



Appendix 13.2

ECOLOGY BASELINE REPORT

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Ecology Baseline Report



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- 1.1 BSG Ecology was commissioned by Oxford University Development (OUD) in 2017 to undertake ecological surveys to provide baseline ecological baseline information to inform an ecological assessment of development on land within part of the Cherwell Local Plan PR8 allocation site, east of the A44 at Begbroke, Oxfordshire. This work was then updated in 2021 and 2022. This report sets out the methods and results of this work.
- 1.2 'The Site' is shown in Figure 1; it is approximately 170 ha in extent and comprises part of the area allocated for development under Cherwell District Local Plan policy *PR8 - Land East of the A44*. Policy PR8 covers a new urban neighbourhood comprising up to 1,950 new homes, the expansion of Begbroke Science Park, a secondary school, two primary schools, and associated infrastructure.
- 1.3 Previous ecology-related work at the Site includes a 2015 biodiversity survey and badger survey, a 2016 statement of key constraints and opportunities, a 2017 soil survey, a 2018 hydrological study, a 2018 ecological baseline report and a 2018 constraints and opportunities report.
- 1.4 This report presents a comprehensive set of ecology baseline surveys carried out at the Site in 2021 and 2022, as well as relevant desk study information reviewed in early 2023. Information obtained from surveys in 2017 and 2018 is summarised where relevant, and the full 2018 survey report is provided in Appendix 1.
- 1.5 The scope of this work has been agreed with Cherwell District Council and includes: a desk study, Phase 1 habitat survey, habitat condition assessment, hedgerow survey, otter and water vole survey, freshwater invertebrate survey, white-clawed crayfish survey, preliminary bat roost assessment of buildings and trees, bat roost inspections and emergence/re-entry surveys, bat activity survey, dormouse survey, breeding bird characterisation survey, wintering bird survey, badger survey, reptile survey, great crested newt survey, and brown hairstreak butterfly survey.
- 1.6 A stream, the Rowel Brook passes east to west through the Site and joins the Oxford Canal which forms part of the Site's eastern boundary. The A44 Woodstock Road forms part of the western boundary of the Site, and is likely to present a significant barrier to many species (such as great crested newt and reptiles).
- 1.7 The main habitats present at the Site are arable land, poor semi-improved grassland, semi-improved woodland, hedgerows, streams, and ditches. Six ponds are present within the Site, as are numerous mature trees, and there are small areas of good semi-improved grassland, scrub, tall ruderal vegetation, amenity grassland, plantation woodland, and hardstanding. Buildings are present at Begbroke Science Park in the centre-north of the Site and at Parker's Farm in the north-east of the Site. Of these habitats, the woodland and hedgerows, and one of the ponds are classified as Habitats of Principal Importance in England. Of the 54 hedgerows present at the Site, 38 hedgerows are species-rich, and 31 are considered *Important* under wildlife and landscape criteria of the Hedgerow Regulations 1997.
- 1.8 The parts of the Site proposed for development are dominated by arable land. The parts of the Site proposed for green space include grassland and arable fields in the east, and arable land and the Rowel Brook (and adjacent woodland) in the north.
- 1.9 The results of surveys indicate that the Site supports the following protected species: badger (including setts), bats (roosting, foraging, and commuting), birds (ground and scrub/tree nesting), great crested newt, and reptiles (slow-worm, common lizard, and grass snake). The following further Species of Principal Importance are present: common toad, brown hare, brown hairstreak butterfly, and several bird species. Based on the surveys, dormouse and white-clawed crayfish are unlikely to be present. Freshwater invertebrate surveys indicate that the stream at the Site, the Rowel Brook, has fair to good water quality. Surveys in 2022 did not find evidence of water vole or otter at the Site. However, water vole is known to be present on the Oxford Canal which is adjacent to the east, and so could be present on the Rowel Brook in future years, and the Rowel Brook has the potential to support otter.

