



Broomers Hill Business Park - Phase 2

Ecological Impact Assessment

03/06/2026



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1 Introduction

1.1 Site Description

Broomers Hill Business Park is an industrial estate located off Broomers Hill Lane, to the north of Codmore Hill, in the County of West Sussex at postcode RH20 2RY.

The overall estate contains commercial buildings, hard standing, grassland, scrub/ruderal vegetation, trees, a ditch and a pond.

The land that is the focus of this report (area B - the 'site') is around 0.5 hectares in size, centred on Ordnance Survey (OS) grid reference TQ 0595 2041, located to the south-east of the access road/commercial buildings and comprised of hard standing used for car parking, bare ground, ruderal vegetation, trees and a ditch.

The land surrounding the site is rural in character, containing a relatively low density of residential and commercial properties, along with roads, a railway line, agricultural fields, scattered trees, woodland and water bodies.

The site and surrounding area are illustrated in aerial images provided in Appendix 1 and a site location plan is provided in Appendix 2.

1.2 Background

GreenLink Ecology Ltd. has been undertaking ecological and protected species survey work for this site and adjacent land since 2018.

The proposed development site has consistently contained hard standing, neutral grassland, scrub/ruderal vegetation, scattered/boundary trees and a ditch, although partial site clearance took place in late February/early March 2026 to facilitate the reptile mitigation strategy (details in a subsequent section), removing the neutral grassland and some of the scrub/ruderal vegetation and trees, whilst retaining boundary vegetation/trees.

The results of the protected species survey work conducted during 2018 and 2025 are also consistent, as follows:

- Bats
 - During the activity/automated survey conducted in May-June 2018 and May-July 2025, the only species of bat recorded as being present were common pipistrelle (*Pipistrellus pipistrellus*), noctule (*Nyctalus noctula*), soprano pipistrelle (*Pipistrellus pygmaeus*) and brown long-eared (*Plecotus auritus*). Overall, the level of activity recorded during the survey was found to be relatively low and generally restricted to bats commuting across the site in a west-east direction and foraging around the scrub/line of poplars on the eastern boundary.
- Great crested newt (*Triturus cristatus*)
 - The result of the May 2018 and June 2025 environmental DNA (eDNA) laboratory test of water samples taken from a pond to the north of the site (circa 70 metres from the proposed development site at OS grid ref: TQ 0591 2055) during the optimal seasonal period was negative, i.e. the species was not present in this pond and it is therefore considered that great crested newt is most likely absent from the site and immediate area.

- Hazel dormouse (*Muscardinus avellanarius*)
 - The results of the survey that was undertaken during April-September 2018 and June-November 2025 were negative. There were no actual dormice or dormouse nests recorded as present and it is therefore considered that hazel dormouse is most likely absent from the site and immediate area.
- Reptiles
 - The results of the reptile survey that was conducted during May 2018 and June-September 2025 indicate that the proposed development site supports very low numbers (small-sized population) of common lizard (*Zootoca vivipara*), grass snake (*Natrix helvetica*) and slow worm (*Anguis fragilis*), which are associated with the eastern part of the site only (i.e. in proximity to the railway line boundary).

1.3 Planning Status

Planning permission ref: DC/13/1048 was granted by Horsham District Council, the Local Planning Authority (LPA), in 2013, for a proposed development of 10 no. 81/88 units with 55 parking spaces, 2 disabled spaces & 10 LGV parking spaces and outline consent for a further 81/88 unit with 10 car parking spaces.

A Section 73 application is now being submitted to vary conditions related to area B of planning permission ref: DC/13/1048. The proposed changes seek to combine the previously consented two blocks into one single block with associated updates to approved infrastructure, landscape and associated plans.

It is understood that a Certificate of Lawful Development (DC/25/1318) was issued for the site confirming that the original application was lawfully implemented and is therefore under construction.

Consultation feedback (pre-application) from the LPA dated 2nd April 2026 specifically mentions that there is a need to consider 'The Mens Special Area of Conservation (SAC) Bat Protocol', which is a planning guidance document designed to protect rare bat species - including barbastelle (*Barbastella barbastellus*) and Bechstein's bat (*Myotis bechsteinii*). It requires development proposals to assess impacts on, and protect, functional habitats like flightlines and foraging areas.

1.4 Aims of Study

To inform the Section 73 application, GreenLink Ecology Ltd. has been commissioned to document the ecological and protected species survey work that has been completed for the site and detail the mitigation and enhancement measures that have been/will be implemented for the site.

2 Methodology

2.1 Desk Study

A desk study was undertaken in order to locate existing ecological data held by the Sussex Biodiversity Records Centre (SxBRC), relating to any statutory or non-statutory designated sites for nature conservation (i.e. sites of international, national, regional/local importance), notable habitats and protected/notable species records from within a one kilometre Zone of Influence (Zol).

The Geographic Information Systems (GIS) database <https://magic.defra.gov.uk/> was also interrogated for information relating to internationally designated sites in the wider area, along with the presence of habitats listed in the Priority Habitat Inventory (PHI) and granted European Protected Species Mitigation (EPSM) licences.

2.2 PEA Survey

An initial survey was undertaken on 16th March 2018 by experienced consultant ecologist Marcus Fry MCIEEM¹ following published guidelines². The plant species and habitat types present within the site were identified and any evidence of, or potential for, protected/notable species and their habitats was recorded. On the day of the survey the weather conditions were sunshine with scattered cloud and the temperature at midday was around 8°C.

The site was resurveyed on 28th May 2025 by the same consultant ecologist under optimal climatic conditions, to re-establish baseline information about the site's ecological characteristics.

2.3 Protected Species Surveys

2.3.1 Bat Survey

Since there are no buildings within the proposed development site in which bats can roost and the trees to be directly affected by the proposals are all considered to have negligible/low potential for roosting bats, the focus of the survey was bat activity, since there are potentially suitable commuting/foraging habitats present and The Mens SAC Bat Protocol requires consideration of barbastelle and Bechstein's bat.

Therefore, to establish what species of bat are present in the area and evaluate the likely importance of the site for the local bat population, an automated bat detector (Anabat SD2) was installed on an eastern boundary poplar tree during 18th May 2018 and 4th August 2025, to passively record bat echolocation calls for a period of one week.

In addition, a dusk/pre-dawn activity survey was conducted on 28th-29th May and 12th June 2018, and 29th May 25th June and 24th August 2025 by experienced Natural England bat licence holders Marcus Fry MCIEEM (no. 2015-10955-CLS-CLS) and Rachel Masters (no. 2014-5522-CLS-CLS), in accordance with the 2016³ and 2023⁴ Bat Conservation Trust's (BCT) published guidance.

During the survey visits, observations were made regarding bat activity around the area, and any bat ultrasonic echolocation calls that made within range of the bat detectors were recorded and later analysed, to determine which species of bat made them.

¹ Member of the Chartered Institute of Ecology and Environmental Management (full)

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

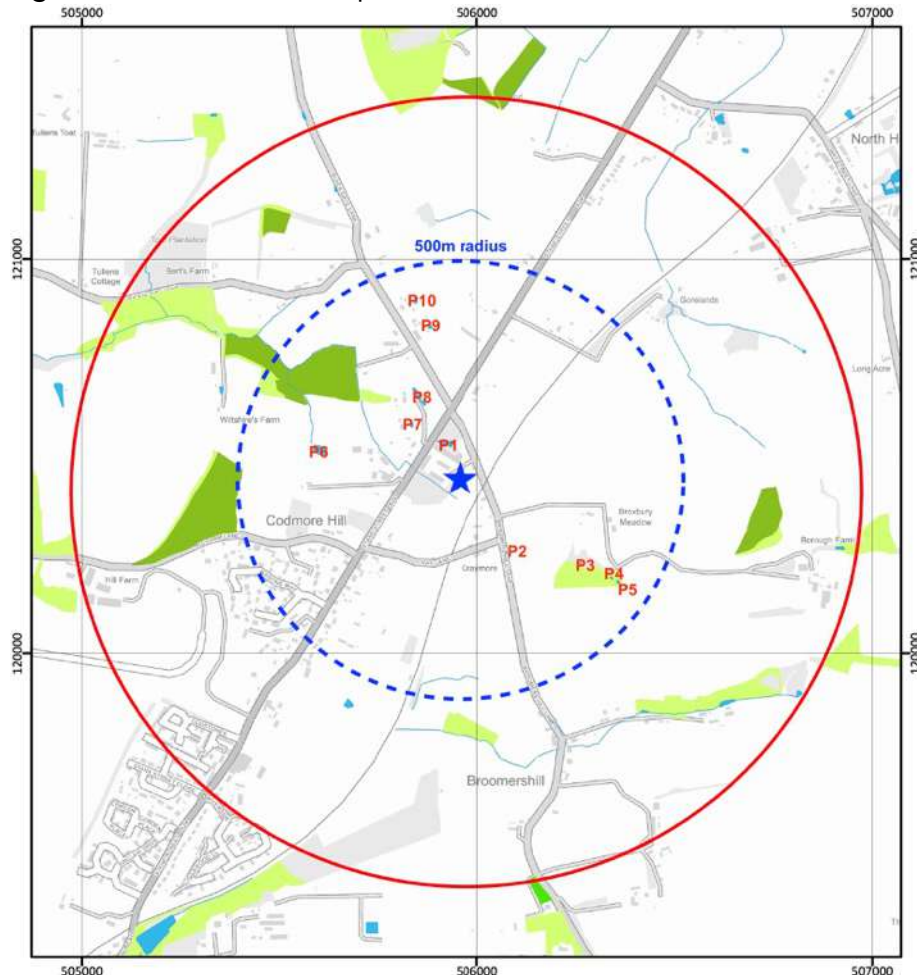
³ Collins, J. (ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines*, Bat Conservation Trust (3rd Edition)

⁴ Collins, J. (ed.) (2023) *Bat Surveys for Professional Ecologists: Good Practice Guidelines*, Bat Conservation Trust (4th Edition)

2.3.2 Great Crested Newt Survey

Potential pond locations (10 no.) within circa 500 metres of the site were identified using aerial/OS maps (Figure 1) with the intention of assessing them during a walkover survey.

Figure 1: 10 no. identified pond locations within circa 500 metres of the site (blue star)



Where accessible, ponds were assessed by experienced Natural England great crested newt licence holder Marcus Fry (no. 2015-16857-CLS-CLS) using the Habitat Suitability Index (HSI) criteria (Appendix 3), which makes an evaluation of key diagnostic habitat variables⁵ to establish the likelihood of great crested newt presence.

The pond located circa 70 metres to the north of the proposed development site (P1 – Figures 1 and 2, OS grid ref: TQ 0591 2055) is owned by the applicant and this was therefore subject to an eDNA test during the optimal seasonal period in 2018 and 2025, to establish the presence/absence of great crested newt. In accordance with Natural England's approved protocols⁶, water samples were taken from the shoreline by a Natural England licence holder (2015-16857-CLS-CLS) homogenised, placed in ethanol filled tubes and sent to an approved laboratory (SureScreen Scientifics) for analysis.

⁵ ARG UK Advice Note 5: Great Crested Newt Habitat Suitability Index, May 2010

⁶ Biggs J, Ewald N, Valentini A, Gaboriaud C, Griffiths RA, Foster J, Wilkinson J, Arnett A, Williams P and Dunn F 2014. Analytical and methodological development for improved surveillance of the Great Crested Newt. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (*Triturus cristatus*) environmental DNA. Freshwater Habitats Trust, Oxford.

Although it was attempted to undertake an eDNA test for P1 in 2020, the location was found to be predominantly dry, with insufficient standing water to allow for samples to be taken for analysis.

Figure 2: Illustrating the P1 location in relation to the proposed development site



2.3.3 Hazel Dormouse Survey

To establish whether hazel dormouse is present within the site and to inform the need for mitigation measures, 50 nest tubes were distributed throughout boundary trees/scrub in March 2018, April 2020 and June 2025, in accordance with Natural England's published guidelines⁷.

The nest tubes were subsequently checked by Natural England dormouse licence holder (no. 2019-41718-CLS) Jessica Smith ACIEEM⁸, during six visits between April to September 2018 and June to November 2025.

The number of tubes used and visits conducted on a monthly basis over a six-month period were designed to comply with the requirement to meet the minimum 'score' of 20, as per the guidelines. This is derived from the index of probability (Table 1) of finding the species present during different months of the year, in order for the survey to be appropriately rigorous and for the results to be considered conclusive.

⁷ Bright, P, Morris, P. & Mitchell-Jones, T. (2006). *The dormouse conservation handbook* (second edition).

⁸ Member of the Chartered Institute of Ecology and Environmental Management (associate)

Table 1: Index of probability of finding dormouse present

Month	Index of probability (50 tubes/boxes)
January	N/A
February	N/A
March	N/A
April	1
May	4
June	2
July	2
August	5
September	7
October	2
November	2
December	N/A
Total	25

2.3.4 Reptile Survey

In accordance with the published guidelines⁹, 100 artificial refugia composed of a mixture of materials (0.5m² sections of roofing felt and corrugated metal) were distributed during late March 2018 and early June 2025. These were allowed to become established for two weeks prior to the survey visits commencing.

The refugia and overall site were subsequently checked by an experienced ecologists Jessica Smith ACIEEM and Marcus Fry MCIEEM on seven separate occasions for the presence of reptiles, under optimal climatic conditions (avoiding inclement weather and periods of peak temperature) during May 2018 and June to September 2025.

⁹ Froglife Advice Sheet 10 – Reptile Survey (1999)

3 Results

3.1 Desk Study

3.1.1 Designated Sites/Notable Habitats

According to the SxBRC data (Appendix 4), there is only one statutory designated site within one kilometre of the site, which is the South Downs National Park, located circa 700 metres to the north-west. There are no non-statutory designated sites present within the Zol.

According to the Section 41 habitats map (NERC Act 2006) provided by the SxBRC (Appendix 4), there are notable habitats in the local area, which include open water, traditional orchards, ancient woodland and deciduous woodland, although none of these habitats are actually within, or close to the site.

The GIS database identifies that the following SAC sites are present in the wider area, which have relevance for bat species, as discussed in a subsequent section:

- The Mens SAC is located circa 3.75 kilometres to the north-west of the site. This is an extensive area of mature beech woodland rich in lichens, bryophytes, fungi and saproxylic invertebrates. Barbastelle is an Annex II species present as a qualifying feature, but not a primary reason for site selection.
- Ebernoe Common SAC is located circa 9.3 kilometres to the north-west of the site. This site has an extensive block of beech high forest and former wood-pasture over dense holly, and has a very rich epiphytic lichen flora. It represents Atlantic acidophilous beech forests in the south-eastern part of the habitat's UK range. The beech woodland is associated with other woodland types, open glades and pools, which contribute to a high overall diversity. Barbastelle and Bechstein's bat are Annex II species present as a primary reason for site selection.
- Singleton and Cocking Tunnels SAC is located circa 18.8 kilometres to the west of the site. Barbastelle and Bechstein's bat are Annex II species present as a qualifying feature, but not a primary reason for site selection.

The GIS database also identifies that there are areas of PHI deciduous woodland present in the local area, with the being circa 240 metres to the north-west (Gerrards Rough).

3.1.2 Species Records

The majority of the records provided in the SxBRC data (Appendix 5) are for relatively common/widespread species of amphibian, plant, invertebrate and mammal, which are protected in ways not relevant to the proposed works (e.g. from trade/sale/exploitation) and/or they have specialist habitat requirements not supported by the site.

However, there are also records for protected species of amphibian, mammal and reptile, which could potentially be present within or close to the site, as described in a subsequent section.

3.2 PEA Survey

3.2.1 Habitat Description

Prior to partial habitat clearance, the proposed development site contained hard standing, neutral grassland, scrub/ruderal vegetation and scattered trees and a ditch.

The site's baseline ecological characteristics did not significantly alter since the original 2018 survey work, although the partial habitat clearance works conducted in late February/early March 2026 has removed the neutral grassland and central scrub areas, resulting in bare ground and sparse ruderal vegetation.

Hard standing is located around the car parking area and this represents an artificial habitat type of inherently low ecological value, with no potential for use by protected/notable species.

The neutral grassland was located in the eastern part of the site and was extensively rabbit-grazed. This was a relatively species-poor habitat type, containing annual meadow grass (*Poa annua*), cock's-foot (*Dactylis glomerata*), fescue (*Festuca* sp.), St. John's wort (*Hypericum* sp.), creeping cinquefoil (*Potentilla reptans*), ground ivy (*Glechoma hederacea*), creeping buttercup (*Ranunculus repens*), speedwell (*Veronica* sp.), common mouse ear (*Cerastium fontanum*) and common ragwort (*Senecio jacobaea*). This represented a habitat type of relatively low ecological value, although it did support low numbers of reptiles and contained potentially suitable breeding bird habitat, as discussed in a subsequent section.

Surrounding the grassland was dense scrub/ruderal vegetation, dominated by blackthorn (*Sambucus nigra*) to the south-west and bramble in other areas, along with thistles (*Cirsium* spp.), willow (*Salix* spp.), teasel (*Dipsacus* sp.), common nettle (*Urtica dioica*), bristly ox-tongue (*Helminthotheca echioides*), bracken (*Pteridium aquilinum*), hawthorn (*Crataegus monogyna*) and willowherb (*Chamaenerion angustifolium*). This represented a habitat type of relatively low ecological value, although it did have the potential for seasonal use by breeding birds and by hazel dormouse, as discussed in a subsequent section.

There are low number of scattered trees present, predominantly close to the site boundaries, comprising a mature oak (*Quercus robur*) to the south-west (retained), along with mature poplars (*Populus nigra 'italica'*) adjacent to the railway line to the east (retained) and immature silver birch (*Betulus pendula*), goat willow (*Salix caprea*), cherry (*Prunus avium*), field maple (*Acer campestre*) and hawthorn (*Crataegus monogyna*) adjacent to the car park area to the north (removed). These represent a habitat type of moderate ecological value at site level, which have the potential for use by bats and breeding birds, as discussed in a subsequent section. The trees are the subject of a report and plans by SJA trees, which makes an evaluation of their arboricultural value.

There is an off-site pond to the north-west of the overall site, which is considered in a subsequent section. This pond has the potential for use by great crested newt during the breeding season and the grassland/scrub/ruderal vegetation within the site represent potentially suitable terrestrial habitat for this species.

There is a ditch located close to the site's southern boundary within dense blackthorn scrub and surrounded by bare ground, with no aquatic/marginal plants present, which has been recorded both wet and dry during the survey visits. This represents a habitat type of relatively low ecological value, with no significant potential for use by protected/notable species, although it is potentially suitable for use as a biodiversity corridor.

