Appendix 8 Ecology

8.1 Ecological Assessment

GRAVEN HILL, D1 SITE, BICESTER

Ecological Assessment

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Graven Hill, D Site, Bicester:
Ecological Assessment
Final v4
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rpsgroup.com

Quality Management

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Kerry Shakespeare	8 June 2022

Prepared by:
RPS

20 Western Avenue
Milton Park
Abingdon, Oxfordshire OX14 4SH

Prepared for:
Graven Hill Purchaser Ltd.
C/o Mark Gauguier
66 Lincoln's Inn Fields
London WC2A 3LH

EXECUTIVE SUMMARY

- RPS was commissioned by Graven Hill Purchaser Ltd. to undertake an Ecological Assessment (EA) of an area of land within the former D Site at Graven Hill, Ambrosden, Bicester. This comprised a desk study of survey work previously undertaken at the Site, an updated Phase 1 Habitat Survey and further protected species surveys which assessed the potential of the Site to support species of conservation concern or other species which could present a constraint to the development of the Site.
- The Site is approximately 31 ha in size and comprised existing buildings, hardstanding, neutral semi-improved grassland and species-poor semi-improved grassland with areas of scrubby woodland, waterbodies and dry ditches.
- The proposals for the Site involve demolishing the existing buildings for the redevelopment into a commercial distribution centre with associated infrastructure and landscaping. The majority of the terrestrial habitat onsite will be lost to allow for the development.
- Previous surveys were undertaken on the Site by Ecology Solutions Ltd. (2018) and Waterman Group (2020). The surveys identified that there were no statutory designated sites of nature conservation value within or immediately adjacent to the Site. The nearest statutory designated site was Arncott Bridge Meadows Site of Special Scientific Interest (SSSI) located approximately 1.8 km south east of the Site. At the time of the surveys undertaken in 2018 and 2020, the habitats on Site were identified as being suitable for roosting, foraging and commuting bats, breeding birds, reptiles, great crested newts (GCN) and badgers.
- A Phase 1 Habitat Survey undertaken by RPS in 2020 and 2021 identified that the majority of the Site comprised buildings, hardstanding, neutral semi-improved grassland and managed (mown) poor semi-improved grassland. Other habitats present included areas of tall ruderal, dense and scattered scrub, dry ditches and semi-natural/plantation woodland. A number of waterbodies were identified within the Site boundary and within 500 m of it.
- An updated Phase 1 Habitat Survey undertaken in 2022 found that the habitats on Site had not changed significantly since the original survey in 2020, with the main changes resulting from vegetation growth and encroachment and ongoing demolition activities
- GCN population assessment surveys were undertaken on six waterbodies in June 2020. GCN were recorded within one pond located within an area of woodland approximately 100 m to the north west of the Site.
- An updated GCN environmental DNA (eDNA) survey was undertaken on four waterbodies in April 2022, all results came back negative and therefore GCN are considered to be likely absent from the Site.
- A Preliminary Bat Roost Assessment (PRA) undertaken by RPS in July 2020 identified 12 buildings with high potential, two buildings with moderate potential and one building with low potential to support roosting bats. Bat droppings were found in two buildings during the PRA. The outbuildings associated with Buildings D1, D4 and D7 were also considered suitable as hibernation roosts
- Emergence and re-entry surveys undertaken by RPS in September 2020 and between June and August 2021 identified seven buildings with confirmed bat roosts, including day roosts for common pipistrelle, soprano pipistrelle and brown long-eared bats; night / feeding roosts for brown long-eared bats and a satellite roost for natterer's bats. One building was confirmed as a maternity roost for common pipistrelle and one building was confirmed as a hibernation roost for brown long-eared during the surveys undertaken between January and February 2021.
- A badger survey was undertaken of the Site by RPS in July 2020, the results for which are held in a confidential appendix (Appendix C).
- Measures to protect the designated sites and habitats on Site as well as enhancement measures for the Site are provided in this report, including using appropriate management to enhance the value of retained boundaries and undertaking tree and hedgerow planting.

- A full Construction Ecological Management Plan (CEMP) and a Landscape and Ecological Management Plan (LEMP) would be provided prior to works commencing. Good practice guidelines will be included within these plans which must be put in place and followed to ensure that the adjacent designated sites are not adversely affected by the development.

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1 INTRODUCTION

1.1 Purpose and Scope of this Report

1.1.1 RPS was commissioned by Graven Hill Purchaser Ltd. to undertake an Ecological Assessment (EA) of an area of land within the former D Site at Graven Hill, Ambrosden, Bicester .

1.1.2 To undertake an initial assessment of the potential ecological impact of the proposals, previous survey work undertaken on Site was reviewed and a Phase 1 Habitat Survey and further protected species surveys were undertaken, including for great crested newt (GCN), Preliminary Roost Assessment (PRA) for bats, bat emergence and re-entry surveys and a badger survey.

1.1.3 The objectives of the EA were to:

- Undertake a desk-based review of previous survey work undertaken on Site by Waterman Group and Ecology Solutions Ltd.;
- Identify, map and assess the habitats present on Site;
- Undertake further survey work to determine the use and value of the Site for roosting bats, foraging and commuting bats, reptiles, GCN and badger;
- Assess any potential effects the development may have on designated sites, protected or notable habitats or species;
- Provide outline options for mitigation measures as appropriate; and
- Make recommendations for appropriate biodiversity enhancements in line with national and local planning policy.

1.1.4 This report pertains to these results only; recommendations included within this report are the professional opinion of an experienced ecologist and therefore the view of RPS.

1.1.5 The surveys and desk-based assessments undertaken as part of this review and subsequent report including the Ecological Appraisal Notes are prepared in accordance with the British Standard for Biodiversity Code of Practice for Planning and Development (BS42020:2013).

1.2 Study Area

1.2.1 The Site is located within the former D Site at Graven Hill, Ambrosden, Bicester. The Site is approximately 31 ha in size. The National Grid coordinates for the centre of the Site SP 59241 19785.

1.2.2 The Site comprised existing buildings, hardstanding, neutral semi-improved grassland and species-poor semi-improved grassland with areas scrubby woodland, waterbodies and dry ditches.

1.2.3 Aerial imaging available via Google Earth Pro was also reviewed to assess the Site in relation to its context in the wider landscape.

1.2.4 The surrounding landscape is predominantly agricultural with some scattered farm holdings and agricultural buildings. A solar farm Site lies immediately to the south and the wider Graven Hill development lies to the north of the Site.

1.3 Development Proposals

1.3.1 The proposals for the Site involve demolishing the existing buildings for the redevelopment into a commercial distribution centre with associated infrastructure and landscaping. The majority of the terrestrial habitat onsite will be lost to allow for the development.

1.4 Legislation and Policy

1.4.1 Relevant legislation, policy guidance and both Local and National Biodiversity Action Plans (BAPs) are referred to throughout this report where appropriate. Their context and application are explained in the relevant sections of this report.

1.4.2 The relevant articles of legislation are:

- The Environment Act, 2021;
- The National Planning Policy Framework (NPPF, 2021);
- Adopted Cherwell Local Plan 2011-2031 (Part 1);
- The Conservation of Habitats and Species Regulations (Amendment) (EU Exit) 2019;
- The Wildlife and Countryside Act 1981 (as amended);
- The Protection of Badgers Act 1992;
- The Countryside and Rights of Way Act 2000;
- The Hedgerow Regulations 1997;
- The Natural Environment and Rural Communities Act 2006; and
- National / Local Biodiversity Action Plan for Oxfordshire.

1.4.3 A summary of legislation relevant to protected or other species identified as potential constraints in this report is provided in Appendix A.

2 BACKGROUND INFORMATION

2.1 Graven Hill, Units D1 and D4 Ecological Assessment (Ecology Solutions Ltd., 2018)

2.1.1 Ecology Solutions Ltd. undertook an EA at Units D1 and D4 (and the areas surrounding them) at Graven Hill, Oxfordshire in March 2018. The EA comprised a desk-based study and Phase 1 Habitat Survey.

2.1.2 The desk study identified that there were no statutory designated sites of nature conservation value within or immediately adjacent to the Site. The nearest statutory designated site was Arncott Bridge Meadows Site of Special Scientific Interest (SSSI), which is designated for its medieval ridge-and-furrow features and is managed as hay meadows and pasture which supports a wide range of plant species. The SSSI is located approximately 1.8 km south east of the Site.

2.1.3 There were no non-statutory designations of conservation value within the Site. The nearest non-statutory designated site was Graven Hill Local Wildlife Site (LWS) that lies approximately 380 m north west of the Site and is designated for its oak and ash woodland with a mixed shrub layer.

2.1.4 The Phase 1 Habitat Survey identified that the Site comprised areas of grassland, scrubby woodland and hardstanding with trees, ponds and buildings.

2.1.5 An assessment of the habitats present on Site was undertaken with regard to bats including buildings and trees. No trees within the Site were identified as having potential to support roosting bats. The buildings were not considered suitable for roosting bats, given their fabric and construction. No evidence of roosting bats was recorded within the majority of the buildings, although a single dropping was recorded in Building D8, therefore the building was subject to an emergence and re-entry survey. No bats were identified emerging or re-entering the building.

2.1.6 During re-entry surveys a single common pipistrelle *Pipistrellus* was recorded roosting in Building D1. Given the fabric of the building, it was considered to be an occasional summer roost.

2.1.7 Specific surveys were undertaken within the Site and wider study area, to search for evidence of badgers in March 2018 and October 2018. The results of these surveys are contained within a confidential appendix (Appendix C) in this report.

2.1.8 The majority of the Site was not suitable for reptiles (regularly managed grassland through cutting), although the ditches with ruderal vegetation banks were considered suitable for reptiles. Specific surveys for reptiles were carried out between August and early October 2018. During the surveys, a very low population of common lizard and slow worm were recorded in the ruderal vegetation along the banks of the railway.

2.1.9 The majority of the Site was not suitable for great crested newts (GCN) (regularly managed grassland through cutting), although the ditches with ruderal vegetation banks and scrubby woodland are considered suitable for foraging and commuting. There was one pond within the Site and a further six ponds within 500 m of the Site. These ponds were artificial emergency fire resource ponds that are constructed of concrete with sloping banks and slight kerbs around the edge.

2.1.10 Presence / absence surveys were undertaken on Site and a low population of GCN was recorded in ponds P2, P3 and P5 within the Site and wider study area and within ponds P4 and P6 within 500 m of the Site. These ponds were previously surveyed by Waterman Group in 2014 and the surveys only recorded a single GCN within ponds P3 and P6. The locations of the ponds are shown on Figure 4.1.

2.1.11 No notable / protected birds were recorded within the Site during the Phase 1 Habitat Survey and a small number of common bird species were recorded. It was considered that the Site offers limited suitable opportunities for these species.

2.1.12 Given the habitats present on Site and the regular cutting management, it was considered that there would only be an assemblage of common invertebrate species present within the Site. There was no evidence to suggest that any rare or notable species would be present.

2.2 Graven Hill Development LTA2, Bicester Protected Species Report (Waterman Group, 2020)

2.2.1 Waterman Group undertook a range of protected species surveys at an area of land called Land Transfer Area 2 (LTA2) located at Graven Hill, Bicester, Oxfordshire. This area included the current development Site this report refers to.

2.2.2 The report also referred to previous survey work undertaken on the Site by Amec Ltd. in 2010 and 2011 and Waterman Group in 2014 and 2016.

2.2.3 No buildings within the current Site boundary were assessed for bat roosting potential, however some were identified adjacent to the Site.

2.2.4 A number of trees within the current Site were identified as having low bat roost potential (T356, T456), moderate bat roost potential (T494) and high bat roost potential (T492). T492 was later confirmed as a bat roost, as three common pipistrelle bats were observed entering a feature on the tree. Given the small number of bats recorded entering the tree it was considered to support a common pipistrelle summer (day) roost for males and / or non-breeding females.

2.2.5 Ten bat species were recorded using the LTA2 Site during bat activity surveys and static bat detectors surveys and activity appeared to be recorded relatively evenly distributed throughout LTA2.

2.2.6 Species recorded included common pipistrelle, soprano pipistrelle *Pipistrellus pygmaeus*, Nathusius' pipistrelle *Pipistrellus nathusii*, noctule *Nyctalus noctula*, Leisler's bat *Nyctalus leisleri*, brown long-eared, Daubenton's bat *Myotis daubentonii*, Brandt's bat *Myotis brandtii*, serotine *Eptesicus serotinus* and barbastelle *Barbastella barbastellus*.

2.2.7 The bat species most frequently recorded were common pipistrelle and soprano pipistrelle, which were considered to be common and widespread bat species in the UK. Barbastelle bats which are considered to be one of the rarest bats in the UK were also recorded regularly in low numbers across the LTA2 Site.

2.2.8 A total of 46 bird species were recorded within the LTA2 Site during the breeding bird surveys carried out in the spring / summer of 2019. A total of four Red- and 12 Amber-listed Birds of Conservation Concern (BoCC, 2018) species were recorded on Site, including five species listed under Section 41 of the NERC Act 2006. Two species listed under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended): red kite *Milvus milvus* and barn owl *Tyto alba* were also recorded on Site. The remainder of the species recorded during the surveys were of low conservation concern.

2.2.9 Breeding birds were recorded actively using the buildings, hedgerows, woodland and trees along the boundaries of grassland areas with some species utilising scrub and semi-improved grassland.

2.2.10 Reptile surveys undertaken in 2019 recorded a low population of slow worm within the current development Site.

2.2.11 Historic surveys of ponds in the southern section of the LTA2 Site recorded low numbers of GCN being present.

2.2.12 Invertebrate surveys were undertaken across the Site. Only one compartment is within the current development Site, comprising sallow woodland with open areas of herbaceous flowers, developing into scrub and grassland. Samples undertaken produced 123 species, which was a very good diversity for the time of year the Site was surveyed (April - July) and the compartment size. Nine of the recorded species had conservation status (7.3%), however, six of these species are now of

lower concern. Only one of the nine species clearly fully deserved its status as applied: *Acalyptus carpini*, two other species were also important but possibly showing an increase in range.