1 Introduction

1.1 Introduction

2.1 BSG Ecology was commissioned by Oxford University Development (OUD) in October 2017 to undertake ecological surveys to provide baseline ecological information in support of potential development on land east of the A44 at Begbroke, Oxfordshire. BSG Ecology was commissioned in early 2021 and early 2022 to undertake a series of update surveys. This report sets out the methods and results of this work.

1.2 Site Description

2.2 'The Site' proposed for development is shown in Figure 1; it is approximately 170 ha in extent and includes part of the area allocated for development under Cherwell District Local Plan policy *PR8 - Land East of the A44* (Cherwell District Council, 2020).

2.3 The Site is located south and east of the village of Begbroke and extends south to the village of Yarnton and east to the Village of Kidlington. It includes Begbroke Science Park ('the Science Park') in its northern part and includes a former landfill site towards its centre. The A44 Woodstock Road forms part of the western boundary, and the Oxford Canal forms part of the eastern boundary. The Site is crossed east-west by the minor road Sandy Lane, and north-south by the Oxford to Banbury railway line.

2.4 The Site is comprised predominantly of arable farmland with hedgerows and some grassland. The only buildings within the Site boundary are at Begbroke Science Park, and two large modern barns and a smaller stone shed at Parker's Farm in the north-east corner of the Site.

2 Development Context

2.1 The Site is proposed for development by Oxford University Development into an innovation district centred on the existing Begbroke Science Park. The Proposed Development would be a mixed use development, comprising research & development and flexible employment uses, industrial uses, commercial and professional services, storage uses, residential dwellings, retail, leisure, local community and centre uses, entertainment venues, supporting social and physical infrastructure, and new and enhanced landscape and wildlife areas (including a new local nature reserve). The proposals are subsequently referred to as the 'Proposed Development'.

2.2 The PR8 Policy Map proposes that the north and east of the Site will be allocated for a variety of greenspace uses, including a new Local Nature Reserve along the Rowel Brook and a Nature Conservation Area east of the railway line.

3 Survey Methods

2.3 This report presents the results of update ecology surveys of the Site in 2021 and 2022, as well as relevant desk study information reviewed in early 2023. This work updated previous work carried out during 2017 and 2018, which is summarised here and described in full in the report in Appendix 1.

2.4 The overall purpose of the surveys and desk study work is to provide the ecology baseline information necessary to support the Ecological Impact Assessment of the Proposed Development at the Site. The impact assessment is set out in the Ecology chapter of the Environmental Statement, of which the current report forms an appendix.

2.5 The specific aims of the ecology baseline survey work are as follows:

- To establish whether any designated nature conservation sites are present within or close to the Site, and to provide a summary of their interest.
- To map and describe the habitats present within the Site, and to collect information to allow their condition to be assessed based on industry guidance (Natural England, 2022).

- To determine the potential of the Site to support any species that are legally protected or any species or species groups that are otherwise of conservation interest.
- To determine whether any such species or species groups are present at the Site and to provide information on their distribution within and their use of the Site.

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3.1 Previous relevant survey and desk study work is summarised below.

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3.2 An ecological survey and assessment was carried out in support of the planning application for a new access road from the A44 Woodstock Road to Begbroke Science Park (Applied Ecology Ltd., 2010). This assessment covered a narrow corridor of land in the north-west of the Site, west of the Science Park, and was based on a habitat survey, a badger survey, and a ground-based assessment of buildings and trees to determine their potential to support roosting bats.

3.3 The assessment noted potential for great crested newt in ponds in the vicinity of the area surveyed, potential for bats to roost in two buildings, and the presence of a main badger sett and an outlier sett nearby. It specified appropriate ecology mitigation, including the installation of a badger tunnel under the new access road.

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3.4 BSG Ecology carried out a biodiversity survey of the PR8 site in January 2015 (BSG Ecology, 2015a and 2015b) comprising a desk study, extended Phase 1 habitat survey, a badger survey, and an assessment of the likely ecological impacts and mitigation options for the development.

3.5 An updated desk study is reported in Section 6 of this report and therefore the 2015 desk study is not summarised here.

