. 28, pp78-86).



the developed site.

Planting schemes have yet to be prepared, however should these include invasive/non-native species (such as those listed on Schedule 9 of the Wildlife & Countryside Act, 1981) there is potential for establishment within the site and spread beyond the application site.

4.9.2 Significance of Impacts

In the absence of precautionary measures, the development presents opportunity for a **possible adverse** effect on ecology at the **local** level, through the spread of invasive non-native species.

5 MITIGATION PROPOSALS

5.1 Designated Sites

5.1.1 Impact Avoidance

The proposed scheme does not result in any direct loss of designated site habitats and no specifically designed avoidance measures are necessary.

5.1.2 Mitigation Measures

A Habitat and Visitor Management Plan for Reading Golf Course (east) LWS site will be prepared in order to manage recreational pressure on the designated site. The plan will include control measures such as fencing, dead hedging as 'soft barriers', signage and appropriate access restrictions to reduce damage to the most important habitats. Further, there should be a review of the current management regime of the site, and introduction of management to maximise biodiversity value of the site to safeguard existing designated features (e.g. scrub clearance, grazing/cutting of calcareous grassland). An appropriate monitoring regime can be put in place to ensure that the management measures for the site are successful and if necessary can be altered to achieve the desired outcomes.

5.1.3 Residual Impacts

With the adoption of a suitable management/enhancement scheme (secured through the development) it is considered that the proposed development could result in a positive impact at the local level.

5.1.4 Compensation Measures

With the adoption of a suitable management/enhancement scheme (secured through the development) no specific compensation is considered necessary.

5.2 Priority Habitats

5.2.1 Impact Avoidance

The southern hedgerow boundary should be retained and protected in accordance with BS5837:2012 and the establishment of a 2m wide buffer strip to protect roots of the feature.



A 15m buffer should be established around the small area of priority woodland habitat present at the northern corner of the site in accordance with current national planning policy.

5.2.2 Mitigation Measures

To prevent impacts from increased recreational pressure, measures shall be put in place to maintain the existing access routes and deter further public access into the woodland. These measures will include improvement of the existing path bisecting the woodland, together with strategic use of dead-hedging and fencing to restrict access to more sensitive areas. The soft landscape scheme shall include planting of dense thorny shrubs such as hawthorn and blackthorn around the woodland edges to discourage uncontrolled access.

The above measures shall be set out in detail through the adoption of a Landscape and Ecology Management Plan (LEMP) for the development site and secured through the planning system.

5.2.3 Residual Impacts

With the adoption of impact avoidance and suitable mitigation measures it is considered that residual impacts on priority habitats are negligible.

5.2.4 Compensation Measures

Given that all areas of priority habitat will be retained within the site, and adoption of mitigation measures to reduce degradation of woodland, no specific compensation measures are required.

5.3 Badgers

5.3.1 Impact Avoidance

All excavations should be covered at night to prevent badgers falling into any pits, failing that an escape mechanism should be provided to allow badgers (and other wildlife) to climb out of an excavation.

Updated badger surveys should be conducted every 6 months in order to confirm the continued absence of active setts or to inform badger mitigation strategy (see following section).

5.3.2 Mitigation Measures

Should badgers move on to the site and take up residence within a sett in the construction zone or its immediate zone of influence (within 30m), a badger mitigation strategy will be required which will include consideration of the need for a development licence to close the sett from Natural England.

5.3.3 Residual Impacts

With the adoption of the above avoidance/mitigation measures, the potential for residual impacts on badgers within the site is considered to be negligible.

5.3.4 Compensation Measures

Given that no residual impacts have been identified, no specific compensation measures are required with regard to badgers.



5.4 Bats

5.4.1 Impact Avoidance

All trees with potential for roosting bats will be retained within the development.

It is important that the proposed scheme incorporates a 'sensitive lighting plan' developed as part of the detailed design, in accordance with guidelines set out by the Bat Conservation Trust. (summarised in Appendix 5). This should include measures to create 'dark corridors' through the development site along the retained hedgerows and tree belts, and measures to minimize light spill onto all semi-natural habitats. All street lighting should be directed downwards and use light sources that are not attractive to insects. Reflective white line marking should be used in preference to artificial lighting in all non-essential applications.

The 2019 bat survey data is considered valid for up to 18 months from the date of the surveys. Should more than 18 months pass prior to the commencement of works updated surveys may be necessary to re-assess the site's value to roosting and foraging bats.