3 METHODS

3.1 Phase 1 Habitat Survey

3.1.1 Phase 1 Habitat Surveys of the Site were undertaken on the 9th July 2020 by Katy Thomas GradCIEEM and Alex Powell GradCIEEM, and on the 26th January 2021 by Annie Davies GradCIEEM, all Ecologists employed by RPS and experienced in undertaking Phase 1 Habitat Surveys.

3.1.2 The Phase 1 Habitat Surveys followed the standard methodology (JNCC, 2010), and as described in the Guidelines for Preliminary Ecological Assessment (CIEEM, 2017). In summary, this comprised walking over the survey area and recording the habitat types and boundary features present.

3.1.3 A protected species scoping survey was carried out in conjunction with the Phase 1 Habitat Survey. The Site was assessed for its suitability to support protected species, in particular GCN, reptiles, birds, badgers, bats, and other species of conservation importance that could pose a planning constraint.

3.1.4 The surveyors looked for evidence of protected species including signs such as burrows, droppings, footprints, paths, hairs, refugia and particular habitat types known to be used by certain groups such as ponds. Any mammal paths were also noted and where possible followed. Fence boundaries were walked to establish any entry points or animal signs such as latrines. Areas of bare earth were inspected for mammal prints. Areas of habitat considered suitable for protected species or those of conservation interest were recorded.

Updated Walkover

3.1.5 An updated walkover of the Site was undertaken on 30th March 2022 by Elizabeth White, in order to verify any changes in habitat condition and re-assess the suitability of the Site to support protected and notable species.

3.2 Great Crested Newt Survey

Habitat Suitability Index Assessment

3.2.1 A GCN Habitat Suitability Index (HSI) assessment was undertaken on all ponds within the Site and on accessible ponds within 500 m of the Site on 1st June 2020.

3.2.2 A HSI is a numerical index, between 0 and 1 where 0 indicates unsuitable habitat and 1 represents optimal habitat. The HSI methodology for GCN has been developed to assess the suitability of ponds for use as breeding Sites. The assessments were made in accordance with the methodology set out in Advice Note 5 published by the Amphibian and Reptile Group UK (ARGUK, 2010).

3.2.3 The HSI incorporates ten suitability indices, all of which are factors thought to affect the likelihood of GCN presence. The ten indices are location, pond area, pond desiccation, water quality, shade, waterfowl, fish, other ponds within 1km, terrestrial habitat and macrophytes.

3.2.4 Once the ponds within 500 m of the Site were viSited and assessed a score was provided for each of the ten suitability indices.

3.2.5 Table 3.1 below provides the HSI scores created on a categorical scale defining pond suitability for GCN and their locations are shown on Figure 4.1.

Table 3.1: Categorical scale showing pond HSI and the suitability for GCN (ARGUK, 2010)

HSI Score	Pond Suitability
<0.5	Poor

HSI Score	Pond Suitability
0.5-0.59	Below average
0.6-0.69	Average
0.7-0.79	Good
>0.8	Excellent

Presence / Absence Surveys

3.2.6 A presence / absence survey was undertaken following the advice given in the Great Crested Newt Mitigation Guidelines (English Nature, 2001).

3.2.7 Population size is determined through taking the peak counts of adult GCN for one survey visit using one method then assigning a score using the criteria in Table 3.2 below (English Nature, 2000).

Table 3.2: GCN population class size

GCN Population Score		
Low	**Good**	**Exceptional**
<10	10-100	>100

3.2.8 Surveys were undertaken by Elizabeth White MCIEEM (NE Licence 2015-18197-CLS-CLS), Sam Barker GradCIEEM (NE Licence 2018-33088-CLS-CLS) and Alex Powell (NE Licence 2019-44045-CLS-CLS) and assisted by Annie Davies and Natalie Brisland between 1st and 16th June 2020.

3.2.9 Due to project delays, each of the waterbodies was viSited on six occasions in June 2020 to determine the presence / absence of GCN. During each survey, three out of four possible survey methods (bottle trapping, torch survey, egg search and netting) were employed. Generally, bottle trapping and torching were carried out on each occasion, with the third method being netting as no vegetation was present in the ponds to undertake egg-searching.

3.2.10 The four methods described provide good survey coverage of GCN and other newts, including palmate newt and smooth newt. Common frog has also been incidentally recorded but these methods are not aimed at identifying these amphibians.

3.2.11 All surveys were undertaken in appropriate weather conditions when night-time air temperatures were greater than 5°C and when there was no / little wind or rain. The weather conditions and temperatures recorded during each visit are summarised in Table 3.3 below:

Table 3.3: Weather conditions during GCN surveys undertaken in 2020

Visit	Date	Weather	Overnight Temperature
1	01/06/2020-02/06/2020	Rain 3.0mm, 5kmph WNW	13°C
2	03/06/2020-04/06/2020	Rain 0.3mm, 7kmph N	16°C
3	04/06/2020-05/06/2020	Rain 1.2mm, 3kmph W	19°C
4	08/06/2020-09/06/2020	Rain 3.6mm, 10kmph WSW	13°C
5	11/06/2020-12/06/2020	Rain 0.1mm, 8kmph NE	15°C
6	15/06/2020-16/06/2020	Dry, clear, 9kmph NNW	14°C

3.2.12 The survey methods employed are discussed below.

Bottle Trapping

3.2.13 Bottle traps constructed from 2 litre plastic drinks bottles supported on bamboo canes were located at approximately 2 m intervals around the edge of each pond. However, at the established

pond bottle traps were placed at 1m intervals as only one side of the pond could be accessed. On each survey visit traps were set out before dusk and were emptied and removed the next morning before 10am. Traps were always placed ¾ submerged so that they contained at least ¼ air; they also had air holes in the exposed ends. The species, number and sex of newts captured in the traps were recorded and the newts were carefully released back into the pond from which they were caught.

Torch Survey

3.2.14 The shoreline of each water body was scanned after dusk using a high-powered torch of 1,000,000 candlepower. The perimeter and centre of the pond were slowly scanned with the torch and the number and, where possible, sex of any amphibians seen was recorded.

Egg Searching

3.2.15 Egg searches are undertaken by searching for folded leaves on marginal and aquatic vegetation around the perimeter of a pond and carefully opening them up to reveal newt eggs. As significant amounts of marginal and aquatic vegetation had not yet established in the newly created ponds artificial egg-laying strips were used, made from shredded plastic bags attached along the margins of the ponds by a wooden post. The shredded plastic provides an alternative egg laying Site for newts when suitable vegetation is lacking. Two artificial egg-laying strips were located in each pond.

3.2.16 The eggs of GCN can be distinguished from those of other species by their size and colour.

Netting

3.2.17 A long-handled dip net was used to search around the pond margins of each pond for amphibians. Each pond was netted for at least 15 minutes per 50 m of shoreline.

Updated eDNA Survey

3.2.18 An updated environmental DNA (eDNA) survey was undertaken on 20th April 2022 which falls within the optimum period for this type of survey (Biggs *et al.,* 2014). The eDNA survey was undertaken on four waterbodies which had been previously surveyed in 2020.

3.2.19 The survey was conducted by Elizabeth White, an RPS Senior Ecologist and Gemma Trinder GradCIEEM an RPS Ecologist. The surveys followed the eDNA surveying and laboratory analysis described by Biggs *et al.* (2014).

3.2.20 Water samples were collected using sampling kits supplied by SureScreen Scientifics Ltd.

3.2.21 Surveyors collected 30 ml water samples from 20 locations along the margins of each waterbody surveyed, using a sterile ladle. Surveyors collected the sample from points evenly spaced along each waterbody, to ensure a representative sample was collected and to ensure the effectiveness of the survey was not compromised.

3.2.22 The surveyors used the ladle to gently agitate the water to mix the water column, whilst taking care not to disturb and collect any sediment. The twenty samples collected from each waterbody were emptied into a sterile plastic bag and homogenised by gently shaking the bag to ensure eDNA was evenly mixed through the sample.

3.2.23 A pipette was used to collect six 15 ml subsamples of the pond from the bag into sterile tubes that already contained 35 ml of ethanol, used to preserve the eDNA sample.

3.2.24 The samples were then removed from Site and sent off to SureScreen Scientifics for analysis. The water samples were analysed using quantitative Polymerase Chain Reaction (qPCR) eDNA test.

3.2.25 SureScreen Scientifics Ltd. participate in Natural England's proficiency testing scheme and carry out inter-laboratory checks on accuracy of results as part of quality procedures.

3.2.26 Defra project WC1067 demonstrated the effectiveness of eDNA in the detection of great crested newts. In detailed field studies eDNA detected great crested newts in 99.3% of the time in ponds where they were known to occur. When used by volunteer surveyors, eDNA detected great crested newts at 91% of ponds where they were known to be present.

3.3 Preliminary Roost Assessment

3.3.1 As a number of trees and buildings on Site had previously been identified as having potential to support roosting bats and / or were confirmed as bat roosts, the preliminary roost assessment (PRA) for bats was updated.

3.3.2 The update PRA was undertaken on the 27th July 2020 by Frances Morris ACIEEM (NE Licence 2018-33855-CLS-CLS) a Senior Ecologist and Katy Thomas, a Consultant Ecologist, both employed by RPS and who are experienced in undertaking PRAs.

3.3.3 The assessment followed the guidelines published by the Bat Conservation Trust (BCT, 2016).

3.3.4 A thorough inspection of the exterior and interior of the buildings on Site was carried out (where access was permitted). During the inspection, the ecologists looked for the following signs to indicate the presence of bats:

- Bat droppings;
- Insect wings (feeding stations);
- Oil (from fur) and urine stains;
- Scratch marks;
- Bat corpses; and
- Actual sightings of bats.

3.3.5 Any potential roost features or potential bat access points and roost places were also searched for and assessed. When suitable features were identified, they were inspected for signs indicating use or possible use by bats including tiny scratches, staining and flies around the entry points, bat droppings and feeding remains in, around and below entrances, distinctive smell of bats and the smoothing of surfaces around cavities.

3.3.6 Guidance from the Bat Conservation Trust Bat Survey: Good Practice Guidelines (BCT, 2016) on the features of buildings and trees which correlate with their use by bats was considered. Table 3.4 below and overleaf is taken from the above guidance and describes the category of potential value to roosting bats.

Table 3.4: Guidelines for assessing the potential value of features and habitats to bats.

Suitability	Description of Roosting Habitats	Commuting and foraging habitats
Negligible	A structure or tree with negligible habitat features on Site likely to be used by roosting bats.	Negligible habitat features on Site likely to be used by commuting or foraging bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough features* to be used on a regular basis or by larger number of bats. A tree of sufficient size and age to contain potential roost features but with none seen from the ground or features seen with only very limited roosting potential.	Habitat that could be used by small numbers of commuting bats such as gaps in a hedgerow or un-vegetated stream, but isolated. Suitable but isolated habitat that could be used by small numbers of foraging bats, such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their features* but unlikely to support a roost of high conservation status.	Continuous habitat connected to the wider landscape that could be used by bats for commuting and foraging, such as lines of trees and scrub or linked back gardens, grassland or water.

Suitability	Description of Roosting Habitats	Commuting and foraging habitats
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their features*.	Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting and foraging bats, such as river valleys, streams, hedgerows, line of trees, woodland edge, broadleaved woodlands, tree-lined watercourses and grazed parkland. Site is close to and connected to known roosts.

*space/size, shelter, protection, conditions, and surrounding habitat.

3.3.7 PRAs of buildings can be carried out at any time of year; however, summer surveys are more likely to reveal signs of bat activity.

3.4 Bat Emergence and Re-entry Surveys

3.4.1 The bat emergence and re-entry surveys were undertaken in accordance with the latest best practice guidelines and recommendations published by the Bat Conservation Trust in Bat Survey: Good Practice Guidelines (BCT, 2016).

3.4.2 As recommended by the BCT guidance, three dusk emergence or dawn re-entry surveys were undertaken on buildings identified as having high potential, two surveys were undertaken on buildings with moderate potential and one dusk emergence survey was undertaken on the building identified as having low potential.

3.4.3 The dusk emergence surveys commenced 15 minutes before sunset and continued for at least 1.5 hours after sunset; dawn re-entry surveys commenced at least 1.5 hours before sunrise and finished 15 minutes after sunrise.

3.4.4 During each survey visit the buildings were continuously surveyed by a team of up to 12 experienced ecologists. Visual observations were made of where bats emerged / re-entered the buildings and in what direction they were flying to / from.

3.4.5 Infra-red cameras, paired with static detectors, were positioned in multiple locations to ensure features suitable for supporting bats were covered in all locations.

3.4.6 Behavioural observations were also recorded for any bats encountered on Site or within the vicinity, including direction of flight and activity observed e.g. foraging and commuting.

3.4.7 Elekon Batlogger and Anabat bat detectors were used to detect echolocation calls which were subsequently analysed using BatExplorer and Kaleidoscope software to identify the species present. Camera data were analysed by a team of experienced ecologists using Windows Media Player.

3.4.8 The surveys were undertaken in appropriate conditions i.e. not during heavy rain, strong wind or if the air temperature dropped below 10°C.