3.6 Habitats identified at the Site included arable land, semi-improved neutral grassland, species-poor semi-improved grassland, improved grassland, broad-leaved semi-natural woodland, plantation woodland, hedgerow, scrub, tall ruderal vegetation, swamp, running water (the Rowel Brook and an inflowing stream), ditches, ponds, mature and semi-mature trees, buildings, and hard standing.

3.7 Evidence of badger *Meles meles* (including badger setts) was found in several locations on and adjacent to the Site.

3.8 The Site was considered to have the potential to support the following protected or notable species: roosting, foraging and commuting bats, otter *Lutra lutra*, water vole *Arvicola amphibia*, dormouse *Muscardinus avellanarius*, breeding birds (including kingfisher *Alcedo atthis*, barn owl *Tyto alba* and farmland birds), reptiles and great crested newt *Triturus cristatus*. Surveys were recommended for these species. Surveys were also recommended to determine the nature conservation value of hedgerows and semi-improved grassland at the Site.

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3.9 BSG Ecology carried out biodiversity surveys over the period January to June 2018 in support of a planning application for building works at Begbroke Science Park. These included a desk study, Phase 1 habitat survey, reptile survey and great crested newt survey (BSG Ecology, 2018a and 2018b). The great crested newt survey recorded a maximum count of two animals in the formal ponds at Begbroke Science Park and found no evidence of reptiles there. Since these surveys were updated in 2021 and 2022, the results are subsumed into Section 6 of this report.

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3.10 BSG Ecology carried out a range of ecology surveys during 2021 in support of a planning application for building works at Begbroke Science Park. These included a desk study, extended Phase 1 habitat survey and a badger survey. The results of this work are the results are subsumed into Section 6 of this report.

Method

Introduction

- 4.1 BSG Ecology first carried out a desk study and an extended Phase 1 habitat survey of the PR8 Site in 2015. This work was reported to Oxford University. Since this 2015 work has been superseded by later work, it is not reported here.
- 4.2 BSG Ecology carried out an updated desk study, extended Phase 1 habitat survey, and a range of other ecology surveys at the Site over the period October 2017 to October 2018. These included a hedgerow survey and assessment, botanical survey, badger survey, bat surveys, dormouse surveys, water vole and otter surveys, breeding bird surveys, great crested newt (HIS, eDNA, population size class assessment surveys), white clawed crayfish survey, and aquatic invertebrate surveys (BSG Ecology, 2018a and 2018b). The methods and results of these surveys are set out in the report in Appendix 1.
- 4.3 The historical landfill Site towards the centre of the Site (south of Sandy Lane) did not form part of Oxford University’s land ownership in 2018 and was not included in 2018 surveys. It was subsequently purchased by the University and has been included in the 2022 survey work.
- 4.4 The following sections describe the methods of ecology desk study and survey work, carried out in 2021 and 2022.

Design

- 4.5 In order to obtain information on designated wildlife sites in the vicinity of the Site, together with historical records of protected species and species of conservation importance, an updated data search was requested from the Thames Valley Environmental Records Centre (TVERC) on 06 January 2023. Data was received from TVERC on 06 January 2023, and included the following:
- Information on non-statutory wildlife sites within 2 km of the Site.
 - Records of protected, notable¹ and invasive species from within 2 km of the Site.
- 4.6 Species records from the last 10 years (i.e., from 2012 onwards) were reviewed in the desk study.
- 4.7 A search for statutory designated wildlife sites was carried out on 26 January 2023 by searching the UK Government MAGIC² website for the following:
- Information on International/European wildlife sites within 10 km of the Site.
 - Information on statutory wildlife sites within 5 km of the Site.
 - Information on ancient woodland within 3 km of the Site.
- 4.8 Great crested newts can use terrestrial habitat up to 500 m from breeding ponds (English Nature, 2001) and therefore searches were carried out in early 2017, March 2021, and February 2023 for ponds within 500 m of the Site using Ordnance Survey (OS) mapping available from the Multi-Agency Geographical Information for the Countryside (MAGIC) website.
- 4.9 Aerial imagery and OS mapping of the Site and surrounding area available at Bing Maps and Google Maps were accessed in January 2023 to provide background, location and mapping information.
- 4.10 The reports of previous surveys relating to the Site noted in section 3 *Previous ecology survey work*, above, were also reviewed as part of the ecology desk study.