5.4.2 Mitigation Measures

No specific mitigation measures are currently required. Should the assessment of the site's roost resource or foraging/commuting habitat value change a bat mitigation strategy will be required.

5.4.3 Residual Impacts

With the adoption of the above avoidance and mitigation measures residual impacts on roosting and foraging bats are considered to be negligible.

5.4.4 Compensation Measures

Given that no residual impacts have been identified, no specific compensation is considered necessary with regard to roosting/foraging bats.

5.5 Breeding Birds

5.5.1 Impact Avoidance

Any vegetation removal should only be undertaken outside of the breeding bird season (avoiding March-August inclusive).

It is an offence to cause disturbance to an active nest of any bird species listed on Schedule 1 of the Wildlife and Countryside Act (1981) as amended. The identified red kite nest should be subjected to monitoring prior to the commencement of works. If construction works are to be undertaken within a 50m radius of the nest site during the breeding bird season (March August inclusive) these will only be permitted if a suitably qualified ecologist can confirm that the nest is currently inactive.

5.5.2 Mitigation Measures

There is no provision for a licence from Natural England to permit development works that cause



disturbance and would otherwise be unlawful. It is not considered possible to mitigate for displacement of nesting red kites as the species is not known to adopt artificial nest sites.

5.5.3 Residual Impacts

There remains a risk that the developed site may deter red kites from returning to the nest site. They will likely be displaced into the immediate surroundings which contain suitable alternative nest sites. It is not considered possible to mitigate for this displacement as the species is not known to adopt artificial nest sites.

The residual impact resulting from the displacement of a single pair of red kites into adjacent habitat is not considered to be significant beyond the site level given the context of the species abundance within the local area.

5.5.4 Compensatory Measures

Compensation for the displacement of a pair of red kites is not required.

5.6 Other Notable Species

5.6.1 Impact Avoidance

All excavations should be covered at night to prevent hedgehogs falling into any pits, failing that an escape mechanism should be provided to allow hedgehogs (and other wildlife) to climb out of an excavation.

5.6.2 Mitigation Measures

All new garden fencing should contain accessible gaps (10cm x 15cm) at their base to allow movement of hedgehogs between garden plots. An ecological permeability plan (showing hedgehog movement routes) should be included in the LEMP.

5.6.3 Residual Impacts

With the adoption of the above avoidance/mitigation measures, in conjunction with creation of new garden habitats, the proposed development presents a likely positive impact on hedgehogs at the site level.

5.7 Invasive Non-native Species

5.7.1 Impact Avoidance

Impacts resulting from non-native species will be avoided through the adoption of native planting schemes.

Seed mixes and tree/shrub planting schemes should be detailed within a site-wide LEMP.

5.7.2 Mitigation Measures

No specific mitigation measures are currently required.



5.7.3 Residual Impacts

With the adoption of the above avoidance measures, residual impacts resulting from invasive non-native species are considered to be negligible.

6 BIODIVERSITY ENHANCEMENTS

Biodiversity enhancement within the developed site should include:

- Native tree/shrub planting and management
- Species-rich grassland creation and management
- Native hedgerow planting and management
- Provision of integrated and externally mounted bat roosting features
- Provision of integrated and externally mounted bird nesting features
- Hedgehog houses
- Hedgehog movement corridors
- Insect houses
- Log piles

These features must be detailed within a site-wide LEMP and shown on a Biodiversity Enhancement Plan that sets out accurately the total area of each new habitat created, provides a detailed planting plan for each new habitat/feature and where necessary a method for establishment/installation.

In accordance with the National Planning Policy Framework, 2019, the development will seek to achieve a 10% net gain in biodiversity. This will be achieved through on-site enhancement or biodiversity offsetting elsewhere in the local area. An LEMP, incorporating a Biodiversity Impact Calculation (using the DEFRA Metric 2.0) will be produced to demonstrate how high-value habitat will be created and managed to achieve a 10% net gain in biodiversity.

7 CONCLUSIONS

A summary of the EclA process is presented in Table 15 below.

Table 14. Summary Table of the impacts of the development at Reading Golf Course.