3.3 Protected/Notable Species

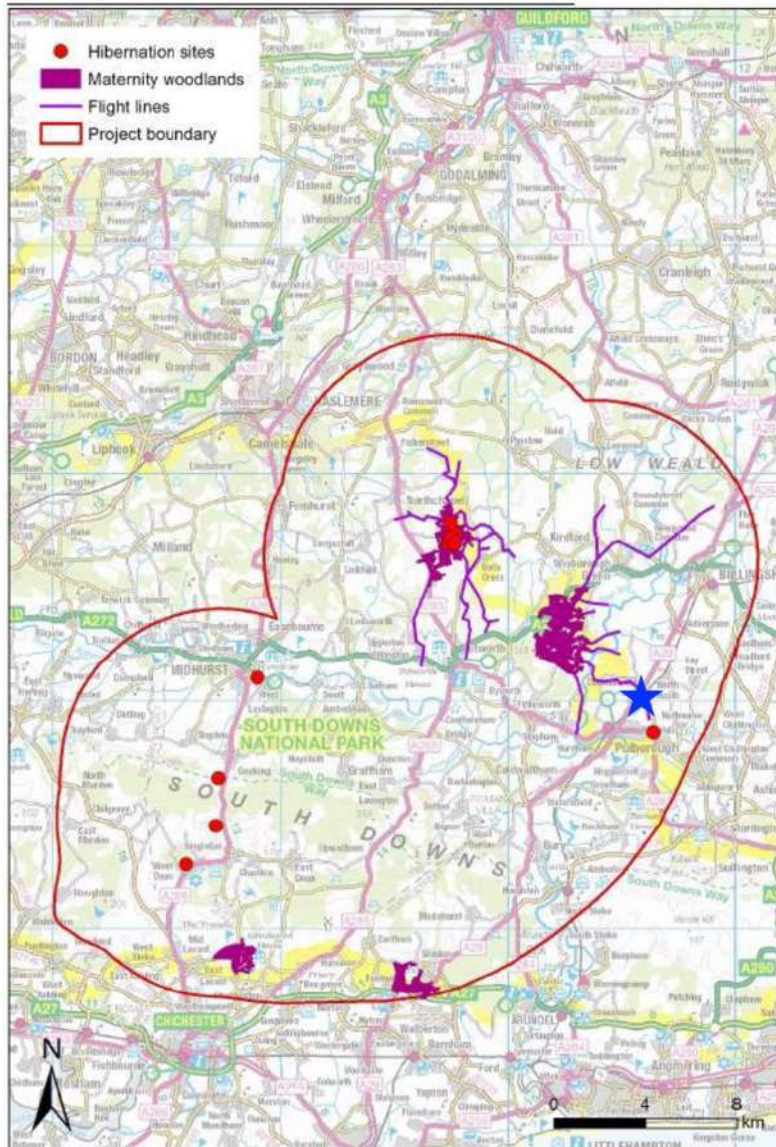
3.3.1 Bat Survey

According to the SxBRC data (Appendix 5) there are a low number of records for seven species of bat from within the Zol, including barbastelle, serotine (*Eptesicus serotinus*), Natterer's bat (*Myotis nattereri*), noctule, common pipistrelle, soprano pipistrelle and brown long eared.

According to the GIS database, the closest granted EPSM licence for bats (soprano pipistrelle, non-breeding, 2016) is from a location circa 2.2 kilometres to the south-west.

As detailed in the Pulborough Neighbourhood Development Plan 2019-2031, which is informed by a Habitat Regulations Assessment (HRA), The Mens SAC represents a barbastelle maternity woodland and there are flightlines that radiate out from this location, including one in relatively close proximity to the proposed development site (Figure 3), which appears to link a hibernation site to a maternity woodland. Bechstein's bats forage exclusively in the woodland and do not utilise external flightlines in the same way as barbastelle.

Figure 3: Barbastelle maternity woods key flightlines (blue star centred on the site)



Source: Bat Conservation Trust 2015 Scoping study for the West Sussex Bat Project - Assessing current evidence to recommend conservation measures important to barbastelle and Bechstein's bats of consequence in the project area. A report to Natural England.

Since the proposed works required trees to be removed, which could affect roosting bats, these were assessed by Natural England licence holder Marcus Fry MCIEEM (registration no. 2015-10955-CLS) in 2018, 2020 and 2025 and categorised (to align with British Standard (BS) 8596:2015 "Surveying for Bats in Trees and Woodland") in accordance with the BCT published guidance:

- Negligible potential – Unlikely to be used by roosting bats.
- Low potential – A tree of sufficient size and age to contain potential roost features but with none seen from the ground or features seen with only limited roosting potential
- Moderate potential – A tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation significance.
- High potential – A tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.

In summary, there was no evidence of bats recorded in association with any of the trees and the majority are considered to have negligible potential for roosting bats on the basis of their immaturity, with the exception of the mature oak (identified as T4 in the SJA report and plans), which has been categorised as having low potential on the basis of maturity and is being retained.

However, the scrub and trees represent potentially suitable commuting/foraging habitats for use by the local bat population, which may include species of international importance (i.e. barbastelle and Bechstein's bat).

There were no echolocation calls recorded during the 2018 and 2025 automated surveys that had characteristics associated with either barbastelle or Bechstein's bat, with all of the identifiable records being for species that are relatively common/widespread, including common pipistrelle (P pip), soprano pipistrelle (P pyg), noctule (N noc) and brown long-eared (P aur).

Table 2: Details of the 2018 automated survey

Date	18/05/18	19/05/18	20/05/18	21/05/18	22/05/18	23/05/18	24/05/18
Weather	Cloudy	Overcast	Cloudy	Clear	Clear	Cloudy	Cloudy
Beaufort	0	2	0	1	2	1	2
Humidity	65%	60%	62%	55%	50%	75%	80%
Temp	Low 12°C	Low 12°C	Low 13°C	Low 12°C	Low 11°C	Low 13°C	Low 13°C
Species (calls)	P pip (14)	P pip (20)	P pip (17)	P pip (16)	P pip (7)	P pip (11)	P pip (12)
	P pyg (3)	-	P pyg (2)	-	-	P pyg (4)	P pyg (3)
	-	N noc (2)	N noc (1)	-	N noc (2)	-	N noc (1)
	-	P aur (1)	P aur (2)	-	-	-	-

Table 3: Details of the 2025 automated survey

Date	04/08/25	05/08/25	06/08/25	07/08/25	08/08/25	09/08/25	10/08/25
Weather	Cloudy	Clear	Clear	Overcast	Clear	Cloudy	Clear
Beaufort	1	0	1	1	0	0	0
Humidity	75%	60%	65%	80%	60%	70%	60%
Temp	Low 16°C	Low 13°C	Low 11°C	Low 16°C	Low 16°C	Low 12°C	Low 17°C
Species (calls)	P pip (31)	P pip (43)	P pip (12)	P pip (62)	P pip (29)	P pip (25)	P pip (53)
	P pyg (9)	-	P pyg (11)	-	-	P pyg (9)	P pyg (21)
	N noc (11)	-	-	N noc (19)	N noc (5)	N noc (12)	-
	-	-	-	P aur (1)	-	-	P aur (1)

During the 2018 and 2025 activity survey visits, low numbers of common pipistrelle, soprano pipistrelle were consistently recorded commuting across the site in a west-east direction (Figure 4 – solid light blue arrows) shortly after dusk, which suggests that they may have emerged from roosting locations associated with residential dwellings off-site to the west. These species were subsequently recorded foraging above the scrub and along the line of poplar trees (Figure 4 – dashed light blue arrows) that are present on the site's eastern boundary (to be retained).

Low numbers of noctule bats were also recorded during the 2025 survey visits both visually and via the bat detectors, although less consistently and this species was generally commuting/foraging high over the site (Figure 4 – dashed orange circle) and not in direct association with it.

Table 4: Details of the 2018 activity survey

Date	Climatic conditions	Sunset/rise	Bat activity (calls)
28/05/18	Scattered cloud, 16°C	21:01	Common pipistrelle (15) Soprano pipistrelle (4)
29/05/18	Overcast, 12°C	04:52	Common pipistrelle (6)
12/06/18	Scattered cloud, 18°C	21:15	Common pipistrelle (11) Soprano pipistrelle (2)

Table 5: Details of the 2025 activity survey

Date	Climatic conditions	Sunset	Bat activity (calls)
28/05/25	Clear skies, 17°C	21:01	Common pipistrelle (11) Soprano pipistrelle (7) Noctule (3)
24/06/25	Scattered cloud, 18°C	21:19	Common pipistrelle (13) Soprano pipistrelle (3)
04/08/25	Scattered cloud, 19°C	20:41	Common pipistrelle (9) Soprano pipistrelle (4) Noctule (2)

Figure 4: Indicative bat commuting and foraging activity



3.3.2 Breeding Birds

According to the SxBRC data, there are numerous records for a wide variety of bird species from within the Zol, many of which are associated with habitats that are not present within or close to the site, although there are records for species of bird that could potentially be present.

No evidence for actively breeding birds was recorded during the 2018 and 2025 survey visits, which were undertaken within the breeding season (March-July/August), although inactive nests and potentially suitable breeding habitats were identified throughout the site (i.e. scrub and trees), some of which will be directly affected by the proposed works.

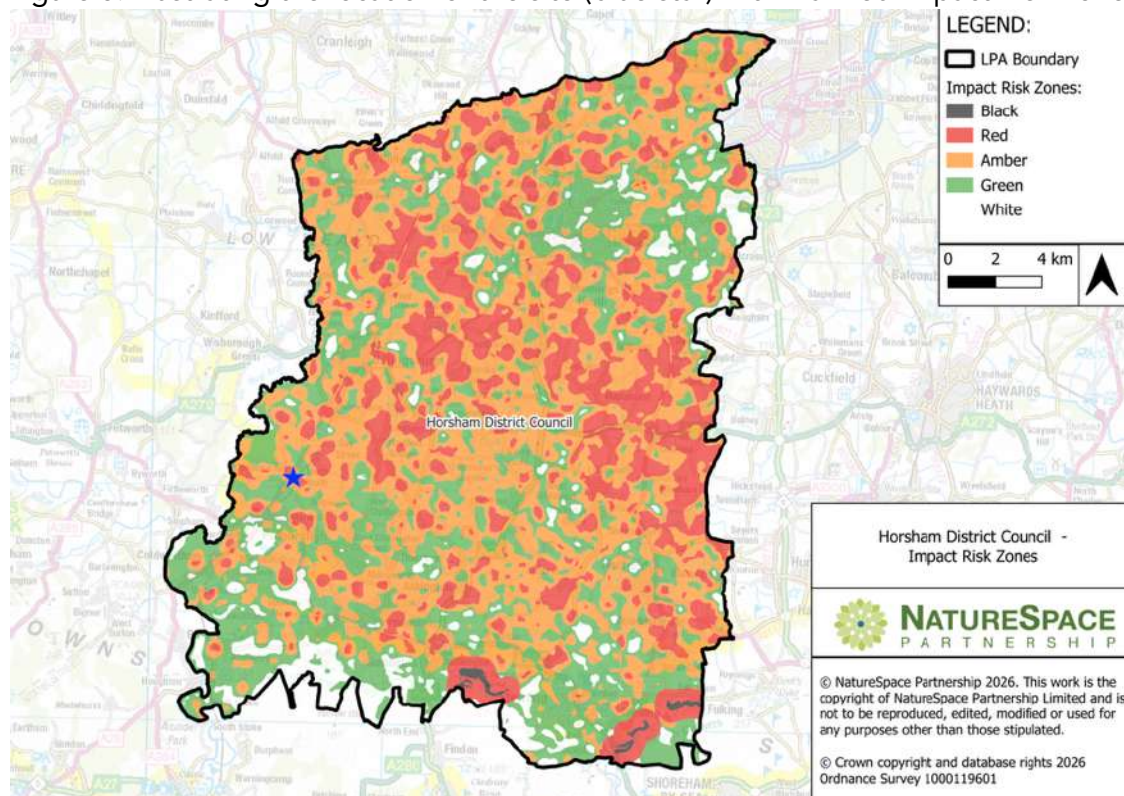
3.3.3 Great Crested Newt Survey

According to the SxBRC data, there is one record for a single great crested newt from within the Zol, which is from a non-specific location, dated 1997.

According to the GIS database, the closest granted EPSM licence for great crested newt is from a location circa 3.7 kilometres to the south-west (non-breeding, 2017).

According to the NatureSpace Partnership Ltd., the site is located within a 'Red Impact Risk Zone', which is considered likely to contain highly suitable habitat for great crested newt (Figure 5).

Figure 5: Illustrating the location of the site (blue star) within a 'Red Impact Risk Zone'



The results of the walkover survey of ponds within circa 500 metres of the site boundaries are provided in Table 4, to be cross-referenced with Figure 1 (Section 2.4).

Table 6: Results of the pond walkover survey

Pond location	Distance from site	Details
1	70m	On-site pond – see below
2	210m	Dried up/no long present
3	360m	Dried up/no long present
4	440m	Dried up/no long present
5	470m	Dried up/no long present
6	350m	Inaccessible/private property
7	160m	Inaccessible/private property
8	190m	Inaccessible/private property
9	390m	Inaccessible/private property
10	450m	Inaccessible/private property

In summary, with the exception of the P1, all of the ponds within circa 500 metres either no longer exist or are on private property and were not accessible.

According to the HSI assessment, P1 scores as having 'average' suitability (Table 7 - score of 0.62), and there is a corresponding likelihood of great crested newt presence.

Table 7: HSI assessment for P1

Number	Value	Factor
1.	1	Location
2.	0.8	Pond area
3.	0.5	Drying out
4.	0.33	Water quality
5.	1	Shade
6.	0.67	Fowl
7.	1	Fish
8.	0.9	Nearby ponds
9.	0.33	Terrestrial habitats
10.	0.3	Macrophytes
Product	0.007	
HSI	0.62	
Suitability	Average	

The SureScreen Scientifics Laboratory 2018 and 2025 results are provided in Appendix 6, which establishes that there was no great crested newt eDNA present in the water samples.

Since P1 was found to be dry during early June in 2020, which is in the middle of the species' breeding season, when standing water is required in order for eggs to be laid/juveniles to develop, it is considered reasonable to assume that great crested newt was also not present in 2020.

3.3.4 Hazel Dormouse Survey

According to the SxBRC data, there is one record for hazel dormouse from within the Zol, which is from a non-specific location, dated 2007.

According to the GIS database, the closest granted EPSM licence for hazel dormouse (breeding, 2018) is from a location circa 5 kilometres to the south-east.

In summary, there were no actual dormice or hazel dormouse nests recorded as being present in any of the 50 nest tubes during the 2018 and 2025 surveys, and it is therefore considered most likely that the species is absent from the site and immediate surrounding area.

Table 8: Details of the 2018 hazel dormouse survey

Date	Climatic conditions	Results
27/04/18	Overcast, 18°C	Negative
24/05/18	Scattered cloud, 21°C	Negative
12/06/18	Clear skies, 24°C	Negative
19/07/18	Light rain, 21°C	Negative
24/08/18	Clear skies, 26°C	Negative
25/09/18	Scattered cloud, 20°C	Negative

Table 9: Details of the 2025 hazel dormouse survey

Date	Climatic conditions	Results
27/06/25	Overcast, 20°C	Negative
29/07/25	Overcast, 19°C	Negative
17/08/25	Clear skies, 20°C	Negative
19/09/25	Clear skies, 21°C	Negative
13/10/25	Scattered cloud, 15°C	Negative
17/11/25	Overcast, 13°C	Negative

3.3.5 Hedgehog

According to the SxBRC data, there are three records for hedgehog (*Erinaceus europaeus*) from within the Zol, from non-specific locations dated 2017.

The site and surrounding area contain potentially suitable habitats for the species, although there are relatively busy main roads and a railway line present, which reduces the potential for hedgehog to be present due to the probability of killing/injury.

3.3.6 Reptile Survey

According to the SxBRC data, there are three records for grass snake from within the Zol, from non-specific locations dated 2019. There are no records for any other species of reptile.

In summary, very low numbers of adult, sub-adult and juvenile slow worm were consistently recorded as present during both the 2018 (total count seven, max count two, average count one) and 2025 (total count 19, max count six, average count three) surveys, predominantly in association with the grassland/scrub margins in the eastern part of the site adjacent to the railway line boundary, as illustrated in Figure 6. Common lizard (one individual only) and grass snake (one individual on two occasions) were only recorded as present during the 2018 survey.

Table 10: Details of the 2018 reptile survey

Date	Climatic conditions	Results
01/05/18	Clear skies, 17°C	Negative
07/05/18	Scattered cloud, 18°C	1 x sub-adult slow worm, 1 x juvenile grass snake
10/05/18	Clear skies, 20°C	1 x adult female slow worm, 1 x sub-adult slow worm
14/05/18	Overcast, 16°C	Negative
22/05/18	Clear skies, 18°C	1 x sub-adult slow worm, 1 x juvenile slow worm
24/05/18	Scattered cloud, 21°C	1 x sub-adult male slow worm, 1 x adult male common lizard
29/05/18	Scattered cloud, 20°C	1 x juvenile slow worm, 1 x sub-adult grass snake

Table 11: Details of the 2025 reptile survey

Date	Climatic conditions	Results
27/06/25	Overcast, 20°C	2 x adult female slow worms, 3 x adult male slow worms
07/07/25	Overcast, 18°C	1 x sub-adult slow worm
29/07/25	Overcast, 19°C	1 x adult female slow worm, 3 x adult male slow worms
17/08/25	Clear skies, 20°C	Negative
08/09/25	Scattered cloud, 19°C	1 x male slow worm, 1 x sub-adult slow worm
19/09/25	Clear skies, 21°C	4 x adult female slow worms, 1 x adult male slow worm, 1 juvenile slow worm
25/09/25	Scattered cloud, 15°C	1 x female slow worm

Figure 6: Illustrating the approximate location of reptile records



4 Assessment

4.1 Constraints

The SxBRC provided comprehensive records for designated sites/notable habitats and protected/notable species and the survey work was undertaken by an experienced consultant ecologist using standard survey techniques, under appropriate climatic conditions and in accordance with the published guidelines. It is therefore considered that there were no significant constraints to the PEA.

The bat, hazel dormouse and reptile survey work was conducted by appropriately experienced and licensed ecologists, during the optimal season, under suitable climatic conditions and in accordance with the published guidelines. It is therefore considered that there were no significant constraints to the survey work for these protected species.

