

L	N	D	R
	B6	Store building. Late 20 <sup>th</sup> century. Stone walls and asbestos and metal roof.	Negligible
	B7	Store building. 21 <sup>st</sup> century later. Metal walls and roof.	Negligible
	B8	Electrical switch room near to building B1. No roof void identified, well-sealed internally. The only possible access identified was under the eaves/fascia boards. The internal elevations are constructed from breeze block with wooden boarding externally so there is a possibility of a small cavity between the two.	Low
Two semi-detached houses on Sandy Lane (off-Site)	C1	Two two-storey semi-detached houses south off Sandy Lane. Rendered wall, pitched tile roofs with some missing tiles. Gaps under ridge tiles. Loft space may be present. Property and grounds not accessed, viewed from within the PR8 Site, hence precautionary assessment.	Moderate–High
House on Woodstock Road (off-Site)	D1	Blenheim Edge Guest House. Modern two-storey brick house. Tiled roof with some missing tiles and gaps under ridge. Plastic soffit boards. Appears to have loft space, but no obvious access points for bats. Property and grounds not accessed, viewed from within the Site.	Low
Houses near level crossing (off-Site)	E1	Stone two-storey cottage east of level crossing. Pitched slate roof. Loft space. Property and grounds not accessed, viewed from within the Site/Sandy Lane.	Moderate
	E2	Two modern mobile homes. Property and grounds not accessed, viewed from within the Site/Sandy Lane.	Negligible

5.34 Within the Site, Begbroke Farmhouse and associated buildings (four buildings in total: B2b, B2c, B2d, and B2e) have high suitability, two further buildings at the Science Park (B1 and B2f) and a stone barn (BA3) at Parker’s Farm have Moderate suitability, and two further buildings at the Science Park (B1 and B2f) have low suitability. All other buildings on-site have negligible suitability for bats.

5.35 Of the off-site buildings that were assessed, a pair of semi-detached houses south of Sandy Lane (C1) has moderate to high suitability, a stone cottage at the level crossing (E1) has moderate suitability and a house on the A44 Woodstock Road (D1) has low suitability. The only other building (E2) that was assessed has negligible suitability (E2).

5.36 On-site buildings with bat suitability that are indicated as buildings that may be demolished on the Building Demolition Plan were subject to further surveys, as described below.

**Emergence/re-entry survey of Buildings**

5.37 The results of the emergence and re-entry surveys of buildings carried out by BSG Ecology in 2022 are provided in Table 12. These indicate that day roosts of small numbers of common pipistrelle bats are present in two buildings at Begbroke Science Park: Begbroke Hill Farmhouse (B2e) and an adjacent stone building (B2e). The maximum number of bats observed emerging on any one survey visit from each of these buildings was one.

Table 12: Results of bat emergence and re-entry surveys of buildings.

L	N	D	R
Stone Barn at Parkers Farm	A3	Moderate	None
Begbroke Hill Farmhouse and adjacent buildings	B2d	High	possible emergence

L	N	H	R	R	R	R
			from south-western corner	floor window. NE side of the building	windows. NE side of the building	
Building south-west of Begbroke Hill Farmhouse	B2e	High	possible emergence from northern side	None	None	Day roost
Tree line east of landfill site	n/a	Low–Moderate	None	None	a/a	n.a
L-shaped building in SW of Begbroke Science Park	B1	Moderate	None	None	n/a	
Tree 3	n/a	Moderate	None	None	n/a	n/a
Tree 9	n/a	Moderate	None	None	n/a	n/a

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

5.38 The 2022 survey results differed from the 2018 results in that a maximum of six bats were observed to emerge from Begbroke Hill Farmhouse in 2018 (one soprano pipistrelle, four common pipistrelles and one unidentified bat).

**Bat Roost Suitability of Trees**

5.39 There is some potential for bats to roost within trees at the Site. Results of the preliminary ground level roost assessment are provided in Appendix 8, and indicated on Figure 6b, which also incorporates the results of follow-up ground-based and climbed endoscope inspections (these were carried out on Trees 5, 6 and 10, and on tree 9, respectively). Trees east of the railway line, around and north of the Rowel Brook

5.40 A total of 70 trees either within or immediately adjacent to the Site have potential to support roosting bats. Two trees have high potential, nine have moderate potential, and 59 have low potential.