Ecological feature	Importance	Impact characterisation	Level of significance	Avoidance/ Mitigation	Residual impact	Compensation required? (Y/N)
Reading Golf Course (east) LWS	County	Degradation of habitat through increased human activity	County	Reading Golf Course (east) LWS Habitat and Visitor Management Plan	Unknown	Unknown
Priority habitats contained within site	District	Potential degradation of woodland through	Site	Improvement of existing public access route	Site/ negligible	N



Reading Golf Club – ECOLOGICAL IMPACT ASSESSMENT

Ecological feature	Importance	Impact characterisation	Level of significance	Avoidance/Mitigation	Residual impact	Compensation required? (Y/N)
		increased human activity		Planting up of woodland edges to deter access		
Badgers	Site	Loss of foraging habitat	Site	Appropriate Construction methods	Negligible	N
Foraging and commuting bats	Local	Temporary loss of foraging habitat and change of habitat characteristics Deterrence as a result of light-spillage	Local	Biodiversity enhancements incorporated into soft landscape and drainage schemes; ecologically sensitive lighting design	Negligible	N
Roosting bats (trees)	Local/Site	No impact	Negligible	Sensitive lighting	Negligible	N
Breeding bird assemblage	Local	Disturbance to nesting red kites Displacement of red kites Small-scale loss of nesting habitat for common species	Site	Appropriate Construction methods (timed outside breeding season); monitoring and red kite exclusion zone	Site	N
Invertebrates	Local	Temporary loss of habitat and change of habitat characteristics	Site	Biodiversity enhancements incorporated into soft landscape	Potentially local positive impact	N
Other notable species: European hedgehog	Local	Temporary loss of foraging habitat and change of habitat characteristics	Site	Appropriate Construction methods Provision of hedgehog movement corridors	Potentially local positive impact	N



8 APPENDIX 1 – LEGISLATION AND POLICY

Introduction

The following text is intended for general guidance only and does not constitute comprehensive professional legal advice. It provides a summary of the current legal protection afforded to wildlife in general and certain species. It includes current national planning policy relevant to nature conservation.

The ‘Birds Directive’, ‘Habitats Directive’ and ‘Natura 2000 Sites’.

The Council Directive 79/409/EEC on the Conservation of Wild Birds (“the Birds Directive”) sets a framework for the protection of wild birds. Under the directive, several provisions are made including the designation and protection of ‘Special Protection Areas’ (SPAs) – areas which support important bird populations, and the legal protection of rare or vulnerable species.

The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the “Habitats Directive”) directs member states of the EU to take measures to maintain favourable conservation status of important habitats and species. This requires the designation of a series of sites which contain important populations of species listed on Annex II of the directive. Together with ‘Special Areas of Conservation’ (SPAs), designated under the Birds Directive, SACs form a network across Europe of protected areas known as the ‘Natura 2000’.

Annex IV lists species in need of more strict protection, these are known as “European Protected Species (EPS)”. All bat species, common dormice *Muscardinus avellana*, otter *Lutra lutra* and great crested newts *Triturus cristatus* are examples of EPS that are regularly encountered during development projects.

The ‘Habitats Regulations’

The Conservation of Habitats and Species Regulations 2010 (the Habitats Regulations”) is the principle means of transposing the Habitats Directive and the Birds Directive, and updates the Conservation (Natural Habitats, &c.) Regulations 1994 (“the 1994 regulations”) in England and Wales.

‘Natura 2000’ sites receive the highest level of protection under this regulation which requires that any activity within the zone of influence of these sites would be subject to a Habitats Regulations Assessment (HRA) by the competent authority (e.g. planning authority), leading to an Appropriate Assessment (AA) in cases where ‘likely significant effects on the integrity of the site are identified.

For European Protected Species, Regulation 41 makes it a criminal offence to;

- Deliberately capture, injure or kill any such animal;
- Deliberately disturb wild animals of such species;
- Deliberately take or destroy their eggs (where relevant);
- Damage or destroy a *breeding or resting place* of such an animal;
- Possess, control, sell or exchange any live or dead animal or plant, of such species;
- Deliberately pick, collect, cut, uproot or destroy a wild plant of such species.

The Habitats Directive and Habitats Regulations provide for the derogation from these prohibitions for specific reasons provided certain conditions are met. An EPS licensing regime allows operations that would otherwise be unlawful acts to be carried out lawfully. Natural England is the licensing Authority



and, in order to grant a license, ensures that three statutory conditions (sometimes referred to as the ‘three derogation tests’) are met:

- A licence can be granted for the purposes of “preserving public health or safety or for other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment” (Regulation 53 (2) (e).
- A licence can be granted if “there are no satisfactory alternatives” to the proposed action.
- A licence shall not be granted unless the action authorised will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range.