Although the great crested newt survey work was partially constrained by a lack of full access to potential pond locations on private properties to undertake HSI assessments, the P1 location has consistently tested negative for great crested newt eDNA, which is the closest pond to the proposed development site. Therefore, this lack of access is not considered to be a significant constraint, since precautionary mitigation measures have been implemented for the species as detailed in a subsequent section.

4.2 Potential Impacts

4.2.1 Designated Sites/Notable Habitats

Since it is considered that the proposals would not have any direct or indirect impacts to designated sites, mitigation measures are not considered necessary.

4.2.2 Habitats

The site contains hard standing, neutral grassland, scrub/ruderal vegetation, which represent common/widespread habitats that are not of conservation concern and impacts to these habitat types are considered to be insignificant, since they can be partially offset via replacement planting post-construction, as discussed in a subsequent section.

Potential impacts to trees are considered in the independent report by SJA Trees.

4.2.3 Protected/Notable Species

4.2.3.1 Bats

Since there are no buildings within the proposed works area in which bats can roost and with the exception of the T4 oak that is to be retained/protected, the trees are all considered to have negligible/low potential for roosting bats, there will be no direct impact on roosting bats.

The use of the automated bat detector has determined that the species of bats that were recorded during the survey are all considered to be relatively common/widespread and none of the records were for species of international importance, i.e. barbastelle and Bechstein's bat, which have specialist habitat requirements not supported by the site or immediate surrounding area.

The relatively low number of records from the automated survey, along with the observations from the activity survey, indicate that overall, the site is likely to be of limited importance to the bat species recorded during the survey work, other than in association with occasional commuting/foraging.

However, as detailed in the HRA, there is flightline between the Mens SAC barbastelle maternity woodland and a hibernation site, which appears to be located close to the site's north/eastern boundary. Therefore, the poplar tree line on this boundary could represent a habitat feature of importance to this flightline and species. As a result of this, mitigation measures will be required to ensure that the tree line is retained (consent was previously granted for its removal under planning permission ref: DC/13/1048) and enhanced, as detailed in a subsequent section.

In addition, new artificial lighting could have an indirect impact on all bat species whilst commuting/foraging and therefore, mitigation measures are recommended in a subsequent section to avoid the risk of this occurring.

The proposed works could actually have a positive impact for the local bat population, through the provision of tree-mounted bat boxes, as described in a subsequent section.

4.2.3.2 Great Crested Newt

Since the results of the 2018 and 2025 eDNA test for P1 were negative and this location was found to be predominantly dry during the core part of the breeding season in 2020, it is considered most likely that great crested newt is not present in the immediate area and therefore, should not be affected by the proposals.

However, the proposed development site is located within a 'Red Impact Risk Zone' and the site does contain potentially suitable terrestrial habitat. Therefore, there is a risk that the site clearance associated with the proposals could result in impacts to the species.

To avoid what is considered to be a low risk based on the results of the eDNA testing, precautionary mitigation measures have been implemented in conjunction with measures for breeding birds and reptiles, as detailed in a subsequent section.

4.2.3.3 Hazel Dormouse

Since there were no actual dormice or hazel dormouse nests recorded during the 2018 and 2025 surveys and it is considered most likely that the species is absent from the site and immediate surrounding area, it is considered that hazel dormouse will not be affected by the proposals.

4.2.3.4 Hedgehog

There has been no evidence recorded for the presence of hedgehog, although the site and surrounding area contain potentially suitable habitat types.

Therefore, the species could be occasionally present within the site and there is a low risk of potential impact to the hedgehog in relation to the ground works phase of the proposals, since hedgehogs can become trapped and killed/injured in deep excavations.

To avoid the risk of potential impacts, precautionary mitigation measures are recommended in a subsequent section.

4.2.3.5 Reptiles

The survey work has confirmed that according to the guidelines¹⁰, the site supports a low-end, small-sized population of common lizard (<20/ha), grass snake (<2/ha) and slow worm (<50/ha), which are associated with the eastern part of the site only.

¹⁰ Herpetofauna Groups of Britain and Ireland. Evaluating local mitigation/translocation programmes: Maintaining best practice and lawful standards (1998). HGBI advisory notes for Amphibian and Reptile Groups (ARGs)

The site clearance associated with proposals could result in direct impacts to reptiles through killing or injury, which would be an offence against the legislation.

To avoid the risk of impacts to reptiles, mitigation measures have been implemented in conjunction with measures for breeding birds and great crested newt, as detailed in a subsequent section.

4.3 Legislation and Policy

4.3.1 Bats, Great Crested Newt and Hazel Dormouse

All species of bat, great crested newt, hazel dormouse and the habitats of these species are fully protected under the Wildlife and Countryside Act 1981 (as amended by the CRow Act 2000) and by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019.

The legislation makes it illegal under the Wildlife and Countryside Act 1981 (as amended) to:

- Intentionally or recklessly kill, injure or take a wild bat, great crested newt, or hazel dormouse;
- Be in possession or control of any live or dead wild bat, great crested newt, or hazel dormouse, or any part of, or anything derived from a wild bat, great crested newt, or hazel dormouse;
- Intentionally or recklessly damage, destroy or obstruct access to any place that a wild bat, great crested newt, or hazel dormouse uses for shelter or protection; and
- Intentionally or recklessly disturb any wild bat, great crested newt, or hazel dormouse while it is occupying a structure or place that it uses for shelter or protection.

The legislation makes it illegal under the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 to:

- Deliberately capture, injure or kill any wild animal of a European Protected Species;
- Deliberately disturb wild animals of any such species. Disturbance of animals includes in particular any disturbance which is likely to:
 - impair their ability -
 - to survive, to breed or reproduce, or to rear or nurture their young; or
 - in the case of animals of a hibernating or migratory species, to hibernate or migrate; or
 - to affect significantly the local distribution or abundance of the species to which they belong;
- Deliberately take or destroy the eggs of such an animal; or
- Deliberately damage or destroy a breeding site or resting place of such an animal.

4.3.2 Breeding Birds

Breeding birds are protected under the Wildlife and Countryside Act 1981 (as amended) which makes it an offence to intentionally or recklessly kill, injure or take any wild bird or take, damage or destroy its nest whilst it is in use or being built, or to take or destroy its eggs.

4.3.3 Reptiles

All species of reptile native to the UK are legally protected under the Wildlife and Countryside Act 1981 (as amended) in respect of deliberate, intentional or reckless killing and injuring.

4.3.4 Natural Environment and Rural Communities (NERC) Act 2006

The NERC Act extends the biodiversity duty set out in the CRoW Act to public bodies and statutory undertakers to ensure due regard to the conservation of biodiversity.

This duty is set out in Section 40 of the NERC Act and states that: *"Every public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity"*.

Section 41 of the NERC Act refers to a published list of habitats and species which are of principal importance for the conservation of biodiversity in England, including PHI deciduous woodland and hedgehog.

4.3.5 National Planning Policy Framework

The Government revised the National Planning Policy Framework (NPPF) in December 2024. The NPPF states that when determining planning applications, LPAs should aim to conserve and enhance biodiversity by encouraging opportunities to be taken for the incorporation of biodiversity in and around developments.

5 Recommendations

5.1 Mitigation Measures

5.1.1 Designated Sites/Notable Habitats

Since it is considered that the proposals would not have any direct or indirect impacts to designated sites, mitigation measures are not considered necessary.

5.1.2 Habitats

As detailed in the report by SJA Trees, the retained trees will need to be protected in accordance with British Standard (BS) 5837:2012 "*Trees in Relation to Design, Demolition and Construction - Recommendations*", to ensure that no damage to stems or roots, no soil compaction by vehicles, no contamination of soil from spillages, no scorching from fires, or instability/stress from changes in soil levels shall take place.

5.1.3 Protected/Notable Species

5.1.3.1 Bats

Since it is considered that the proposals will not have a direct impact on bats, mitigation measures are recommended on a precautionary basis only, to avoid the risk of indirect impacts.

In addition to the T4 mature oak and vegetated boundaries to the north, south and east, the line of mature poplar trees on the site's eastern boundary with the railway line will now also be retained, contrary to the original consent, which allowed for them to be removed. This will ensure that the relatively common/widespread species of bat that have been recorded during the survey work, along with barbastelle bats that may seasonally use a flightline between the Mens SAC barbastelle maternity woodland and a hibernation site, can continue to utilise these habitats for commuting/foraging.

The lighting scheme has been designed by Landscape Perspective Ltd. (submitted drawing ref: L90-306) in compliance with the Institute of Lighting Professional (ILP) and BCT published guidance note 08/23¹¹ (Appendix 7), to ensure that all lighting is low-level, downwardly directional and focussed towards the centre of the site, avoiding any direct illumination of the boundary vegetation, mature oak T4 and poplar tree line. The specification for the appropriate lamps/fittings will be confirmed with BEGA Lighting, to ensure that they are in accordance with the specifications in Section 4.29 of the guidance note.

5.1.3.2 Breeding Birds

To avoid the risk of impacts to breeding birds, the potentially suitable habitat was removed in late February/early March 2026, which is prior to the breeding season (March-July/August). The retained boundary vegetation and trees will be isolated from the construction site via the use of 'heras' fencing, to ensure that there is no risk of affecting birds during the breeding season.

5.1.3.3 Great Crested Newt

Based on the results of the eDNA testing for P1, it is considered most likely that great crested newt is not present in the immediate area and therefore, should not be affected by the proposals.

¹¹ Bats and artificial lighting at night, Guidance Note 08/23

However, the proposed development site is located within a 'Red Impact Risk Zone' and there is a risk that the site clearance could result in impacts to the species. Therefore, great crested newt has been a consideration in the mitigation strategy that has been implemented primarily for breeding birds and reptiles.

A 'finger-tip search' was conducted for the site by a Natural England licence holder prior to the clearance works in late February/early March, with no great crested newt or other species of amphibian being recorded as present. Potentially suitable refugia/hibernacula were also looked for, with none being identified.

The mitigation strategy included a protocol requiring works to temporarily cease if great crested newt is recorded as present and to consult a Natural England licence holder about how to proceed further, without the risk of an offence being committed.

As detailed in a subsequent section, there were no species of amphibian recorded as present during the mitigation strategy, including great crested newt.

5.1.3.4 Hazel Dormouse

Since there was no evidence of hazel dormouse recorded during the survey and the species will therefore not be affected by the proposals, mitigation measures are not required for hazel dormouse.

However, if at any time during the proposed works, it becomes apparent that hazel dormouse is present and at risk of direct impacts, works will need to cease whilst a Natural England licence holder is contacted and consulted about how to proceed without the risk of an offence being committed.

5.1.3.5 Hedgehog

The vegetation clearance work that was conducted in late February/early March 2026 was supervised by an experienced Ecological Clerk of Works (ECoW), who checked the habitats for any features that could be used by hibernating hedgehog, with none being identified.

During the construction phase, excavations that could trap hedgehog and other species of wildlife will not be left uncovered unless unavoidable. If this is the case, exit ramps (e.g. scaffold boards or similar) and floatation devices (e.g. blocks of polystyrene or similar) will be provided. Excavations will be checked first thing every morning to ensure that no animals have become trapped.

If at any time hedgehog or other protected/notable species are found to be present, an experienced ecologist will need to be consulted and protocols reviewed.

5.1.3.6 Reptiles

Since the survey work has confirmed that the site supports a low-end, small-sized population of slow worm, grass snake and common lizard, which could be directly impacted on by the proposals, mitigation measures have been implemented to ensure that the site clearance works associated with the proposals do not result in killing/injury to reptiles.

During late February/early March 2026, prior to the breeding bird season, a staged vegetation clearance took place to reduce the scrub/ruderal and grassland vegetation to near ground level, using hand-held strimmer machinery, rather than any tracked or wheeled vehicles, to minimise the risk of killing/injury.

During March, a temporary exclusion fence (design specification provided in Appendix 8) was installed around the boundaries of the proposed works area, where not in association with hard standing and outside of the Root Protection Area (RPA) as defined in the SJA Trees report.

Subsequently, in late March 200 refugia were distributed throughout the site and during April-May 2026, a 30 visit trapping/translocation programme was conducted by experienced ecologists, until five visits passed with no reptiles being recorded, which was considered an appropriate interpretation of the guidelines for the small size of site and very low numbers of individuals involved.

There were no grass snake, common lizard or any species of amphibian including great crested newt recorded as present during the trapping/translocation programme and all of the slow worms captured were carefully removed to the other side of the exclusion fence adjacent to the railway line boundary, in an area of suitable habitat, on land already owned by the applicant.

Table 12: Results of the trapping/ translocation programme

Visit	Date	Weather	Result
1	07/04/26	19°C, clear skies, dry	1 x adult female slow worm
2	08/05/26	17°C, scattered cloud, dry	2 x adult male slow worms
3	09/04/26	20°C, overcast, dry	1 x adult male slow worm
4	11/04/26	12°C, scattered cloud, dry	None
5	12/04/26	14°C, scattered cloud, dry	None
6	13/04/26	13°C, scattered cloud, dry	None
7	15/04/26	15°C, overcast, recent rain	None
8	17/04/26	16°C, scattered cloud, recent rain	1 x juvenile slow worm
11	20/04/26	15°C, scattered cloud, dry	None
12	21/04/26	17°C, clear skies, dry	None
13	22/04/26	14°C, clear skies, dry	1 x juvenile slow worm
14	24/04/26	14°C, clear skies, dry	None
15	27/04/26	16°C, clear skies, dry	1 x juvenile slow worm
16	29/04/26	13°C, clear skies, dry	None
17	30/04/26	15°C, scattered cloud, dry	None
18	01/05/26	16°C, scattered cloud, dry	2 x sub-adult slow worms
19	04/05/26	15°C, overcast, dry	None
20	05/05/26	18°C, scattered cloud, dry	None
21	06/05/26	13°C, clear skies, dry	None
22	07/05/26	15°C, scattered cloud, dry	2 x adult female slow worms
23	08/05/26	16°C, overcast, dry	None
24	11/05/26	16°C, scattered cloud, dry	1 x adult female slow worm
25	13/05/26	17°C, overcast, dry	1 x adult female slow worm
26	15/05/26	14°C, overcast, dry	None
27	18/05/26	16°C, scattered cloud, dry	None
28	19/05/26	17°C, clear skies, dry	None
29	20/05/26	16°C, scattered cloud, dry	None
30	22/05/26	18°C, clear skies, dry	None

In summary, a total of 13 slow worms were successfully trapped/translocated from the proposed development site into the receptor site, with no killing/injury taking place and five clear days with no reptiles being recorded as preset was achieved during 15-20/05/26.

The temporary exclusion fencing will be maintained in place and the ruderal vegetation within the site will be managed to ensure that the risk of recolonisation is avoided. Once the Section 73 application has been approved, a destructive search will take place using an excavator with a toothed bucket working under the direction of an experienced ECoW, who will capture any remaining reptiles and relocate them to the receptor site.

5.2 Enhancement Measures

As detailed in the Landscape Perspective Ltd. plan (submitted drawing ref: L90-300), the proposals include the following habitat enhancement measures:

- 16 no. native species of tree – extra heavy stock, 16-18cm girth, which include specimens that will be planted alongside the eastern boundary, to enhance the existing tree line;
- Species-rich biodiverse turf areas to the south and east, to buffer the existing vegetated boundaries from the development; and
- Non-native ornamental planting around the development that incorporates a proportion of species that are beneficial to wildlife.

As detailed in the Landscape Perspective Ltd. plan (submitted drawing ref: L90-200), the proposals include the following enhancement measures for protected/notable species:

- 4 no. Schwegler bat boxes (2 no. model 1FD and 2 no. model 2FN, available from <https://www.nhbs.com/>), to be installed above 4-5 metres from ground level on the mature oak T4 and on mature tree line poplars on the eastern boundary, not illuminated by any artificial lighting;
- 8 no. Schwegler bird boxes (4 no. oval entrance, 2 no. 26mm entrance and 2 no. 32mm entrance, available from <https://www.nhbs.com/>), to be installed above 3-4 metres from ground level on the mature oak T4 and on tree line poplars on the eastern boundary, on different aspects but not facing south to avoid the risk of over-heating during the summer breeding season; and
- Consideration should be given to the viability of integrating/mounting bat and bird boxes on the proposed building, if the construction type/materials used permit this.

6 Conclusions

To inform a Section 73 application, GreenLink Ecology Ltd. was commissioned to document the ecological and protected species survey work that has been completed for the site, and to detail the mitigation and enhancement measures that have been/will be implemented for the site.

The results of the SxBRC desk study indicate that the statutory designated South Downs National Park is present in the Zol, along with notable habitat types. There are also SAC present in the wider area. Since it is considered that the proposals would not have any significant impacts on designated sites/notable habitats, mitigation measures are not considered necessary.

The SxBRC desk study data also includes protected/notable species records from within the Zol, which of relevance to the site includes bats, birds, great crested newt, hazel dormouse and reptiles.

The site contains common/widespread habitats that are not of conservation concern and since impacts to most of these habitat types are considered to be insignificant, mitigation measures are only required for retained trees, as detailed in the report by SJA Trees, which will be protected in accordance with BS 5837:2012 *"Trees in Relation to Design, Demolition and Construction - Recommendations"*.

The results of the 2018 and 2025 bat survey indicate that the site appears to be of limited importance to the local bat population, other than in association with occasional commuting/foraging. However, there is flightline between the Mens SAC barbastelle maternity woodland and a hibernation site, which appears to be located close to the site's north/eastern boundary and the associated tree line may represent a habitat feature of seasonal importance. Therefore, mitigation measures have been recommended to avoid the risk of indirect impacts.

Potentially suitable breeding bird habitat was removed outside the breeding season and retained boundary vegetation and trees will be isolated from the construction site via the use of 'heras' fencing, to ensure that there is no risk of affecting birds during the breeding season.

The results of the laboratory analysis of water samples from the pond located to the north-west of the site have proven that there is no great crested newt eDNA present in P1 during 2018 or 2025, and in 2020 there was insufficient standing water present. Although the risk of impacts was considered to be low, great crested newt was a consideration during the mitigation strategy that was implemented for breeding birds and reptiles. There were no great crested newt or any other species of amphibian recorded as present at any time.

Since there was no evidence of hazel dormouse recorded during the 2018 and 2025 surveys and the species will therefore not be affected by the proposals, mitigation measures are not required for hazel dormouse.

Hedgehog was a consideration during the mitigation strategy that was implemented for breeding birds and reptiles, with no hedgehogs recorded as present. On a precautionary basis, mitigation measures have also been recommended to avoid the risk of impacts during the construction phase.

The reptile survey conducted in 2018 and 2025 recorded a low numbers of three reptile species. During the mitigation strategy implemented in April-May 2026, low number of slow worms were carefully trapped and translocated into the receptor site, with no killing/injury taking place and five clear days with no reptiles being recorded as present being achieved within a 30 day period. Once the Section 73 application has been approved, the strategy will be concluded with an ECoW supervised a destructive search.