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¹ “Notable” species in this context are those listed as notable in the TVERC database, indicating that they are included on any of various lists of species of conservation concern or priority at the local, regional or national level (e.g, the red data lists, Oxfordshire rare plants register, etc).

² Multi-agency Geographic Information for the Countryside: www.magic.gov.uk.

4.11-4.16 Habitat Survey

- 4.11 A Phase 1 habitat survey of the Site, based on standard industry guidance (JNCC, 2016), was carried out on 15 and 17 June 2022 by Dr Tom Flynn MCIEEM, Principal Ecologist at BSG Ecology. This survey updated a previous Phase 1 habitat survey of the Site carried out by the same surveyor on both 16 and 17 April, and 23 and 31 May 2018.
- 4.12 The extent of the Phase 1 habitat survey is indicated in Figure 2.
- 4.13 Habitats present at the Site were identified and mapped onto an Ordnance Survey base map, with target notes describing any features of particular ecological interest.
- 4.14 Lists of dominant plant species were collected for all habitats of potential conservation significance in a series of target notes to accompany the Phase 1 habitat plan.
- 4.15 It should be noted that species lists derived from the target notes do not necessarily provide an exhaustive inventory of all species occurring at a Site; they are intended to indicate the character of habitats present, the general species richness of a particular areas, and to draw attention to any species that may be considered uncommon or unusual. The habitat surveys were conducted on days when the weather conditions were calm and dry, and the weather did not constrain this work. The survey visits were carried out within the optimal time-of-year for Phase 1 habitat surveys (JNCC, 2010).
- 4.16 The Phase 1 habitat survey was ‘extended’ to assess the potential of the habitats present on Site to support protected species or species of conservation interest. This included a preliminary appraisal of the potential value of the Site for bats.

4.17-4.21 Hedgerow Survey

- 4.17 In order to evaluate the conservation significance of hedgerows present at the Site, hedgerow surveys and assessments were carried out at the Site on 19 October 2021 by Tom Flynn MCIEEM, Principal Ecologist at BSG Ecology and Chris Woolley, Ecologist at BSG Ecology. The surveys were undertaken at a suitable time of year for hedgerow surveys (Defra, 2007).
- 4.18 All hedgerows present were mapped on to Ordnance Survey base maps of the Site (for hedgerow locations see Figure 3). The average numbers of woody and woodland species (as defined in the Hedgerow Regulations 1997) were recorded for each hedgerow. Hedgerows were placed into the categories ‘species-rich’ or ‘species-poor’ by the surveyor, based on whether the average number of woody species present in a 30 m length was five or more (‘species rich’) or fewer than five (‘species poor’) (see Defra, 2007). Further information on the condition of hedgerows was collected, including the presence or extent of: a bank or wall, gaps, trees, woodland species, adjacent ditches, parallel hedgerows (within 15 m), and connections to other ecological features such as woodlands, ponds, and other hedgerows.
- 4.19 Freely available aerial imagery from Bing Maps (www.bing.com/maps) was used to aid in the locating and mapping of hedgerows by indicating their lengths and the presence of significant gaps.
- 4.20 The above information was used to identify hedgerows at the Site meeting the criteria for determining ‘Important’ hedgerows under *Wildlife and Landscape* in Schedule 1 of the Hedgerow Regulations 1997.
- 4.21 Hedgerows were also assessed to determine their habitat condition using the condition assessment criteria of Natural England (2022).