Wildlife and Countryside Act (1981) as amended.

The Wildlife and Countryside Act (1981)¹³ remains one of the most important pieces of wildlife legislation in the UK. There are various schedules to the Act protecting birds (Schedule 1), other animals including insects (Schedule 5), plants (Schedule 8), and control of invasive non-native species (Schedule 9).

Under the Wildlife and Countryside Act (WCA) 1981, all wild birds (with the exception of those listed on Schedule 2), their eggs and nests are protected by law and it is an offence to:

- Take, damage or destroy the nest of any wild bird while it is in use or being built.
- Take or destroy the egg of any wild bird.
- Disturb any bird listed on Schedule 1, while it is nest building, or at a nest with eggs or young, or disturb the dependant young of any such bird.

Schedule 5 lists all non-avian animals receiving protection to a varied degree. At its strongest, the Act makes it an offence to intentionally kill, injure or take any wild animal listed on Schedule 5, and prohibits interference with places used for shelter or protection, or intentionally disturb animals while occupying such places. Examples of species with *full protection* include all EPS, common reptile species, water vole *Arvicola amphibius*, white-clawed crayfish *Austropotamobius pallipes* and Roman snail *Helix pomatia*. Other species are protected from sale, barter or exchange only, such as white letter hairstreak *Satyrrium w-album*.

The Act makes it an offence to intentionally pick, uproot or destroy any plant or seed, and sell or possess any plant listed on Schedule 8. It is also an offence to intentionally uproot any wild plant not listed on Schedule 8 unless authorised [by the land owner]. Species on Schedules 5 and 8 are reviewed every 5 years when species can be added or removed.

Measures for the prevention of spreading non-native species which may be detrimental to native wildlife is included in the Act, which prohibits the release of animals or planting of plants into the wild of species listed on Schedule 9 (for example Japanese knotweed *Fallopia japonica*, Himalayan balsam *Impatiens glandifera*, New Zealand Pygmyweed *Crassula helmsii*).

The Wildlife and Countryside Act 1981 (as amended) also prohibits certain inhumane methods of traps and devices for the capture or killing of wild animals and certain additional methods such as fixed trap, poisoning with gas or smoke, or spot-lighting with vehicles for killing species listed on Schedule 6 of the Act (this includes all bat species, badger, otter, polecat, dormice, hedgehog and red squirrel).

¹³ Wildlife and Countryside Act (WCA) (1981). HMSO London.



Natural Environment and Rural Communities (NERC) Act (2006)

The NERC Act (2006)¹⁴ places a statutory duty under Section 40 on all public bodies, including planning authorities, to take, or promote the taking by others, steps to further the conservation of *habitats and species of principal importance for the conservation of biodiversity* in England (commonly referred to as the 'Biodiversity Duty'). This duty extends to all public bodies the biodiversity duty of Section 74 of the Countryside and Rights of Way (CROW) Act 2000, which placed a duty only on Government and Ministers. Section 41 lists the habitats and species of principle importance. This includes a wide range of species from mosses, vascular plants, invertebrates through to mammals and birds. It originates from the priority species listed under the UK Biodiversity Action Plan (UK BAP) with some omissions and additions.

Protection of Badgers Act (1992)

The Badger *Meles meles* is afforded specific legal protection in Britain under the Protection of Badgers Act (1992)¹⁵, and Schedule 6 of the Wildlife and Countryside Act 1981 (as amended) (see above).

Under this legislation, it is a criminal offence to:

- intentionally kill, injure, take, possess, or cruelly ill-treat, a Badger, or to attempt to do so;
- interfere with a sett, by damaging or destroying it;
- to obstruct access to, or any entrance of, a Badger sett; or
- to disturb a Badger when it is occupying a sett.

A licence may be obtained from Natural England to permit certain prohibited actions for a number of defined reasons including interference of a sett for the purpose of development, provided that a certain number of conditions are met. Note that licenses are not normally granted for works affecting badgers between the end of November and the start of July.

National Planning Policy Framework

The National Planning Policy Framework (NPPF 2019)¹⁶ sets out the Government's view on how planners should balance nature conservation with development and helps ensure that Government meets its biodiversity commitments regarding the operation of the planning system.

Paragraph 174b, which states that council policies should “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”. In accordance with the NPPF, it is important that developments should contribute to and enhance the natural and local environment by:

- Minimising impacts on existing biodiversity and habitats,

¹⁴ Natural Environment and Rural Communities Act (2006). HMSO London.