3.4.9 The dates, times and weather conditions for the emergence / re-entry surveys are provided in Table 3.5 below.

Table 3.5: Bat emergence / re-entry survey dates, times and weather conditions

Building Number	Survey Date and Type	Sunset / Sunrise Time	Start Time	End Time	Weather
D4	02/09/20 – emergence	19:48	19:33	21:18	Calm, following earlier heavy rain, 18°C, wind 2, 100% cloud cover
D4, D7	03/09/20 – re-entry	06:20	04:20	06:35	17°C, wind 2, 100% cloud cover

Building Number	Survey Date and Type	Sunset / Sunrise Time	Start Time	End Time	Weather
D7	03/09/20 – emergence	19:46	19:31	21:16	Light breeze, warm, 18°C, wind 1, 85% cloud cover
	04/09/20 – re-entry	06:22	04:13	06:37	Still and dry, 11°C, wind 0, 25% cloud cover
D1	07/09/20 – emergence	19:38	19:23	21:08	Dry, 20°C, wind 1, 100% cloud cover
	08/09/20 – re-entry	06:26	04:26	06:41	Warm, 15°C, wind 1, 100% cloud cover
D10, 19	08/09/20 – emergence	19:34	19:19	21:04	Light breeze, 21°C, wind 1, 50% cloud cover
19a	09/09/20 – re-entry	06:29	04:29	06:44	15°C, wind 1, 50% cloud cover
20, 25, 26	09/09/20 – emergence	19:32	19:17	21:32	18°C, wind 2, 60% cloud cover
D2, 27	14/09/20 – emergence	19:20	19:05	21:20	Clear skies, 22°C, wind 0
28	15/09/20 – re-entry	06:38	04:38	06:53	Clear skies, 14°C, wind 1
29, 30	17/09/20 – emergence	19:15	19:00	20:45	Dry, 21°C, wind 0/1, no cloud
D1	02/06/21 – emergence	21:15	21:00	22:45	Thin cloud cover, 21°C, wind 1
	03/06/21 – re-entry	04:49	03:19	05:04	No breeze, 20°C, overcast
D7	09/06/21 – emergence	21:20	21:05	22:50	22°C, wind 1, 100% cloud cover, dry
	10/06/221 – re-entry	04:46	03:16	05:01	17°C, wind 1, 100% cloud cover, dry
34	14/06/21 – emergence	21:25	21:10	22:55	Dry, 18°C, wind 2, 30% cloud cover
26, 27, 28	16/06/21 – emergence	21:11	21:26	22:59	Dry, 22°C, wind 0, 50% cloud cover
29, 30	17/06/21 – re-entry	21:26	21:11	22:56	Intermittent light drizzle, 20°C, wind 0, 100% cloud cover
D4	22/06/21 – emergence	21:28	21:13	22:58	Dry, 16°C, wind 1, 30% cloud cover
	23/06/21 – re-entry	04:45	03:15	05:00	Dry, 8°C, wind 0, clear skies
19	23/06/21 – emergence	21:28	21:13	22:58	Dry, 15°C, wind 0, clear skies
25	24/06/21 – re-entry	04:45	03:15	05:00	9°C, wind, 1, dry and clear
D1	28/06/21 – emergence	21:27	21:12	22:57	Light drizzle at start of survey, 14°C, wind 1, 100% cloud cover
	29/06/21 – re-entry	04:48	03:18	05:03	13°C, wind 2, 100% cloud cover
19a	01/07/21 – emergence	21:27	21:12	22:57	Dry, 17°C, wind 0, 0% cloud cover
20	02/07/21 – re-entry	04:50	03:20	05:05	Dry, 13°C, wind 1, 85% cloud cover
D10	07/07/21 – re-entry	04:54	03:24	05:09	Dry, 11°C, wind 1, 100% cloud cover

Building Number	Survey Date and Type	Sunset / Sunrise Time	Start Time	End Time	Weather
D7	07/07/21 – emergence	21:23	21:08	22:53	16°C, wind 2, 75% cloud cover, dry
	08/07/21 – re-entry	04:55	03:25	05:10	14°C, wind 1, 100% cloud cover, dry
D2	08/07/21 – emergence	21:23	21:08	22:53	18°C, wind 1, 100% cloud cover, dry following earlier rain
	09/07/21 – re-entry	04:56	03:26	05:11	16°C, wind 0, 70% cloud cover
28	13/07/21 – emergence	21:19	21:04	22:49	16°C, wind 2, 100% cloud cover
26, 27	14/07/21 – re-entry	05:02	03:32	05:17	Dry, 14°C, wind 2, 75% cloud cover
20, 25	14/07/21 – emergence	21:18	21:03	22:48	20°C, wind 2, 30% cloud cover
D4	19/07/21 – emergence	21:12	20:57	22:42	Dry, 25°C, wind 0, clear skies
	20/07/21 – re-entry	05:09	03:39	05:24	Dry, clear skies, 18°C
D10	22/07/21 – emergence	21:08	20:53	22:38	Warm and dry, 24°C, wind 0, clear skies
29, 30	23/07/21 – re-entry	05:13	03:43	05:28	14°C, wind 1, 75% cloud cover, dry
19a	26/07/21 – emergence	21:08	20:53	22:38	Dry, 20°C, wind 1, cloud cover 60%
19	27/07/21 – re-entry	05:19	03:49	05:34	Overcast, 18°C, wind 1, 90% cloud cover
D2	31/08/21 – emergence	19:53	19:38	21:23	Dry, 16°C, wind 1, 50% cloud cover
	01/09/21 – re-entry	06:16	04:16	06:31	14°C, wind 1, dry, 50% cloud cover

3.5 Bat Hibernation Surveys

3.5.1 Hibernation surveys were undertaken on the single-storey brick outbuildings associated with Buildings D1, D4 and D7.

3.5.2 The surveys were led by Nicola Pyle MCIEEM and Julie Watson MCIEEM (both Natural England Level 2 Class Licence holders) and assisted by Annie Davies GradCIEEM, following best practice as described by the Bat Conservation Trust (Collins, 2016), English Nature's Bat Mitigation Guidelines (Mitchell-Jones, 2004) and the Joint Nature Conservation Committee's Bat Worker's Manual (Mitchell-Jones & McLeish, 2004).

3.5.3 Internal inspections of the buildings were undertaken on 18th January 2021 and 17th February 2021. This involved internally inspecting the accessible outbuildings and any other potential hibernation features, such as gaps in brickwork and cracked walls, with an endoscope and a powerful torch (Cluson CB2).

3.5.4 Static bat detectors were left in the outbuildings at the locations shown on Figure 4.2. These locations were chosen due to their potential to support hibernating bats. The detectors were left to record for a minimum of 14 nights in January and February 2021.

3.5.5 The static bat detectors were used to record bat echolocation calls and identify species, where possible. Anabat Swift and Express detectors were used. Calls were analysed using Analook and Kaleidoscope software to identify bat species recorded in each survey location.

3.5.6 The surveys were carried out following current guidelines (Collins, 2016).

3.6 Badger Survey

Survey

3.6.1 The badger survey was undertaken at the same time as the Phase 1 Habitat Survey and included all areas within the project boundary and a 30 m buffer, where access was provided.

3.6.2 Badger surveys can be carried out at any time of year, as badgers do not hibernate. Winter surveys are often preferred as the vegetation levels are likely to be reduced, facilitating visibility of setts. However, levels of badger activity using other signs such as runs and foraging may be more easily understood when vegetation growth is present, and this also tends to make it easier to understand how recent and how frequent such activity might be.

3.6.3 The survey sought to identify and record all signs of badger activity based primarily on field signs. Evidence of badger activity can be identified in the following ways:

Setts

3.6.4 A sett is defined as “any structure or place, which displays signs indicating current use by a badger”. Natural England guidance (Natural England, 2009) regarding “current use” takes into account the fact that badgers may use setts on an occasional basis and therefore, suggests that signs of activity recorded within weeks of proposed works schedules, rather than months or days, should be taken as an indication of current use. Signs that could indicate the absence of badgers should also be surveyed for, such as absence of signs of activity or debris in sett entrance ways.

3.6.5 Setts are identified on the basis of their size, location and form. To establish relatively recent badger activity, and to confirm that the structure really is a sett, spoil heaps are inspected for badger hair or footprints. Activity is gauged by general demeanour, with fresh spoil and unobstructed holes. They are categorised as:

- Well used: being clear of debris or vegetation or obviously in regular use and may or may not have been excavated recently;
- Partially/occasionally used: not in regular use, with debris such as leaves and twigs in the entrance, or moss and/or other plants growing in or around the entrance. Partially used holes could be in regular use after a minimal amount of clearance; or
- Disused: not been in use for some time, with partially or completely blocked entrances which could not be re-used without a considerable amount of clearance effort. If the hole had been disused for some time, all that may be visible is a depression in the ground where the hole used to be and the remains of a spoil heap, which may be covered in moss or plants.

3.6.6 Setts are generally classified as one of four types:

- Main: normally the focal point sett of a group of badgers. Generally, always occupied, main setts usually have several active holes with radiating tracks, latrines and other signs of activity. The actual number of holes can vary greatly, depending on social group size and soil conditions;
- Annexe: a secondary sett, close to the main sett. Will normally be connected to the sett with very obvious tracks. Annexes may not be occupied constantly, even when the main sett is very active;
- Subsidiary: occurring at a greater distance from the main sett and not as clearly linked to it as an annexe. These setts will fall clearly within the territory of a social group and may be seasonally used by badgers; or

- Outlier: less frequently used, these setts may be colonised by other species when not in use by badgers. Outliers may represent a temporary sett, or a habitation for migrating individuals, or those excluded from a social group.

Exploratory Holes

3.6.7 A single entrance way excavation created by a badger, which was abandoned as it was for some reason considered unsuitable for occupation. The excavation is visibly short, and the end of the excavation is visible.

Dung Pits

3.6.8 The normal method of excretion for badgers is to defecate into a small scrape or pit, which is left uncovered.

Latrines

3.6.9 Collective names for a series of dung pits within an area. These are used by badger social groups to demarcate their territory and may be used for other behavioural purposes. Latrines are therefore an important part of badger social life.

Track

3.6.10 A main arterial route frequently used by badgers, which may be clearly visible over a considerable distance.

Runs

3.6.11 A less frequently used route, which may only be visible where it crosses some obstacle, such as a bank, a hedge or a fence. Badger hair can sometimes be collected along tracks where they have pushed under barbed wire fences.

Foraging Area

3.6.12 An area which shows signs of foraging activity. Most often occurs as some form of “snuffle holes” and rooting up of turf or ground cover, overturning of dried cow manure, when in search of earthworms. Other foraging evidence may appear as holes left from digging out wasp or bees’ nests, or in arable areas, “rolling” of cereal crops.

Prints

3.6.13 Can be detected where badgers have crossed areas of bare ground and are easily distinguishable from other mammal prints.

3.7 Impact Appraisal

3.7.1 The overall ecological appraisal is based on the standard best practice methodology provided by the Guidelines for Preliminary Ecological Appraisal (CIEEM, 2017). The assessment identifies Sites, habitats, species and other ecological features that are of value based on factors such as legal protection, statutory or local Site designations such as SSSIs, LWSs or inclusion on Red Data Book Lists or BAPs.

3.7.2 The assessment also refers to planning policy guidance (e.g. NPPF) where relevant to relate the value of the Site and potential impacts of development to the planning process, identifying constraints and opportunities for ecological enhancement in line with both national and local policy.

3.7.3 The methodology for evaluation of the nature conservation value of ecological features affected by development (ecological receptors) is adapted from the current Chartered Institute of Ecology &

Environmental Management guidelines for Ecological Impact Assessment (CIEEM, 2018). These guidelines recommend assignment of value (or potential value) to ecological receptors in accordance with the following scale:

1. International;
2. UK;
3. National (i.e. England/Northern Ireland/Scotland/Wales);
4. Regional;
5. County (or Metropolitan - e.g. in London);
6. District (or Unitary Authority, City, or Borough);
7. Local or Parish; and/or
8. within immediate zone of influence only.

3.7.4 Following on from the above, potential constraints to development are identified on that basis, with recommendations for further, more detailed surveys made as appropriate, for example to fully investigate botanical value or to confirm presence / likely absence of a protected species

3.7.5 In appraising any impacts, the review considers the client's Site proposals and any subsequent recommendations made are proportionate and appropriate to the Site and have considered the Mitigation Hierarchy as identified below:

- **Avoid**: Provide advice on how the development may proceed by avoiding impacts to any species or Sites by either consideration of Site design or identification of an alternative option.
- **Mitigate:** Where avoidance cannot be implemented mitigation proposals are put forward to minimise impacts to species or Sites as a result of the proposals. Mitigation put forward is proportionate to the Site.
- **Compensate:** Where avoidance cannot be achieved any mitigation strategy will consider the requirements for Site compensatory measures.
- **Enhance**: The assessment refers to planning policy guidance (e.g. NPPF) to relate the ecological value of the Site and identify appropriate and proportionate ecological enhancement in line with both national and local policy.

3.8 Limitations

Survey

3.8.1 It should be noted that whilst every effort has been made to provide a comprehensive description of the Site, no investigation can ensure the complete characterisation and prediction of the natural environment.

3.8.2 The protected / notable species assessment provides a preliminary view of the likelihood of these species occurring on the Site, based on the suitability of the habitat, known distribution of the species in the local area provided in response to our enquiries and any direct evidence on the Site. It should not be taken as providing a full and definitive survey of any protected/notable species group.

3.8.3 The second Phase 1 Habitat Survey was undertaken in January 2021, outside of the optimal survey season (April to October). Although the survey was carried out at a sub-optimal time of year, it is considered that sufficient information was obtained to enable an accurate assessment of the Site to be carried out.

3.8.4 Bats exhibit seasonal use of buildings and built structures and being so mobile may arrive and start using a Site after it has been surveyed or be roosting somewhere else during the period it was surveyed. Additionally, bats can forage in different areas and preferentially commute along different routes in response to several changing physical and environmental factors. Therefore, it should be noted that this survey provides a snapshot of ecological constraints found to be present

at the time and should not be relied upon as evidence of presence / absence for periods longer than one year.

3.8.5 The bat data presented in the tables detailing results of the bat surveys shows the number of contacts for different bat species. It is important to note that the number of contacts does not equate to number of individual bats, as several contacts can be generated by one bat flying past the surveyors several times. Instead, the number of contacts provides an index of bat activity, which can be used to identify areas of habitat of greater or lesser importance for bats.

3.8.6 Species identification by sonogram is limited to a certain extent by similarities in call structure parameters for certain species. All bats modulate their calls according to the habitats they are navigating and their behaviour. This imposes limitations on reliable identification of bats to species level for species of the same genus, and specifically for *Plecotus, Myotis* and *Nyctalus* bats.

3.8.7 Due to the location of the Site and known range of *Plecotus* bats, every *Plecotus* bat recorded was assumed to be brown long-eared bat. *Nyctalus* species (noctule and Leisler's bat) were separated where possible but grouped where call parameters overlapped and prevented reliable identification to species.

