

Location	Building Number	Bat Suitability	Survey Visit 1	Survey Visit 2	Survey Visit 3	Roost Type*
Farm						
Begbroke Hill Farmhouse and adjacent buildings	B2d & B2e	High	<b>1 common pipistrelle emerged</b> from eastern end of taller roof ridge above reception building, northern side.	<b>1 bat</b> (echolocation not heard and so species not identified) emerged from hole in stonework on east-facing gable end of farmhouse (B2e) close to roofline. <b>2 common pipistrelles</b> entered near apex of gable end of a small stone extension on east face. <b>2 common pipistrelles</b> emerged from south-west corner of protruding wing on southern face of building. Possible emergence of <b>1 soprano pipistrelle</b> from southern aspect of lowest roof of building B2d.	None	Day roost.
Building south-west of Begbroke Hill Farmhouse	B2e	High	None	<b>1 common pipistrelle</b> emerged from hole below bargeboard (ca. half way along board) on northern gable end.	None	Day roost.

\* Based on Table 3.1 in Collins (2016).

**Roost Potential of Trees**

6.44 There is some potential for bats to roost within trees at the Site. Results of the preliminary ground level roost assessment are provided in Table 19, and indicated on Figure 6b, which also incorporates the results of follow-up endoscope and climbing inspections (these inspections were carried out on Trees 5, 6 and 10, and on tree 9, respectively).

Table 19: Bat roost potential of trees on or adjacent to the Site.

Tree ID	Species	Age	Notes	Bat Suitability
<b>Trees within Site boundary</b>				
T1	Walnut	Semi-mature	Small knot hole on SE side, 3.5 m from ground.	Low
T2	Walnut	Semi-mature	Dead tree. Peeling bark on south side, ground level to 1.5 m.	Low
T3	Crack willow	Semi-mature	Four stems. Several small and 1 medium woodpecker hole on north side of north stem. Dead wood and bracket fungus above.	Moderate
T4	Italian alder	Mature	Bark damage on east side, ca 3 m in length. Some woodpecker damage near top of this. Could develop into roosting feature in future.	Negligible
T5	Crab apple	Mature	Openings at base right near ground, no upward holes. Stump section 3 to 4 m tall. Follow up inspection with endoscope confirmed low potential.	Low
T6	Crab apple	Mature	Openings at base of stump. Follow up inspection with endoscope confirmed low potential.	Low
T7	Oak	Mature	No visible features. No clear view of all of the crown due to branches. Poor roosting habitat.	Low

Tree ID	Species	Age	Notes	Bat Suitability
T8	Oak	Semi-mature	Some dead wood and broken branches. Small areas of flaky bark. Poor roosting habitat.	Low
T9	Ash	Semi-mature	Split along 3 m of SE side of trunk. Limited value to bats.	High
T10	Hybrid black	Mature	Medium hole at 2 m on east side of trunk. Follow-up endoscope inspection confirmed high potential.	High
<b>Trees outside Site boundary</b>				
T11	Hybrid black poplar	Semi-mature	Several woodpecker holes on east side.	Moderate
T12	Hybrid black poplar	Semi-mature	Woodpecker hole half way up stem on east side.	Low
T13	Ash	Mature	Heavy ivy growth, making parts of stem/main branches not visible.	Low
T14	Oak	Mature	Small woodpecker hole present on north side.	Low
T15	Ash	Semi-mature	Parts of crown obscured by ivy. Low potential on a precautionary basis.	Low
T16	Crack willows & ash	Semi-mature	Line of trees with some ivy. No visible features. Negligible to Low on a precautionary basis.	Negligible–Low
T17	Ash	Ash	Two small woodpecker holes facing downwards on branch on north side. One blocked knot hole on east	Low
T18	Crack willow	Mature	Pollarded crack willow. Large mature stump with some holes/cracks present but likely too congested with young growth to allow access by bats.	Low
T19	Ash	Semi-mature	Two small woodpecker holes on north side.	Low
T20	Ash	Mature	Main trunk is broken open. Likely to open for bats and open above.	Low
T21	Oak	Mature	Dead limbs. Woodpecker hole facing downwards in dead limb pointing east.	Moderate
T22	Oak	Mature	Pollarded. Many holes on north-east side. Bark contorted into potential roost feature towards stop of main stem.	High
T23	Crack willow	Mature	Pollarded. Trunk split open to east, crack extending much of trunk. Potential roost feature.	High
T24	Crack willow	Mature	Pollarded. Potential roost feature (small crack at 2 m height) on north-east side.	Low
T25	Crack willow	Mature	Pollarded. Cavity on north-west side. Potential roost feature. Low potential because cluttered by brambles.	Low