5.41 All other trees at the Site are considered to have negligible suitability to support roosting bats or are present within proposed greenspace and are unlikely to be affected by the Proposed Development.

5.42 The line of trees at the eastern edge of the disused landfill site (towards the centre of the Site) were subject to emergence surveys for bats (see Table 12 above).

**Bat activity transect surveys**

5.43 A summary of the walked bat transect survey data is provided in Table 13 (and where bat locations were noted in the field, on Figures 6d and 6e). This indicates that at least eight species of bat were recorded during the transect surveys, including common pipistrelle (867 passes in total), soprano pipistrelle (332 passes), noctule (251 passes) Nathusius’ pipistrelle (8 passes), *Myotis* species (26 passes), brown long-eared bat (5 passes), Leisler’s bat (3 passes), and serotine (1 pass). The highest number of passes was recorded during the April transect (326 passes) and the lowest activity was in June (56 passes).



Table 13: Summary of bat transect data showing bat passes per transect and total numbers of passes.

Species	Bat passes per transect									Total passes
	A	M			A	A			M	
Common pipistrelle	171	126	85	197	61	145	66	16	108.4	
Soprano pipistrelle	62	65	53	68	3	40	27	14	41.5	
Noctule	89	46	35	15	19	12	16	19	31.4	
<i>Myotis</i> species	1	9	2	5	-	1	4	4	3.3	
Nathusius' pipistrelle	1	6	-	-	-	1	-	-	1.0	
Noctule / Leisler's bat	1	-	1	1	2	-	-	3	1.0	
Brown long eared bat	1	-	-	-	2	-	2	-	0.6	
Leisler's bat	-	-	-	1	1	1	-	-	0.4	
Serotine	-	-	-	1	-	-	-	-	0.1	
<i>Myotis</i> spp.										

- 5.44 The most commonly noted species over the course of the surveys were common pipistrelle (average of 108.4 bat passes per transect) and soprano pipistrelle (average of 41.5 passes per transect). Three species (serotine, brown long-eared bat, and Leisler's bat) had the lowest average pass rate recorded (<1 pass per transect).
- 5.45 Early passes by noctule and pipistrelles (common and soprano) were recorded at the Site, indicating that roosting sites for these species are present in the local area.
- 5.46 A total of 26 passes by *Myotis* species, which could not be identified to species level, were recorded with a relatively even spread across the entire survey season. Eight Nathusius' pipistrelle passes were recorded, with six of these coming in a single month (May). Five brown long-eared bat passes were recorded, with records spread between April, August (dawn survey), and September. Three Leisler's bat passes were recorded, one in each of July, August (dawn survey) and August (dusk survey). The single Leisler's bat for which GPS data is available was at the eastern boundary of the Site, adjacent to the corner where Sandy Lane intersects with Green Lane. The single serotine pass was recorded in this survey (in July).
- 5.47 Figures 6d and 6e show the spatial distribution of bat passes at the site, as recorded by surveyors during the bat activity transect survey. This distribution is similar to that recorded in the 2018 surveys: bat activity was particularly abundant adjacent to woodland along the Rowel Brook in the north of the Site and along Yarnton Lane (which has a double hedgerow with numerous mature trees). Some bat passes were recorded from almost all hedgerows that were included in the transects, and also from the small area of plantation woodland around the barns at Parker's Farm.

**Automated detector survey**

- 5.48 A summary of the data obtained from the automated bat detector survey is provided in Tables 14 to 18. A total of 9,499 bat passes were recorded over the entire monitoring period. At least nine species of bat were recorded within the Site. These included all eight species that were recorded in the transect survey, plus barbastelle. Common pipistrelle was the species most frequently recorded, with this species accounting for 4,668 passes (i.e., almost half of the total number). Noctule and soprano pipistrelle were the species next most frequently recorded.
- 5.49 Nathusius' and serotine bats had the lowest pass rate, equating to a total of four and ten passes, respectively, over the whole survey period.
- 5.50 A total of 79 barbastelle passes were recorded. This species was recorded from all three automated detector locations, with the majority being recorded at L1 (46 passes).