3.8.8 An emergence survey on 13th July 2021 was terminated early (by approximately 20 minutes) due to the onset of heavy rain. The survey adequately covered the main period of emergence for bat species likely using the Site and is therefore not considered to be a limitation to the robustness of this assessment.

Accurate Lifespan of Ecological Data

3.8.9 The majority of ecological data remains valid for only short periods due to the inherently transient nature of the subject. The survey results contained in this report are considered accurate for up to one year, assuming no significant considerable changes to the Site conditions. A verification walkover could be required within this time to identify if the Site has changed significantly.

4 RESULTS

4.1 Designated Sites

4.1.1 There were no statutory designated sites for nature conservation value within or immediately adjacent to the Site. The nearest statutory designated site was Arncott Bridge Meadows SSSI located approximately 1.8 km south east of the Site.

4.1.2 There were no non-statutory designations of conservation value within the Site. The nearest non-statutory designated site was Graven Hill LWS which lies approximately 380 m north west of the Site.

4.1.3 Full details are provided within the Ecology Solutions Ltd. (2018) report.

4.2 Phase 1 Habitat Survey

2020 and 2021 Survey

4.2.1 The Phase 1 Habitat Survey undertaken by RPS in 2020 and 2021 identified that the majority of the Site comprised buildings, hardstanding, neutral semi-improved grassland and managed (mown) poor semi-improved grassland. Other habitats present included areas of tall ruderal, dense and scattered scrub, dry ditches and semi-natural/plantation woodland. A number of waterbodies were identified within the Site boundary and within 500 m of it.

2022 Updated Walkover

4.2.2 The habitats on Site had not changed significantly since the original survey in 2020, with the main changes resulting from vegetation growth and encroachment and ongoing demolition activities.

4.2.3 The once poor semi-improved grassland across the majority of the Site had developed into neutral semi-improved grassland which contained a rich species diversity. Buildings which were once present in the north of the Site had since been demolished, leaving areas of hardstanding.

4.2.4 The disused rail tracks had also been removed, in addition to the ruderal vegetation that was present alongside it.

4.2.5 The survey results are presented in the form of a map with the habitat types and boundary features marked (Figure 4.1).

4.2.6 Descriptions of the habitat types and boundary features are detailed below. Habitat descriptions are defined by broad habitat types (JNCC, 2010).

A1.1.1 Semi-natural Broadleaved Woodland

4.2.7 A block of semi-natural woodland was located to the south of the Site. The species here comprised of silver birch *Betula pendula*, poplar *Populus sp.* and oak *Quercus robur*. The understorey comprised of false fox-sedge *Carex otrubae*, pendulous sedge *Carex pendula*, bramble *Rubus fruticosus*, wood woundwort *Stachys sylvatica*, wood dock *Rumex sanguineus* and small balsam *Impatiens parviflora*.

A1.1.2 Broadleaved Plantation Woodland

4.2.8 Small blocks of planted woodland were located in the north east of the Site. They comprised of poplar, cherry *Prunus avium*, oak and hornbeam *Carpinus betulus*.

A1.3.2 Mixed Plantation Woodland

4.2.9 A block of plantation woodland was located to the south of the Site within an area of semi-natural woodland. The plantation canopy was dominated with Scot's pine *Pinus sylvestris*.

A2.1 Dense Scrub

4.2.10 Areas of dense scrub within the Site and wider area was dominated by willow species *Salix sp*. and bramble, with occasional rose *Rosa sp*., great mullein *Verbascum thapsus* and hard rush *Juncus inflexus*.

4.2.11 Sections of dense scrub ran along the sides of the disused railway tracks, creating a canopy over the streams in the north east of the Site. The scrub was dominated by bramble, with increasing quantities of hawthorn *Crataegus monogyna*, common gorse *Ulex europaeus* and willow species *Salix sp*., towards the northern end of the Site.

A2.2 Scattered Scrub

4.2.12 Small areas of scattered scrub with a similar species composition to that described in paragraph 4.2.10 were found adjacent to areas of hardstanding and adjacent to the plantation woodland in the south of the Site and along the eastern boundary.

A3.1 Scattered Broadleaved Trees

4.2.13 A number of trees were located throughout the Site and wider area with species including, hawthorn, ash *Fraxinus excelsior*, alder *Alnus glutinosa*, horse chestnut *Aesculus hippocastanum* and sweet chestnut *Castanea sativa*.

4.2.14 A number of trees were located throughout the poor semi-improved grassland in the north of the Site, comprising mature oak, with occasional ash, field maple *Acer campestre*, hawthorn and willow species.

B2.2 Semi-Improved Neutral Grassland

4.2.15 In 2022, the large areas of neutral semi-improved grassland within the Site and wider area were subject to occasional management through cutting, which created a short sward. Species within the sward included perennial rye-grass *Lolium perenne*, Yorkshire fog *Holcus lanatus*, creeping bent *Agrostis stolonifera*, red fescue *Festuca rubra*, meadow foxtail *Alopecurus pratensis* and cock's-foot *Dactylis glomerata*. Herbaceous species present included yarrow *Achillea millefolium*, creeping buttercup *Ranunculus repens*, white clover *Trifolium repens*, ribwort plantain *Plantago lanceolata*, groundsel *Senecio vulgaris*, selfheal *Prunella vulgaris*, ragwort *Jacobaea vulgaris*, primrose *Primula vulgaris*, daisy *Bellis perennis* and dandelion *Taraxacum officinale agg.*

4.2.16 Additional species of false oat-grass *Arrhenatherum elatius,* spear thistle *Cirsium vulgare*, cinquefoil *Potentilla sp*. common mouse-ear *Cerastium fontanum*, lesser celandine *Ranunculus ficaria*, red dead nettle *Lamium purpureum*, bristly ox-tongue *Helminthotheca echioides*, dove's-foot crane's-bill *Geranium molle* and glaucous sedge *Carex flacca* were also present, but less frequently.

4.2.17 Strips of diverse semi-improved grassland were identified along the banks parallel to the disused rail tracks. The species here were consistent with that of the other semi-improved grassland with the addition of goat's beard *Tragopogon dubious*, false fox-sedge, wild carrot *Daucus carota*, black knapweed *Centaurea nigra*, agrimony *Agrimonia eupatoria*, common spotted orchid *Dactylorhiza fuchsii*, ox-eye daisy *Leucanthemum vulgaris* and field horsetail *Equisetum arvense*.

C3.1 Tall Ruderal

4.2.18 In 2020, the railway tracks and some of the roads comprised a mixture of wet and dry ditches which ran adjacent to them, with banks dominated by ruderal vegetation and saplings. Species

included rose, willow, bramble, hawthorn, elm *Ulmus procera*, gorse *Ulex sp*., spear thistle, hard rush, broadleaved willowherb *Epilobium montanum*, common hogweed *Heracleum sphondylium*, broadleaved dock *Rumex obtusifolius*, hairy bittercress *Cardamine hirsuta*, cowslip *Primula veris,* wild teasel *Dipsacus fullonum*, cleavers *Galium aparine* and field speedwell *Veronica persica.*

4.2.19 Since the Phase 1 survey was undertaken, the ruderal vegetation has been cleared (to bare ground) in addition to the disused rail tracks across the Site and are therefore not shown on the Phase 1 habitat plan (Figure 4.1).

G1 Standing Water

4.2.20 Waterbody P1 comprised a tall (approximately 2.5 m high) red-brick fire pit. The waterbody had steep brick sides with no aquatic or emergent vegetation.

4.2.21 In 2020, six waterbodies (P2-P7) within the Site and wider area were present, formerly used as emergency fire resource ponds, constructed of concrete with sloping banks and slight kerbs around the edges. The waterbodies contained none or very limited aquatic and / or emergent vegetation.

4.2.22 Since these surveys were undertaken, Ponds 6 and 7 have been cleared and drained as part of the wider Graven Hill development.

4.2.23 Drainage ditches ran adjacent to many of the disused rail tracks. The species present within the ditches included hard rush, soft rush, bull rush *Typha latifolia*, meadow sweet *Filipendula ulmaria*, false fox-sedge, common sedge, pendulous sedge, cock's-foot and false oat-grass.

G2 Running Water

4.2.24 A couple of wet ditches were present in the north east of the Site, with water running southwards. The banks of the ditches were occupied with dense scrub as described above.

J2.6 Dry Ditch

4.2.25 A number of dry ditches were also present adjacent to the disused rail tracks with a similar species composition as described in paragraph 4.2.20.

J3.6 Buildings

4.2.26 The buildings on Site comprised large warehouses, constructed of brick with metal sheeted roofs, single-storey prefabricated buildings, small sheds constructed of brick with flat roofs and single-storey brick structures with corrugated roofs.

4.2.27 A number of buildings have been demolished as part of the wider Graven Hill development, leaving large areas of bare ground and hardstanding.

4.2.28 Further detailed description of each building are provided in Section 4.3 of this report.

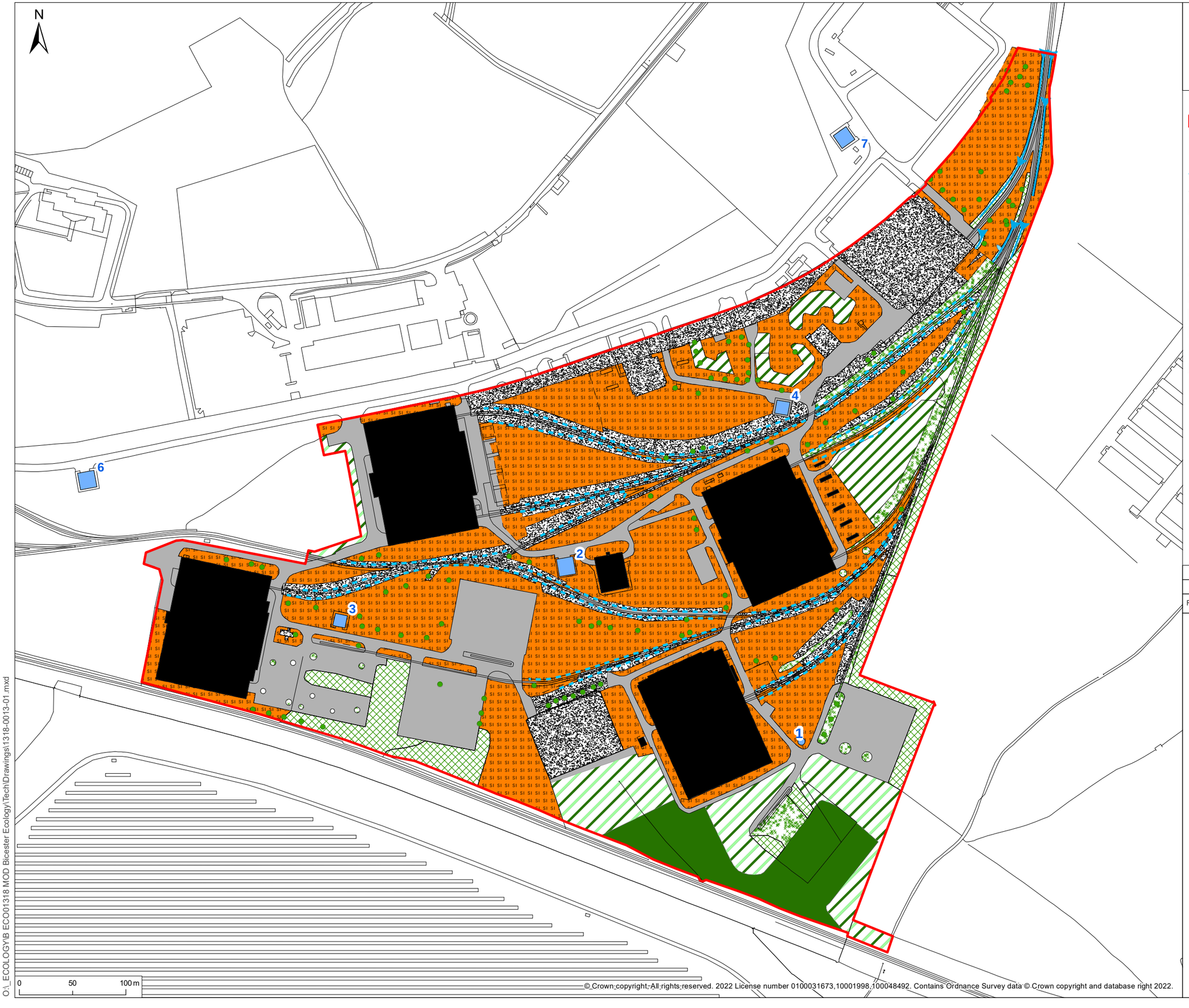
J4 Bare Ground and J5 Hardstanding

4.2.29 Areas of bare ground and hardstanding were located around the buildings and included a number of access roads and car parks. Some areas of hardstanding within the Site have been colonised by willow and bramble scrub.

4.2.30 Areas of bare ground and hardstanding have been created through ongoing demolition and Site clearance work.

4.2.31 Subsequent removal of the railway tracks and associated vegetation across the Site has left large areas of bare ground.

Figure 4.1: Phase 1 habitat plan (2022)



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Legend

- Application boundary
- Broadleaved Tree
- Dry ditches
- Wet ditches
- Fence
- Bare Ground
- Building
- Poor Semi-Improved Grassland
- Mixed Plantation Woodland
- Broadleaved Plantation Woodland
- Scattered scrub
- Dense Scrub
- Pond
- Semi-Natural Broadleaved Woodland
- Semi-improved neutral grassland
- Hardstanding

Rev	Description	By	CB	Date

MAKING COMPLEX EASY

20 Western Avenue, Milton Park, Abingdon, Oxfordshire, OX14 4SH
T: +44(0)1235 821 888 E: rpsox@rpsgroup.com

Client: Graven Hill Developer Ltd

Project: MOD Bicester Ecology

Title: Phase 1 habitat plan (2022)

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Rev: **-**

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4.3 Ecological Scoping Survey

Plants

4.3.1 The Site predominately comprised buildings, hardstanding, neutral semi-improved grassland and managed (mown) poor semi-improved grassland. Other habitats present included areas of dense and scattered scrub, dry ditches and semi-natural/plantation woodland. A number of waterbodies were identified within the Site boundary and within 500 m of it.