Ecological enhancement measures have also been recommended to ensure that the proposed works benefit local biodiversity, in accordance with the principles of the NPPF.

7 Disclaimer

This report is issued to the client for their sole use and for the intended purpose as stated in the agreement between the client and GreenLink Ecology Ltd. under which this work was completed, or else as set out within this report.

This report may not be relied upon by any other party without express written agreement. The use of this report by unauthorised third parties is at their own risk and GreenLink Ecology Ltd. accepts no duty of care to any such third party.

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Any recommendation, opinion or finding stated in this report is based on circumstances and facts as they existed at the time that GreenLink Ecology Ltd. performed the work. The content of this report has been provided in accordance with the provisions of the CIEEM Code of Professional Conduct. GreenLink Ecology Ltd. works where appropriate to the scope of our brief, to the principles and requirements of British Standard BS42020.

Nothing in this report constitutes legal opinion. If legal opinion is required the advice of a qualified legal professional should be secured. Observations relating to the state of built structures or trees have been made from an ecological point of view and, unless stated otherwise, do not constitute structural or arboricultural advice.

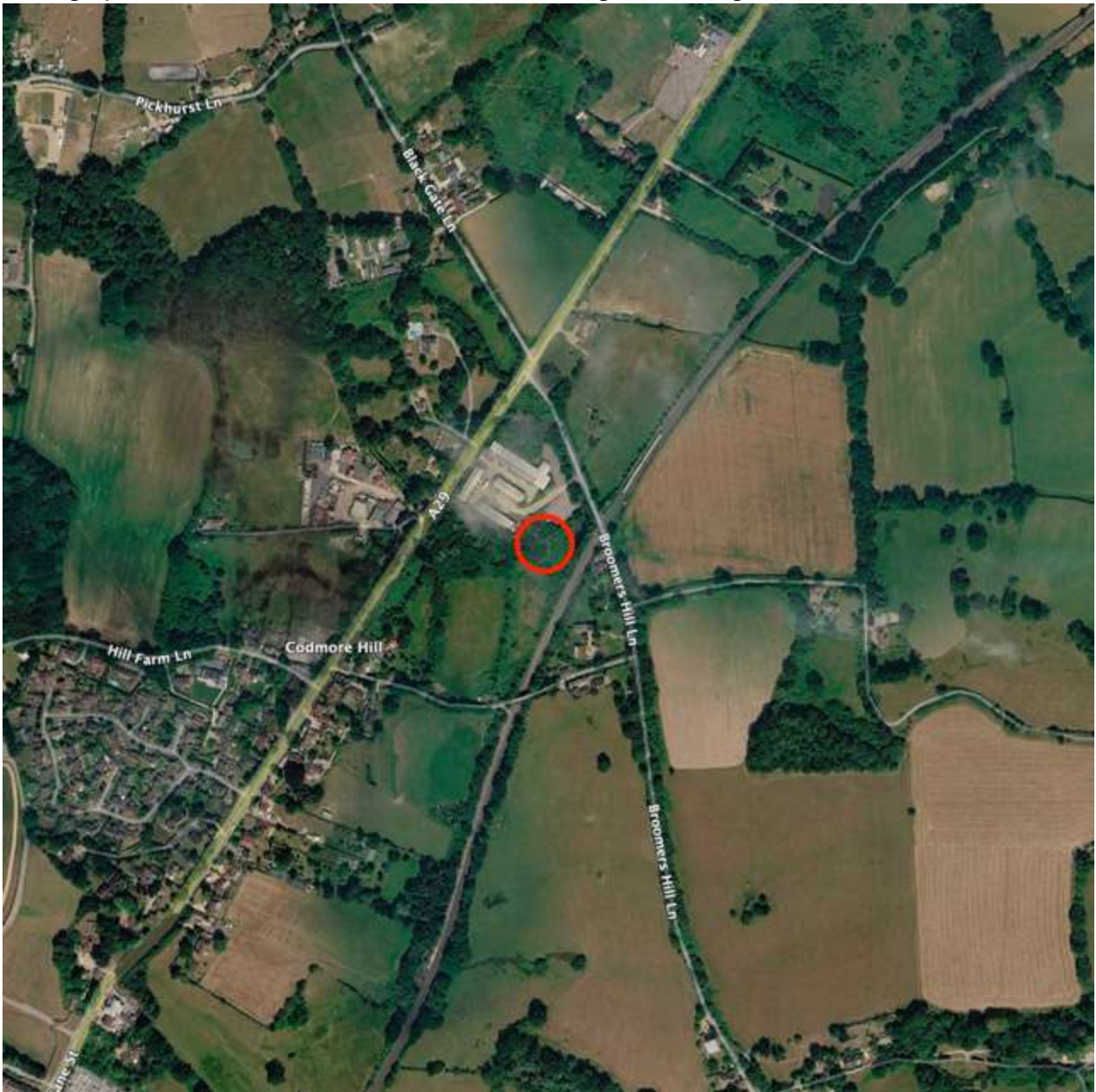
8 Appendices

Appendix 1: The site location and surrounding area

Photograph 1: The approximate site boundaries and immediate surrounding area (drone 05/25)



Photograph 2: The site location and wider surrounding area (Google Earth 06/25)



Appendix 2: Site location plan



Appendix 3: Summary of the HSI scoring system¹², using key diagnostic habitat variables

SI1: Location in the UK

- A (optimal) = 1
- B (marginal) = 0.5
- C (unsuitable) = 0.01

SI2: Pond area

- Measure pond surface area (m²) and round to nearest 50m². Read off graph.

SI3: Pond permanence

- Never dries = 0.9
- Rarely, no more than two years in ten or only in drought = 1
- Dries sometimes, between three years in ten to most years = 0.5
- Dries annually = 0.1

SI4: Water quality

- Good, abundant and diverse invertebrate community = 1
- Moderate invertebrate diversity = 0.67
- Poor, low invertebrate diversity, few submerged plants = 0.33
- Bad, clearly polluted, only pollution-tolerant invertebrates, no submerged plants = 0.01

SI5: Shade

- Estimate percentage perimeter shaded to a least 1 metre from shore. Read off graph.

SI6: Fowl

- Absent, no evidence of water fowl (although moorhen may be present) = 1
- Minor, waterfowl present, but little sign of impacts = 0.67
- Major, severe impact of waterfowl = 0.01

SI7: Fish

- Absent, no records of fish stocking and no fish revealed during survey = 1
- Possible, no evidence of fish, but local conditions suggest that they may be present = 0.67
- Minor, small numbers of crucian carp, goldfish or stickleback known to be present = 0.33
- Major, dense populations of fish known to be present = 0.01

SI8: Ponds

- Count the number of ponds within 1 km of survey pond, not separated by major barriers, and divide by 3.14. This can be done from maps rather than in the field. Read off graph.

SI9: Terrestrial habitat

- Good = 1
- Moderate = 0.67
- Poor = 0.33
- None = 0.01

SI10: Macrophytes

- Estimate the percentage of the pond surface area occupied by macrophyte cover (between May and the end of September). Read off graph.

¹² ARG UK Advice Note 5: Great Crested Newt Habitat Suitability Index, May 2010

The HSI is a geometric mean of the ten suitability indices:

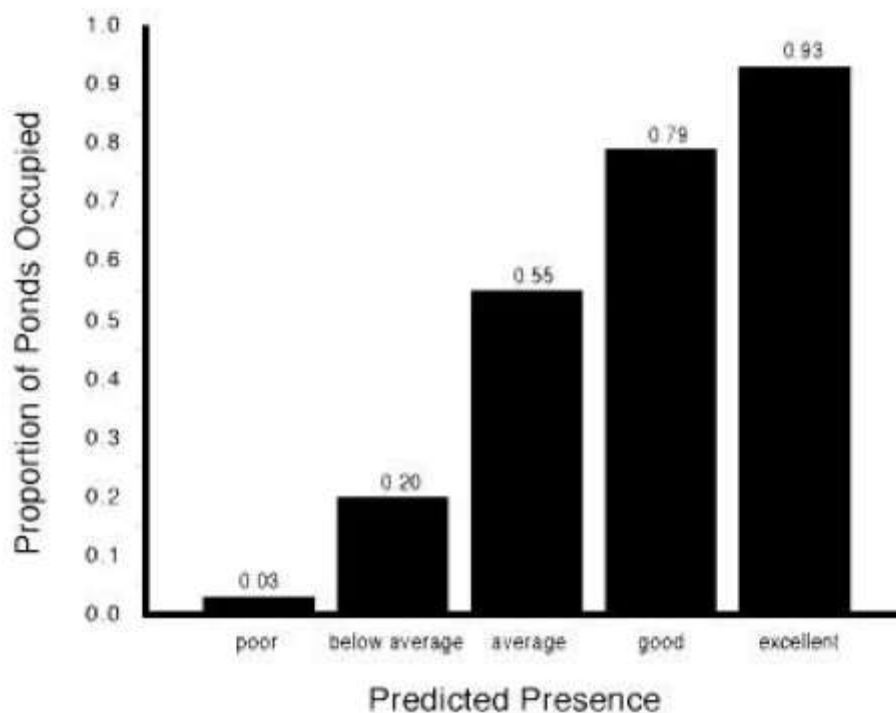
$$\text{HSI} = (\text{SI1} \times \text{SI2} \times \text{SI3} \times \text{SI4} \times \text{SI5} \times \text{SI6} \times \text{SI7} \times \text{SI8} \times \text{SI9} \times \text{SI10})^{1/10}$$

- The ten Suitability Indices are scored for a pond, in the field and from map work;
- The ten field scores are then converted to SI scores, on a scale from 0.1 to 1 (0.1 is used as the bottom end of the range instead of 0, because multiplying by 0 reduces all other SI scores to 0);
- The ten SI scores are then multiplied together; and
- The tenth root of this number is then calculated $(X)^{1/10}$.

The calculated HSI for a pond should score between 0 and 1. The Pond's HSI can then be compared to the following ranges of pond suitability:

HSI score	<0.5 = poor
	0.5 – 0.59 = below average
	0.6 – 0.69 = average
	0.7 – 0.79 = good
	> 0.8 = excellent

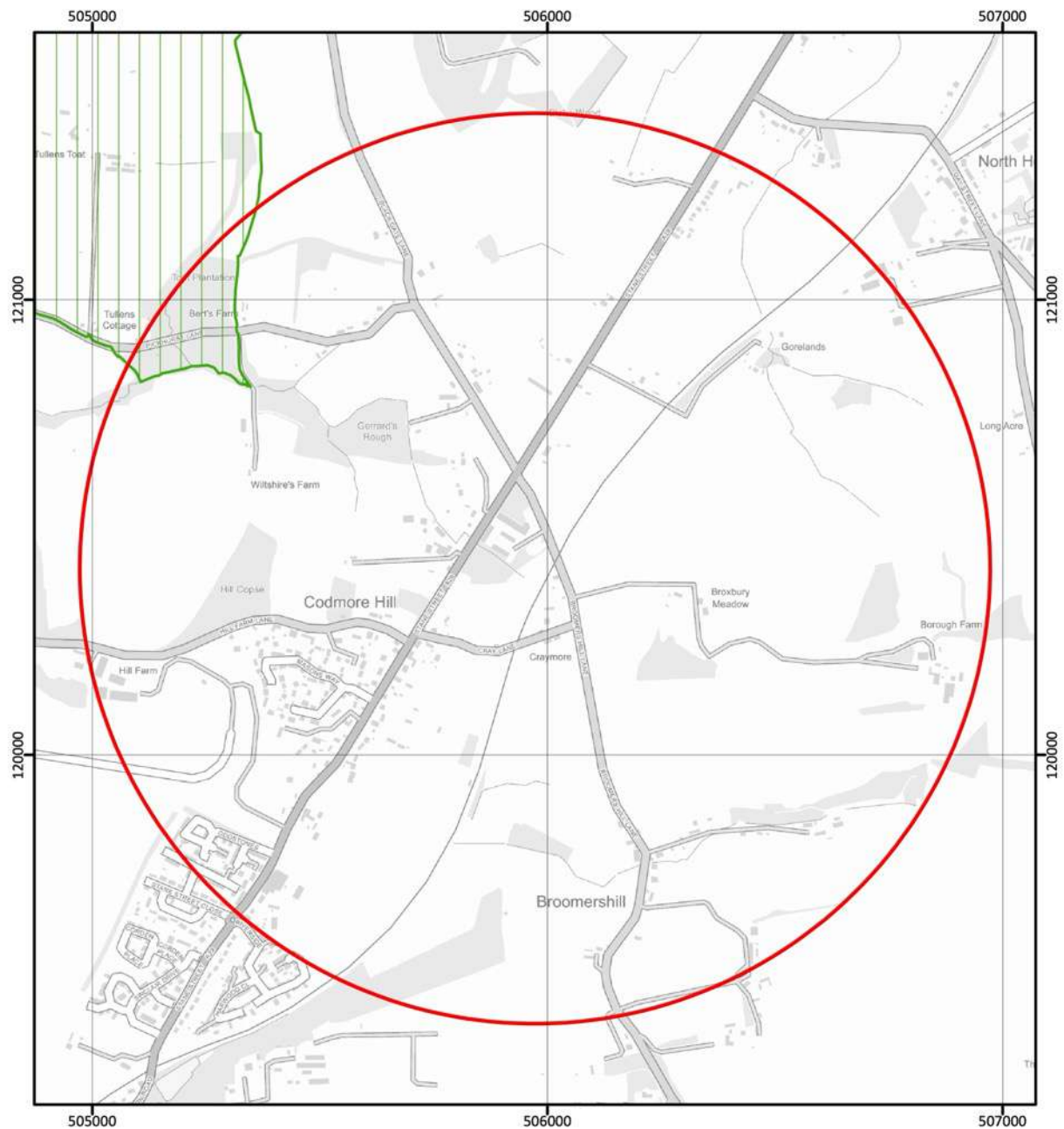
An inference can be made between the HSI of a pond, and the likelihood of great crested newt presence in the pond, based on the number of ponds in each category that supported the species in Oldham's study:



Appendix 4: Designated sites and notable habitats maps

Map 1: Statutory site designations

Broomers Hill Park, Codmore Hill + 1km radius
 SxBRC/25/639 - 06/11/2025



Key to Map:

- | | |
|-------------------------------------|------------------------------------|
| Search area | Local Nature Reserve |
| Special Area of Conservation | National Park |
| Special Protection Area | Area of Outstanding Natural Beauty |
| Ramsar | Country Park |
| Site of Special Scientific Interest | Marine Conservation Zone |
| National Nature Reserve | |

Statutory designated site boundaries supplied by Natural England. Contains public sector information licensed under the Open Government Licence v3.0.

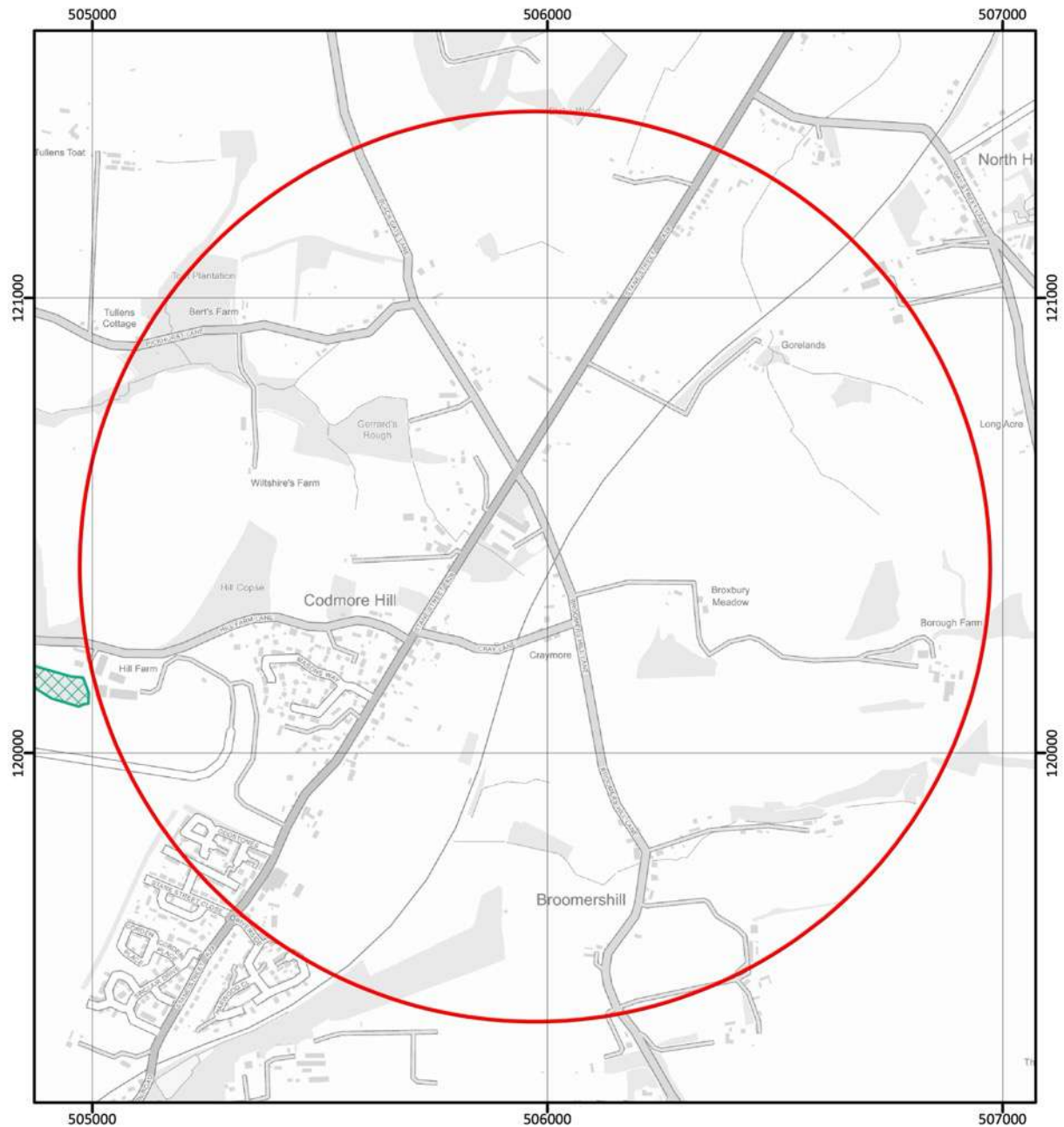
Contains Ordnance Survey data © Crown copyright and database rights 2025

0 0.25 0.5 km



Map 2: Non-statutory site designations**Broomers Hill Park, Codmore Hill + 1km radius**

SxBRC/25/639 - 06/11/2025



Key to Map:

- Search area
- Local Wildlife Site
- Local Geological Site
- Designated Road Verge
- ✦ Marine SNCI

Local Wildlife Site boundaries maintained by Sussex Biodiversity Record Centre (SxBRC) on behalf of Sussex Local Wildlife Sites Initiative. Notable Road Verge data provided by local authorities. Local Geological Site data created by SxBRC in partnership with Sussex Geodiversity Group.