- 5.51 The results from automated detector Location 3 indicate that bats make use of Sandy Lane. All of the species recorded at the wider Site were recorded at this location. 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 potential roosting sites associated with the trees and buildings of Yarnton to the west.
- 5.52 The highest level of bat activity was recorded between 41–60 minutes after sunset, which is when most foraging activity tends to take place. Four bat species were recorded within the 0–40 minute period after sunset: common pipistrelle, noctule, soprano pipistrelle, and Leisler's bat, which all typically emerge from their roosts shortly after dusk. This indicates that roosting sites for these species are present in the local area. Noctule activity continued from 20 minutes before sunrise until sunrise, which is further indication that this species is roosting on or in proximity to the Site.
- 5.53 Taken together, the results of the above bat surveys suggest that the Site provides roosting, foraging, and commuting habitat for a range of bat species, including foraging and commuting habitat for barbastelle which are relatively rare in central England.
- 5.54 These results are broadly similar to those obtained in the 2018 survey work, except that lesser horseshoe bat was not detected in the 2022 survey, whereas two passes of this species were recorded on Sandy Lane in 2018.



Table 14: Summary of automated bat detector survey data showing average pass rate for each month.

Species	April	May	Aug	June	July	Sept	Oct	Total
Common pipistrelle	200	496	771	534	2,257	349	61	4,668
Soprano pipistrelle	35	124	514	155	884	220	64	1,996
Noctule	26	228	266	446	712	203	18	1,899
Leisler's bat	20	102	2	89	185	1	-	399
Myotis species	7	11	47	23	158	81	22	349
Barbastelle bat	4	13	13	7	11	27	4	79
Long eared bat species		7	18	9	5	25	12	76
Noctule / Leisler's bat	-	-	4	3	-	9	-	16
Serotine	5	3	1	-	-	1	-	10
Nathusius' pipistrelle		-	-	2	-	2	-	4
Common / Soprano pipistrelle	-	-	-	-	-	-	3	3
<b>Total</b>	<b>297</b>	<b>984</b>	<b>1,636</b>	<b>1,268</b>	<b>4,212</b>	<b>918</b>	<b>184</b>	<b>9,499</b>

Table 15: Summary of automated bat detector survey data showing average pass rates for each detector location.

Species	L1	L2a	L2b	L3	Total
Common pipistrelle	917	1,029	1,378	1,344	4,668
Soprano pipistrelle	173	723	602	498	1,996
Noctule	871	286	368	374	1,899
Leisler's bat	121	17	96	165	399
Myotis sp.	90	179	34	46	349
Barbastelle bat	46	15	11	7	79
Brown long eared bat	38	14	13	11	76
Noctule / Leisler's bat	2	7	2	5	16
Serotine	-	4	1	5	10
Nathusius' pipistrelle	-	1	1	2	4
Common / Soprano pipistrelle	-	3	-	-	3
<b>Total</b>	<b>2,258</b>	<b>2,278</b>	<b>2,506</b>	<b>2,457</b>	<b>9,499</b>

Table 17: Dusk bat passes from automated bat detector surveys in relation to typical species emergence times (shown in orange). Dusk passes account for 7,803 of the total of 9,499 passes recorded.

Species	Time Period (minutes after sunset)											Total
	Sunset	0-20	21-40	41-60	61-80	81-100	101-120	Night period				
Common pipistrelle	1	29	597	769	433	347	296	1,416				3,888
Soprano pipistrelle		1	207	405	232	110	83	773				1,811
Noctule	50	152	386	292	144	48	45	239				1,356
<i>Myotis</i> species	-	-	-	2	13	8	9	289				321
Leisler's bat	-	3	51	52	51	30	5	57				249
Barbastelle bat	-	-	-	-	10	4	2	61				77
Long eared bat species	-	-	-	1	1	4	2	62				70
Noctule / Leisler's bat	-	-	3	3	2	1	1	6				16
Serotine	-	-	1	-	4	2	-	3				10
Common / Soprano pipistrelle	-	-	3	-	-	-	-	3				3
Nathusius' pipistrelle	-	-	1	-	-	-	-	1				2
<b>Total</b>	<b>51</b>	<b>185</b>	<b>1,249</b>	<b>1,524</b>	<b>890</b>	<b>554</b>	<b>443</b>	<b>2,907</b>				<b>7,803</b>

Table 18: Dawn bat passes from automated detector surveys. Dawn passes account for 1696 of the total of 9,499 passes that were recorded.