- 6.45 A total of nine trees within development areas of the Site have potential to support roosting bats. Of these, two have high, one has moderate and six have low suitability to support roosting bats. All other threes within development areas of the Site have negligible suitability.
- 6.46 A further 14 trees located directly adjacent to development areas within the Site, but themselves outside the Site boundary also have potential to support roosting bats. Of these, two have high, two have moderate and, ten have low suitability to support roosting bats. Also, a short row of multi-stemmed crack willows that were difficult separate out was assessed collectively to have negligible to low bat suitability.
- 6.47 All other trees at the Site were considered to have negligible suitability to support roosting bats, or were present within proposed greenspace and are unlikely to be affected by the proposed development.

**Bat activity transect surveys**

- 6.48 A summary of the bat transect survey data is provided in Table 20 (and where bat locations were noted in the field, on Figures 6e, 6f and 6g). This indicates that at least eight species of bat were recorded during the walked transect surveys, including common pipistrelle (439 passes in total), soprano pipistrelle (19 passes), Nathusius' pipistrelle (1 pass), *Myotis* species (9 passes), serotine (1 pass), and barbastelle (1 pass). The highest number of passes was recorded during the October transect (120 passes) and the lowest activity was in April (37 passes) (conditions were suitable on the latter date, with a temperature of 6–11°C and wind of Beaufort scale 1–2, see Table 2 above).

*Table 20: Summary of bat transect survey data showing bat passes per transect and total numbers of passes.*

Species	Bat passes per transect								Total passes
	April	May	June	July	Aug	Sept	Oct	Mean	
Common pipistrelle	15.0	31.0	11.5	22.5	16.0	33.0	98.5	33.8	439
Noctule		23.5	26.0	5.5	13.0	21.5	3.0	13.2	172
Soprano pipistrelle	3.0	11.5	7.0	6.0	9.0	6.0	12.5	7.8	19
Myotis species		0.5	0.5			0.5	3.0	0.7	9
Nyctalus species	0.5	3.0						0.5	7
Brown long-eared bat		0.5					2.0	0.4	5
Common / Soprano pipistrelle		8.0	0.5	0.5			0.0	1.5	2
Nathusius' pipistrelle							0.5	0.1	1
Serotine		0.5						0.1	1
Barbastelle bat							0.5	0.1	1
<b>Total</b>	<b>18.5</b>	<b>78.5</b>	<b>45.5</b>	<b>34.5</b>	<b>38.0</b>	<b>61.5</b>	<b>120.0</b>	<b>58.1</b>	<b>755</b>

- 6.49 The most commonly noted species over the course of the surveys were common pipistrelle (average of 33.8 bat passes per transect) and noctule (average of 13.2 passes per transect). Three species (Nathusius' pipistrelle, brown long-eared bat and barbastelle) had the lowest average pass rate recorded (0.1 passes per transect). Greatest bat activity was recorded during the month of October, with high levels of activity also recorded in May and September.
- 6.50 Figures 6e, 6f, and 6g show the spatial distribution of bat passes at the Site. The highest level of activity was recorded adjacent to woodland along the Rowel Brook in the north of the Site, along Yarnton Lane (which has a double hedgerow with numerous mature trees), on the hedgerow between Yarnton Lane and the Oxford Canal towards the south-east of the Site, and along the hedgerow forming part of the southern boundary of the Site. Bat passes were recorded from almost all hedgerows that were included in the transects, and also from the small plantation around the barns at Parker's Farm.
- 6.51 The single barbastelle pass was recorded in October, adjacent to the woodland that runs along the Rowel Brook in the north of the Site.
- 6.52 The single Nathusius' pipistrelle was recorded in October, adjacent to the woodland that runs along the Rowel Brook in the north of the Site.
- 6.53 Early passes by noctule and pipistrelles (common and soprano) were recorded in the south-east and the north of the Site indicating that roosting sites for these species are present in the local area.

**Automated detector survey**

- 6.54 A summary of the data obtained from the automated bat detector survey is provided in Tables 21, 22 and 23. A total of 7,188 bat passes were recorded over the entire monitoring period. At least ten species of bat were recorded within the Site. These included the eight species recorded in the

transect survey plus Leisler's bat and lesser horseshoe bat. In agreement with the findings of the transect data, the static data showed that common pipistrelle was the species most frequently recorded, with an average pass rate of 4.81 bats/hr (equating to a total of 5,421 passes over the whole survey period). Noctule and soprano pipistrelle were the species next most frequently recorded.