¹⁵ Protection of Badgers Act (1992). HMSO London.

¹⁶ HM Government (2019). National Planning Policy Framework. Department for Communities and Local Government. Available online at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/779764/NPPF_Feb_2019_web.pdf.



- Providing net gains in biodiversity and habitats, wherever possible,
- establishing coherent ecological networks that are more resilient to current and future pressures.

UK Post-2010 Biodiversity Framework

The UK Biodiversity Action Plan (UK BAP), published in 1994, was the UK's response to the commitments of the Rio Convention on Biological Diversity (1992). The UK BAP was replaced by the UK Post-2010 Biodiversity Framework. This framework covers the period 2011 to 2020 and forms the UK government's response to the new strategic plan of the United Nations Convention on Biodiversity (CBD) published in 2010. This promotes a focus on individual countries delivering target for protection for biodiversity through their own strategies.

The most recent biodiversity strategy for England, 'Biodiversity 2020: A strategy for England's wildlife and ecosystem services' was published by Defra (2011)¹⁷, and a progress update was provided in July 2013 (Defra 2013)¹⁸.

'Biodiversity 2020' builds on the Natural Environment White Paper for England – 'The Natural Choice', published on 7 June 2011, and sets out the strategic direction for biodiversity policy for the next decade.

Biodiversity 2020 deliberately avoids setting specific targets and actions for local areas because Government believes that local people and organisations are best placed to decide how to implement the strategy in the most appropriate way for their area or situation.

Birds of Conservation Concern (BoCC)

In 1996, the UK's leading non-governmental bird conservation organisations reviewed the conservation status of all bird species in the UK against a series of criteria relating to their population size, trends and relative importance to global conservation. The lists, known as the 'Red', 'Amber' and 'Green' lists (in order of decreasing concern) are used to inform key conservation policy and decisions. The lists are reviewed every 5 years and are a useful reference for determining the current importance of a particular site for birds. The most recent review was undertaken in 2015¹⁹ (Eaton et al, 2015), which provides an up to date assessment of the conservation status of birds in the UK.

¹⁷ Defra (2011) Biodiversity 2020: A strategy for England's wildlife and ecosystem services. Available at: <https://www.gov.uk/government/publications/biodiversity-2020-a-strategy-for-england-s-wildlife-and-ecosystem-services>.

¹⁸ Defra (2013) Progress Update. Available at: <https://www.gov.uk/government/publications/biodiversity-2020-simple-guide-and-progress-update-july-2013>.

¹⁹ Eaton, M., Aebischer, N., Brown, A., Hearn, R., Lock, L., Musgrove, A., Noble, D., Stroud, D., and Gregory, R. (2015) Birds of Conservation Concern 4: the population status of birds in the UK, Channel Islands and Isle of Man. British Birds 108. December 2015. 708–746