4.22 Grassland

- 4.22 In 2018, four fields in the east of the Site supported grassland. All four fields were classified as semi-improved grassland (either semi-improved neutral grassland or poor semi-improved grassland, see Appendix 1). In 2018 these fields were subject to a botanical survey based on the National Vegetation Classification to the determine grassland type in more detail. These fields were subject to a walkover

survey by an experienced botanist in 2022, to determine whether there had been any significant changes to the habitats. This was followed by a botanical condition assessment of these fields using Natural England's (2022) condition assessment criteria.

- 4.23 The botanical survey and habitat condition assessment were undertaken on 15 June 2022 by Dr Tom Flynn MCIEEM, Principal Ecologist at BSG Ecology, and Jamie Townsend, Ecologist at BSG Ecology. The area subject to detailed botanical survey includes the four pasture fields at the east of the Site, a small area of grass and scrub adjacent to the west of the rail line, is indicated in Figure 4. The historical landfill Site was also included in the 2022 botanical condition assessment (having not been accessible in 2018).
- 4.24 Woodland at the Site was not subject to detailed botanical survey because its status as a valuable habitat to be retained in the Proposed Development was clear from the results of the Phase 1 habitat survey (in contrast to the areas of grassland, which required more detailed information for their conservation value to be determined).
- 4.25 The grassland condition assessment involved the surveyor marking out five quadrats (each 1 m × 1 m in size, marked out using tape measures) within typical stands of vegetation for each of the four survey fields to the east of the railway line and the former landfill site.
- 4.26 For the small area of grassland just east of the railway line, two quadrats were taken in grassland and two in tall ruderal vegetation. The small size of this area meant that further quadrats were considered unnecessary to characterise this vegetation. The area of scrub dominating the centre of this latter field was not subject to quadrat survey because the density of this scrub prevented access. A species list for this scrub was produced based on observations from the exterior, including estimation of relative abundance using the DAFOR³ scale.
- 4.27 For each quadrat, the surveyor identified all vascular plant species present and estimated their percentage cover classes using the Domin scale (Rodwell *et al*, 1992). Where noted, bryophytes (mosses and liverworts) were also recorded, though a detailed search/survey for these species was not carried out.
- 4.28 Quadrat data were tabulated using Microsoft Excel and sorted into floristic tables (as used in Rodwell *et al*, 1992). Data analysis involved the following methods:
- The vegetation community identification keys in Rodwell *et al* (1992) were used to identify plant communities, based on the data in the floristic table.
 - The floristic tables were compared (by inspection) with those of Rodwell *et al* (1992).
- 4.29 A written summary of each of the grassland in each of the surveyed fields was also produced.
- 4.30 The conservation value of the grassland in the survey area was evaluated with reference to the following:
- BRIG (2011) *UK Biodiversity Action Plan Priority Habitat Descriptions*. JNCC. This was used to identify Habitats of Principal Importance in England (HPIs), designated under Section 41 of the NERC Act, 2006.
 - Stroh *et al* (2014) *A Vascular Plant Red List for England*. BSBI.
 - TVERC & BMERC (2009) *Criteria for the Selection of Local Wildlife Sites in Berkshire, Buckinghamshire and Oxfordshire*. TVERC.
 - Oxfordshire Flora Group (2015). *Oxfordshire Rare Plant Register*. ANHSO.
- 4.31 A Natural England (2022) condition assessment form for grassland was completed for each field.

³ DAFOR is a scale of relative abundance that is frequently used in habitat and botanical surveys, with the following categories: D: dominant; A: abundant; F: frequent; O: occasional; R: rare.

4.32 Badger setts

4.32 Badger survey work carried out in 2022 and 2021 updated previous badger surveys of the Site carried out by BSG Ecology in 2018 (see Appendix 1).

4.33 In order to obtain information on the presence and use of the Site by badgers, and on the location of any badger setts, the Site was subject to a badger survey by Jamie Townsend, Ecologist at BSG Ecology, on 19 April 2022. The badger survey covered all areas within the Site. Where evidence of badger in adjacent areas was visible from the Site, or adjacent footpath, this was also recorded.