- 6.55 Lesser horseshoe and serotine had the lowest average pass rate (of <0.01 bats/hr), equating to a total of two and three actual passes (respectively) over the whole survey period. Lesser horseshoe was recorded from static detector location 2 (on Sandy Lane) in September and serotine from location 1 (on the southern edge of the Science Park) in May and June.
- 6.56 The results from static detector Location 3 indicate that bats (including lesser horseshoe) do make use of Sandy Lane. This rural lane with hedgerows on both sides provides linking habitat between Kidlington and the Oxford Canal to the east of the Site with habitat within the Site (e.g. the double hedgerows associated with Yarnton Lane and potential roosting sites in the semi-detached houses on Sandy Lane itself) and with Yarnton to the west.
- 6.57 A total of 31 barbastelle passes were recorded, in April, May September and October. This species was recorded from all three static detector locations.
- 6.58 Greatest bat activity was recorded between 41–60 minutes after sunset which is when most foraging activity tends to take place. Six bat species were recorded within the 1–40 minute period after sunset: common pipistrelle, noctule, soprano pipistrelle, brown long-eared bat, Leisler's bat and lesser horseshoe. Of these species, noctule, Leisler's bat, pipistrelle species, lesser horseshoe typically emerge early. This indicates that roosting sites for these species are present in the local area. Common pipistrelle bat and noctule activity continued from 20 minutes before sunrise until sunrise, which is further indication that these two species are roosting on or in proximity to the Site.
- 6.59 Taken together, the results of the above bat surveys suggest that the Site does provide important roosting, foraging and commuting habitat for a range of bat species, including foraging and commuting habitat for barbastelle and lesser horseshoe which are relatively rare in central England.

Table 21: Summary of static bat detector survey data showing average pass rate (bat passes per hour) for each month.

Species	Month											
	April	May	June	July	August	September	October	Total				
Common pipistrelle	0.27	3.16	12.55	6.91	11.98	1.45	0.50	4.81				
Noctule	0.02	1.74	1.65	0.50	0.45	0.21	0.03	0.66				
Soprano pipistrelle	0.04	0.30	0.42	1.51	1.33	0.65	0.09	0.60				
Myotis species	0.03	0.06	0.28	0.18	0.14	0.11	0.16	0.13				
Brown long-eared bat		0.03	0.01	0.10	0.05	0.04	0.02	0.04				
Leisler's bat		0.20	0.02	0.01	0.04			0.04				
Common pipistrelle / soprano pipistrelle			0.05	0.06	0.06	0.01	0.02	0.03				
Nathusius' pipistrelle		0.15	0.01			0.01		0.03				
Barbastelle		0.10	0.04			<0.01	0.03	0.03				
Nyctalus sp.			0.06	0.01	0.01		0.01	0.01				
Serotine		0.01		0.01			0.01	<0.01				
Lesser horseshoe bat						0.01		<0.01				
<b>Total</b>	<b>0.35</b>	<b>5.74</b>	<b>15.10</b>	<b>9.29</b>	<b>14.05</b>	<b>2.50</b>	<b>0.85</b>	<b>6.38</b>				

Table 22: Summary of static bat detector survey data showing average pass rates (bat passes per hour) for each static detector location.

Species	Location			Total
	1	2	3	
Common pipistrelle	9.08	3.06	2.29	4.81
Noctule	0.98	0.43	0.55	0.66
Soprano pipistrelle	0.22	0.73	0.86	0.60
Myotis species	0.17	0.07	0.16	0.13
Brown long-eared bat	0.07	0.02	0.01	0.04
Leisler's bat	0.05	0.03	0.05	0.04
Common pipistrelle / soprano pipistrelle	0.01	0.05	0.02	0.03
Nathusius' pipistrelle	0.03	0.04	0.02	0.03
Barbastelle	0.06	0.01	0.01	0.03
Nyctalus sp.	0.01	0.01	0.01	0.01
Serotine	0.01			<0.01
Lesser horseshoe bat		0.01		<0.01
<b>Total</b>	<b>10.69</b>	<b>4.46</b>	<b>3.98</b>	<b>6.38</b>

Table 23: Summary of static bat detector survey data showing average pass rate (bat passes per hour) for each time period.