9 APPENDIX 2 – IMPORTANCE OF ECOLOGICAL FEATURES

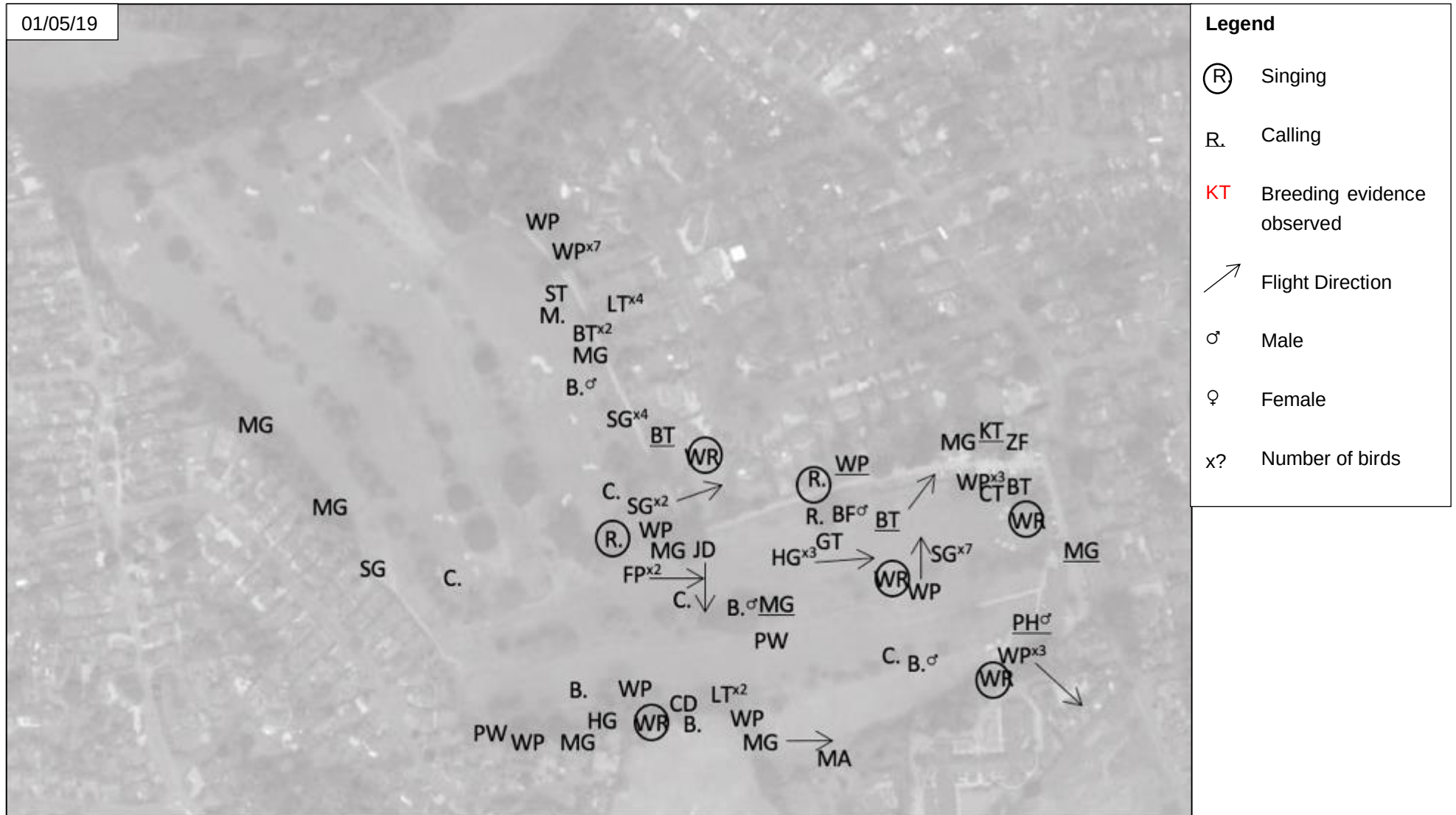
Table 1: Determining importance of an ecological feature

Level of importance	Criteria
International	Internationally designated site; Special Protected Area (SPA), Special Areas of Conservation (SAC), Ramsar, Biosphere Reserves; Regularly occurring population of internationally important species listed in Annex 1, 2 or 4 of the Habitats Directive and Annex 1 of the Birds Directive; A viable area of a habitat listed in Annex 1 of the Habitats Directive or area important for maintaining viability listed as in Annex 1 of the Habitats Directive; Areas outside designated sites that are important for supporting and maintaining the viability of the above designated habitats and/or species.
National	Nationally designated sites; Site of Special Scientific Interest (SSSI), National Nature Reserve (NNR), Local Nature Reserves (LNR). A sufficiently large population of a species or area of habitat listed as a priority for nature conservation (S41 NERC Act) to make a significant contribution to the national conservation status (e.g. greater than 1% of the national total). A viable or regularly occurring population of a species that is nationally scarce, threatened or declining on a national scale. A habitat type that is nationally scarce, threatened or declining on a national scale.
Regional	A habitat type that is scarce, threatened or declining on a regional scale. A sufficiently large population of a species or area of habitat listed as a priority for nature conservation (S41 NERC Act) to make a significant contribution to the regional conservation status (e.g. greater than 1% of the national total).
County	Locally designated sites; Local Wildlife Sites (LWSs), Sites of Nature Conservation (SNCIs) and Site of Importance for Nature conservation (SINCs). A sufficiently large population of a species or area of habitat listed as a priority for nature conservation (S41 NERC Act) to make a significant contribution to the conservation status of the species at county level (e.g. greater than 10% of the county total). A viable or regularly occurring population of a species that is rare in the county, but may be common and widespread elsewhere, For example, a population at the edge of a species' range. A habitat type that is scarce in a county but may be more frequent elsewhere.
Local/parish	Habitats and species which are scarce in the local area but are sufficiently common and widespread elsewhere that they do not meet the above criteria.
Site / negligible	Habitats with little to no ecological value (e.g. amenity grassland and hardstanding)