4.3.2 A number of notable plants were recorded within 2 km of the Site. The Site did not have a diverse flora and was unlikely to support any protected or notable flora.

Invertebrates

4.3.3 The Site comprised a low diversity of common and widespread flora which could support a variety of locally common and widespread invertebrates. There was limited suitable habitat onsite which had the potential to support invertebrates. The woodland and mature trees had limited amounts of deadwood and the ponds and ditches on Site were relatively small with little aquatic vegetation present. The grassland was limited in species diversity, limiting their value to invertebrates.

4.3.4 Considering all the habitats on Site and the plant species recorded during the Phase 1 Habitat Survey, no further invertebrate surveys are considered necessary. However, suggestions of enhancement measures to provide further suitable habitat for invertebrates are included in Section 6 of this report.

Herpetofauna

GCN

4.3.5 The habitats on Site continued to provide suitable terrestrial habitat for amphibians, including GCN. There were a number of waterbodies on Site and within 500 m of the Site.

Reptiles

4.3.6 Specific surveys for reptiles were carried out by Ecology Solutions Ltd. of an area within the Site in 2018, which identified a very low population of common lizard and slow worm along the ruderal vegetation along the banks of the railway. Reptile surveys undertaken by Waterman Group in 2019 recorded a low population of slow worm within the current development Site.

4.3.7 The majority of the Site was not suitable for reptiles (regularly managed grassland through cutting), although the ditches with ruderal vegetation banks were considered suitable.

4.3.8 The grassland had remained relatively unchanged since the reptile surveys were undertaken in 2018 and 2019 i.e. regularly managed grassland through cutting. However, due to the presence of reptiles on Site and the time elapsed since the original surveys, further mitigation will be required as detailed in Section 6 of this report.

Breeding Birds

4.3.9 The buildings, woodland, trees and scrub on Site continued to provide suitable habitat for nesting birds.

4.3.10 A number of protected and notable bird species were recorded within 2 km of the Site, which may be present on Site where suitable habitat exists.

4.3.11 Breeding bird surveys have previously been undertaken on Site by the Waterman Group. The habitats remained relatively unchanged since the surveys were undertaken in 2018 and 2019 and therefore the results of these surveys remain valid for the purpose of this assessment.

Barn Owls

4.3.12 Specific surveys for barn owl were not undertaken, however numerous sightings of this species were observed during the bat emergence and re-entry surveys in 2020. There are no suitable roost or nest Sites within the Site boundary, however the grassland provided suitable foraging habitat.

Bats

4.3.13 The woodland, treelines and open grassland continued to provide ideal foraging and commuting habitats for bats. The buildings and mature trees present on the Site continued to provide roosting potential.

Badgers

4.3.14 The Site had areas of habitat including woodland and dense scrub that were all suitable to support badgers and their setts. The fields also provided foraging opportunities for badgers.

Otter and Water Vole

4.3.15 The streams and wet ditches running to either side of the railway line were narrow with small amounts of water present; approximately 15 cm of water. The banks and channel where heavily shaded by surrounding vegetation. Given the characteristics of the watercourses, they were deemed as being unsuitable for water vole.

4.3.16 The streams and ditches do not connect with any larger rivers or streams and are not large enough to support a stable fish population. These features are therefore considered unsuitable habitat for otter.

Dormice

4.3.17 Dormouse surveys were undertaken by AMEC in 2010 and 2011 which recorded a single dormouse nest in a nest-tube in September 2011, on the northern edge of Graven Hill Wood (approximately 600 m to the north of the Site). No other evidence of dormouse was recorded during the surveys.

4.3.18 Waterman Group undertook further surveys for dormouse in 2014. No dormice or evidence of this species was recorded during the nest tube surveys and no evidence of dormice was recorded during the nest search. Therefore it was considered unlikely that dormice were present on the Site and the Site was of negligible value to this species. An updated assessment for dormice was undertaken in 2020 (Waterman Group, 2020) which concluded that the species remained absent from the Site.

4.3.19 The habitats currently present on Site are of negligible suitability for dormouse and are not well connected to Graven Hill Wood. Considering the absence of dormouse in the desk study data and the historic absence of dormouse on Site, the conclusions of the 2020 assessment (Waterman Group, 2020) remain valid and accurate, therefore dormouse is not considered further in this report.

4.4 Great Crested Newt Survey

Habitat Suitability Index Assessment

4.4.1 A HSI assessment was undertaken on all waterbodies within the Site and within 500 m of the Site, where access was provided. The results are provided in Table 4.1 overleaf.

Table 4.1: GCN HSI Assessment

Waterbody	Geographic Location	Area (m^2)	Permanence	Water Quality	Shade	Waterfowl Presence	Fish Presence	Pond Density	Terrestrial Habitat	Macrophyte Cover	Overall Score
1	1	0.1	0.9	0.33	1	1	1	1	0.01	0.3	0.38 Poor
2	1	0.2	0.9	0.33	1	0.67	0.33	1	0.33	0.3	0.51 Below average
3	1	0.2	0.9	0.33	1	0.67	0.33	1	0.33	0.3	0.51 Below average
4	1	0.2	0.9	0.33	1	0.67	0.33	1	0.33	0.3	0.51 Below average
5	1	0.2	0.9	0.33	1	0.67	0.33	1	0.33	0.3	0.51 Below average
6	1	0.2	0.9	0.33	1	0.67	0.33	1	0.33	0.3	0.51 Below average
7	1	0.2	0.9	0.33	1	0.67	0.33	1	0.33	0.3	0.51 Below average

4.4.2 An indication of the suitability of the seven waterbodies on the Site which were located on or within 500 m of the whole Site (connected to the Site by suitable terrestrial habitat) was made using HSI scores.

4.4.3 The locations of these waterbodies are presented on Figure 4.1. A score was obtained for each water body ranging between 0-1; with 0 indicating likely unsuitable habitat and 1 indicating optimal habitat.

4.4.4 Waterbodies P2 to P7 were of the same design and construction and were considered below average for GCN. The HSI results had not changed from when they were previously surveyed in 2019 by Waterman Group. Waterbody P1 was considered to offer poor quality habitat for GCN, with steep brick sides and no vegetation present. This waterbody was not surveyed by either Ecology Solutions Ltd. or Waterman Group as it was considered unsuitable for GCN.

Population Assessment Survey

4.4.5 The survey results of the presence/absence surveys undertaken on the ponds on Site and within 500 m of the Site are provided in Table 4.2 below.

Table 4.2: GCN survey results 2020

Visit	Date	Pond 1	Pond 2	Pond 3	Pond 4	Pond 5	Pond 6	Pond 7
1	01/06/2020-02/06/2020	None	2 Frogs	None	6FSN (bottle trap) 30 Frogs 36 Tadpoles	3SN (bottle trap) 75 Tadpoles	6MGCN 1FSN (bottle trap)	5 Tadpoles
2	03/06/2020-04/06/2020	None	None	None	1MSN 3FSN (bottle trap)	None	1MGCN 2MSN (bottle trap)	None
3	04/06/2020-05/06/2020	None	None	3FSN	None	None	1FSN 1FGCN	None
4	08/06/2020-09/06/2020	None	None	None	1FSN (torching)	None	1MGCN, 7MSN (bottle traps)	None
5	11/06/2020-12/06/2020	None	None	None	None	None	None	None
6	15/06/2020-16/06/2020	None	1FSN (torching)	None	1FSN (torching) 1FSN (bottle trap)	None	None	None

Abbreviations: FSN: female smooth newt; MSN: male smooth newt; SN: smooth newt; MGCN: male great crested newt; FGCN: female great crested newt

4.4.6 GCN were only recorded within Pond 6, which is located within an area of woodland approximately 100 m to the north west of the Site. Low populations of smooth newts, frogs and tadpoles were also recorded within Ponds 2, 3, 4, 5 and 6 during the surveys.

4.4.7 The peak count of GCN recorded in each pond during the survey visits was six. This equates to a ‘good’ population of GCN within the pond.

Updated eDNA Survey

4.4.8 Since the 2020 surveys were undertaken, Ponds 6 and 7 have been cleared and drained under a GCN mitigation licence held for the wider Graven Hill development and extensive newt fencing is present around the boundary of the Site, acting as a significant barrier to dispersal; a mitigation pond (receptor Site) has been created over 700 m to the north of the Site boundary. The ruderal vegetated banks (associated with the railway lines) have also been cleared.

4.4.9 An updated environmental DNA (eDNA) survey of the remaining four waterbodies within the Site boundary was undertaken in April 2022 to reaffirm presence / likely absence. The eDNA surveys were negative, confirming likely absence of GCN from these waterbodies. The results of the eDNA surveys are provided in Appendix D.

4.5 Preliminary Roost Assessment

4.5.1 Bats were recorded using the LTA2 Site during activity surveys and static detector surveys undertaken by Waterman Group in 2019. The activity appeared to be evenly distributed throughout the LTA2 Site; ten species were recorded including common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, noctule, Leisler's bat, brown long-eared, Daubenton's bat, Brandt's bat, serotine and barbastelle.

4.5.2 A number of trees and buildings on Site had previously been identified by Ecology Solutions Ltd. in 2018 and Waterman Group in 2019 as having potential to support roosting bats. A number of buildings and one tree (T492) were confirmed as bat roosts. The PRA and subsequent bat emergence and re-entry surveys were therefore updated.

4.5.3 The locations of all buildings and trees assessed are shown on Figure 4.2. This figure also includes the locations of trees which were previously assessed by Waterman Group (2020). Site photographs are provided in Appendix B.

Building D1

4.5.4 This building was previously confirmed as a bat roost. The building comprised a large brick warehouse with metal cladding leading into ten pitched metal roofs. Externally, the metal cladding was mainly flush with the brickwork, but slightly lifted at the corners and crevices were present in brickwork across all elevations. Bricks were missing on the corner of the south west elevation leading to a cavity wall and a disused bird nest was present.

4.5.5 Internal areas consisted of a large open warehouse with no roof voids present and several smaller office rooms. There were gaps into voids where pipework was present, although generally the rooms were well sealed; within the main warehouse, there were small crevices within the brickwork, but these did not appear to recede substantially and no evidence of bats was found.

4.5.6 Single-storey outbuildings were present on the east and west elevations of the building which appeared to be in an overall good condition. A small outbuilding was located on the south east corner with cavities on its western elevation.

4.5.7 There was a small single-storey brick extension, with a flat roof on the northern elevation of the main building. The door was open at the time of the survey with a swallow's nest (and mature chicks) present. The whole building had **High** potential for roosting bats. The outbuildings were also considered to provide hibernation potential.

Building D4

4.5.8 A large brick warehouse with metal cladding leading into ten pitched metal roofs. Externally the metal cladding was mainly flush with the brick work, but slightly lifted at the corners and adjacent to large metal shutter doors, which could allow access to internal void.

4.5.9 The internal areas consisted of a large open warehouse with no roof voids present and several smaller office rooms. Within the main warehouse, there were small crevices within the brickwork, but these did not appear to recede substantially; bat droppings were found on a surface in the south east corner of the main building. A sample was taken to be analysed which was confirmed as brown long-eared bat.

4.5.10 There were three, single-storey brick flat roof extensions on the south east (bunker), western (bunker – sealed, no access) and north west sides of the building. The bunker on the south east

side comprised an L-shaped entrance hall, one large room and two chemical closet areas. Two large holes on either side of the room which led to a void within the cavity wall; old bat droppings were present in both voids. Fresh droppings were found throughout the bunker and at the entrance. Samples were taken to be analysed which confirmed the presence of brown long-eared and natterer's bat *Myotis nattereri*.

The whole building had **High** potential for roosting bats and the bunker was **confirmed** as a bat roost. The outbuildings were also considered to provide hibernation potential.

Buildings 19a,19 and 20

4.5.11 These comprised three single-storey brick bunkers, each with flat roofs and open windows on each the northern and southern elevations. Internally the buildings comprised of an entrance hall, one large room and two chemical closet areas. At the time of the internal inspections, the bunkers were damp and drafty; water was leaking through cracks in the concrete above, suggesting that the roof is in poor condition. There were no internal cavities or gaps in the brickwork, but it was possible that bats may use these buildings as a night / feeding roost.

4.5.12 No evidence of bats was found but considering evidence of bat roosts nearby, the three buildings had **High** potential for roosting bats.

Buildings 25-30

4.5.13 These comprised six single-storey brick bunkers, each with a flat roof and open windows on each the north west and south east aspects. They were the same construction as buildings 19a, 19 and 20 described above.

4.5.14 A single bat dropping was found in one of the bunkers (Building 29). All buildings had **High** potential for roosting bats.

Building 34

4.5.15 A small single storey concrete and brick-built building with a flat roof (no internal access). Externally, there were many small crevices present where the concrete was deteriorating leading to exposed brickwork and small cavities behind (although most appeared shallow and exposed). Small gaps were also present under the roofing felt along the length of the building.

4.5.16 The building was considered to have **Low** potential to support roosting bats.

Building D2

4.5.17 A large brick warehouse with metal cladding leading into ten pitched metal roofs. Internal areas consisted of a large open warehouse with no roof voids present and several smaller office rooms. There were gaps into voids where pipework was present, although generally the rooms were well sealed, and no evidence of bats was found.

4.5.18 Externally the metal cladding was mainly flush with the brick work, but slightly lifted at the corners. The building had **Moderate** potential for roosting bats.

Building D7

4.5.19 A large brick warehouse with metal cladding leading into pitched metal roofs. Internal areas consisted of a large open warehouse with no roof voids present and several smaller office rooms, there were some gaps into voids where pipework present. Although generally the rooms were well sealed, and no evidence of bats was found, within the main warehouse, there were small crevices within the brickwork, which did not appear to recede substantially.

4.5.20 Externally, gaps were present under the lip of metal cladding across all elevations with small crevices in brickwork.