4.34 The badger survey involved searching for and mapping (using a hand-held GPS receiver) any field signs of badger, such as latrines, obvious pathways used by badger, and locations of setts. Several categories of badger setts have been identified, as described below (adapted from Neal and Cheeseman, 1996; Harris et al., 1994):

- Main sett - Normally where cubs are raised and in continuous and regular use throughout the year. Typified by large spoil heaps and well-trodden paths. There can be many entrances to the sett (often with some of these disused), although a main sett can sometimes only have a single entrance.
- Annexe setts - Intermediate-sized and may be used by breeding badgers. Normally close to a main sett and connected to it by obvious paths. They may not be in use all the time, even if the main sett is very active.
- Subsidiary sett - Similar to annexe setts but are likely to be further away (at least 50 m from the main sett) and not as well connected to the main sett as annexe setts. May only be used intermittently.
- Outlier setts - Small setts with one or two entrance holes which are used sporadically by badgers as a temporary refuge (Neal & Cheeseman, 1996). Spoil heaps are likely to be small and there may not be obvious paths connecting to other setts. Use may be sporadic. There may be several outlier setts within one badger social group's territory (Neal & Cheeseman, 1996).

4.35 For all badger sett entrance holes that were found, an indication of the level of activity was also recorded according to Harris et al. (1989), as follows:

- Active - active sett entrances contain no debris or vegetation, are obviously regularly used and often show signs of having been recently excavated.
- Partially used - partially used entrances are those not in regular use, and which may have debris (leaf litter, twigs, moss, etc.) around the entrance. However, they could potentially be used regularly in the future with minimal clearance necessary.
- Disused - disused sett entrances show signs of not having been used for a considerable period of time and would not be used again without extensive clearance by a badger.

4.36 Bat roost assessments

4.36 Bat roost assessments of buildings carried out in 2021 and 2022 updated a preliminary roost assessment of the Site carried out by BSG Ecology in 2018 (see Appendix 1).

4.37 A ground level roost assessment of buildings at the Site was carried out in April 2021 by Dr Tom Flynn MCIEEM, Principal Ecologist at BSG Ecology and Oliver Kemp, Ecologist at BSG Ecology (who holds Natural England bat licences numbers 2015-10061-CLS-CLS and 2015-10063-CLS-CLS).

4.38 The suitability of buildings for roosting bats was verified by Dr Tom Flynn MCIEEM, Principal Ecologist at BSG Ecology and Kai Hayes, Ecologist at BSG Ecology, at various times between April and September 2022.

4.39 These surveys were carried out to determine the potential of buildings that could be affected by the Proposed Development to support roosting bats. These buildings included all of those at Begbroke Science Park, and two large metal agricultural barns and a low stone barn at Parkers Farm east of the Science Park. They were based on industry standard guidance (Chapters 4 and 6 of Collins, 2016). Buildings were inspected externally for the presence of any potential roost features or access points for bats. Buildings were allocated to the following categories of suitability for bats, based on the above guidance: Negligible, Low, Moderate or High. Notes of building structure and any potential bat roost features that were visible were also made during the surveys.

4.40 Various further off-site buildings that will be surrounded by the development were subject to an external assessment for bats from the Site or from public roads.

Roost Assessments of Trees

4.41 Bat roost assessments of trees carried out in 2021 and 2022 updated previous surveys of the Site carried out by BSG Ecology in 2018 (see Appendix 1).

4.42 A ground level roost assessment of trees at the Site was carried out in April 2021 by Dr Tom Flynn MCIEEM, Principal Ecologist at BSG Ecology and Oliver Kemp, Ecologist at BSG Ecology (who holds Natural England bat licences numbers 2015-10061-CLS-CLS and 2015-10063-CLS-CLS). Where necessary, accessible features were examined using an endoscope to search for signs of bats.

4.43 The suitability of trees for roosting bats was updated via a ground level assessment by Dr Tom Flynn MCIEEM, Principal Ecologist at BSG Ecology and Kai Hayes, Ecologist at BSG Ecology, on 03 August and 07 September 2022, and by Hannah Smith, independent ecologist, on 01 March 2023.