Species	Time Period												Total	
	Sunset- 20 mins	21-40 mins	41-60 mins	61-80 mins	81-100 mins	101- 120 mins	Middle of night	120- 101 mins	100-81 mins	80-61 mins	60-41 mins	40-21 mins		Sunrise- 20 mins
Common pipistrelle	0.78	19.73	27.00	14.73	10.43	8.45	2.43	1.38	1.88	2.48	3.35	5.03	0.95	4.81
Noctule	1.53	2.88	2.10	1.80	1.70	0.65	0.16	0.03	0.03	0.25	1.35	0.73	1.05	0.66
Soprano pipistrelle		0.60	1.68	1.45	1.00	1.13	0.60	0.13	0.25	0.83	0.28			0.60
Myotis species			0.05	0.15	0.25	0.28	0.17	0.18	0.05	0.03	0.03			0.13
Brown long-eared bat	0.03		0.03	0.03	<0.01		0.05	0.05	0.00	0.03	<0.01			0.04
Leisler's bat	0.03	0.13	0.30	0.18	0.10	0.10	0.01			0.05	0.03			0.04
Common pipistrelle / soprano pipistrelle		0.05	0.03	0.05	0.08	0.08	0.02		0.05		0.03			0.03
Nathusius' pipistrelle			0.05	0.10	0.10	0.08	0.03		0.03					0.03
Barbastelle				0.03	0.03	0.15	0.04							0.03
Nyctalus species		0.03			0.05	0.10	<0.01		0.03					0.01
Serotine				0.03	<0.01		<0.01							<0.01
Lesser horseshoe bat	<0.01												<0.01	<0.01
<b>Total</b>	<b>2.35</b>	<b>23.40</b>	<b>31.23</b>	<b>18.53</b>	<b>13.73</b>	<b>11.00</b>	<b>3.53</b>	<b>1.75</b>	<b>2.30</b>	<b>3.65</b>	<b>5.05</b>	<b>5.75</b>	<b>2.00</b>	<b>6.38</b>

### Dormouse

- 6.60 Three records of hazel dormouse were obtained in the desk study, all of which were from woodland at Bladon Heath, which is 0.9 km west of the Site, beyond the A44 Woodstock Road. The closest record was 1.3 km from the Site, and all three records were relatively recent (2007–2010).
- 6.61 Dormouse is a European Protected Species and a SPI.
- 6.62 Dormouse is thought to be under-recorded in Oxfordshire, and BSG has anecdotal evidence that this species is present close to Woodstock. Habitats suitable for this species, including woodland and hedgerows are present at the Site.
- 6.63 No evidence of dormouse was found during the 2018 survey, indicating that this species is likely to be absent from the areas of the Site proposed for development.

### Water vole

- 6.64 The desk study yielded 61 records of water vole from the search area. Of these, 15 were from 2008 or later. The majority of records were from the Oxford Canal, including from the section adjacent to the eastern boundary of the Site. There were also three records from within the Site. These were from the Rowel Brook (and its tributary), from the late 1990s and early 2000s. There was also a record (from 1997) from a ditch adjacent to the southern boundary of the Site east of the railway line; this ditch is outside the Site boundary.
- 6.65 There were two records of the invasive species American mink *Neovison vison* (from 2003–2005) from the search area (both from around 1.5 km south of the Site), one of which was from the Oxford Canal). This species is a significant predator of water vole.
- 6.66 The Berkshire, Buckinghamshire and Oxfordshire Water Vole Recovery Project has conducted surveys for water vole on the Oxford Canal since 2003. Recent surveys have revealed a stable but relatively low population of water voles in many areas. Mink continue to be present and are subject to a control programme (BBOWT, 2017).
- 6.67 This species and its burrows are protected under the Wildlife and Countryside Act 1981 (as amended) and it is a SPI.
- 6.68 The Oxford Canal clearly provides important habitat for this species. The Rowel brook is considered to provide sub-optimal habitat for water vole due to its relatively fast flow and generally shaded conditions and scarcity of suitable marginal food plants. Ditches at the Site also provide possible habitat for this species, but due to their seasonal nature and also the lack of food plants, these are also considered to be sub-optimal.
- 6.69 The water vole surveys carried out at the Site found clear signs of the species in 2017 and 2018. These included a latrine site with fresh droppings (present on both survey visits) at Pond P1, which is situated adjacent to the Rowel Brook in the north of the Site. Water vole burrows were also found in the banks of the Rowel Brook just west of this pond. No other signs of this species were found within the Site, such as in ditches in the south of the Site. These results suggest that this species is present at the Site in low numbers. The suitable habitats at the Site have good connectivity to the Oxford Canal, and any water vole at the Site are likely to be from part of the much larger Oxford Canal Population.