4.5.21 There were single-storey office extensions on the north west aspect of building and an additional single-storey brick flat roof extension (bunker). The bunker was not accessed internally but could possibly be accessed (by bats / birds) through an open window; the interior was very dark, although it is assumed that the layout was similar to those others found across the Site. No droppings or evidence of bats was found. The building had **Moderate** potential for roosting bats. The outbuildings were also considered to provide hibernation potential.

Building D10

4.5.22 A large brick-built building with a curved asbestos corrugated roof. There were large gaps present between the metal shutter doors and overhang of building and gaps under the roofing felt on the north and south aspects. Internally, there were bricks missing in the north west and south west corners of the building and the building was open and uncluttered. The building had **Moderate** potential for roosting bats.

Trees

4.5.23 During the update Phase 1 Habitat Survey, the trees on Site previously identified as having bat roost potential were verified as having low bat roost potential (T356, T456), moderate bat roost potential (T494) and high bat roost potential (T492). T492 had been previously confirmed as a bat roost by the Waterman Group.

4.6 Bat Emergence and Re-entry Surveys

4.6.1 Results from the bat emergence / re-entry surveys undertaken in September 2020 and between June and August 2021 are detailed below in Table 4.3 below. This includes details of species found and roost types.

Table 4.3: Bat emergence / re-entry results (September 2020 and June-August 2021)

Building Number	Visit Number	Survey Date and Type	Emergences / Re-entries recorded	Notes	Roost type
19a	1	09/09/20 – re-entry	None	None	None
	2	01/07/21 – emergence	None	None	None
	3	26/07/21 – emergence	None	None	None
19	1	08/09/20 – emergence	None	None	None
	2	23/06/21 – emergence	None	None	None
	3	27/07/21 – re-entry	P.aur x 2	Two bats flew out of doorway on northern elevation. The bats were not seen to enter from the other side. No echolocation. Likely P.aur.	Night / feeding
20	1	09/09/20 – emergence	None	None	None
	2	02/07/21 – re-entry	None	None	None
	3	14/07/21 – emergence	None	None	None

Building Number	Visit Number	Survey Date and Type	Emergences / Re-entries recorded	Notes	Roost type
25	1	09/09/20 – emergence	None	None	None
	2	24/06/21 – re-entry	None	None	None
	3	14/07/21 – emergence	P.aur x 1	A single bat was observed entering the structure, via the doorway on the SE aspect, shortly after 22:17. The bat re-emerged on the NW aspect approximately 90 seconds later.	Night / feeding
26	1	09/09/20 – emergence	None	None	None
	2	16/06/21 – emergence	None	None	None
	3	14/07/21 – re-entry	None	None	None
27	1	14/09/20 – emergence	None	None	None
	2	16/06/21 – emergence	None	None	None
	3	14/07/21 – re-entry	None	None	None
28	1	15/09/20 – re-entry	None	None	None
	2	16/06/21 – emergence	None	None	None
	3	13/07/21 – emergence	None	None	None
29	1	17/09/20 – emergence	None	None	None
	2	17/06/21 – re-entry	None	None	None
	3	23/07/21 – re-entry	None	No re-entries on 29, however at least three P.pygs seen re-entering feature on NE aspect of D2 – two bats flew directly from woodland to feature and one bat circling before re-entry. Likely day / summer roost.	None
30	1	17/09/20 – emergence	None	None	None
	2	17/06/21 – re-entry	None	None	None
	3	23/07/21 – re-entry	None	None	None
34	1	14/06/21 – emergence	None	None	None
D1	1	07/09/20 – emergence	P.pip x 1	Single bat emerged from underneath metal cladding on southern aspect.	Day / summer
		08/09/20 – re-entry	P.pip x 2	Single re-entry above metal roller door on eastern aspect. Single re-entry under metal cladding above single-storey extension on western aspect.	Day / summer

Building Number	Visit Number	Survey Date and Type	Emergences / Re-entries recorded	Notes	Roost type
	2	02/06/21 – emergence	P.pip x 3	Three bats emerged from underneath metal cladding at various points along northern aspect.	Day / summer
		03/06/21 – re-entry	None	None	None
	3	28/06/21 – emergence	P.pip x 5	At least this number of bats were seen emerging from a gap under the metal cladding above the 'D1' sign on the eastern aspect. The surveyor was positoned to the south and therefore could not confirm exact numbers. No bats were observed re-entering the feature on the dawn survey.	Day / summer
		29/06/21 – re-entry	None	None	None
D2	1	14/09/20 – emergence	None	None	None
	2	08/07/21 – emergence	None	None	None
		09/07/21 – re-entry	None	None	None
	3	31/08/21 - emergence	None	None	None
		01/09/21 – re-entry	None	None	None
D4	1	02/09/20 - emergence	None	None	None
		03/09/20 - re-entry	None	None	None
	2	22/06/21 – emergence	Unknown* x 1	Single bat emerged from corner of metal cladding on SW aspect.	Day / summer
		23/06/21 – re-entry	None	None	None
	3	19/07/21 – emergence	P.aur x 1 Unknown* x 3	Single brown long-eared emerged from doorway of known roost approximately 22:37. Three bats emerged from above the roller door on the NE corner of the building between 22:04 and 22:29.	Day / summer
		20/07/21 – re-entry	P.pip x 1	Direct flight into small gap above roller door on NW aspect.	Day / summer
D7	1	03/09/20 - re-entry	None	None	None
		03/09/20 – emergence	P.pip x 3	Three bats emerged from under metal cladding on SE aspect; two at 20:06 and one at 20:09.	Day / summer
		04/09/20 – re-entry	None	None	None
	2	09/06/21 – emergence	None	None	None
		10/06/221 – re-entry	None	None	None

Building Number	Visit Number	Survey Date and Type	Emergences / Re-entries recorded	Notes	Roost type
	3	07/07/21 – emergence	Unknown* x 1	Single bat emerged from underneath metal cladding on SE aspect at approximately 22:11.	Day / summer
		08/07/21 – re-entry	None	None	None
D10	1	08/09/20 – emergence	None	None	None
	2	07/07/21 – re-entry	P.pip x 38	At least 38 bats re-entering building under overhanging roofing felt on northern aspect.	Maternity
	3	22/07/21 – emergence	None	None	None

Abbreviations used in Table 4.3: P.pip: common pipistrelle; P.pyg: soprano pipistrelle; P.aur: brown long-eared bat
* bat emerged/re-entered silently therefore species could not be identified.

4.6.2 A number of roosts were confirmed across the Site during the emergence / re-entry surveys, including common and soprano pipistrelle summer / day roosts, a common pipistrelle maternity roost and brown long-eared summer / day and night / feeding roosts.

4.6.3 A natterer's roost (likely a satellite roost) was confirmed through DNA analysis of droppings collected during the PRA in 2020, however there were no natterer's bats seen emerging / re-entering the structure during the surveys undertaken in 2020 or 2021.

4.6.4 Generally, common and soprano pipistrelle accounted for the highest levels of foraging and commuting activity recorded during the surveys. *Myotis* species, noctule, Leisler's and serotine were also frequently recorded. Fewer passes were observed from brown long-eared bats and only occasional passes were recorded from Nathusius' pipistrelle and barbastelle.

4.6.5 The locations of the confirmed roosts identified during the emergence / re-entry surveys are shown on Figure 4.2.

Figure 4.2: Confirmed bat roost locations – D Site only (emergence and re-entry surveys)

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Legend

- Application boundary
- Brown long-eared emergence / re-entry points
- Common pipistrelle emergence / re-entry points
- Soprano pipistrelle emergence / re-entry points
- Unknown species emergence / re-entry points
- Major flightlines and foraging areas

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20 Western Avenue, Milton Park, Abingdon, Oxfordshire, OX14 4SH
T: +44(0)1235 821 888 E: rpsox@rpsgroup.com

Client: Graven Hill Purchaser LLC

Project: MOD Bicester Ecology

Title: Confirmed bat roost locations (emergence and re-entry surveys)

Status	Drawn By	PM/Checked By
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Project Number	Scale @ A3	Date Created
ECO01318	1:3,000	NOV 2021

Figure Number	Rev
4.2	-

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4.7 Bat Hibernation Surveys

4.7.1 One brown long-eared bat was found during the hibernation survey undertaken in January 2021. The bat was found in the outbuilding on the north west side of Building D4, tucked away between the top of the brick wall and flat concrete roof. No other bats were seen during the hibernation checks in either January or February 2021.

4.7.2 The brick outbuildings associated with the larger buildings were generally considered suitable to support roosting bats such as brown long-eared and pipistrelle species. Cracks and voids in the walls and stonework of these buildings were considered capable of supporting crevice hibernating bats.

4.7.3 The standalone brick outbuildings (Buildings 19, 19a, 20 and 25-30) were not considered suitable for hibernating bats given the lack of suitable features, generally open (draughty) structure and damp conditions.

4.7.4 The static detectors recorded bats at only one location in February 2021: the outbuilding on the north west side of Building D4, where calls of at least three bat species were recorded.

4.7.5 The results of the static detector surveys are provided below in Table 4.4. The location of the confirmed hibernation roost and static detector locations are shown on Figure 4.3.

Table 4.4: Numbers of bat contacts recorded during static monitoring surveys in January and February 2021

Survey nights	Number of nights recording	Location	Bat species			
			P.pip	P.pyg	M.sp.	Total
18/01/21 – 31/01/21	14	D4 (SE)			No bats	
18/01/21 – 31/01/21	14	D4 (NW)			No bats	
18/01/21 – 31/01/21	14	D7			No bats	
02/02/21 – 18/02/21	15	D4 (SE)			No bats	
02/02/21 – 18/02/21	15	D4 (NW)	23	1	2	26
02/02/21 – 18/02/21	15	D7			No bats	

Abbreviations used in Table 4.4: P.pip: common pipistrelle; P.pyg: soprano pipistrelle; M.sp.: *Myotis* species

Figure 4.3: Confirmed bat roost locations – D Site only (hibernation surveys)

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Legend

- Brown long-eared bat recorded
- Static detector location

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20 Western Avenue, Milton Park, Abingdon, Oxfordshire, OX14 4SH
T: +44(0)1235 821 888 E: rpsox@rpsgroup.com

Client: Graven Hill Purchaser LLC

Project: MOD Bicester Ecology

Title: Confirmed bat roost locations (hibernation surveys)

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4.8 Badger Survey

4.8.1 Due to the sensitive nature of badger data the results are provided within a confidential Appendix C. Those with a legitimate need for the information may request it from RPS.

5 EVALUATION AND POTENTIAL IMPACTS

5.1 Designated Sites

5.1.1 There were no statutory or non-statutory designated sites for nature conservation value within or immediately adjacent to the Site. The nearest statutory designated site was Arncott Bridge Meadows SSSI, which is located 1.8 km to the south east of the Site, and the nearest non-statutory designated site was Graven Hill LWS, which is located 380 m to the north west of the Site.

5.2 Habitats

5.2.1 The Site predominately comprised buildings, hardstanding, neutral semi-improved grassland and managed (mown) poor semi-improved grassland. Other habitats present included areas of dense and scattered scrub, dry ditches and semi-natural/plantation woodland. A number of waterbodies were identified within the Site boundary and within 500 m of it.

5.2.2 The habitats present on Site had the potential to support roosting, foraging and commuting bats, breeding birds, reptiles, great crested newts (GCN) and badgers.

5.2.3 The NPPF (2021) states that to minimise impacts on biodiversity, planning policies should promote the preservation, restoration and re-creation of priority habitats. The habitats that would be lost should be recreated. Ideally this should be carried out onsite. Where this is not possible, opportunities for offsite habitat creation will be explored to ensure a net gain for biodiversity is achieved.

5.2.4 A full Construction Ecological Management Plan (CEMP) and a Landscape and Ecological Management Plan (LEMP) would be provided prior to works commencing. Good practice guidelines will be included within these plans which must be put in place and followed to ensure that the adjacent designated sites are not adversely affected by the development.

5.3 Species

Plants

5.3.1 The species identified during the Phase 1 Habitat Survey were common and widespread and there were no protected, notable or invasive species recorded.

5.3.2 Therefore, further botanical surveys are not required.

Invertebrates

5.3.3 Most of the habitats identified on Site were likely to support a variety of common and widespread invertebrates. The Site was not considered floristically diverse and was therefore considered to be of low value for invertebrates (of Site-level importance).

5.3.4 Considering the habitats on Site and the plant species recorded during the Phase 1 Habitat Survey, no further invertebrate surveys are considered necessary, however enhancement measures to provide suitable habitat for invertebrates are included in Section 6 of this report.

Herpetofauna

Great Crested Newts

5.3.5 The majority of the Site was not considered suitable for GCN (comprising hardstanding and managed grassland), however the ditches with ruderal vegetated banks, areas of scrubby woodland and less managed grassland areas are considered suitable for them.

5.3.6 GCN were recorded in Pond 6 during surveys undertaken by RPS in 2020 (which is located within 100 m of the Site) and previously recorded in Pond 3. It was considered that GCN are likely to utilise the suitable terrestrial habitat on Site and therefore the development would result in the disturbance or loss of terrestrial habitat. Since these surveys were undertaken, Ponds 6 and 7 have been cleared and drained under a GCN mitigation licence held for the wider Graven Hill development and extensive newt fencing is present around the boundary of the Site, acting as a significant barrier to dispersal.

Reptiles

5.3.7 Specific surveys for reptiles were carried out by Ecology Solutions Ltd. of an area within the Site in 2018, which identified a very low population of common lizard and slow worm along the ruderal vegetation along the banks of the railway. Reptile surveys undertaken by Waterman Group in 2019 recorded a low population of slow worm within the current development Site.

5.3.8 Due to the presence of reptiles on Site and the time elapsed since the original surveys, further mitigation will be required as detailed in Section 6 of this report.

Breeding Birds

5.3.9 The buildings, woodland, trees and scrub on Site provided suitable habitat for nesting birds.

5.3.10 Measures to ensure that breeding birds are not impacted on during construction activities are included in Section 6 of this report.