4.44 These surveys were carried out to determine the potential of trees that could be affected by the Proposed Development to support roosting bats. The survey was based on industry standard guidance (Chapters 4 and 6 of Collins, 2016). Trees were inspected externally from ground level for the presence of any potential roost features or access points for bats. Trees were allocated to the following categories of suitability for bats, based on the above guidance: Negligible, Low, Moderate or High. Notes on tree structure and any potential bat roost features that were visible were also made during the survey.

4.45 Trees east of the railway line, and adjacent to and north of the Rowel Brook in the north of the Site, are likely to be retained within greenspace within the development and therefore were not subject to survey, since impacts on these trees are unlikely.

Bat Emergence/Re-entry Surveys

4.46 Bat emergence/re-entry surveys of buildings and trees carried out in 2022 updated previous such surveys of the Site carried out by BSG Ecology in 2018 (see Appendix 1). These surveys were as follows.

Parkers Farm

4.47 Emergence/re-entry surveys were carried out on a stone shed at Parker’s Farm (building A3 on Figure 6ci), in order to determine whether it is being used by roosting bats. In line with the guidance in Chapter 7 of Collins (2016) and the moderate bat potential assigned to this building, the survey involved one dusk emergence survey (on 19 July 2022) and one dawn re-entry survey (on 14 August 2022).

Begbroke Hill Farmhouse

4.48 Emergence/re-entry surveys were also carried out at the Begbroke Hill Farmhouse building complex at Begbroke Science Park (buildings 2a to 2e on Figure 6cii), which was assessed as having high

potential to support roosting bats. This historic building is to be retained in the Proposed Development, and therefore no direct effects on this building from the Proposed Development are anticipated. However, given the potential for this building to support a roost of high conservation significance (due to its age, size and the presence of potential roost features), and the fact that the Science Park (and hence this building) will be largely surrounded by new development under the Proposed Development, it was considered appropriate to obtain more information on the use of this building by bats. Internal surveys were not considered safe due to the known historical presence of asbestos in this building, and for this reason emergence/re-entry surveys were carried out instead. In line with the guidance in Chapter 7 of Collins (2016) and the high bat potential assigned to this building, the survey involved two dusk emergence surveys (on 14 June, and 20 July) and on dusk re-entry survey (on 24 August 2022).

Other buildings at Begbroke Science Park

- 4.49 Buildings at Begbroke Science Park with negligible suitability to support roosting bats were not subject to emergence/re-entry surveys. A building (B1) in the south-west corner of Begbroke Science Park building, initially assessed as having low suitability for roosting bats, may be subject to demolition under the Proposed Development. This building was not subject to emergence or re-entry surveys in 2022. It was subject to a detailed bat inspection on 01 March 2023 and its bat suitability upgraded to moderate. Bat emergence surveys of this building were carried out on 05 and 22 June 2023.

Trees

- 4.50 Industry guidance (Collins 2016, Chapter 6) indicates that trees identified as having suitability for roosting bats that are to be affected by development may require further survey work (e.g., detailed inspections and/or emergence/re-entry surveys). Based on the roost potential assessment described above, trees with moderate or high suitability for roosting bats were identified in four areas of the Site: (1) along the southern boundary, (2) on the eastern boundary of the landfill site, (3) one tree south of the Science Park, and (4) one tree in a hedgerow southeast of the landfill site.
- 4.51 The trees on the southern boundary of the Site (T13 to T25) were not subject to further survey as they are outside the Site boundary ditch and are shown as retained on the Green Infrastructure parameter plan.
- 4.52 Trees on the eastern boundary of the landfill site included three trees with moderate suitability for bats. This tree line was therefore subject to one dusk emergence and one dawn re-entry survey on 18 July and 16 August 2022, respectively.
- 4.53 The tree south of the Science Park (T3) was identified as having low/moderate suitability for bats, due to the presence of woodpecker holes. This was subject to a torch and endoscope inspection from the ground in March 2023 and to bat emergence surveys on 05 and 27 June 2023.
- 4.54 The tree southeast of the landfill site (T9) was considered to have high suitability for bats; this had been subject to an endoscope inspection in October 2018 which found no signs of bats (see Appendix 1). This tree was then subject to an endoscope inspection in September 2021 and a bat emergence survey on 27 June 2023.