Species	Time Period (minutes before sunrise)								Total
	120-101	100-81	80-61	60-41	40-21	20-0			
Common pipistrelle	113	157	174	265	71	-	-	780	
Noctule	5	6	18	172	324	18	-	543	
Soprano pipistrelle	35	37	46	58	9	-	-	185	
Leisler's bat	3	3	9	84	51	-	-	150	
<i>Myotis</i> species	14	6	5	3	-	-	-	28	
Long eared bat sp.	4	1	-	-	1	-	-	6	
Barbastelle bat	2	-	-	-	-	-	-	2	
Nathusius' pipistrelle	-	1	-	1	-	-	-	2	
<b>Total</b>	<b>176</b>	<b>211</b>	<b>252</b>	<b>583</b>	<b>456</b>	<b>18</b>		<b>1,696</b>	



**Dormouse**

- 5.55 No records of dormouse were obtained in the desk study within the last 10 years. Dormouse is a European Protected Species and a SPI.
- 5.56 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.
- 5.57 No evidence of dormouse was found during the 2022 survey, indicating that this species is likely to be absent from the areas of the Site proposed for development.
- 5.58 These results are similar to those obtained in the 2018 survey work, when a similar level of survey effort also found no evidence of this species at the Site.
- 5.59 Therefore, dormouse is considered likely to be absent from the Site.

**Water Vole**

- 5.60 The desk study yielded 15 records of water vole from the search area within the last 10 years. All of these were from the Oxford Canal. There were no records from within the Site, but three were from locations on the canal that are directly adjacent to the east of the Site.
- 5.61 There were no records of the invasive species American mink *Neovison vison*, which is a significant predator of water vole.
- 5.62 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 sporadic presence of this species, but the 2021 survey showed no evidence of water voles at Kidlington. American mink are noted to continue to be present along the Oxford Canal. (BBOWT 2021).
- 5.63 This species and its burrows are protected under the Wildlife and Countryside Act 1981 (as amended), and it is a SPI.
- 5.64 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 the lack of food plants, these are also considered to be sub-optimal.
- 5.65 The water vole surveys carried in 2022 out at the Site found no signs of this species.
- 5.66 Suitable habitats at the Site have good connectivity to the Oxford Canal, and water vole is likely to be present in the wider surrounding area.
- 5.67 These results differ to those obtained in the 2018 survey work, which reported signs of this species on the Rowel Brook. These included a latrine site with fresh droppings (present on both survey visits) at Pond P1, which is situated adjacent to Rowel Brook in the north of the Site. Water vole burrows were also found in the banks of Rowel Brook just west of pond P1.
- 5.68 The survey results indicate that this species is likely to be absent from the Site, but is could be present in the Oxford Canal adjacent to the east of the Site, and therefore has potential to recolonise the Rowel Brook within the Site.

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- 5.69 There were 98 records of otter (a European Protected Species and a SPI) from the desk study search area within the last 10 years. Almost all of the records are from the Oxford Canal (including many from the section directly adjacent to the Site). None of the records are from within the Site itself.
- 5.70 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.
- 5.71 No otter signs were found within the Site during the surveys carried out in 2022. However, Rowel Brook (and its tributary) could support otters, as this species is clearly well established on the Oxford Canal, adjacent to the Site. It is possible that otters occasionally use 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 the River Glyme (ca. 2.5 km to the north-west).
- 5.72 These results are broadly similar to those obtained in the 2018 survey work.

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- 5.73 Records were obtained for two other notable mammal species in the desk study: hedgehog *Erinaceus europaeus*, and brown hare *Lepus europaeus*. These are both SPIs.
- 5.74 There were 289 records of hedgehog within the last 10 years. Most of these records were from Kidlington and Yarnton. There were two records from within the Site, on Sandy Lane. The hedgerows, woodland and scrub at the Site provide suitable shelter and habitat for this species, and areas of grassland provide suitable foraging habitat. Therefore, this species is assumed to be present within areas of suitable habitat at the Site, although the arable fields which dominate the west of the Site represent relatively poor habitat for hedgehog due to a lack of suitable cover.
- 5.75 There were 90 records of brown hare, from the last 10 years. None are from the Site itself. The majority were from Bladon Heath to the west of the Site. The open fields at the Site provide suitable habitat for this species, and several individuals were noted onsite during the 2022 breeding bird surveys.