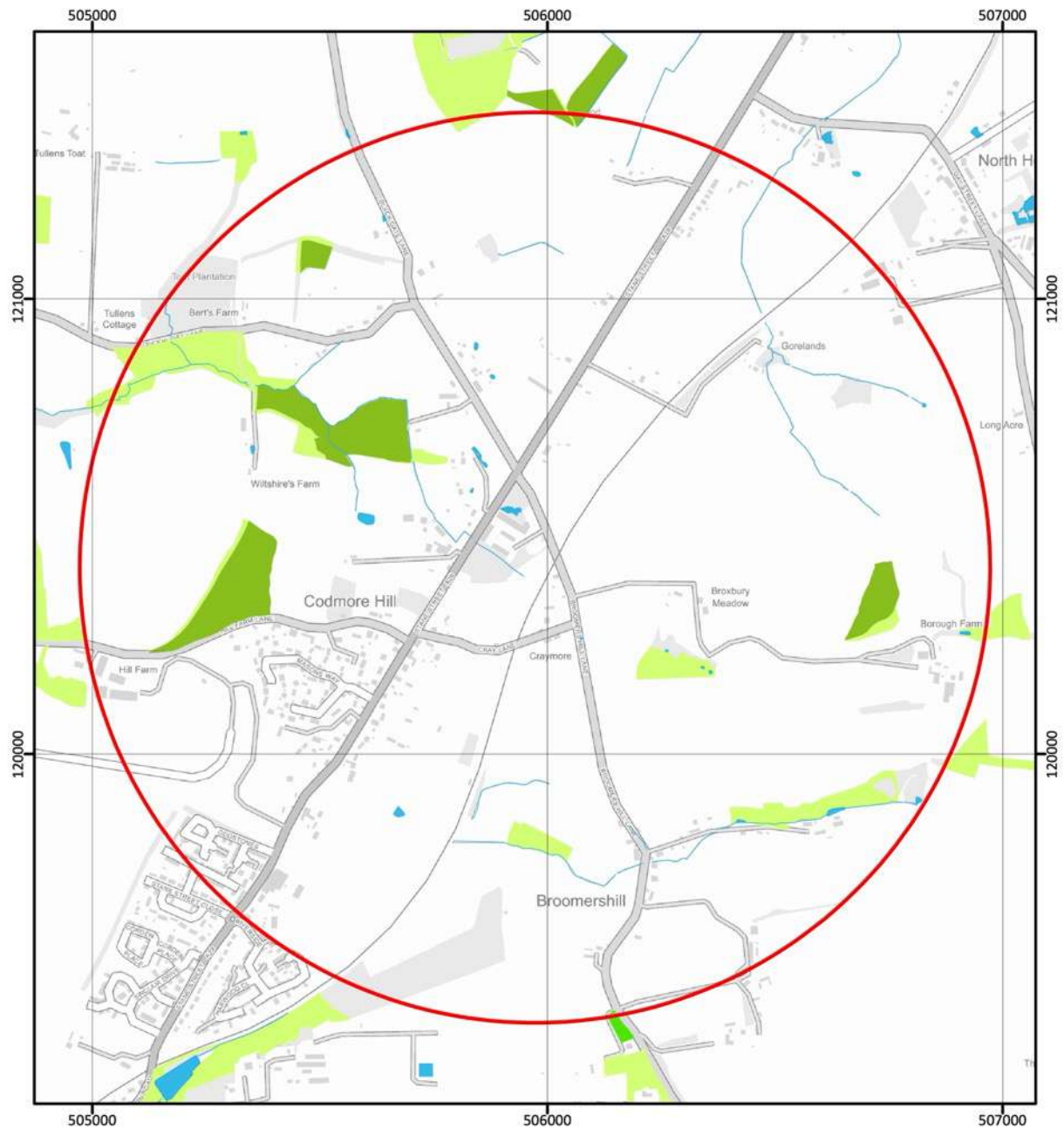
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0 0.25 0.5 km



Map 4: Section 41 habitats and other

Broomers Hill Park, Codmore Hill + 1km radius
 SxBR/25/639 - 06/11/2025



Key to Map:

- Search area
- Open Water
- Traditional orchard
- Ancient woodland
- Deciduous woodland

Ancient woodland, and section 41 habitat data supplied by Natural England. Contains public sector information licenced under the Open Government Licence v3.0. Additional contributors of habitat data include Sussex Wildlife Trust, South Downs Conservation Board, Environment Agency, Sussex Wetlands Landscapes Project, WSCC, RSPB, High Weald AONB Unit, Ancient Tree Hunt, and Tree Register of the British Isles.

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0 0.25 0.5 km



Appendix 5: Protected/notable species data

Table 1: Summary protected and designated species records (excluding bats and birds)

This table summarises records from 1980 onwards. See accompanying spreadsheet for detailed records.

See Table 2 for bat records, Table 3 for bird records and Table 4 for invasive non-native species.

Maximum abundance = highest total number of species recorded at one time.

N.B. Where 'Present' appears in abundance column, no single numerical figure for abundance was provided with the record.

Taxon name	Common name	International Designation	National Designation	Other Designation	Date of earliest record	Date of latest record	No. of records	Max. abundance
Amphibians								
<i>Bufo bufo</i>	Common Toad		WCA Sch5 s9.5a, NERC S41	UK BAP Priority	01/01/1992	01/01/1992	3	100
<i>Lissotriton vulgaris</i>	Smooth Newt		WCA Sch5 s9.5a		01/01/1987	01/01/1992	2	1
<i>Rana temporaria</i>	Common Frog		WCA Sch5 s9.5a		01/01/1987	01/01/1992	3	1
<i>Triturus cristatus</i>	Great Crested Newt	Hab Dir A2 NP, Hab Dir A4	Hab Reg Sch2, WCA Sch5 s9.4b/s9.4c/s9.5a, NERC S41	UK BAP Priority	03/03/1997	03/03/1997	1	1
Higher Plants - Flowering Plants								
<i>Angelica archangelica</i>	Garden Angelica			RedList GB post2001 RE	16/05/2005	16/05/2005	1	1
<i>Buxus sempervirens</i>	Box			RedList GB post2001 DD, RedList ENG post2001 DD, Nat Rare, Sussex Rare	12/06/2004	12/06/2004	1	1
<i>Carex echinata</i>	Star Sedge			RedList ENG post2001 NT	05/07/2008	05/07/2008	1	1
<i>Carex vesicaria</i>	Bladder-sedge			RedList ENG post2001 VU	21/06/2011	21/06/2011	1	1
<i>Cruciata laevipes</i>	Crosswort			RedList ENG post2001 NT	2004	24/09/2010	4	1
<i>Fragaria vesca</i>	Wild Strawberry			RedList ENG post2001 NT	21/08/2006	25/08/2008	3	1
<i>Glebionis segetum</i>	Corn Marigold			RedList GB post2001 VU, RedList ENG post2001 VU	08/09/2008	08/09/2008	1	1
<i>Hieracium aggregatum</i>	Aggregate-headed Hawkweed			Nat Rare	24/07/2011	24/07/2011	1	1
<i>Hyacinthoides non-scripta</i>	Bluebell		WCA Sch8		12/06/2004	13/04/2009	5	1

The Sussex Biodiversity Record Centre must be acknowledged whenever data is cited from this report.

Taxon name	Common name	International Designation	National Designation	Other Designation	Date of earliest record	Date of latest record	No. of records	Max. abundance
<i>Hydrocotyle vulgaris</i>	Marsh Pennywort			RedList ENG post2001 NT	2004	2004	1	1
<i>Hypericum maculatum</i> x <i>perforatum</i> = <i>H. x desetangii</i>	Des Etangs' St John's-wort			Sussex Rare	06/09/2008	06/09/2008	1	1
<i>Jacobaea aquatica</i>	Marsh Ragwort			RedList ENG post2001 NT	08/09/2008	08/09/2008	1	1
<i>Knautia arvensis</i>	Field Scabious			RedList ENG post2001 NT	12/06/2004	12/06/2004	1	1
<i>Mentha arvensis</i>	Corn Mint			RedList ENG post2001 NT	21/07/2008	21/07/2008	1	1
<i>Oenanthe silaifolia</i>	Narrow-leaved Water-dropwort			Nat Scarce, Sussex Rare	28/04/2022	28/04/2022	1	1
<i>Oxalis acetosella</i>	Wood-sorrel			RedList ENG post2001 NT	15/10/2006	15/10/2006	1	1
<i>Potentilla erecta</i>	Tormentil			RedList ENG post2001 NT	21/08/2006	05/07/2008	2	1
<i>Ranunculus flammula</i>	Lesser Spearwort			RedList ENG post2001 VU	2004	26/09/2010	3	1
<i>Ranunculus hederaceus</i>	Ivy-leaved Crowfoot			Sussex Rare	2004	2004	1	1
<i>Sanicula europaea</i>	Sanicle			RedList ENG post2001 NT	21/08/2006	15/10/2006	2	1
<i>Silene flos-cuculi</i>	Ragged Robin			RedList ENG post2001 NT	2004	29/03/2009	2	1
<i>Solidago virgaurea</i>	Goldenrod			RedList ENG post2001 NT	15/10/2006	15/10/2006	1	1
<i>Spergula arvensis</i>	Corn Spurrey			RedList GB post2001 VU, RedList ENG post2001 VU	12/06/2004	08/09/2008	2	1
<i>Valeriana officinalis</i>	Common Valerian			RedList ENG post2001 NT	2004	05/06/2018	3	1
<i>Veronica officinalis</i>	Heath Speedwell			RedList ENG post2001 NT	21/04/2011	21/04/2011	1	1
Invertebrates - Butterflies								
<i>Thecla betulae</i>	Brown Hairstreak		WCA Sch5 s9.5a, NERC S41	UK BAP Priority, RedList GB post2001 VU, Sussex Rare	23/12/1996	14/01/2011	2	2
Invertebrates - Dragonflies & Damselflies								

The Sussex Biodiversity Record Centre must be acknowledged whenever data is cited from this report.

Taxon name	Common name	International Designation	National Designation	Other Designation	Date of earliest record	Date of latest record	No. of records	Max. abundance
<i>Libellula fulva</i>	Scarce Chaser			RedList GB post2001 NT, Sussex Rare	1997	1997	3	1
<i>Sympetrum striolatum</i>	Common Darter			RedList GB post2001 DD	1997	1997	1	1
Invertebrates - Grasshoppers & Crickets								
<i>Conocephalus fuscus</i>	Long-winged Cone-head			Sussex Rare	08/08/2024	08/08/2024	1	1
Invertebrates - Moths								
<i>Tyria jacobaeae</i>	Cinnabar		NERC S41	UK BAP Priority	26/07/2023	23/05/2025	3	4
Invertebrates - True Flies								
<i>Volucella inanis</i>	A True Fly			Sussex Rare	01/08/2025	01/08/2025	1	Present
Mammals - Terrestrial (excl. bats)								
<i>Erinaceus europaeus</i>	Hedgehog		NERC S41	UK BAP Priority, RedList GB post2001 VU	2005	01/12/2017	3	1
<i>Muscardinus avellanarius</i>	Hazel Dormouse	Hab Dir A4	Hab Reg Sch2, WCA Sch5 s9.4b/s9.4c/s9.5a, NERC S41	UK BAP Priority, RedList GB post2001 VU	August 2007 - September 2007	August 2007 - September 2007	1	Present
<i>Mustela putorius subsp. furo</i>	Feral Ferret		NERC S41	UK BAP Priority	02/09/2014	02/09/2014	1	1
<i>Oryctolagus cuniculus</i>	Rabbit			RedList Global post2001 NT	01/09/2001	16/04/2012	13	10
Reptiles								
<i>Natrix helvetica</i>	Grass Snake		WCA Sch5 s9.1/s9.1 kill/s9.5a, NERC S41	UK BAP Priority	23/04/2019	14/06/2019	3	2

The Sussex Biodiversity Record Centre must be acknowledged whenever data is cited from this report.

Table 2: Summary bat records

This table summarises records from 1980 onwards. See accompanying spreadsheet for detailed records.

Maximum abundance = highest total number of bats recorded at one time.

N.B. Where 'Present' appears in abundance column, no single numerical figure for abundance was provided with the record.

Taxon name	Common name	International Designation	National Designation	Other Designation	Date of earliest record	Date of latest record	No. of records	Max. abundance
<i>Barbastella barbastellus</i>	Barbastelle	Hab Dir A2 NP, Hab Dir A4	Hab Reg Sch2, WCA Sch5 s9.4b/s9.4c/s9.5a, NERC S41	UK BAP Priority, RedList GB post2001 VU	24/07/2009	13/08/2010	2	1
<i>Chiroptera</i>	Bat	Hab Dir A2 NP, Hab Dir A4	Hab Reg Sch2, WCA Sch5 s9.4b/s9.4c/s9.5a, NERC S41	UK BAP Priority, RedList GB post2001 CR, RedList GB post2001 EN, RedList GB post2001 VU, RedList GB post2001 NT, RedList GB post2001 DD	05/06/1990	27/10/1993	2	Present
<i>Eptesicus serotinus</i>	Serotine	Hab Dir A4	Hab Reg Sch2, WCA Sch5 s9.4b/s9.4c/s9.5a	RedList GB post2001 VU	08/06/2016	06/07/2019	2	1
<i>Myotis nattereri</i>	Natterer's Bat	Hab Dir A4	Hab Reg Sch2, WCA Sch5 s9.4b/s9.4c/s9.5a		13/08/2010	26/06/2015	2	2
<i>Nyctalus noctula</i>	Noctule	Hab Dir A4	Hab Reg Sch2, WCA Sch5 s9.4b/s9.4c/s9.5a, NERC S41	UK BAP Priority	24/07/2009	06/07/2019	2	1
<i>Pipistrellus pipistrellus</i>	Common Pipistrelle	Hab Dir A4	Hab Reg Sch2, NERC S41, WCA Sch5 s9.4b/s9.4c/s9.5a	UK BAP Priority	05/08/1989	31/07/2019	6	2
<i>Pipistrellus pygmaeus</i>	Soprano Pipistrelle	Hab Dir A4	Hab Reg Sch2, WCA Sch5 s9.4b/s9.4c/s9.5a, NERC S41	UK BAP Priority	08/06/2016	08/06/2016	1	1
<i>Plecotus</i>	Long-eared Bat species	Hab Dir A4	Hab Reg Sch2, WCA Sch5 s9.4b/s9.4c/s9.5a, NERC S41	UK BAP Priority, RedList GB post2001 EN	11/10/2007	11/06/2011	2	1
<i>Plecotus auritus</i>	Brown Long-eared Bat	Hab Dir A4	Hab Reg Sch2, WCA Sch5 s9.4b/s9.4c/s9.5a, NERC S41	UK BAP Priority	21/11/1993	31/07/2019	7	20

The Sussex Biodiversity Record Centre must be acknowledged whenever data is cited from this report.

Table 3: Summary bird records

This table summarises all records from 1980 onwards. See accompanying spreadsheet for detailed records of Sussex Notable Birds (charged reports only).

Confidential records

Records of birds classed as confidential by the Sussex Ornithological Society (SOS) are not included in our reports. These records relate to a range of different species. 1 such record has been flagged up in this search area. The SOS should be contacted directly if potentially damaging operations are to occur.

Email: conservation@sos.org.uk

Wetland Bird Survey (WeBS)

The data search area does not intersect with any WeBS count areas. For more information about WeBS visit <https://www.bto.org/volunteer-surveys/webs/data>.

Maximum abundance = highest total number of birds recorded at one time.

N.B. Where 'Present' appears in abundance column, no single numerical figure for abundance was provided with the record.

Taxon name	Common name	International Designation	National Designation	Other Designation	Date of earliest record	Date of latest record	No. of records	Max. abundance
<i>Accipiter nisus</i>	Sparrowhawk			Bird Amber	05/03/2007	25/08/2024	27	3
<i>Buteo buteo</i>	Buzzard				22/05/2008	25/08/2024	61	15
<i>Circus aeruginosus</i>	Marsh Harrier	Birds Dir A1	WCA Sch1 Pt1	Bird Amber, Notable Bird	02/01/2022	18/12/2024	3	2
<i>Haliaeetus albicilla</i>	White-tailed Eagle	Birds Dir A1	WCA Sch1 Pt1	Bird Amber	25/08/2022	25/08/2022	1	1
<i>Milvus milvus</i>	Red Kite	Birds Dir A1	WCA Sch1 Pt1	RedList Global post2001 NT, Notable Bird	07/05/2011	25/08/2024	32	7
<i>Aix galericulata</i>	Mandarin Duck				13/05/2010	13/05/2010	1	1
<i>Alopochen aegyptiaca</i>	Egyptian Goose				09/02/2022	27/05/2024	7	3
<i>Anas acuta</i>	Pintail			Bird Amber, Notable Bird	30/10/2006	25/03/2023	5	21
<i>Anas crecca</i>	Teal			Bird Amber, Notable Bird	22/01/2008	25/03/2023	8	30
<i>Anas platyrhynchos</i>	Mallard			Bird Amber, Notable Bird	22/01/2008	27/01/2024	34	10
<i>Anser anser</i>	Greylag Goose			Bird Amber	30/10/2006	16/03/2024	16	72
<i>Aythya ferina</i>	Pochard			Bird Red, Notable Bird	18/02/2008	18/02/2008	1	2
<i>Aythya fuligula</i>	Tufted Duck			Notable Bird	13/05/2010	13/05/2010	1	1
<i>Branta bernicla</i>	Brent Goose			Bird Amber	18/02/2008	09/11/2020	2	80
<i>Branta canadensis</i>	Canada Goose				22/01/2008	27/05/2024	32	350
<i>Cygnus atratus</i>	Black Swan				22/01/2008	26/01/2022	3	2

The Sussex Biodiversity Record Centre must be acknowledged whenever data is cited from this report.