### Otter

- 6.70 There were 137 records of otter (which is a European Protected Species and a SPI) from the desk study search area. All of these are from 2007 or later. Almost all of the records are from the Oxford Canal (including many from the section directly adjacent to the Site), with several from the River Cherwell to the east of Killington. None of the records are from within the Site.

- 6.71 The Environment Agency (2010) otter survey has abundant records for this species from across the Thames catchment, including records from the River Cherwell (in whose catchment the Site lies). It describes this species as present throughout the Cherwell valley.
- 6.72 No signs of otter were found within the Site during the surveys carried out in 2017 and 2018, suggesting that the Rowel Brook (and its tributary) and ditches elsewhere at the Site do not support resident otters, although this species is clearly well established on the Oxford Canal, adjacent to the Site. However it is possible that otters occasionally use the Rowel Brook or ditches at the site, for example to disperse between the Oxford Canal and areas of suitable habitat to the west, such as lakes at Cassington Quarry (ca. 1.5 km to the south) or even to the River Glyme (ca. 2.5 km to the north-west).

### Other Notable Mammals

- 6.73 Records were obtained for three other notable mammal species in the desk study: hedgehog *Erinaceus europaeus*, polecat *Mustela putorius* and brown hare *Lepus europaeus*. These are all SPIs.
- 6.74 There were 79 records of hedgehog, from 1981 to 2015 (with 45 from 2008 or later). Most of these records were from Kidlington and Yarnton. There were three records from Sandy Lane, within the Site. The hedgerows, woodland and scrub at the Site provide suitable shelter and habitat for this species, and areas of grassland provides suitable foraging habitat. Therefore this species should be assumed present. The arable fields represent relatively poor habitat for hedgehog.
- 6.75 There were nine records of brown hare, from 1987–2015 (with four from 2008 or later). None are from the Site itself. The majority were from Bladon Heath to the west of the Site, and the closest was from an arable field ca. 0.7 km north-west of the Site. The open fields at the Site provide potentially suitable habitat for this species, but the lack of sightings during the extensive ecology surveys carried out there in 2017-2017 suggest that this species is unlikely to be present at anything other than very low numbers.
- 6.76 There were 5 record of polecat, from 2000 to 2012. Of these, one record (from 2006) is from Sandy Lane within the Site. Polecat is not strongly associated with any particular habitat types, but the Site is likely to be suitable for this species.

### Birds

- 6.77 The desk study returned 3,181 records of birds, including 33 species listed in Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). Of those, the following have the potential to breed on or near the Site: red kite *Milvus milvus*, hobby *Falco Subbuteo*, peregrine *Falco peregrinus*, barn owl kingfisher and firecrest *Regulus ignicapilla*.
- 6.78 There were records of 31 SPIs, of which the following have potential to breed on or near the Site: bullfinch *Pyrrhula pyrrhula*, corn bunting *Emberiza calandra*, cuckoo *Cuculus canorus*, dunnock *Prunus modularis*, grasshopper warbler *Locustella naevia*, grey partridge *Perdix perdix*, herring gull *Larus argentatus*, house sparrow *Passer domesticus*, lapwing *Vanellus vanellus*, lesser spotted woodpecker *Dendrocopos minor*, linnets *Carduelis cannabina*, skylark *Alauda arvensis*, song thrush *Turdus philomelos*, starling *Sturnus vulgaris*, tree sparrow *Passer montanus*, turtle dove *Streptopelia turtur*, willow tit *Poecile montanus*, yellow wagtail *Motacilla flava* and yellowhammer *Emberiza citrinella*.
- 6.79 There were records of a further six species that are red-listed: (dunlin *Calidris alpina*, fieldfare *Turdus pilaris*, redwing *Turdus iliacus*, ruff *Philomachus pugnax*, Temminck's stint *Calidris temminckii*, and whimbrel *Numenius phaeopus*), none of which have potential to breed on or near the Site.
- 6.80 There were also records of amber-listed species from within the Site, of which green woodpecker *Picus viridis*, grey wagtail *Motacilla cinerea*, kestrel *Falco tinnunculus*, mistle thrush *Turdus viscivorus*, and willow warbler *Phylloscopus trochilus* have potential to breed on or near the Site.