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- 5.76 The desk study returned 946 records of birds from the last ten years, including 19 species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). Of these, the following have the potential to breed on or near the Site: red kite *Milvus milvus*, hobby *Falco Subbuteo*, peregrine *Falco peregrinus*, barn owl *Tyto alba*, kingfisher *Alcedo atthis*, and firecrest *Regulus ignicapilla*.
- 5.77 There were records of 19 SPIs, of which the following have potential to breed on or near the Site: bullfinch *Pyrrhula pyrrhula*, 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*, linnets *Carduelis cannabina*, skylark *Alauda arvensis*, song thrush *Turdus philomelos*, starling *Sturnus vulgaris*, yellow wagtail *Motacilla flava* and yellowhammer *Emberiza citrinella*.
- 5.78 There were records of a further eight species that are red-listed, of these greenfinch *Chloris chloris*, house martin *Delichon urbicum*, mistle thrush *Turdus viscivorus*, swift *Apus apus*, have potential to breed on or near the Site.

**Wintering bird survey results**

- 5.79 The grassland and arable areas of the Site were considered to have some potential to support wintering bird species, but only very limited use of the Site was noted during the wintering bird survey carried out in winter 2021/22 (i.e., fieldfare within grassland and gulls on arable land). The arable land at the Site is intensively farmed and sown to winter crops (so winter stubble is not present) 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 parts of the Site proposed for development), the nearest significant wetlands are at Yarnton / Cassington Gravel Pits, ca. 1.6 km to the southwest, and 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.

5.80 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 and 2022.

**Breeding bird survey results**

5.81 The Site itself supports a range of arable, grassland, woodland/scrub, and hedgerow habitats that provide suitable breeding habitat for various bird species. Results of the breeding bird characterisation survey are shown on Figures 9a-d. Territory numbers are listed in Table 19.

Table 19: Summarised breeding bird survey data from April-June 2022 survey visits.

Common Name	Latin Name	Category	Count
Blackbird	<i>Turdus merula</i>	Green	33
Blackcap	<i>Sylvia atricapilla</i>	Green	31
Blue Tit	<i>Cyanistes caeruleus</i>	Green	34
Carrion Crow	<i>Corvus corone</i>	Green	1
Chiffchaff	<i>Phylloscopus collybita</i>	Green	24
Collared Dove	<i>Streptopelia decaocto</i>	Green	3
Chaffinch	<i>Fringilla coelebs</i>	Green	6
Dunnock	<i>Prunella modularis</i>	Amber	40
Green Woodpecker	<i>Picus viridis</i>	Green	3
Goldcrest	<i>Regulus regulus</i>	Green	1
Goldfinch	<i>Carduelis carduelis</i>	Green	13
Greenfinch	<i>Chloris chloris</i>	Red	8
Great Spotted Woodpecker	<i>Dendrocopos major</i>	Green	2
Great Tit	<i>Parus major</i>	Green	22
House Sparrow	<i>Passer domesticus</i>	Red	6
Red Kite	<i>Milvus milvus</i>	Green	1
Linnet	<i>Linaria cannabina</i>	Red	1
Long-tailed Tit	<i>Aegithalos caudatus</i>	Green	8
Lesser Whitethroat	<i>Curruca curruca</i>	Green	2
Mistle Thrush	<i>Turdus viscivorus</i>	Red	1
Magpie	<i>Pica pica</i>	Green	2
Grey Partridge	<i>Perdix perdix</i>	Red	1
Robin	<i>Erithacus rubecula</i>	Green	64
Skylark	<i>Alauda arvensis</i>	Red	21
Barn Swallow	<i>Hirundo rustica</i>	Green	1
Song Thrush	<i>Turdus philomelos</i>	Amber	18
Sedge Warbler	<i>Acrocephalus schoenobaenus</i>	Amber	1
Treecreeper	<i>Certhia familiaris</i>	Green	1