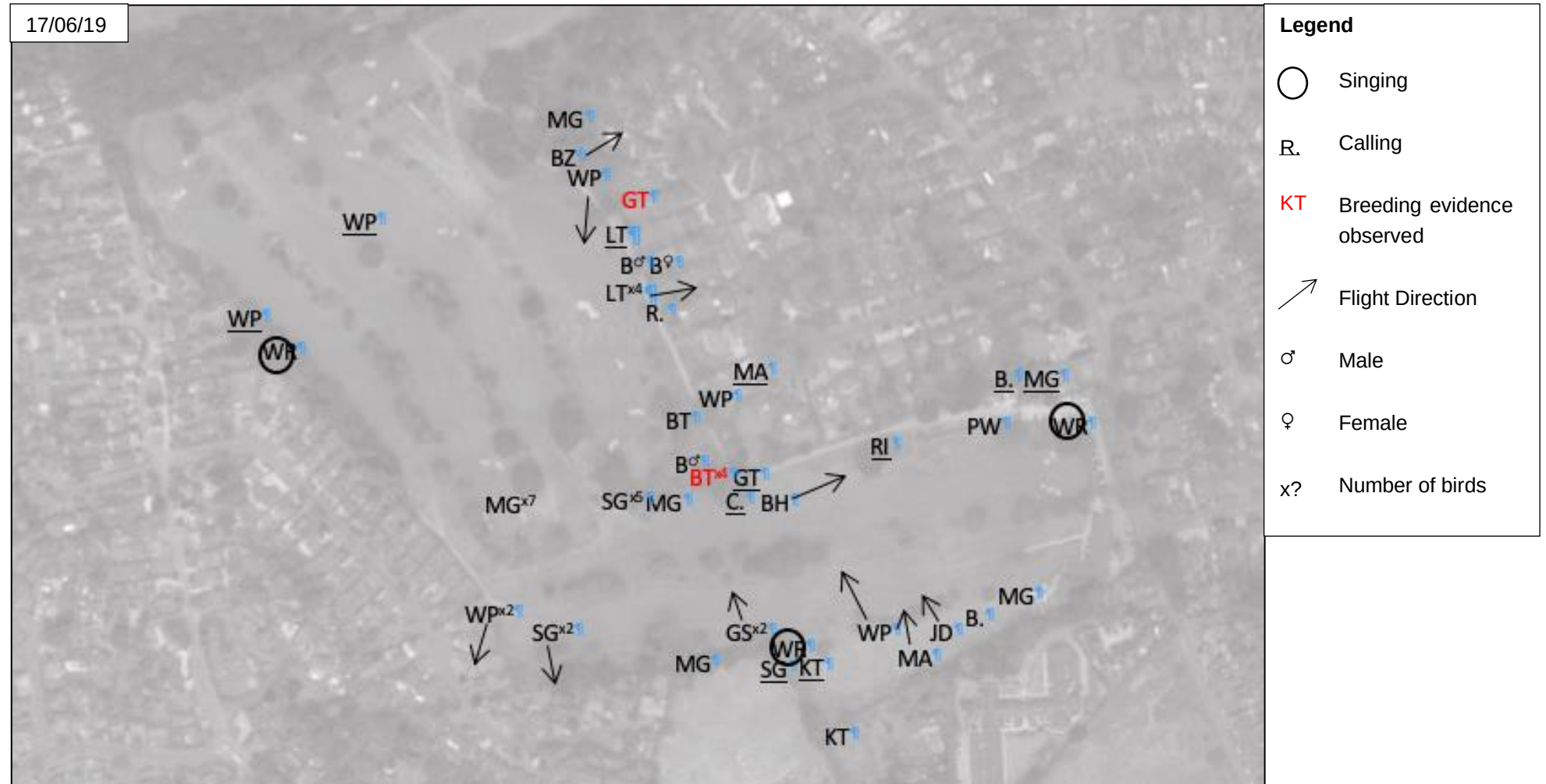
08/04/19

Legend

- (R.) Singing
- R. Calling
- KT Breeding evidence observed
- ↗ Flight Direction
- ♂ Male
- ♀ Female
- x? Number of birds









11 APPENDIX 4 – GREAT CRESTED NEWT 'HABITAT SUITABILITY INDEX' VALUES

Table 15. HSI calculation for the single pond assessed during the survey at Reading Golf Club.