- 6.81 The Site itself supports a range of arable, grassland, woodland/scrub and hedgerow habitats that provide suitable breeding habitat for various bird species. The arable areas have some potential to support wintering bird species, but only limited use of the site was noted during habitat survey visits in winter 2015 (BSG Ecology, 2015) and winter 2018 (i.e. fieldfare within grassland and gulls on arable land). The arable and almost all of the grassland at the Site is intensively farmed and sown to winter crops (rather than stubble) and is set within a wider area of mainly intensive arable land and developed land. It is not close to any important sites for wintering birds. Whilst there is some wetland habitat at Stratfield Brake, Kidlington, just east of the Oxford Canal (40 m east of the Site, and 0.8 km from areas of the Site proposed for development), the nearest significant wetlands are at Yarnton/Cassington Gravel Pits, ca. 1.6 km to the southwest, which have extensive adjacent damp grassland at Oxford Meadows SAC. The desk study included many records of wetland bird species at these two locations, but not from within or close to the Site itself. Therefore, wintering bird surveys were not considered necessary or proportionate at the Site.
- 6.82 The Phase 1 habitat survey and the assessment of buildings and trees for their bat potential indicated that there are no buildings or trees within the Site that have potential to support roosting or breeding barn owl. The open farmland at the site provides suitable foraging habitat for this species, but its presence was not noted during the extensive suite of ecology surveys (including numerous visits at dusk and dawn) that were carried out in 2018.
- 6.83 Results of the breeding bird characterisation survey are shown on Figure 9. These indicate that the breeding bird community there is typical of the habitats present. This consisted mainly of common and widespread species, but also included several SPIs as well as species listed in the Birds of Conservation Concern (Eaton et al., 2015) Red or Amber lists. The majority of the species of higher conservation status are those associated with farmland habitats. This included small numbers of skylark *Alauda arvensis* (21 territories present on the Site) which utilise the arable land on the Site and yellow wagtail *Motacilla flava* (2 territories present on the Site), both of which are SPIs.
- 6.84 Several other SPIs were also recorded as breeding which are more associated with the woodlands and hedgerow or scrub areas, including dunnock *Prunella modularis* (an Amber listed species; 42 territories present on the Site) and song thrush *Turdus philomelos* (a Red-listed species; 8 territories present on the Site).
- 6.85 Other species of conservation concern were noted in the vicinity of the Site, such as house sparrow *Passer domesticus* (a SPI and Red-listed species) and swift *Apus apus* (an Amber-listed species) but these were not breeding within the Site.

#### **Great crested newt**

- 6.86 The desk study returned 45 records of great crested newt from the search area (from 2007-2015). The closest of these to the Site are from a pond in north-east Kidlington ca. 1 km north-east of the Site, beyond the Oxford Canal. The majority of the other records are from over 1.5 km from the Site (e.g. from North Oxford Golf Club, and Water Eaton).
- 6.87 Great crested newt is a European Protected Species and a SPI. Ponds within and close to the Site provide potentially suitable breeding habitat. Hedgerows, woodland, scrub, verges and grassland provide suitable terrestrial habitat, although the arable land which occupies the majority of the proposed development areas within the Site provides poor habitat for this species.

#### **Habitat Suitability Index**

- 6.88 The suitability of waterbodies within 500 m of the Site for great crested newts was determined using the HSI approach. The component scores and HSI scores resulting from this assessment are shown in Table 24.
- 6.89 Four ponds (P1, P8, P9 and P10 on Figure 10) have excellent suitability, three ponds (P11, P12 and P13) have good suitability, two ponds (P4 and P6) have average suitability, one pond (P7) has below average and three ponds (P2, P3 and P5) have poor suitability for great crested newts.

- 6.90 Of the six ponds within the Site, pond P1 has excellent suitability, Ponds P4 and P6 have average suitability, and ponds P2, P3 and P5 have poor suitability.
- 6.91 Because ponds 10, 11 and 12 could not be accessed, a precautionary approach was used in the assessment, with component scores set high for factors such as pond drying and shade which could not be determined from Ordnance survey maps or aerial photography. As a consequence, the HSI scores for these ponds may have been overestimated.

Table 24: Results of great crested newt habitat suitability assessment.

Pond ID	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13
1. Location	1	1	1	1	1	1	1	1	1	1	1	1	1
2. Pond area	0.4	0.05	0.05	0.2	0.05	0.2	1	0.8	0.6	0.9	0.1	0.1	0.2
3. Pond drying	0.9	0.1	0.1	0.9	0.1	0.5	0.9	0.9	1	1	1	1	1
4. Water quality	1	0.33	0.33	0.67	0.67	0.67	0.33	1	1	1	0.67	0.67	1
5. Shade	1	0.2	0.2	1	1	0.6	1	1	1	1	1	1	1
6. Fowl	1	1	1	1	1	1	1	1	1	1	1	1	1
7. Fish	1	1	1	0.33	1	1	0.01	0.67	1	1	1	1	1
8. Ponds	0.92	0.92	0.92	0.92	0.82	0.82	0.92	0.92	0.95	0.92	0.82	0.82	0.7
9. Terrestrial	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	1	1	0.67
10. Macrophytes	0.8	0.4	0.4	0.6	0.4	0.4							
<b>HSI Score</b>	0.84	0.39	0.39	0.66	0.49	0.62	0.53	0.89	0.91	0.94	0.75	0.75	0.79
<b>Suitability class<sup>1</sup></b>	E	P	P	A	P	A	BA	E	E	E	G	G	G

<sup>1</sup> Suitability classes: E: excellent; G: good; A: average; BA: below average; P: poor.