**5.92 eDNA Survey**

In 2021, a total of six ponds were subject to eDNA survey. Pond P4 located at Begbroke Science Park was not surveyed as GCN had been recorded from this pond in 2018 and it was assumed to still be present there. All of the eDNA survey results from 2021 were negative (indicating the absence of GCN). Results are listed in Table 20. Pond locations are shown on Figure

*Table 20: Results of 2021 eDNA survey for GCN.*

Pond ID	eDNA Results
1	Negative
2	Negative
3	Negative
4	Not surveyed, previously positive
5	Negative
6	Negative
7	Not surveyed, pond no longer present
8	Negative
9	Not surveyed, poor habitat connectivity to site
10	Not surveyed, poor habitat connectivity to site
11	Not surveyed, no access
12	Not surveyed, no access
13	Not surveyed due to poor habitat connectivity to development areas within Site

**5.93 Overnight Surveys**

In 2022, overnight surveys for GCN were carried out of pond 4. The results of these surveys are provided in Table 21.

*Table 21: Results of overnight GCN survey*

Pond ID	Males						Total	GCN Present	Other Species
	0	1	2	3	4	5			
4	0	0	1	1	3	0	3	Yes	30 smooth newt, 5 common toads. Abundant goldfish. 1 large carp. Large external filter (with UV unit) in operation.

5.94 In the overnight surveys, GCN was recorded from the single pond (P4) that was surveyed. The peak count was three adult GCN. Eggs of this species were found.

5.95 The peak count for pond 4 was three. This equates to a small population size class for this pond. Since this pond was the only pond that was found to contain GCN, the peak count (and population size class) for the Site as a whole is the same.

**Terrestrial survey for GCN**

5.96 A terrestrial survey for GCN was carried out in a part of the Site in proximity to ponds 11 and 12, because of the lack of access to survey these offsite ponds. This survey found no GCN, although common toad was recorded, indicating that the survey conditions and artificial refuges employed was suitable for detecting amphibians.

**Overview of GCN Results**

5.97 The results of the various GCN survey work carried out in 2021 and 2022 is consistent with the 2018 survey results, indicating that a small population of this species is present in the ornamental pond at Begbroke Science Park (pond 4), but that it is likely absent from other ponds at the Site. It is likely to be present in suitable terrestrial habitat in the vicinity of pond 4 but is likely absent from other parts of the Site.

**Other amphibians**

5.98 The desk study returned 26 records of smooth newt *Lissotriton vulgaris*, six records of palmate newt *Lissotriton helveticus*, 12 records of common frog *Rana temporaria*, and seven records of common toad *Bufo bufo* within the last 10 years. Of these, common toad is a SPI.

5.99 Common toad was found at the Site during the terrestrial survey for GCN and the reptile survey. The peak count of common toad at the Site was three. This species was also noted at Begbroke Science Park (in proximity to pond 4) during the bat emergence surveys carried out in 2022 (with a peak count of two individuals). 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, Field E in the south of the Site (the locations of these fields are indicated in Figure 4) and Begbroke Science Park. Smooth newt and common toad were found in pond P4 during overnight surveys for GCN.

**R**

5.100 The desk study returned records of 21 reptiles from the last ten years, of the following species: slow-worm *Aguis fragilis*, grass snake *Natrix natrix*, and common lizard *Zootoca vivipara*. These species are protected under the Wildlife and countryside Act 1981 (as amended) and are SPIs. None of these records were from within the Site.

5.101 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.

5.102 Results of the 2022 reptile survey are provided in Table 22 and shown on Figure 11. Three species of reptile were found to be present at the Site (slow-worm, grass snake, and common lizard).

Table 22: Results of reptile survey.

Field	Reptiles			Other
	Slow-worm	Grass snake	Common lizard	
1	-	-	-	-
2	2	-	1	2 x field vole, 2 x toad
3	17	1	1	-
4	7	-	-	4 x field vole
5	17	-	-	2 x toad, 1 x small mammal
6	9	-	-	-
7		--		Several field voles
Total	72	1	2	10

5.103 Key areas of the Site for reptiles are the grassland Fields in the north-east of the Site, Parkers Farm to the east of the Science Park, and a triangular area of grassland and scrub in the south of the Site.