Taxon name	Common name	International Designation	National Designation	Other Designation	Date of earliest record	Date of latest record	No. of records	Max. abundance
<i>Cygnus olor</i>	Mute Swan			Notable Bird	22/01/2008	27/01/2024	20	25
<i>Mareca penelope</i>	Wigeon			Bird Amber, Notable Bird	30/10/2006	27/01/2024	10	170
<i>Spatula clypeata</i>	Shoveler			Bird Amber, Notable Bird	30/10/2006	25/03/2023	5	20
<i>Tadorna tadorna</i>	Shelduck			Bird Amber, Notable Bird	22/01/2008	22/04/2022	5	8
<i>Apus apus</i>	Swift			Bird Red, Notable Bird	23/04/2007 - 30/04/2007	26/07/2024	30	40
<i>Burhinus oedicnemus</i>	Stone-curlew	Birds Dir A1	WCA Sch1 Pt1, NERC S41	UK BAP Priority, Bird Amber, Notable Bird	22/04/2016	22/04/2016	1	1
<i>Pluvialis apricaria</i>	Golden Plover	Birds Dir A1			26/01/2022	26/01/2022	2	1
<i>Vanellus vanellus</i>	Lapwing		NERC S41	UK BAP Priority, Bird Red, Notable Bird	05/01/2008	25/03/2023	20	500
<i>Chroicocephalus ridibundus</i>	Black-headed Gull			Bird Amber, Notable Bird	22/01/2008	27/01/2024	30	40
<i>Larus argentatus</i>	Herring Gull		NERC S41	UK BAP Priority, Bird Red, Notable Bird	29/12/2008	18/12/2024	50	120
<i>Larus canus</i>	Common Gull			Bird Amber, Notable Bird	08/12/2020	21/02/2022	4	10
<i>Larus fuscus</i>	Lesser Black-backed Gull			Bird Amber, Notable Bird	07/05/2011	27/05/2024	14	4
<i>Recurvirostra avosetta</i>	Avocet	Birds Dir A1	WCA Sch1 Pt1	Bird Amber, Notable Bird	25/03/2023	25/03/2023	1	1
<i>Actitis hypoleucos</i>	Common Sandpiper			Bird Amber, Notable Bird	22/04/2022	22/04/2022	1	1
<i>Calidris alpina</i>	Dunlin			Bird Red	26/01/2022	26/01/2022	2	2
<i>Calidris pugnax</i>	Ruff	Birds Dir A1	WCA Sch1 Pt1	Bird Red	31/10/2021	21/11/2021	2	4
<i>Gallinago gallinago</i>	Snipe			Bird Amber, Notable Bird	11/02/1991	25/03/2023	4	6
<i>Numenius phaeopus</i>	Whimbrel		WCA Sch1 Pt1	Bird Red	22/04/2022	24/04/2022	3	2
<i>Scolopax rusticola</i>	Woodcock			Bird Red, Notable Bird	01/12/2010	01/01/2022	3	1
<i>Tringa ochropus</i>	Green Sandpiper		WCA Sch1 Pt1	Bird Amber	11/07/2022	11/07/2022	1	1
<i>Tringa totanus</i>	Redshank			Bird Amber, Notable Bird	07/05/2011	25/03/2023	2	1
<i>Ardea cinerea</i>	Grey Heron				22/01/2008	18/08/2024	23	2
<i>Bubulcus ibis</i>	Cattle Egret			Bird Amber	07/09/2022	07/09/2022	1	1

The Sussex Biodiversity Record Centre must be acknowledged whenever data is cited from this report.

Taxon name	Common name	International Designation	National Designation	Other Designation	Date of earliest record	Date of latest record	No. of records	Max. abundance
<i>Egretta garzetta</i>	Little Egret	Birds Dir A1		Notable Bird	19/12/2021	23/09/2023	8	2
<i>Ciconia ciconia</i>	White Stork	Birds Dir A1			26/08/2022	26/08/2022	1	1
<i>Columba</i>	Pigeon				15/04/2019	15/04/2019	1	1
<i>Columba livia</i>	Rock Dove				17/06/2008	17/12/2024	16	30
<i>Columba oenas</i>	Stock Dove			Bird Amber, Notable Bird	21/11/2008	25/08/2024	40	10
<i>Columba palumbus</i>	Woodpigeon			Bird Amber	22/01/2008	25/08/2024	83	170
<i>Streptopelia decacoto</i>	Collared Dove				17/06/2008	17/12/2024	33	8
<i>Alcedo atthis</i>	Kingfisher	Birds Dir A1	WCA Sch1 Pt1	Notable Bird	09/01/2009	13/03/2022	4	1
<i>Cuculus canorus</i>	Cuckoo		NERC S41	UK BAP Priority, Bird Red, Notable Bird	22/05/2008	27/05/2024	9	1
<i>Falco columbarius</i>	Merlin	Birds Dir A1	WCA Sch1 Pt1	Bird Red	22/01/2008	22/01/2008	1	1
<i>Falco peregrinus</i>	Peregrine	Birds Dir A1	WCA Sch1 Pt1	Notable Bird	05/12/2019	09/09/2022	7	1
<i>Falco subbuteo</i>	Hobby		WCA Sch1 Pt1	Notable Bird	15/07/1984	25/08/2024	14	3
<i>Falco tinnunculus</i>	Kestrel			Bird Amber, Notable Bird	02/06/1989	17/12/2024	38	3
<i>Alectoris rufa</i>	Red-legged Partridge				15/06/2022	15/06/2022	1	1
<i>Perdix perdix</i>	Grey Partridge		NERC S41	UK BAP Priority, Bird Red, Notable Bird	14/12/2016	04/03/2018	2	6
<i>Phasianus colchicus</i>	Pheasant				17/06/2008	18/12/2024	41	15
<i>Fulca atra</i>	Coot				22/01/2008	25/03/2023	7	6
<i>Gallinula chloropus</i>	Moorhen			Bird Amber	12/05/1980	16/06/2024	25	5
<i>Rallus aquaticus</i>	Water Rail				17/01/2022	11/02/2022	3	1
<i>Acrocephalus schoenobaenus</i>	Sedge Warbler			Bird Amber	02/06/2009	27/07/2022	8	7
<i>Acrocephalus scirpaceus</i>	Reed Warbler				22/04/2009	03/08/2022	9	4
<i>Aegithalos caudatus</i>	Long-tailed Tit				22/01/2008	26/07/2024	35	12
<i>Alauda arvensis</i>	Skylark		NERC S41	UK BAP Priority, Bird Red, Notable Bird	17/06/2008	16/06/2024	24	8
<i>Certhia familiaris</i>	Treecreeper				18/02/2008	18/08/2024	22	4
<i>Cettia cetti</i>	Cetti's Warbler		WCA Sch1 Pt1	Notable Bird	28/08/2022	28/08/2022	1	1
<i>Coloeus monedula</i>	Jackdaw				18/02/2008	19/10/2024	66	250
<i>Corvus corax</i>	Raven				05/12/2019	18/08/2024	14	5
<i>Corvus corone</i>	Carrion Crow				30/10/2006	25/08/2024	78	59
<i>Corvus frugilegus</i>	Rook			Bird Amber	20/05/1996	17/12/2024	48	95
<i>Garrulus glandarius</i>	Jay				30/10/2006	18/08/2024	37	5

The Sussex Biodiversity Record Centre must be acknowledged whenever data is cited from this report.

Taxon name	Common name	International Designation	National Designation	Other Designation	Date of earliest record	Date of latest record	No. of records	Max. abundance
<i>Pica pica</i>	Maggie				22/01/2008	18/08/2024	65	13
<i>Emberiza citrinella</i>	Yellowhammer		NERC S41	UK BAP Priority, Bird Red, Notable Bird	04/01/1981	25/08/2024	35	8
<i>Emberiza schoeniclus</i>	Reed Bunting		NERC S41	UK BAP Priority, Bird Amber, Notable Bird	04/01/2008	18/08/2024	16	7
<i>Acanthis cabaret</i>	Lesser Redpoll		NERC S41	UK BAP Priority, Notable Bird	31/12/2010	31/12/2010	1	8
<i>Carduelis carduelis</i>	Goldfinch				19/02/2007 - 26/02/2007	22/11/2024	62	23
<i>Chloris chloris</i>	Greenfinch			Bird Red	18/02/2008	13/06/2024	42	19
<i>Fringilla coelebs</i>	Chaffinch				22/01/2008	19/10/2024	61	31
<i>Fringilla montifringilla</i>	Brambling		WCA Sch1 Pt1		08/01/2006 - 15/01/2006	08/03/2022	3	1
<i>Linaria cannabina</i>	Linnet		NERC S41	UK BAP Priority, Bird Red, Notable Bird	06/06/2008	26/07/2024	15	30
<i>Loxia curvirostra</i>	Crossbill		WCA Sch1 Pt1	Notable Bird	19/08/2012	23/05/2024	2	3
<i>Pyrrhula pyrrhula</i>	Bullfinch		NERC S41	UK BAP Priority, Bird Amber, Notable Bird	22/01/2006 - 29/01/2006	17/07/2024	21	8
<i>Spinus spinus</i>	Siskin				29/12/2020	14/03/2022	5	2
<i>Delichon urbicum</i>	House Martin			Bird Red, Notable Bird	21/05/2007	25/08/2024	30	40
<i>Hirundo rustica</i>	Swallow			Notable Bird	23/04/2007 - 30/04/2007	25/08/2024	38	20
<i>Riparia riparia</i>	Sand Martin			Notable Bird	07/05/2011	07/08/2023	2	13
<i>Anthus pratensis</i>	Meadow Pipit			Bird Amber, Notable Bird	23/03/2011	27/07/2022	15	3
<i>Motacilla alba</i>	Pied Wagtail				05/01/2008	30/12/2024	26	50
<i>Motacilla alba yarrellii</i>	Pied Wagtail				03/06/2013	19/12/2021	8	8
<i>Motacilla cinerea</i>	Grey Wagtail			Bird Amber, Notable Bird	05/01/2008	21/03/2024	13	3
<i>Erithacus rubecula</i>	Robin				30/10/2006	18/12/2024	73	25
<i>Luscinia megarhynchos</i>	Nightingale			Bird Red, Notable Bird	12/05/1980	12/05/2024	30	7
<i>Muscicapa striata</i>	Spotted Flycatcher		NERC S41	UK BAP Priority, Bird Red, Notable Bird	22/05/2008	17/06/2008	2	2
<i>Saxicola rubicola</i>	Stonechat				09/11/2020	05/05/2022	2	1
<i>Cyanistes caeruleus</i>	Blue Tit				22/01/2008	19/10/2024	75	35
<i>Parus major</i>	Great Tit				22/01/2008	15/05/2024	61	13

The Sussex Biodiversity Record Centre must be acknowledged whenever data is cited from this report.

Taxon name	Common name	International Designation	National Designation	Other Designation	Date of earliest record	Date of latest record	No. of records	Max. abundance
<i>Periparus ater</i>	Coal Tit				19/02/2007 - 26/02/2007	27/05/2024	30	2
<i>Passer domesticus</i>	House Sparrow		NERC S41	UK BAP Priority, Bird Red, Notable Bird	18/02/2008	12/06/2024	51	37
<i>Passer montanus</i>	Tree Sparrow		NERC S41	UK BAP Priority, Bird Red, Notable Bird	29/10/1984	29/10/1984	1	20
<i>Phylloscopus collybita</i>	Chiffchaff				22/05/2008	19/10/2024	50	7
<i>Phylloscopus trochilus</i>	Willow Warbler			Bird Amber, Notable Bird	24/04/2011	18/08/2024	9	1
<i>Prunella modularis</i>	Dunnock		NERC S41	UK BAP Priority, Bird Amber, Notable Bird	18/02/2008	31/05/2025	63	10
<i>Regulus ignicapilla</i>	Firecrest		WCA Sch1 Pt1	Notable Bird	24/02/2022	18/08/2024	6	2
<i>Regulus regulus</i>	Goldcrest				19/02/2007 - 26/02/2007	18/08/2024	37	5
<i>Sitta europaea</i>	Nuthatch				19/02/2007 - 26/02/2007	18/08/2024	30	6
<i>Sturnidae</i>	Starlings				03/05/2019	15/06/2019	3	9
<i>Sturnus vulgaris</i>	Starling		NERC S41	UK BAP Priority, Bird Red, Notable Bird	30/10/2006	25/08/2024	52	85
<i>Curruca communis</i>	Whitethroat			Bird Amber, Notable Bird	17/06/2008	18/08/2024	17	12
<i>Curruca curruca</i>	Lesser Whitethroat				16/05/2012	11/05/2024	6	1
<i>Sylvia atricapilla</i>	Blackcap				22/05/2008	18/08/2024	36	7
<i>Troglodytes troglodytes</i>	Wren			Bird Amber	22/01/2008	18/08/2024	70	20
<i>Turdus iliochus</i>	Redwing		WCA Sch1 Pt1	Bird Amber	22/01/2008	19/02/2023	20	121
<i>Turdus merula</i>	Blackbird				22/01/2008	13/11/2024	71	37
<i>Turdus philomelos</i>	Song Thrush		NERC S41	UK BAP Priority, Bird Amber, Notable Bird	19/02/2007 - 26/02/2007	26/07/2024	59	10
<i>Turdus pilaris</i>	Fieldfare		WCA Sch1 Pt1	Bird Red	22/01/2008	27/01/2024	17	48
<i>Turdus viscivorus</i>	Mistle Thrush			Bird Red, Notable Bird	05/03/2007 - 19/03/2007	16/06/2022	19	3
<i>Phalacrocorax carbo</i>	Cormorant				30/10/2006	18/08/2024	20	3
<i>Dendrocopos major</i>	Great Spotted Woodpecker				19/02/2007 - 26/02/2007	12/11/2024	52	3
<i>Dryobates minor</i>	Lesser Spotted Woodpecker		NERC S41	UK BAP Priority, Bird Red, Notable Bird	01/06/1984	11/06/2011	3	2
<i>Picus viridis</i>	Green Woodpecker			Notable Bird	30/10/2006	18/08/2024	49	7

The Sussex Biodiversity Record Centre must be acknowledged whenever data is cited from this report.

Taxon name	Common name	International Designation	National Designation	Other Designation	Date of earliest record	Date of latest record	No. of records	Max. abundance
<i>Athene noctua</i>	Little Owl				01/06/1984	03/08/2022	6	2
<i>Strix aluco</i>	Tawny Owl			Bird Amber, Notable Bird	11/06/2011	03/01/2024	9	1
<i>Tyto alba</i>	Barn Owl		WCA Sch1 Pt1	Notable Bird	10/01/2006	21/08/2022	10	3

The Sussex Biodiversity Record Centre must be acknowledged whenever data is cited from this report.

Appendix 6: Results from the 2018 and 2025 eDNA testing



Folio No: E2585
 Report No: 1
 Order No: 18_1396
 Client: GREENLINK ECOLOGY
 Contact: Marcus Fry
 Contact Details: mail@greenlink-ecology.com
 Date: 09/05/2018

TECHNICAL REPORT

ANALYSIS OF ENVIRONMENTAL DNA IN POND WATER FOR THE DETECTION OF GREAT CRESTED NEWTS

Date sample received at Laboratory: 01/05/2018
Date Reported: 09/05/2018
Matters Affecting Results: None

RESULTS

Lab Sample No.	Site Name	O/S Reference	SIC	DC	IC	Result	Positive Replicates
1435	18_1396 Broomers Hill Park	TQ 0592120544	Pass	Pass	Pass	Negative	0

SUMMARY

When Great Crested Newts (GCN); *Triturus cristatus* inhabit a pond, they deposit traces of their DNA in the water as evidence of their presence. By sampling the water, we can analyse these small environmental DNA (eDNA) traces to confirm GCN habitation, or establish GCN absence.

The water samples detailed below were submitted for eDNA analysis to the protocol stated in DEFRA WC1067 (Latest Amendments). Details on the sample submission form were used as the unique sample identity.

RESULTS INTERPRETATION

Forensic Scientists and Consultant Engineers
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 Company Registration No. 08950940



Lab Sample No.- When a kit is made it is given a unique sample number. When the pond samples have been taken and the kit has been received back in to the laboratory, this sample number is tracked throughout the laboratory.

Site Name- Information on the pond.

O/S Reference - Location/co-ordinates of pond.

SIC- Sample Integrity Check. Refers to quality of packaging, absence of tube leakage, suitability of sample (not too much mud or weed etc.) and absence of any factors that could potentially lead to results errors. Inspection upon receipt of sample at the laboratory. To check if the Sample is of adequate integrity when received. Pass or Fail.

DC- Degradation Check. Analysis of the spiked DNA marker to see if there has been degradation of the kit since made in the laboratory to sampling to analysis. Pass or Fail.

IC- Inhibition Check- PCR inhibitors can cause false results. Inhibitors are analysed to check the quality of the result. Every effort is made to clean the sample pre-analysis however some inhibitors cannot be extracted. An unacceptable inhibition check will cause an indeterminate sample and must be sampled again.

Result- NEGATIVE means that GCN eDNA was not detected or is below the threshold detection level and the test result should be considered as no evidence of GCN presence. POSITIVE means that GCN eDNA was found at or above the threshold level and the presence of GCN at this location at the time of sampling or in the recent past is confirmed. Positive or Negative.

Positive Replicates- To generate the results all of the tubes from each pond are combined to produce one eDNA extract. Then twelve separate analyses are undertaken. If one or more of these analyses are positive the pond is declared positive for the presence of GCN. It may be assumed that small fractions of positive analyses suggest low level presence but this cannot currently be used for population studies. In accordance with Natural England protocol, even a score of 1/12 is declared positive.

METHODOLOGY

The laboratory testing adheres to strict guidelines laid down in WC1067 Analytical and Methodological Development for Improved Surveillance of The Great Crested Newt, Version 1.1

The analysis is conducted in two phases. The sample first goes through an extraction process where all six tubes are pooled together to acquire as much eDNA as possible. The pooled sample is then tested via real time PCR (also called q-PCR). This process amplifies select part of DNA allowing it to be detected and measured in 'real time' as the analytical process develops. qPCR combines PCR amplification and detection into a single step. This eliminates the need to detect products using gel electrophoresis. With qPCR, fluorescent dyes specific to the target sequence are used to label PCR products during thermal cycling. The accumulation of fluorescent signals during the exponential phase of the reaction is measured for fast and objective data analysis. The point at which amplification begins (the Ct value) is an indicator of the quality of the sample. True positive controls, negatives and blanks as well as spiked synthetic DNA are included in every analysis and these have to be correct before any result is declared so they act as additional quality control measures.

The primers used in this process are specific to a part of mitochondrial DNA only found in GCN ensuring no DNA from other species present in the water is amplified. The unique sequence appropriate for GCN analysis is quoted in DEFRA WC 1067 and means there should be no detection of closely related species. We have tested our system exhaustively to ensure this is the case in our laboratory. We can offer eDNA analysis for most other species including other newts.