Bats

Buildings

5.3.11 During the emergence surveys undertaken in September 2020 and between June and August 2021, seven buildings were confirmed to have bats using them. These were predominantly in use by low numbers (between 1 - 5) of common pipistrelle, soprano pipistrelle and brown long-eared bats and were therefore likely day / summer roosts. Building D10 was confirmed as a maternity roost for common pipistrelles (peak count of 38 bats recorded in early July 2021) and Buildings 19 and 25 were also confirmed to be in use as likely night / feeding roosts.

5.3.12 The internal inspections of all buildings during the PRA in 2020 identified a mixture of old and fresh bat droppings throughout the outbuilding on the south east aspect of Building D4. Samples were taken to be analysed which confirmed the presence of brown long-eared and natterer's bats. Natterer's bats were not recorded emerging / re-entering any of the buildings during the surveys undertaken in 2020 and 2021; given the small quantity of droppings present at the time of the PRA, it is likely to be an occasional satellite roost for a low number of individuals.

5.3.13 The common pipistrelle maternity roost in Building D10 was surveyed once in September in 2020 and twice in July 2021. At least 38 bats were recorded re-entering the building at two points on the northern elevation during the survey in early July. However, there were no bats recorded emerging / re-entering the building during any other survey; the colony could have been using a different maternity roost Site on that night, or it is even possible that the colony had already broken up by the final survey in late July 2021. Maternity colonies are known to start breaking up once the

juveniles are weaned at 6 weeks of age (BCT, 2016). This is typically in August but depending on weather variables the maternity season can shift to earlier / later in the season.

5.3.14 The roosts on Site were assessed in accordance with Wray *et al.* (2010). The scoring system for valuing bat roosts can be seen below in Table 5.1.

Table 5.1: The scoring system for valuing bat roosts (Wray et al. 2010)

Geographic frame of reference	Roost types
District, Local or Parish	Feeding perches (common species) Individual bats (common species) Small numbers of non-breeding bats (common species) Mating Sites (common species)
County	Maternity Sites (common species) Small numbers of hibernating bats (common and rarer species) Feeding perches (rarer/rarest species) Individual bats (rarer/rarest species) Small numbers of non-breeding bats (rarer/rarest species)
Regional	Mating Sites (rarer/rarest species) including well-used swarming Sites Maternity Sites (rarer species) Hibernation Sites (rarest species) Significant hibernation Sites for rarer/rarest species or all species assemblages
National/UK	Maternity Sites (rarest species) Sites meeting SSSI guidelines
International	SAC Sites

5.3.15 The common pipistrelle maternity roost, satellite for natterer's bat and brown long-eared hibernation roost were assessed as being of County importance. The day and feeding roosts associated with common species such as day roosts for common and soprano pipistrelle and brown long-eared bats are of Local importance.

Hibernation Surveys

5.3.16 One brown long-eared bat was found during the hibernation survey undertaken in January 2021, in the outbuilding on the north west side of Building D4.

5.3.17 The static detectors recorded bats at only one location in February 2021: the outbuilding on the north west side of Building D4, where calls of at least three bat species were recorded.

5.3.18 Two foraging calls from *Myotis* bats were recorded on the evenings of the 15th and 16th February 2021 at approximately 21:34 and 23:49. As sunset on these days was around 17:20, it is likely that the bat was flying past the structure at the time, however it is not possible to be certain as the detector, was near the entrance of the building. Thus, it could still pick up bats flying by as it likely did on the other nights *Myotis* bats were recorded.

5.3.19 Foraging calls from common pipistrelle and one call from soprano pipistrelle were also recorded on the evening of 15th February 2021, between 19:16 and 20:28. As above, sunset was around 17:20, with the first calls recorded nearly two hours after then (and therefore past typical pipistrelle emergence time). This indicates the bats were possibly roosting nearby. As with the *Myotis* calls it is not possible to be certain due to the location of the static detector within the structure.

Trees

5.3.20 A number of trees within the current development Site have been identified as having low bat roost potential (T356, T456), moderate bat roost potential (T494) and high bat roost potential (T492). T492 was also confirmed as a bat roost (Waterman Group, 2020).

5.3.21 There were no emergence / re-entry surveys undertaken on trees within the Site boundary between 2020 and 2021.

5.3.22 Due to the presence of a confirmed roost and time elapsed since the original surveys in 2019, further mitigation will be required as detailed in Section 6 of this report.

Badgers

5.3.23 The information on impacts of badgers is contained within confidential Appendix C.

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 Designated Sites

6.1.1 There were no statutory or non-statutory designated sites for nature conservation value within or immediately adjacent to the Site. The nearest statutory designated site was Arncott Bridge Meadows SSSI and the nearest non-statutory designated site was Graven Hill LWS.

6.1.2 During any construction activities, there is a low risk of air- or water-borne pollutants being transmitted to nearby designated sites, however best practice pollution and dust control measures would be required, and this would ensure they would not affect the designated sites.

6.1.3 Good practice guidelines will include but may not be limited to:

- Protective fencing installed along retained boundary features adjacent to the Site, where they fall outside the construction areas. Best practice guidelines for constructing exclusion zones, barriers and ground protection around trees provided in British Standard 5837:2012 (Trees in Relation to design, demolition and construction - Recommendations), should be followed where necessary;
- The sensitive siting of construction compounds, access roads and laydown areas away from retained boundary features; and
- A plan produced to ensure that air or water-borne pollution generated during construction is contained and does not affect nearby designated sites.

6.1.4 Due to the implementation of the above measures, significant ecological effects on statutory designated sites are not considered likely.

6.2 Habitats

6.2.1 The majority of the Site was of low ecological value (i.e. managed grassland and hardstanding), however higher-value habitats were present in the form of woodland and woodland edges, scattered mature trees and areas of scrub. The buildings were of value to roosting bats and breeding birds. The majority of the terrestrial habitats would be lost to facilitate the development.

6.2.2 In accordance with the NPPF (2021) a Biodiversity Net Gain (BNG) assessment of the Site will be undertaken to assess the habitats on Site prior to and post development, to demonstrate how the Site will deliver net gain.

6.3 Herpetofauna

GCN

6.3.1 The majority of the Site was not considered suitable for GCN (comprising hardstanding and managed grassland), however the ditches with ruderal vegetation banks, areas of scrubby woodland and less managed grassland areas are considered suitable for them.

6.3.2 GCN were recorded in Pond 6 during surveys undertaken by RPS in 2020 (which is located within 100 m of the Site) and previously recorded in a pond within the Site boundary. Since these surveys were undertaken, two ponds (including Pond 6) have been cleared and drained under a Natural England EPS GCN mitigation licence held for the wider Graven Hill development and numerous receptor Sites have been created over 700 m to the north of the Site boundary.

6.3.3 In April 2022, an updated eDNA survey of the remaining four waterbodies on Site confirmed likely absence of GCN.

6.3.4 The potential for offences and impacts on GCN within the Site was assessed using the Natural England Rapid Risk Assessment tool which indicates 'Amber: Offence Likely'. This is due to the scale of the proposed development. The approach advocated by NE is to consider options for redesign of the scheme in terms of location, layout, methods duration and timing so that effects can be minimised. It also recommends that the exact location of development in relation to resting places, dispersal areas and barriers to movement is critically examined prior to determining whether a derogation licence under the Habitats Regulations is required.

6.3.5 The nearest receptor Site for GCN for the wider Graven Hill development is over 500 m from the Site. Newts disperse over land to forage for food and move between ponds. As part of the GCN licence held under the wider Graven Hill development, extensive newt fencing is present around the boundary of the Site, which will likely act as a significant barrier to dispersal.

6.3.6 The distances moved during dispersal vary widely according to habitat quality and availability. At most Sites, the majority of adults stay within around 250 m of the breeding pond, so the density of individuals gradually decreases away from the pond. However, newts may well travel further if there are areas of high-quality foraging and refuge habitat extending beyond this range.

6.3.7 The majority of the Site comprised areas of hardstanding, buildings and open semi-improved grassland which is of sub-optimal value and considered unlikely to be used by GCN other than for dispersal, as they offer few foraging opportunities and little shelter. Areas of higher quality habitat such as scrub and woodland were present in the south of the site.

6.3.8 In the absence of mitigation, the loss of habitat as a result of the proposed development is unlikely to significantly affect GCN. However, a precautionary method of working will be employed during demolition and Site clearance to ensure that an offence is not committed and to minimise or eliminate the risk of encountering GCN. The measures would include altering the timing of works to avoid periods when newts are likely to be present within the terrestrial phase; toolbox talks prior to works within the area by an ecologist; and works within the area to be completed under Ecological Clerk of Works (ECoW).

6.3.9 In the highly unlikely event that a GCN is found during Site clearance, works will stop immediately and advice sought from a suitably qualified and licenced ecologist. If a GCN is found, it is likely that a Natural England licence will be required before works can resume.

Reptiles

6.3.10 The majority of the Site was not suitable for reptiles (regularly managed grassland through cutting), although the ditches with ruderal vegetation banks were considered suitable for them. Common lizard and slow worm have previously been recorded on Site.

6.3.11 Due to the presence of reptiles on Site and the time elapsed since the original surveys, these surveys will be updated in 2022 in order to determine the current reptile populations that may be affected by the development.

6.3.12 The level of mitigation required will be dependent on the results of the updated surveys however may include a destructive search of suitable reptile habitat or translocation programme; part of the Site may be required for reptile mitigation as part of the translocation exercise.

6.3.13 Reptile surveys can be undertaken between April and June and again in September when temperatures were between 10°C and 19°C avoiding rain or strong winds. A total of seven survey visits would be required and an additional visit would be required to lay out the refugia (to be undertaken 10-14 days prior to the start of the survey visits).

6.4 Breeding Birds

6.4.1 Vegetation (trees and scrub) and buildings with the potential to support breeding birds is present on Site. Habitats suitable for breeding birds should be cleared outside of the bird nesting season,

as far as practicable. The clearance works should be undertaken between October and mid-February to ensure nesting birds are not disturbed.

6.4.2 If any clearance or works are required during the nesting season, the relevant areas should be inspected by a suitably experienced ecologist to check for the presence of nesting birds prior to any Site clearance. If an active nest was present, the nest and vegetation within 5 m of it would be retained until the young birds had fledged. If the nest proved to be of a species listed in Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), advice from the inspecting ecologist regarding suitable distances to avoid disturbance of the nest and any bird using it will be sought and agreed with clearance contractors. Such buffers will remain in place until the young birds have fledged and left the nest.

6.4.3 The potential nesting habitat lost due to the development should be compensated for through tree and scrub planting exceeding the area of the habitats lost. This would provide feeding and nesting opportunities for breeding birds; provide foraging habitat for common bird species and provide a source of food in the autumn to early winter months.

6.4.4 Bird nest boxes installed on retained trees is also recommended to enhance the Site for nesting birds.

6.5 Bats

Bat Roosts

Buildings

6.5.1 A Preliminary Bat Roost Assessment (PRA) undertaken in July 2020 (RPS, 2021) identified 12 buildings with high potential, two buildings with moderate potential and one building with low potential to support roosting bats. Bat droppings were found in two buildings during the PRA. The outbuildings associated with Buildings D1, D4 and D7 were also considered suitable as hibernation roosts.

6.5.2 The emergence / re-entry surveys undertaken in September 2020 and between June and August 2021 identified seven buildings with confirmed bat roosts, including day roosts for common pipistrelle, soprano pipistrelle and brown long-eared bats; night / feeding roosts for brown long-eared bats and a satellite roost for natterer's bats. One building was confirmed as a maternity roost for common pipistrelle and one building was confirmed as a hibernation roost for brown long-eared during the surveys undertaken between January and February 2021. The types of roosts and species using them are summarised in Table 6.1 below.

Table 6.1: Summary of confirmed roosts identified through bat surveys undertaken between 2020 and 2021

Building number	Species identified	Roost type and number of roosts	Peak count (any roost)
D1	P.pip	Day / summer x 6	5
D2	P.pyg	Day / summer x 1	3
D4	Unknown*	Day / summer x 2	3
	P.aur	Day / summer x 1	1
		Hibernation x 1	1
	P.pip	Day / summer x 1	1
	M.nat**	Satellite x 1	N/A
D7	P.pip	Day / summer x 1	3
	Unknown*	Day / summer x 1	1
D10	P.pip	Maternity x 1	38
19	P.aur	Night / feeding x 1	2
25	P.aur	Night / feeding x 1	1
29	Unknown***	Night / feeding x 1	N/A

Building number	Species identified	Roost type and number of roosts	Peak count (any roost)

Abbreviations used in Table 6.1: P.pip: common pipistrelle; P.pyg: soprano pipistrelle; P.aur: brown long-eared bat; M.nat: natterer's bat; * bat emerged silently therefore species could not be identified; ** confirmed through DNA analysis, ***roost identified during PRA, species not identified

6.5.3 The Site is in use by multiple species of bat with some rarer species present (such as natterer's bat) and has a number of bat roost types such as maternity roosts, day roosts for multiple species and a hibernation roost. The Site also has high levels of bat activity with foraging and commuting activity from least nine different species recorded during the summer surveys undertaken in 2020 and 2021.

6.5.4 Due to the presence of roosts in multiple buildings across the Site, a Natural England European Protected Species (EPS) licence will be applied for prior to works commencing on the Site. As part of the licence application a detailed method statement and mitigation strategy will be produced, including details of the 'soft-strip' approach during demolition. Due to the type of roosts and species present, a bespoke bat house will be constructed on Site prior to demolition in order to compensate for the roosts lost. A detailed design of the bat house will be included within the licence application. The location of the bat house has been chosen to maximise the likelihood of successful occupation; the bat house will be well connected to high-quality foraging and commuting habitat (offsite) and shielded from excessive lighting of the project Site.

6.5.5 The timings of building demolition will avoid the most sensitive times of the known roosts, which would be the bat maternity and hibernation periods. Thus, demolition will be undertaken between October and March inclusive (and October to November for the hibernation roost). Demolition of the maternity roost can only take place after construction of the bat house. Compensatory roosting habitat (i.e. bat boxes) will be in situ prior to demolition commencing.