	Pond 1	
NGR	SU 7202 7647	
SI attribute	SI value	Notes
Location	1	SE England
Pond area	0.8	2100m ²
Pond drying	0.9	Never dries
Water quality	0.33	Poor
Shade cover	1	50%
Waterfowl	0.01	Major
Fish presence	0.7	Possible
Ponds (within 1km)	0.6	2
Terrestrial habitat	0.33	Poor
Macrophytes	0.3	<1%
HSI value	0.4	Poor



12 APPENDIX 5 – ARTIFICIAL LIGHTING AND WILDLIFE

Bright external lighting can have a detrimental impact upon foraging and commuting bat flight paths, but more importantly can also cause bats to remain in their roosts for longer. Artificial lighting can also cause significant impacts on other nocturnal species, most notably moths and other nocturnal insects. It can also result in disruption of the circadian rhythms of birds, reducing their fitness. Guidelines issued by the Bat Conservation Trust²⁰ should be considered while designing the lighting scheme. A simple process which should be followed where the impact on bats is being considered as part of a proposed lighting scheme. It contains techniques which can be used on all sites, whether a small domestic project or larger mixed-use, commercial or infrastructure development. This includes the following measures:

Avoid lighting on key habitats and features altogether

there is no legal duty requiring any place to be lit. British Standards and other policy documents allow for deviation from their own guidance where there are significant ecological/environmental reasons for doing so. It is acknowledged that in certain situations lighting is critical in maintaining safety, such as some industrial sites with 24-hour operation. However, in the public realm, while lighting can increase the perception of safety and security, measurable benefits can be subjective. Consequently, lighting design should be flexible and be able to fully consider the presence of protected species

Apply mitigation methods to reduce lighting to agreed limits in other sensitive locations – lighting design considerations

Where bat habitats and features are considered to be of lower importance or sensitivity to illumination, the need to provide lighting may outweigh the needs of bats. Consequently, a balance between a reduced lighting level appropriate to the ecological importance of each feature and species, and the lighting objectives for that area will need to be achieved. The following are techniques which have been successfully used on projects and are often used in combination for best results;

- Dark buffers, illuminance limits and zonation
- Sensitive site configuration, whereby the location, orientation and height of newly built structures and hard standing can have a considerable impact on light spill
- Consider the design of the light and fittings, whereby the spread of light is minimised ensuring that only the task area is lit. Flat cut-off lanterns or accessories should be used to shield or direct light to where it is required. Consider the height of lighting columns. It should be noted that a lower mounting height is not always better. A lower mounting height can create more light-spill or require more columns. Column height should be carefully considered to balance task and mitigation measures. Consider no lighting solutions where possible such as white lining, good signage, and LED cats' eyes. For example, light only high-risk stretches of roads, such as crossings and junctions, allowing headlights to provide any necessary illumination at other times.
- Screening, whereby light spill can be successfully screened through soft landscaping and the installation of walls, fences and bunding
- Glazing treatments, whereby glazing should be restricted or redesigned wherever the ecologist and lighting professional determine there is a likely significant effect upon key bat habitat and features.

²⁰ Bat Conservation Trust and Institute for Lighting Professionals (2018) Guidance note 8. Bats and Artificial Lighting. <https://www.theilp.org.uk/documents/guidance-note-8-bats-and-artificial-lighting/>



- Creation of alternative valuable bat habitat on site, whereby additional or alternative bat flightpaths, commuting habitat or foraging habitat could result in appropriate compensation for any such habitat being lost to the development.
- Dimming and part-night lighting. Depending on the pattern of bat activity across the key features identified on site it may be appropriate for an element of on-site lighting to be controlled either diurnally, seasonally or according to human activity. A control management system can be used to dim (typically to 25% or less) or turn off groups of lights when not in use.

Demonstrate compliance with illuminance limits and buffers

- *Design and pre-planning phase*; It may be necessary to demonstrate that the proposed lighting will comply with any agreed light-limitation or screening measures set as a result of your ecologist's recommendations and evaluation. This is especially likely to be requested if planning permission is required.
- *Baseline and post-completion light monitoring surveys*; baseline, pre-development lighting surveys may be useful where existing on or off-site lighting is suspected to be acting on key habitats and features and so may prevent the agreed or modelled illuminance limits being achieved.
- *Post-construction/operational phase compliance-checking*