Analysis of eDNA requires scrupulous attention to detail to prevent risk of contamination. Kits are manufactured by SureScreen Scientifics to strict quality procedures in a separate building and with separate staff, adopting best practice from WC1067 and WC1067 Appendix 5. Kits contain a 'spiked' DNA marker used as a quality control tracer (SureScreen patent pending) to ensure any DNA contained in the sampled water has not deteriorated in transit. Stages of the DNA analysis are also conducted in

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different buildings at our premises for added

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

Reported by: Derry Hickman

Approved by: Sam Humphrey

End Of Report

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Folio No: 2255-2025
Purchase Order: PO: 18_1396
Contact: Greenlink Ecology
Issue Date: 23.06.2025
Received Date: 09.06.2025

GCN Report

Technical Report



Folio No: 2255-2025
Purchase Order: PO: 18_1396
Contact: Greenlink Ecology
Issue Date: 23.06.2025
Received Date: 09.06.2025



GCN eDNA Analysis

Summary

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

Results

Lab ID	Site Name	OS Reference	Degradation Check	Inhibition Check	Result	Positive Replicates
GCN25 7152	Codmore Hill	TQ 05934 20557	Pass	Pass	Negative	0/12

Matters affecting result: none

Reported by: Amy Bermudez

Approved by: Lauryn Jewkes



Folio No: 2255-2025
 Purchase Order: PO: 18_1396
 Contact: Greenlink Ecology
 Issue Date: 23.06.2025
 Received Date: 09.06.2025



Methodology

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

If GCN DNA is present, the DNA is amplified up to a detectable level, resulting in positive species detection. If GCN DNA is not present then amplification does not occur, and a negative result is recorded. Analysis of eDNA requires attention to detail to prevent the risk of contamination. True positive controls, negative controls, and spiked synthetic DNA are included in every analysis and these have to be correct before any result is declared and reported. Stages of the DNA analysis are also conducted in different buildings at our premises for added analytical security.

SureScreen Scientifics Ltd is ISO9001 accredited and participates in Natural England's proficiency testing scheme for GCN eDNA testing.

Interpretation of Results

Sample Integrity Check:	When samples are received in the laboratory, they are inspected for any tube leakage, suitability of sample (not too much mud or weed etc.) and absence of any factors that could potentially lead to inconclusive results. Any samples which fail this test are rejected and eliminated before analysis.
Degradation Check:	Pass/Fail. Analysis of the spiked DNA marker to see if there has been degradation of the kit or sample between the date it was made to the date of analysis. Degradation of the spiked DNA marker may lead indicate a risk of false negative results.
Inhibition Check:	Pass/Fail. The presence of inhibitors within a sample is assessed using a DNA marker. If inhibition is detected, samples are purified and re-analyzed. Inhibitors cannot always be removed, if the inhibition check fails, the sample should be re-collected.
Result:	Presence of GCN eDNA (Positive/Negative/Inconclusive) Positive: GCN DNA was identified within the sample, indicative of GCN presence within the sampling location at the time the sample was taken or within the recent past at the sampling location. Positive Replicates: Number of positive qPCR replicates out of a series of 12. If one or more of these are found to be positive the pond is declared positive for GCN presence. It may be assumed that small fractions of positive analyses suggest low level presence, but this cannot currently be used for population studies. In accordance with the WC1067 Natural England protocol, even a score of 1/12 is declared positive. 0/12 indicates negative GCN presence. Negative: GCN eDNA was not detected or is below the threshold detection level and the test result should be considered as evidence of GCN absence, however, does not exclude the potential for GCN presence below the limit of detection. Inconclusive: Controls indicate inhibition or degradation of the sample, resulting in the inability to provide conclusive evidence for GCN presence or absence.



Appendix 7: ILP and BCT GN08: Bats and artificial lighting at night (extract)

- 4.12 The evaluation will enable the ecologist to determine the presence of any Key Habitats or Supporting Habitats for bats. The whereabouts of these habitats should be set out on a plan of the site or as an Ecological Constraints and Opportunities Plan (ECOP), see Case Study 3. The bat habitat plan/ECOP and report can then be used to help guide the design of the lighting strategy (see next steps) as well as the wider project.
- 4.13 Key Habitats are those which are considered essential for the function and stability of local bat populations, while Supporting Habitats may be of lesser significance or usage. Habitats falling within neither category are considered to be of negligible or very low importance to bats.
- 4.14 Examples of Key Habitats include:
- Roosting and swarming sites for all species and their associated flightpaths and commuting habitat
 - Foraging or commuting habitat for highly light-averse species (greater and lesser horseshoe bats, some *Myotis* bats, *barbastelle* bats and all long-eared bats) or nationally/locally rare species
 - Foraging or commuting habitat supporting relatively large numbers of bats or high activity rates as assessed through survey
 - Any habitat otherwise assessed by the ecologist as being of elevated importance in maintaining the 'favourable conservation status' of the bat population using it

Step 3: Avoid lighting on any Key Habitats

- 4.15 An adverse impact from illumination onto a Key Habitat feature is likely to have a significant effect on the bats using it. Therefore, an absence of artificial illumination and glare acting upon both the feature and an appropriately sized buffer zone is most often the only acceptable solution. An ecologist will be best placed to set the size of such a buffer zone according to the species present and the level of usage, and these can be tens of metres if unattenuated light spill or glare from local sources is predicted. The input of a lighting professional should be sought when determining the distances of light spill from new sources and likelihood of glare. It is recommended that proposals are communicated by them to the Principal Designer and the Highways Designer, (if applicable) as in some circumstances these decisions may influence highway function (e.g. visibility departures). Further information on demonstrating an absence of illumination within proposals via lux/illuminance contour plans is provided in Step 5.
- 4.16 As detailed in Section 2.1, there is no legal duty requiring any place to be lit. British Standards and other policy documents allow for deviation from their own guidance where there are significant ecological/environmental reasons for doing so. It is acknowledged that in certain situations lighting is critical in maintaining safety, such as some industrial sites with 24hr operation, or in high-risk security situations. Nevertheless, these are not exempt from

the statutory protection afforded to bats, their roosts and commuting routes directly associated with roosts, and good design principles recommended under industrial documents such as the Institution of Lighting Professionals' GN01: The Reduction of Obtrusive Light remain best practice. However, in the public realm, while lighting can increase the perception of safety and security, measurable, objective benefits on safety and security are less well established. Consequently, lighting design should be holistic, taking into consideration the relevant British Standards or local policies concerning lighting but, through a risk assessment-style process, be able to fully take into account the presence of protected species and the likely adoption of mitigation approaches through proper engagement with local communities (see Case Study 4).

- 4.17 Completely avoiding any lighting conflicts in the first place is advantageous, because proposals would be automatically compliant with the relevant wildlife legislation and planning policy, and costly, time-consuming additional surveys, mitigation and post-development monitoring would be avoided. Furthermore, LPAs are likely to favour applications where steps have been taken to avoid such conflicts.
- 4.18 Sources of lighting which can have the potential to disturb bats are not limited to roadside, footpath or security lighting, but can also include light spill via windows, permanent but sporadically operated lighting such as sports floodlighting, and in some cases car headlights. It is important to note that these situations often comprise many complex variables, and light emission is often difficult to predict or model accurately.
- 4.19 A competent lighting professional should be involved in the design of proposals as soon as potential impacts (including from glare) are identified by the ecologist, in order to avoid planning difficulties, or late-stage design revision. The lighting professional will be able to make recommendations about placement of luminaires tailored to the project.

Glare

- 4.20 Glare (extremely high contrast between a source of light and the surrounding darkness - linked to the 'intensity' of a luminaire) may additionally affect bats over a greater distance than the area directly lit by a luminaire. Glare impacts on bats and other wildlife should be considered on the site alongside best practice advice on reducing obtrusive light (see ILP GN01).

Highways

- 4.21 Where highways lighting schemes are to be designed by the LPA, the ecology officer (or planning officer) should be consulted on the presence of important bat constraints, determined in Step 2, which may impact the design of the lighting scheme in order to ensure compliance with wildlife legislation.

LPA-specific guidance

- 4.22 Some LPAs have Supplementary Planning Documents (SPD) or other guidance concerning the management of potential development impacts on particular species of bats, or in relation to certain protected sites, such as Special Areas of Conservation (SACs). These should be consulted for particular advice concerning lighting. For example, the North Somerset and Mendip Bats SAC Guidance on Development SPD provides a methodology for calculating the specification of compensatory habitat required to off-set certain development impacts on the bat population of the SAC. In it, retained or created habitats that are subject to lighting above certain lux levels, are considered to be lost to development, with implications for compensation requirements¹.

Environmental Impact Assessment (EIA)

- 4.23 For plans and projects subject to the Environmental Impact Assessment (EIA) Regulations screening process, it is important for LPAs to understand the nature of mitigation measures at this relatively early stage. Under current EIA Regulations, schemes planning to avoid likely significant effects on the environment through either embedded design measures, such as sensitive site configuration or strategic land/building usage etc., or by other robust mitigation, may be exempt from EIA and therefore less costly. However, the over-reliance on conditions to effect environmental mitigation may be open to legal challenge.

Step 4: On Supporting Habitat, apply mitigation methods and sensitive design to reduce lighting to a minimum

- 4.24 Supporting Habitats may be less frequently used by bats compared to Key Habitats, or support fewer, or more light-opportunistic species. Consequently, a balance between a reduced lighting level appropriate to the ecological importance of each feature and species, and the lighting objectives for that area will need to be achieved.
- 4.25 It is important to reiterate the legal protection from disturbance that bats receive under the Wildlife and Countryside Act 1981, as amended. Where the risk of offences originating from lighting is sufficiently high, it may be best to apply the avoidance approach in Step 3. (see Case Study 5).
- 4.26 Advice from an ecologist and lighting professional will be essential in finding the right approach for the site according to their evaluation. The following are techniques which have been successfully used on projects to limit lighting impacts on bats, and are often used in combination for best results.

¹ <https://n-somerset.gov.uk/sites/default/files/2020-03/North%20Somerset%20and%20Mendip%20Bats%20SAC%20guidance%20supplementary%20planning%20document.pdf>

Dark buffers and concentric zonation

- 4.27 A buffer zone subdivided into smaller zones of increasing illuminance limit further away from the Supporting Habitat would ensure light levels (illuminance - measured in lux) do not exceed certain defined limits. This has the effect of a gradual decrease in lighting from the developed zone, rather than a distinct cut-off, which may provide useable area for the project which also limits lighting impacts on less sensitive species, or less well-used habitat.
- 4.28 The ecologist (in collaboration with a lighting professional) can help determine the most appropriate buffer widths and illuminance limits according to the value of that habitat to bats. Figure 4 gives an example of a multi-zoned approach which includes Key Habitat (Zone A) which would receive no ALAN, and Supporting Habitat (Zones B and C) which would act as a 'light attenuation zone', but remain within the public realm, and so receive reduced light levels.

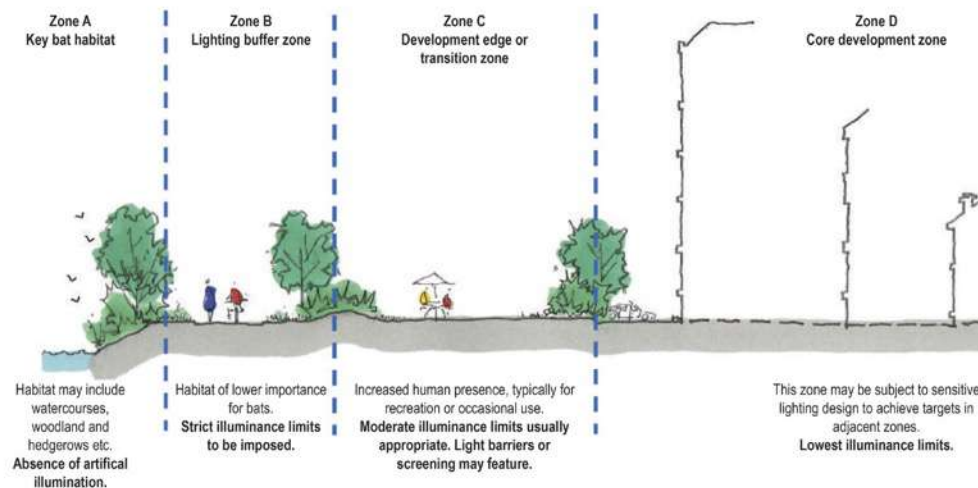


Figure 4. Example of illuminance limit zonation.

Appropriate luminaire specifications

- 4.29 Light sources, lamps, LEDs and their fittings come in a myriad of different specifications which a lighting professional can help to select. However, the following should be considered when choosing luminaires and their potential impact on Key Habitats and features:
- All luminaires should lack UV elements when manufactured. Metal halide, compact fluorescent sources should not be used
 - LED luminaires should be used where possible due to their sharp cut-off, lower intensity, good colour rendition and dimming capability
 - A warm white light source (2700Kelvin or lower) should be adopted to reduce blue light component

Guidance Note 08/23: Bats and Artificial Lighting At Night

- Light sources should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats (Stone, 2012)
- Internal luminaires can be recessed (as opposed to using a pendant fitting - See Figure 5) where installed in proximity to windows to reduce glare and light spill
- Waymarking inground markers (low output with cowls or similar to minimise upward light spill) to delineate path edges (see Case Study 1)
- Column heights should be carefully considered to minimise light spill and glare visibility. This should be balanced with the potential for increased numbers of columns and upward light reflectance as with bollards
- Only luminaires with a negligible or zero Upward Light Ratio, and with good optical control, should be considered - See ILP GN01
- Luminaires should always be mounted horizontally, with no light output above 90° and/or no upward tilt
- Where appropriate, external security lighting should be set on motion-sensors and set to as short a possible a timer as the risk assessment will allow. For most general residential purposes, a 1 or 2 minute timer is likely to be appropriate
- Use of a Central Management System (CMS) with additional web-enabled devices to light on demand
- Use of motion sensors for local authority street lighting may not be feasible unless the authority has the potential for smart metering through a CMS
- The use of bollard or low-level downward-directional luminaires is strongly discouraged. This is due to a considerable range of issues, such as unacceptable glare, poor illumination efficiency, unacceptable upward light output, increased upward light scatter from surfaces and poor facial recognition which makes them unsuitable for most sites. Therefore, they should only be considered in specific cases where the lighting professional and project manager are able to resolve these issues. See Case Study 6
- Only if all other options have been explored, accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only to where it is needed. However, due to the lensing and fine cut-off control of the beam inherent in modern LED luminaires, the effect of cowls and baffles is often far less than anticipated and so should not be relied upon solely

Bats, lighting and the mitigation hierarchy

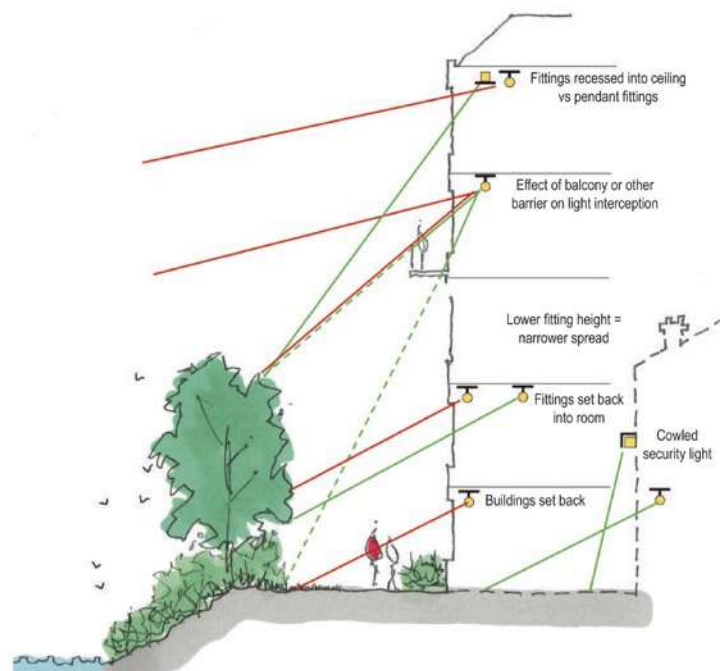


Figure 5. Internal lighting mitigation options.

Sensitive site configuration

4.30 The location, orientation and height of newly built structures, and hard standing, relative to each other can have a considerable impact on light spill. Small changes in terms of the placement of footpaths, open space and windows can all help to achieve a better outcome in terms of minimising light spill onto Key Habitats and features.

- Key or Supporting Habitat is often located alongside, or to the rear of buildings, on new developments. In this case, the removal or reduction of windows can be the most effective way to permanently limit light spill, potentially alongside the internal reconfiguration of the building, to ensure high-use spaces are not as impacted by loss of natural light
- It may be possible to include Key or Supporting Habitat into unlit public open space such as parks. However, avoid including into residential gardens, as uncontrolled and inappropriate lighting may be introduced by residents following occupation
- It is often considered better for a residential scheme to specify good quality downward-directional external light fittings for security, and/or at the front entrance, on short PIR timers, rather than risk the imposition of poor quality and poorly controlled lighting at a later date
- Buildings, walls and hard landscaping may be sited and designed so as to block light spill from reaching habitats and features

Guidance Note 08/23: Bats and Artificial Lighting At Night

- Paved surfaces should not be located within Key Habitat or buffer zones, unless they form part of unlit public open space
- Taller buildings may be best located toward the centre of the site, or sufficiently set back from Key Habitats, to minimise the effect of their light spill
- Column mounted luminaires can be located so that the rear shields are adjacent to habitats, or narrow optics selected that direct light into the task area where needed

Physical screening

- 4.31 Light spill can be successfully screened through landscaping and the installation of walls and fences, or even banks and bunds (See Figure 6). In order to ensure that fencing makes a long-term contribution, it is recommended that it is supported on concrete or metal posts. Fencing can also be over planted with hedgerow species or climbing plants to soften its appearance and provide a vegetated feature which bats can use for navigation or foraging.
- 4.32 The planting of substantial landscape features integrated to the wider network of green corridors such as hedgerows, woodland and scrub would make a long-term positive contribution to the overall connectivity of bat habitat and light attenuation. It would also contribute to any local Nature Recovery and Green Infrastructure policies and help achieve obligatory Biodiversity Net Gain targets. A landscape architect can be appointed to collaborate with the ecologist on maximising these natural light screening opportunities.
- 4.33 It should be noted that newly planted vegetation (trees, shrubs and scrub) is unlikely to adequately contribute to light attenuation upon Key Habitats for a number of years, until it is well established. Sufficient maintenance to achieve this is also likely to be required. Consequently, this approach is best suited to the planting of dense, mature or translocated vegetation. In some cases, it is appropriate to install temporary fencing, or other barrier, to provide the desired physical screening effects until the vegetation is determined to be sufficiently established.
- 4.34 Given the fact that planting may be removed, die back or inadequately replaced over time, it should never be relied on as the sole means of attenuating light spill.