### Environmental DNA survey

- 6.92 In 2018, a total of nine ponds were subject to eDNA survey. Positive results (indicating the presence of great crested newt) were obtained for one pond: P4 located at Begbroke Science Park. Results are listed in Table 25.

*Table 25: Results of 2015 eDNA survey for great crested newt. Grey highlighting indicates ponds within the Site. The single positive result is shown in bold.*

Pond ID	eDNA survey results
P1	Negative
P2	Negative
P3	Negative
<b>P4</b>	<b>Positive</b>
P5	Negative
P6	Negative
P7	Negative
P8	Negative
P9	Negative
P10	Not surveyed
P11	Not surveyed
P12	Not surveyed
P13	Not surveyed

### Overnight surveys

- 6.93 In 2016, overnight surveys for great crested newts were carried out at Pond 4. The results of these surveys for the ponds are provided in Table 26.

*Table 26: Results of overnight great crested newt survey.*

Pond ID	Maximum adult GCN count per survey visit						Peak count	GCN eggs present	Notes, including peak counts of other amphibians or fish.
	1	2	3	4	5	6			
4	1	0	2	0	0	0	2	No	Four smooth newt, one common toad. Large numbers of young goldfish and one large common carp.

- 6.94 In the overnight surveys, great crested newt was recorded from the single pond (P4) that was surveyed. The peak count was two adults. No eggs of this species were found.

### Population class estimate

- 6.95 The peak count for pond P4 was two. This equates to a small population size class for this pond. Since this pond was the only pond that was found to contain great crested newt, the peak count (and population size class) for the Site as a whole is the same.

### Terrestrial Survey

- 6.96 No great crested newts were found on any of the 10 terrestrial survey visits that were carried out. Common toad was found within the survey area on various occasions, including during the reptile survey and during bat activity transects.

**Other amphibians**

- 6.97 There were 38 records of smooth newt *Lissotriton vulgaris* (from 1985–2015), six records of palmate newt *Lissotriton helveticus* (from 2009), 22 records of common frog *Rana temporaria* (1995–2015) and two records of common toad *Bufo bufo* (from 1986–2003).
- 6.98 Of these, common toad is a SPI. Records for this species were from ca. 1.3 km to the east and ca. 1.0 km to the south.
- 6.99 Common toad was found at the Site during the terrestrial survey for great crested newt and the reptile survey. The peak count of common toad at the Site was seven. Key areas of the Site for this species are: the plantation woodland around Parker's Farm, Field A in the north-east of the Site and Field E in the south of the Site (the locations of these fields are indicated in Figure 4).
- 6.100 Smooth newt and common toad were found in pond P4 during overnight surveys for great crested newt. There is no industry standard approach to estimating population size class for these species.

**Reptiles**

- 6.101 The desk study returned records of four reptile species: slow-worm *Aguis fragilis*, grass snake *Natrix natrix*, common lizard *Zootoca vivipara*, and adder *Vipera berus*. These species are protected under the Wildlife and countryside Act 1981 (as amended) and are SPIs.
- 6.102 There were fourteen records of grass snake (from 1980 to 2015), the closest being from ca. 150 m north of the Site, from with Rushy Meadows SSSI. There were five records of slow-worm (from 1980 to 2009), from east Kidlington (ca. 0.8 km east of the Site) and from ca. 1.7 km west of the Site, at Bladon Heath. There were three records of common lizard (from 1983 to 2001), the closest being from ca. 0.8 km north of the Site. There was one record of adder (from 1987) from ca. 1.9 km south of the Site.
- 6.103 The large arable fields which dominate the Site provide poor habitat for reptiles. Hedgerows, scrub, woodland, riparian habitats, verges and grassland provide more suitable habitat.
- 6.104 Results of the reptile survey are provided in Table 27. Three species of reptile were found to be present at the Site (slow-worm, grass snake and common lizard). Common toad was also recorded during this survey.