Emergence/re-entry survey methods

- 4.55 The emergence and re-entry surveys were carried out in accordance with industry standard guidance (Chapter 7, Collins, 2016). Numbers and positions of surveyors for each survey visit were determined by Dr Tom Flynn MCIEEM, Principal Ecologist at BSG Ecology and Dr Peter Shepherd MCIEEM, Director of BSG Ecology, who holds a Natural England Level 4 bat class licence: 2015-15520-CLS-CLS. Numbers of surveyors viewing each building on each survey visit and dates of survey visits are provided in Table 1. Buildings at the Site that were assessed as having negligible value for roosting bats and/or that will not be affected by the development, were not subject to these, or any further, surveys.

Table 1: Dates of emergence surveys and numbers of surveyors employed.

Location	Nod	Nod	Suitability	Emergence/Re-entry Survey Dates		
				Start	End	Notes
Stone Barn at Parkers Farm	A3	2	Moderate	21/07/22 Dawn	23/08/22 Dusk	N/A
Begbroke Hill Farmhouse and adjacent buildings	B2b, B2c, & B2e	5	High	14/06/22 Dusk	23/08/22 Dusk	24/08/22 Dawn
Building south – west of Begbroke Hill Farmhouse	B2d	2	High	03/08/22 Dusk	23/08/22 Dusk	24/08/22 Dawn
Tree line east of landfill site	N/A	4	Low–moderate	18/07/22 Dusk	16/08/22 Dawn	N/A
L-shaped building in SW of Begbroke Science Park	B1	4	Moderate	05/06/2023 Dusk	22/06/22 Dusk	N/A
Tree 3	N/A	1	Moderate	05/06/23 Dusk	27/06/23 Dusk	N/A
Tree 9	N/A	2	Moderate	27/06/23	N/A	N/A

4.56 The numbers of emergence/re-entry survey visits in Table 1 met the number required under the industry guidance (Chapter 7 of Collins, 2016), i.e. three visits for buildings or trees with high suitability and two visits for buildings or trees with low suitability.

Additional Information

4.57 It became clear in early 2023 that a single storey building in the south-west of Begbroke Science Park, assessed externally in 2022 as having low suitability for bats, may require demolition under the Proposed Development. This building was subject to an additional external and internal inspection for bats on 01 March 2023. The inspection involved the use of a torch and endoscope to examine any potential roost features. The inspection was carried out by Hannah Smith, independent ecologist who holds a Natural England Level 2 bat licence (number 2015-12267-CLS-CLS).

Roost Inspections

4.58 Trees at the Site assessed as having moderate or high suitability to support bats (in the bat potential assessment), were subject to ground level or climbed roost inspections (as appropriate, depending on the height of any potential roost features) in 2018 (see Appendix 1), 2021 and 2021.

4.59 Ground level or ladder-based endoscope inspections of trees T5, T6 and T10, were carried out on 19 October 2018 by Helen Simmons ACIEEM (who holds Natural England bat licences (numbers 2015-10061-CLS-CLS and 2015-10063-CLS-CLS), and on 28 September 2021 by Oliver Kemp.

4.60 Climbing inspections of the tree south-east of the landfill site (T9) were carried out by Karl Lofthouse, and by Steve Allen (independent licensed bat workers and trained tree climbers) on 26 October 2018 and 28 September 2021, respectively. Additionally, an emergence survey of it was undertaken in 2023 (see above).

4.61 Tree T3, south of the Science Park, was considered to have low-moderate bat potential, but was considered unsafe to climb, due to fungal rot being present. This tree is not indicated as retained on the Green Infrastructure parameter plan. It was subject to two emergence surveys in 2023 (see above).