**F**

5.104 The desk study returned 15 records of three species of fish from the last ten years, all from the River Cherwell, located ca. 1.7 km east of the Site). Of these brown trout *Salmo trutta* is a SPI, bullhead



*Cottus gobio* is listed on Annex II of the European Habitats Directive, and barbel *Barbus barbus* receives some protection under the Habitats Regulations 2017. Rowel Brook has suitability to support bullhead, and a small specimen of this species was recorded there during the macroinvertebrate survey, but the stream is considered too shallow to support the other species.

5.105 Other widespread stream fish could be present, although stream is susceptible to summer drying (it was completely dry in September 2022).

**Crayfish**

5.106 There are no desk study records of that native white-clawed crayfish *Austropotamobius pallipes* from the search area within the last 10 years.

5.107 The crayfish survey carried out at the Site in 2017 found no evidence of white-clawed crayfish. One adult individual of the non-native invasive American signal crayfish *Pacifastacus leniusculus* was found during the torchlight survey (location indicated in Figure 8).

5.108 The absence of white-clawed crayfish in the 2017 survey, and the presence of signal crayfish means that the former is unlikely to be present at the Site. Since there was considered to be no realistic possibility for this situation to have changed since 2017, further survey for this species after 2017 was not considered necessary.

**Appendix 9**

5.109 Stream habitat details and water chemistry measurements at each of the three sampling locations are provided in Tables 23 and 24, respectively. A total of 25 unique aquatic macroinvertebrate families were recorded from the sampling locations in 2022. The samples were generally dominated by freshwater shrimps (Gammaridae), caddisflies (Limnephilidae), hoglice (Asellidae) and true fly larvae (Diptera). A complete list of all the macroinvertebrate taxa recorded at each of the stream locations can be found in Appendix 9.

Table 23: Stream habitat details at sampling locations 1 to 3. For locations see Figure 8.

Location	1	2	3
Water temperature (°C)	1	1.5	1
Water pH	0.04	0.08	NA
Water conductivity (µS/cm)	0.05	0.125	0.3
Water turbidity (NTU)	0.3	1.2	0.8
Water dissolved oxygen (mg/l)	0.3	1.2	0.8
Substrate	Arable	Scrub	Arable
Bank cover	Arable	Arable	Arable
Macroinvertebrate richness (A)	90	0	NA
Macroinvertebrate richness (M)	0	0	0
Flow	Run	Run	Run
Diversity	Extensive	Extensive	Extensive
Stability	Soft	Stable	Unstable
Water quality (A)	Moderate	Slight	NA
Water quality (M)	Slight	Clear	Moderate
Water clarity	Moderate	Moderate	Heavy
Fish	None	Low	None

Table 24: Stream water chemistry measurements at sampling locations 1 to 3.

Dissolved Solids (mg/L)	Metric	Sampling Locations			Average
		1	2	3	
688	Dissolved Solids (mg/L)	688	775	NA	731.5
	Dissolved Oxygen (mg/L)	8.07	8.13	NA	8.1
	Dissolved Oxygen (%)	347	389	NA	368
	Dissolved Oxygen (mg/L)	NA	NA	NA	NA
	Dissolved Oxygen (%)	NA	NA	NA	NA

TDS: total dissolved solids; DO: dissolved oxygen.

**WHPT scores**

5.110 Whalley Hawkes, Paisley and Trigg (WHPT) metric scores (Whalley and Hawkes 1996, 1997) for Autumn 2022 and Summer 2022 were calculated from the family-level macroinvertebrate data and are summarised in Table 25.

Table 25: WHPT scores for summer and autumn 2022 at sampling locations 1 to 3.

Metric	Metric	Sampling Locations			Average
		1	2	3	
Autumn 2022	Narrow	11	13	NA	12
	Average	4.809	4.846	NA	4.83
Summer 2022	Narrow	16	15	10	13.67
	Average	5.325	5.2	4.26	4.93

WHPT: Whalley, Hawkes, Paisley and Trigg metric score.  
ASPT: Average (number of ) species per taxon.

5.111 WHPT scores are highest in the samples taken from Sampling Locations 1 and 2, scoring over 4.8 in both autumn and summer. This indicates at these points in the Rowel Brook the water quality is good. Sampling location 3 had the lowest WHPT score, indicating water quality is fair in this location. In addition, the water chemistry measurements for locations 1 and 2 indicate the Rowel Brook and its tributary have moderate water quality.