Bats, lighting and the mitigation hierarchy

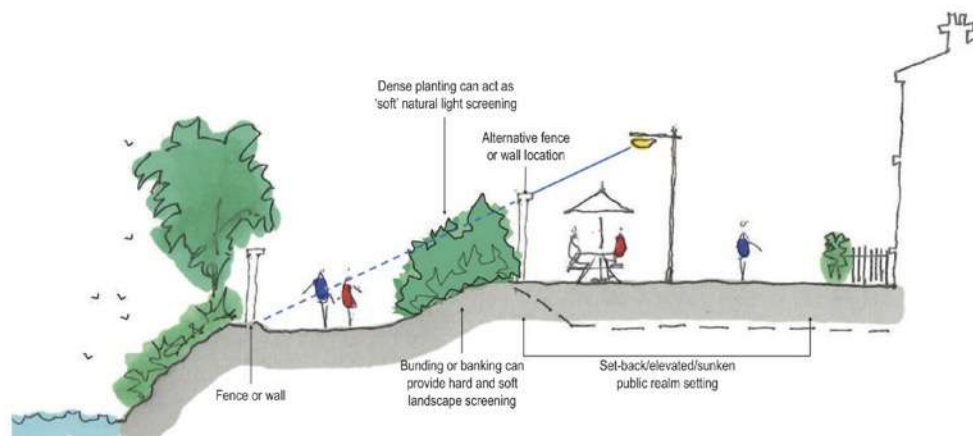


Figure 6. Examples of physical light screening options.

Dimming and part-night lighting

- 4.35 Depending on the pattern of bat activity across the Supporting Habitat identified by the ecologist, it may be appropriate for an element of on-site lighting to be controlled by dimming or switching either diurnally, seasonally, or according to human activity (light on demand). This is known as Part-Night Lighting (PNL). It is important to state that PNL is not likely to be appropriate where Key Habitats are at risk, especially as PNL often results in lighting when bats are most active.
- 4.36 A Central Management System (CMS) can be specified by the lighting engineer to dim or turn off individual or groups of luminaires when not in use or during less busy times. Dimming can be precisely controlled, with dimming states often being as low as 10 or 20%. However, due to the electrical difficulties of maintaining a dimming state of under 10%, luminaires should be set to off below this point.
- 4.37 Lighting could be set to a low output state by default, to turn up to a pre-determined output in response to a trigger, and be combined with a timeclock or photocell to further add an element of seasonal or diurnal control. For example, Passive Infrared (PIR), Artificial Intelligence enabled cameras, on demand controls, or pressure sensors may be used to trigger lights to come on or dim in response to movements, either by vehicles (for example at car parks or industrial loading bays) or by pedestrians (for example a footpath leading from residential development through an area of Supporting Habitat). The timeclock or photocell could ensure that this response only occurs during a set window of hours after sunset and before sunrise, or during certain months.
- 4.38 Where some trigger is used to temporarily modify lighting states, it will be necessary to specify the timed trigger window during which the response is maintained beyond the last triggering activity. For most typical residential purposes, 1-2 minutes is likely to be sufficient, however risk assessments must

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be performed in line with BS5489-1. The proposed system of lighting control will be determined by the outcome of the risk assessment. Where used in locations which receive distinct busy periods, such as cycle paths used by commuters, care will be needed to ensure lighting responds adequately to permit safe usage, but avoids both over-illumination and potentially disruptive dimming states of lighting groups.

- 4.39 Alternative lighting designed for subtle waymarking, rather than illumination, may be more appropriate, such as very low-wattage, ground-level luminaires (photo 4). This lighting option can have a number of additional benefits such as a reduced risk of vandalism, lower carbon footprint during manufacture and fitting and no requirement for cabling. However, it should be noted that these systems depend on regular maintenance and a long-term commitment for them to be successful, as well as a clear view of the sky for solar-powered options. Due to this, proposals and potential planning conditions should be considered in liaison with maintenance teams, to ensure success (and any handover of assets) post install. See Case Study 1 for further information.
- 4.40 Part-Night Lighting should be designed with input from an ecologist as it may still produce unacceptably high light levels when active or dimmed. Part-Night Lighting is not usually appropriate where lights are undimmed during key bat activity times, as derived from bat survey data or within riparian habitats (see research chapter 1.27). Research has indicated that impacts upon commuting bats are still prevalent where lighting is dimmed during the middle of the night at a time when illumination for humans' use is less necessary (Azam et. al., 2015) thus this approach should not always be seen as a solution, unless backed up by robust ecological survey and assessment of nightly bat activity. In this case, designing areas to be lit to avoid retained Key Habitat, or the provision of sufficient alternative dark corridors, may be the only solution.



*Photo 4: Waymarkers installed on a multi-user path in Worcester.
Image credit: Cody Levine.*

Glazing treatments on buildings

- 4.41 As mentioned, glazing should be restricted and reduced wherever the ecologist and lighting professional determine there to be a likely significant effect upon bats' Key Habitat and associated features.
- 4.42 Where Supporting Habitat is present, glazing treatments such as tinted, frosted or low transmission glazing treatments are not generally considered suitable ways of fully mitigating light spill. In the case of frosted or 'frit' glazing, windows typically remain luminous surfaces in their own right, defeating the objective of reducing lighting impacts. Although promisingly named, low-transmission glazing (glazing with a lower visible light transmittance) often makes only a very small difference to light spill in practice - a window's fundamental objective is to transmit light!
- 4.43 Automatic blinds should be discouraged as their longevity depends on regular maintenance and successful routine operation by the occupant. Such blinds are generally only suited to commercial situations where maintenance can be incorporated into the long-term regime routine for the building.
- 4.44 Depending on the height of the building and windows, and therefore predicted light spill, glazing treatments or window design restrictions may not be required on all storeys. This effect can be more accurately determined by a lighting professional.

Creation of alternative valuable bat habitat on site

- 4.45 The provision of new, additional or alternative bat flightpaths, commuting or foraging habitat is encouraged and could result in appropriate compensation for any such habitat being lost to the development. The ecologist will be able to suggest and design such alternative habitats, although particular consideration should be given as to its connectivity to other features, the species to be used, the lag time required for a habitat to sufficiently establish and the provision for its ongoing protection and maintenance.
- 4.46 As almost all new development will be required to result in at least 10% Biodiversity Net Gain (BNG), opportunities to improve habitat connectivity for bats should always be considered. Further to the 10 principles at the core of BNG, the implementation of sensitively sited habitat features for bats would be a clear contribution to 'additionality'. Particularly when considering achieving BNG off-site, assessment should be made of the impacts of altering the type and proportion of bat-suitable habitats, both within and beyond the site, upon the potential Core Sustenance Zone of any maternity roosts which use them.²

² <https://cdn.bats.org.uk/uploads/pdf/Bat-Species-Core-Sustenance-Zones-and-Habitats-for-Biodiversity-Net-Gain.pdf>

Step 5: Demonstrate compliance with illuminance (lux) limits and buffers within proposals and, where appropriate, the operational scheme

- 4.47 Once it has been determined through the above process how Key and Supporting Habitats will be protected, or impacts on them mitigated or compensated for, it will be necessary to demonstrate how this will be achieved. For a planning application, this information is increasingly required prior to determination in order for the LPA to make an informed decision and discharge statutory duties towards protected species legislation and policies. This is most likely to be the case for 'Full' planning applications. For 'Outline', phased or complex applications, this information is, at times, deemed a 'Reserved Matter', for which detail will normally follow at a later date before final consent is granted, or in the discharging of reserved matters. Incidences include EIAs and should be made prior to determination. It is appropriate for a pre-commencement planning condition to be imposed on a consented application which would require that an ecologically sensitive lighting plan is prepared, or is achievable.
- 4.48 In all cases where impacts from lighting on bats are possible, the LPA will require some form of documentation to be produced by the lighting engineer, either in collaboration with the ecologist, or working to the constraints set out within the bat habitat plan/ECOP (see Step 2), in order to demonstrate compliance. Usually, this will take the form of a 'Lighting Strategy', 'Lighting Design' or 'Lighting Impact Assessment', depending on the level of detail in the application. A Lighting Strategy may simply set out the agreed lighting parameters, objectives and likely mitigation requirements (e.g. unlit zones and any other bat mitigation), together with a plan. A Lighting Design/Impact Assessment would provide finalised details, consisting of a plan to show modelled illuminance from all proposed (and existing, where necessary) light sources, taking into account all site configuration, physical screening and glazing measures adopted. It would usually be accompanied by an explanatory document detailing the specification of each luminaire, as well as all assessment assumptions made and any other rationale for lighting mitigation, such as recessed light fittings or part-night lighting.
- 4.49 In the case of Outline or phased applications, the precise detail of architectural materials, glazing, landscaping etc. might not be known at the time of submission, therefore a Lighting Strategy may be the most appropriate document to provide. As described above, the bat mitigation objectives derived from the ecologist's bat habitat plan/ECOP should be referenced. It is worth being aware of the potential for matters such as highways (incorporating highways-specific lighting needs) to be fixed at Outline consent stage, which can make the resolution of bat mitigation requirements at a later stage challenging. This highlights the importance of inter-discipline collaboration and early communication of ecological constraints.
- 4.50 In the case of small or simple planning applications, where significant impacts upon bats from lighting are of a low likelihood, the production of a full Lighting Design package may be disproportionately costly and time-consuming. It may therefore be appropriate to provide a simplified document produced between

the ecologist and lighting engineer, setting out design decisions undertaken and the likely achievability of the recommendations within the ECOP according to the lighting engineer's professional judgment.

Lighting contour plans

- 4.51 A horizontal illuminance contour plan can be prepared by a suitably experienced and competent lighting professional (Member of the Institution of Lighting Professionals (ILP), Chartered Institution of Building Services Engineers (CIBSE), Society of Light and Lighting (SLL) or similar to ensure competency) using an appropriate software package to model 'Day 1', extent of light spill from the proposed, retained and, possibly, existing luminaires. The various buffer zone widths and illuminance limits which may have been agreed can then be overlaid to determine if any further mitigation is necessary. In some circumstances, a vertical illuminance contour plot may be necessary to demonstrate the light in sensitive areas, such as entrances to roosts or the Key Habitat associated with it (see Appendix).
- 4.52 Such calculations and documentation would enable the LPA ecologist to fully assess impacts and compliance.
- 4.53 Because illuminance contour plots and plans may need to be understood and examined by non-lighting professionals, such as architects and local planning authority ecologists, the following should be observed when producing or assessing illuminance contour plans, to ensure the correct information is displayed.
- A calculation showing output of luminaires to be expected at 'Day 1' of operation should be included, where the luminaire and/or scheme Maintenance Factor is set to 1. Schemes using Constant Light Output (CLO) luminaires should also be calculated using 'Day 1' output
 - Where deemed necessary by a lighting professional, models should be issued so that all luminaires (i.e. internal and external, or between different phases/plots) can be assessed and each should be set to the maximum output anticipated to be used in normal operation on site (i.e. no dimming where dimming is not anticipated during normal operation)
 - Where dimming, PIR, or variable illuminance states are to be used, an individual set of calculation results should accompany each of these states
 - A horizontal calculation plane representing levels of illuminance at ground level should always be used
 - Vertical calculation planes should be used wherever appropriate, for example along the site-facing aspects of a hedgerow or façade of buildings containing roosts, to show the illumination directly upon the vertical faces of the feature. Vertical planes can also show a cross-sectional view within open space (however, they will only face one direction.) Vertical planes will enable a visualisation of the effects of illumination at the various heights at which different bat species fly. An ecologist can

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advise on the most appropriate dimensions to use according to the likely locations of bat flight around the site's habitats

- The contours (and/or coloured numbers) for 0.2, 0.5, 1, 5, and 10 lux must be clearly shown, as well as appropriate contours for values above these
- Each illuminance/lux contour plan should be accompanied by a table showing their minimum and maximum illuminance/lux values
- Where buildings are proposed in proximity to key features or habitats, plots should also model the contribution of light spill through nearby windows, making assumptions as to internal luminaire specification, internal lighting levels, and visible light transmittance of windows. It should be assumed that blinds or curtains are absent or fully open. Assumptions will need to be made as to the internal luminaire specification and levels of illuminance likely to occur on 'Day 1' of operation. These assumptions should be clearly stated and guided by the building/room type and discussions between architect, client and lighting professional. Consideration may also need to be given to the site topography, and differences in ground levels between key features and lit areas or buildings. It is acknowledged that in many circumstances, only a 'best effort' can be made in terms of accuracy of these calculations as it is often not possible to account for all 'real world' conditions and variables which influence light. Note that evidence-based professional judgement is needed to assess whether light from windows should undergo a full assessment, dependent on factors such as the distance between light source and critical habitats
- Modelled plots should not include any light attenuation factor from new or existing planting, due to the lag time between planting and establishment and the risk of damage, removal or failure of vegetation. This may result in difficulties in the long-term achievement of the screening effect and hamper any post-construction compliance surveys
- The illuminance contour plots should be accompanied by an explanatory note from the lighting professional to list where, in their opinion, sources of glare acting upon the key habitats and features may occur, and what has been done/can be done to reduce their impacts

- 4.54 **N.B.** It is acknowledged that, especially for vertical calculation planes, very low levels of light (<0.5 lux) may occur even at considerable distances from the source if there is little intervening attenuation. It is therefore very difficult to demonstrate 'complete darkness' or a 'complete absence of illumination' on vertical planes where some form of lighting is proposed on site, despite efforts to reduce them as far as possible and where horizontal plane illuminance levels are zero. Consequently, where 'complete darkness' on a feature or buffer is required, it may be appropriate to consider this to be where illuminance is at or below 0.2 lux on the horizontal plane, and at or below 0.4 lux on the vertical plane. These figures are still lower than what may be expected on a moonlit night and are in line with research findings for the illuminance found at hedgerows used by lesser horseshoe bats, a species well known for its light averse behaviour. ^{xvi}

Baseline and post-completion light monitoring surveys

- 4.55 Baseline, pre-development lighting surveys may be useful where existing on or off-site lighting is suspected to be acting on Key and Supporting Habitats and features, and so may prevent the agreed or modelled illuminance limits being achieved. This data can then be used to help isolate which luminaires might need to be removed, or where screening should be implemented, or establish a new illuminance limit reduced below existing levels. For example, where baseline surveys establish that on or off-site lighting illuminates potential Key Habitat, improvements could be made by installing a tall perimeter fence adjacent to the habitat, and alterations to the siting and specification of new lighting, to avoid further illumination.
- 4.56 Baseline lighting surveys must be carried out by a suitably qualified competent person with the correct equipment. As a minimum, readings should be taken at ground level on the horizontal plane (to give illuminance hitting the ground), and in at least one direction on the vertical plane at between either 1.5m or 2m above ground (to replicate the likely location of bats using the feature or site). The orientation should be perpendicular to the dominant light sources, or perpendicular to the surface/edge of the feature in question (such as a wall or hedgerow), in order to produce a 'worst case' reading. Further measurements at other orientations may prove beneficial in capturing influence of all luminaires in proximity to the feature, or principal directions of flight used by bats. This should be discussed with the ecologist.
- 4.57 Baseline measurements should be taken systematically across the site or features in question, with time, date and time of sunset also recorded. They will need to be repeated at intervals to sample across the site or feature, either in a grid or linear transect, as appropriate. The lighting professional will be able to recommend the most appropriate grid spacing.
- 4.58 Measurements should always be taken in the absence of moonlight, either on nights of a new moon or heavy cloud, to avoid artificially raising the baseline. As an alternative, moonlight can be measured at a place where no artificial light is likely to affect the reading.
- 4.59 As all illuminance level contours will be produced from modelled luminaires at 100% output, baseline measurements should, wherever practicable, be taken with all lights on and undimmed, and with blinds or screens over windows removed. Cowls and other fittings on luminaires can remain in place.
- 4.60 Where possible, measurements should be taken during the spring and summer, when vegetation is mostly in leaf, in order to accurately represent the baseline during the principal active season for bats, and to avoid artificially raising the baseline.
- 4.61 The topography of the immediate surrounding landscape should be considered in order to determine the potential for increased or decreased light spill beyond the site.

Post-construction/operational phase compliance-checking

- 4.62 Post-completion lighting surveys are often required where planning permission has been obtained on the condition that the proposed lighting levels are checked to confirm they are in fact achieved on site, and test that the lighting specification (including luminaire heights, design and presence of shielding etc.) is as proposed.
- 4.63 All lighting surveys should be conducted by a suitably qualified competent person. They should be conducted using the same measurement criteria and lighting states used in the preparation of the illuminance contour plots and/or baseline surveys, as discussed above. It may be necessary to conduct multiple repeats over different illumination states, or other conditions specific to the project.
- 4.64 Depending on the potential for residual impacts on bats, and the scale of the proposed scheme, it is often appropriate to factor in bat monitoring surveys. These should have the aim of confirming an absence of significant changes in bat presence, species assemblage or behaviour between lit and unlit areas, compared to baseline results. Results should always be reported to the LPA as per any such planning condition. A 'Statement of Conformity' or similar report should be prepared in order to provide an assessment of compliance by the lighting professional, and a discussion of any remedial measures which are likely to be required in order to achieve compliance. Any limitations or notable conditions such as deviation from the desired lighting state, or use of blinds/barriers should be clearly reported. Ongoing monitoring schedules can also be set, especially where compliance is contingent on automated lighting and dimming systems, or on physical screening solutions.

Conclusion

- 4.65 **In summary,** the importance of integrating avoidance measures (as per the first step of the mitigation hierarchy) into developmental design, cannot be overemphasised. Retaining ecologically functional 'dark corridors' and Key Habitats for bats within schemes (in preference to seeking lighting mitigation strategies), avoids costly and time-consuming additional surveys, mitigation and post-development monitoring. Furthermore, LPAs are likely to favour applications where steps have been taken to avoid such conflicts. This master-planning work needs to be informed by robust ecological survey data and lighting assessments, carried out by the relevant experts at the earliest opportunity in the project. Ultimately, light levels should always be designed to minimise potential environmental impact, and maximise the potential of habitat and species enhancement work, through multidisciplinary working and evidence-based new, or retrofit, scheme design.

Appendix 8: Design of the temporary exclusion fencing (pitfall traps not used)