Trees

6.5.6 A number of trees within the current development Site have been identified as having low bat roost potential (T356, T456), moderate bat roost potential (T494) and high bat roost potential (T492). T492 was also confirmed as a bat roost.

6.5.7 Due to the presence of a confirmed roost and time elapsed since the original surveys in 2019, an updated PRA will be undertaken on all trees within the Site boundary to reaffirm their potential as a bat roost.

6.5.8 Further survey work (i.e. emergence/re-entry surveys) will be undertaken on any moderate or high potential trees which are likely to be affected by the proposed development works, for example removal, pruning or artificial lighting, to determine whether these are currently being used by bats. If any signs of bats are recorded present or bats are seen emerging or returning from any of the trees, this will be included within the Natural England EPS licence to inform the overall mitigation design for the Site.

6.5.9 Best practice guidance for bat surveys require two dawn swarming/dusk emergence surveys for trees with moderate potential, and three surveys for trees with high potential**.** The surveys will follow the latest best practice guidelines and recommendations published by the Bat Conservation Trust in *Bat Survey: Good Practice Guidelines* (BCT, 2016). Three surveys will be required on trees with moderate potential, if a bat roost is identified during the surveys.

6.5.10 The surveys required will be further emergence or dawn swarming surveys where surveyors on each visit will be equipped with bat detectors and recording equipment, observing the potential roost features within the trees, to record any emerging/returning to roost bats. The survey will start 30 minutes before sunset and continue for up to 2 hours after sunset or 2 hours prior to sunrise, until 30 minutes after for dawn swarming.

6.5.11 The optimum survey period to undertake these surveys is between May and August, during suitable weather conditions (temperatures above 10°C, dry, little wind)

6.5.12 No further survey work is required for trees identified as having low suitability. Any trees that are to be removed will require a 'soft fell' methodology to be employed. This can be undertaken at any time of year during suitable weather conditions, but a bat licenced ecologist must be present to oversee the works. If any features are accessible from the ground/aerial inspection the bat licenced ecologist will first check any potential roost features (PRFs)/cavities for signs of bat use (using a high-powered torch/endoscope). If no signs of bat use are identified a soft felling technique can be undertaken on the tree.

6.5.13 Soft felling a tree entails felling the tree in sections, with the following precautions: cutting above or below (rather than directly through) a potential roost feature; lowering cut sections gently to ground level by rope; and, cut sections are then to be left on Site, with any potential roost feature entrances left unobstructed, for 48 hours prior to chipping or removal from Site.

6.5.14 It should be noted that full Planning Permission (or Planning Permission with all nature conservation conditions discharged) will be required prior to an application for a licence.

Bat Activity

6.5.15 Bat activity surveys were undertaken across the Site by Waterman Group in 2019 (Waterman Group, 2020) which identified ten bat species; activity appeared to be relatively evenly distributed throughout.

6.5.16 Due to the loss of large areas of woodland along the southern boundary and the time elapsed since the original surveys, updated monthly transect and static activity surveys will be undertaken between April and October 2022. The surveys will aim to determine the importance of these areas to the bat assemblage present and using the Site and complement the existing data from 2019. This information would be included within the Natural England EPS licence.

6.5.17 The surveys would include one walked transect per month (comprising either one dawn or one dusk visit) and static surveys, whereby bat detectors would be left on Site to record bat activity over five consecutive days each month. The surveys would be undertaken in accordance with the BCT (2016) guidelines.

6.5.18 Lighting to be installed as part of the development should be in line with Guidance Note 08/18 Bats and Artificial Lighting in the UK, the following will be required:

- LED lighting will be used, and light levels should be kept as low as possible. Metal halide, fluorescent sources should not be used;
- Lighting will be directed to where it is needed (away from woodland, woodland edge and mature trees on Site);
- Only luminaires with an upward light ratio of 0% and with good optical control should be used, luminaires should always be mounted on the horizontal, i.e. no upward tilt;
- Any external security lighting should be set on motion-sensors and short (one minute) timers;
- Internal lighting within any new structures should be recessed where installed in proximity to windows to reduce glare and light spill; and
- Light sources should emit minimal ultra-violet light, peak higher than 550nm and be of a warm white spectrum (ideally <2700 Kelvin).

6.5.19 A variety of native, woody species should be used in the landscape scheme and these would provide new areas of suitable habitat for bats to forage around. Grassland areas should be sown with a meadow grassland seed mix to improve the habitat value for bats by providing an additional habitat type suitable for foraging and replacing areas of grassland currently of low ecological value.

6.6 Badgers

6.6.1 The information pertaining to conclusions and recommendations for badgers is contained within confidential Appendix C.

6.7 Enhancement Opportunities

6.7.1 In addition to the mitigation measures outlined above, enhancement measures could also include:

- The provision of bird boxes located within retained vegetation and on mature trees. Boxes would comprise various designs suitable for common species recorded on Site;
- Invertebrate boxes in various habitats, including near retained boundary features, adjacent to waterbodies and within retained woodland;
- The provision of additional bat boxes on existing mature trees (up to three boxes per tree) facing in different directions to offer suitable roosting conditions all year round; and
- Amphibian / reptile hibernacula located in retained or newly created habitat in the south of the Site.

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APPENDICES

Appendix A: Relevant Legislation

Great Crested Newts

Great created newts *Triturus cristatus* are listed on Schedule 5 of the Wildlife and Countryside Act 1981 (and as amended), which affords the species protection under Section 9. The species is also listed on Schedule 2 of the Conservation of Habitats and Species Regulations (Amendment) (EU Exit) 2019. In combination, this makes it an offence to:

- intentionally kill, injure or take (capture etc.) a great crested newt;
- possess a great crested newt;
- intentionally or recklessly damage, destroy, obstruct access to any structure or place used by great crested newt for shelter or protection, or disturb any animal occupying such a structure or place; and
- sell, offer for sale, possess or transport for the purpose of sale (live or dead animal, part or derivative) or advertise for buying or selling such things.

Great crested newts are also listed on the UKBAP as a Priority Species and are listed as a species of principal importance for biodiversity in England & Wales under Section 41 of the Natural Environment & Rural Communities Act (2006).

Reptiles

All common UK reptile species (adder *Vipera berus*, grass snake *Natrix helvetica*, common lizard *Zootoca vivipara* and slow worm *Anguis fragilis*) are protected through part of Section 9(1 and 5) of the Wildlife & Countryside Act 1981 (as amended). This prohibits:

- Intentional or reckless injuring or killing;
- Selling, offering or exposing for sale, or having in possession or transporting for the purpose of sale, any live or dead wild animal or any part of, or anything derived from, such an animal; or
- Publishing or causing to be published any advertisement likely to be understood as conveying buying or selling, or intending to buy or sell, any of those things.

Birds

All birds, their nests and eggs are afforded protection under the Wildlife and Countryside Act 1981, as updated by the Countryside and Rights of Way Act 2000. It is an offence to:

- intentionally kill, injure or take any wild bird;
- intentionally take, damage or destroy the nest of any wild bird while it is in use or being built; and
- intentionally take or destroy the egg of any wild bird.

Schedule 1 birds cannot be intentionally or recklessly disturbed when nesting and there are increased penalties for doing so. Licences can be issued to visit the nests of such birds for conservation, scientific or photographic purposes but not to allow disturbance during a development even in circumstances where that development is fully authorised by consents such as a valid planning permission.

Bats

All British bat species are fully protected under Schedule 5 of the Wildlife and Countryside Act 1981, as updated by the Countryside and Rights of Way Act 2000. All British bats are also included on Schedule 2 of The Conservation of Habitats and Species Regulations (Amendment) (EU Exit) 2019 as European Protected Species. It is an offence to:

- intentionally or recklessly kill, injure or capture bats;
- deliberately or recklessly disturb bats (whether in a roost or not); and

- damage, destroy or obstruct access to bat roosts

A roost is defined as 'any structure or place which [a bat] uses for shelter or protection'. As bats tend to reuse the same roosts, legal opinion is that a roost is protected whether or not bats are present at the time of survey.

A licence will therefore be required by those who carry out any operation that would otherwise result in offences being committed.

The following bat species are listed as being of principal importance for the conservation of biodiversity in England, (commonly referred to as UKBAP Priority species): barbastelle *Barbastella barbastellus*, Bechstein's *Myotis bechsteinii*, noctule *Nyctalus noctula*, soprano *pipistrelle Pipistrellus pygmaeus*, brown long-eared *Plecotus auritus*, greater horseshoe *Rhinolophus ferrumequinum* and lesser horseshoe *Rhinolophus hipposideros*.

Badger

Badgers *Meles meles* are protected under the Protection of Badgers Act 1992. This act is based on the need to protect badgers from baiting and deliberate harm or injury. The act makes it an offence to:

- Wilfully kill, injure, take, possess or cruelly ill-treat a badger, or attempt to do so; and
- Intentionally or recklessly interfere with a sett. Sett interference includes disturbing badgers whilst they are occupying a sett, as well as damaging or destroying a sett or obstructing access routes.

A sett is defined as "any structure or place that displays signs indicating current use by a badger".

Appendix B: Site Photographs

Photograph 1: Eastern elevation of Building D1 showing common pipistrelle emergence point.

Photograph 2: Building D10 showing entry points for the common pipistrelle maternity colony.

Photograph 3: North eastern elevation of Building D2 showing soprano pipistrelle re-entry point.

Photograph 4: Showing Buildings 25-29.

Photograph 5: North western elevation of Building D7 showing the brick outbuilding and potential bat access points.

Photograph 6: Single-storey brick outbuilding on north western aspect of Building D4 – confirmed hibernation roost for a single brown long-eared bat.

Photograph 7: Single-storey outbuilding on south eastern aspect of Building D4 with confirmed brown long-eared and natterer's bat roosts (access point into cavity wall shown on Photograph 8).

Photograph 8: One of two access points leading into the cavity wall of Building D4 outbuilding. Bat droppings were found at the entrance to the cavity, on the walls and on the door leading into the building.

Appendix C: CONFIDENTIAL Badger Survey Results

Due to the sensitive nature of badger data the results are confidential. Those with a legitimate need for the information may request it from RPS.

Appendix D: GCN eDNA Results

SureScreen Scientifics

Folio No: E13198
Report No: 1
Purchase Order: 138
Client: RPS GROUP
Contact: Gemma Trinder

TECHNICAL REPORT

ANALYSIS OF ENVIRONMENTAL DNA IN POND WATER FOR THE DETECTION OF GREAT CRESTED NEWTS (TRITURUS CRISTATUS)

SUMMARY

When great crested newts (GCN), *Triturus cristatus*, inhabit a pond, they continuously release small amounts of their DNA into the environment. By collecting and analysing water samples, we can detect these small traces of environmental DNA (eDNA) to confirm GCN habitation or establish GCN absence.

RESULTS

Date sample received at Laboratory: 03/05/2022
Date Reported: 10/05/2022
Matters Affecting Results: None

Lab Sample No.	Site Name	O/S Reference	SIC	DC	IC	Result	Positive Replicates
0860	Pond 2 Eco01318		Pass	Pass	Pass	Negative	0
0861	Pond 3		Pass	Pass	Pass	Negative	0
0862	Pond 4		Pass	Pass	Pass	Negative	0
0863	Pond 1		Pass	Pass	Pass	Negative	0

If you have any questions regarding results, please contact us: ForensicEcology@surescreen.com

Reported by: Esther Strafford **Approved by:** Chris Troth

METHODOLOGY

The samples detailed above have been analysed for the presence of GCN eDNA following the protocol stated in DEFRA WC1067 'Analytical and methodological development for improved surveillance of the Great Crested Newt, Appendix 5.' (Biggs et al. 2014). Each of the 6 sub-sample tubes are first centrifuged and pooled together into a single sample which then undergoes DNA extraction. The extracted sample is then analysed using real time PCR (qPCR), which uses species-specific molecular markers to amplify GCN DNA within a sample. These markers are unique to GCN DNA, meaning that there should be no detection of closely related species.

If GCN DNA is present, the DNA is amplified up to a detectable level, resulting in positive species detection. If GCN DNA is not present then amplification does not occur, and a negative result is recorded.

Analysis of eDNA requires scrupulous attention to detail to prevent risk of contamination. True positive controls, negative controls and spiked synthetic DNA are included in every analysis and these have to be correct before any result is declared and reported. Stages of the DNA analysis are also conducted in different buildings at our premises for added security.

SureScreen Scientifics Ltd is ISO9001 accredited and participate in Natural England's proficiency testing scheme for GCN eDNA testing. We also carry out regular inter-laboratory checks on accuracy of results as part of our quality control procedures.

INTERPRETATION OF RESULTS

SIC: **Sample Integrity Check** [Pass/Fail]
When samples are received in the laboratory, they are inspected for any tube leakage, suitability of sample (not too much mud or weed etc.) and absence of any factors that could potentially lead to inconclusive results.

DC: **Degradation Check** [Pass/Fail]
Analysis of the spiked DNA marker to see if there has been degradation of the kit or sample between the date it was made to the date of analysis. Degradation of the spiked DNA marker may lead indicate a risk of false negative results.

IC: **Inhibition Check** [Pass/Fail]
The presence of inhibitors within a sample are assessed using a DNA marker. If inhibition is detected, samples are purified and re-analysed. Inhibitors cannot always be removed, if the inhibition check fails, the sample should be re-collected.

Result: **Presence of GCN eDNA** [Positive/Negative/Inconclusive]
Positive: GCN DNA was identified within the sample, indicative of GCN presence within the sampling location at the time the sample was taken or within the recent past at the sampling location.
Positive Replicates: Number of positive qPCR replicates out of a series of 12. If one or more of these are found to be positive the pond is declared positive for GCN presence. It may be assumed that small fractions of positive analyses suggest low level presence, but this cannot currently be used for population studies. In accordance with Natural England protocol, even a score of 1/12 is declared positive. 0/12 indicates negative GCN presence.
Negative: GCN eDNA was not detected or is below the threshold detection level and the test result should be considered as evidence of GCN absence, however, does not exclude the potential for GCN presence below the limit of detection.