*Table 27: Results of reptile survey.*

Visit Number	Peak counts			Other species
	Slow-worm	Grass snake	Common lizard	
1			6	3 common toad
2			1	3 common toad
3	4	1	3	6 common toad
4	5	1	1	6 common toad
5	2	1		7 common toad
6			1	7 common toad
7	9	3	6	2 common toad
Peak count	9	3	6	7 common toad
Key locations	Field A in north-east of Site.	Compost heaps west of Parker's Farm. Field E in south of Site.	Field A in north-east of Site.	Field A in north of Site, Field E in south of Site.

- 6.105 Key areas of the Site for reptiles are Field A in the north-east of the Site, Field E in the south of the Site and the compost heaps and surrounding earth banks) between Parker's Farm and Begbroke Science Park (see Figure 11 for these locations).

## Fish

- 6.106 The desk study returned records of four species of fish, all from the River Cherwell, located ca. 1.7 km east of the Site), from 2002 to 2014. Of these brown trout *Salmo trutta* is a SPI, bullhead *Cottus gobio* is listed on Annex II of the European Habitats and barbel *Barbus barbus* receives some protection under the Habitats Regulations 2017. The Rowel Brook has some suitability to support bullhead, but is too shallow to support the other species.

## Crayfish

- 6.107 There is one desk study record of white-clawed crayfish *Austropotamobius pallipes* from the search area (from 2004), from 1.4 km north of the Site (i.e. the River Cherwell). There are ten records of the non-native invasive American signal crayfish *Pacifastacus leniusculus* (from 2015) from the search area, indicating that it is present in the River Cherwell and in the Oxford Canal in the vicinity of the Site.
- 6.108 The crayfish survey carried out at the Site found no evidence of white-clawed crayfish, and therefore this species is likely to be absent from the Site. One adult individual of the non-native invasive American signal crayfish *Pacifastacus leniusculus* was found during the torchlight survey (location indicated in Figure 8).

## Other Invertebrates

- 6.109 The desk study returned records of 20 species of beetle (from 1982 to 2010) from the 2 km search area, all of which are *Nationally Notable* or *Scarce*. None of these records are from the Site itself. Two species (*Longitarsus dorsalis* and *Chrysolina oricalcia*, both of which have a conservation status of *Nationally Notable*) were recorded from Rushy Meadow and a field to the west of this, both of which are adjacent to the north of the Site.
- 6.110 There are records of six butterfly species (from 1981 to 2015): wall *Lasiommata megera*, small heath *Coenonympha pamphilus*, white admiral *Limenitis camilla*, Duke of Burgundy *Hamearis Lucina*, white-letter hairstreak *Satyrion w-album* and black hairstreak *Satyrion pruni*. None of the records are from within the Site, with the closest being from within Rushy Meadows SSSI, adjacent to the north of the Site. The majority of records were from Bladon Heath (ca.1 km or more to the west of the Site). Black hairstreak is protected under the Wildlife and Countryside Act 1981 (as amended), Duke of Burgundy and white-letter hairstreak are protected under this act and are also SPIs, and the other three species are also SPIs.
- 6.111 There are records of 45 moth species (from 1982 to 2012), none of which were from the Site itself. Most of these records were from Rushy Meadows (adjacent to the Site) or from Bladon heath, Yarnton, or Oxey Mead BBOWT Reserve. Two of these species are *Nationally Notable* and the remainder are SPIs.
- 6.112 There are nine records of one dragonfly species, common club-tail *Gomphus vulgatissimus* (from 1983 to 1993), which is listed as *Near Threatened* on the UK red list (Daguet et al, 2008). One record was from near Pond P1 within the north of the Site (from 1983). The other records were from outside the Site.
- 6.113 There are records of five species of true flies (all from 1999), from either Bladon Heath or Oxey Mead. One of these (*Dicranomyia chorea*) is listed as *Rare* and the others as *Notable* in the UK red list (Falk, 1991).
- 6.114 There are three records of true bugs (from 1992 to 2009). Of these, two are nationally notable and one (*Lygus pratensis*) is listed as *Rare* on the UK red list (Kirby, 1992).
- 6.115 There are also desk study records of three further invertebrate species (from 1998 to 2016), all of which are listed by TVERC as non-native invasive species: two crustaceans (demon shrimp *Dikerogammarus haemobaphes* from the river Cherwell) and the amphipod shrimp *Crangonyx pseudogracilis* from ponds around Kidlington and North Oxford) and a segmented worm *Hypania invalida* from Cassington Gravel Pits.