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Phase 2 Protected Species Assessments

**Wandleys Farm, Wandleys Lane, Fontwell,
West Sussex**

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Report Summary

1. This document summarises the findings of a suite of Phase 2 protected species surveys carried out on land at Wandleys Farm on Wandleys Lane in Fontwell, West Sussex further to a Phase 1 Habitat survey and Preliminary Ecological Appraisal that was completed by the Ecology Co-op on the 14th of February 2017. Further to recommendations in this report, surveys have been undertaken for dormice, great crested newts, bats and reptiles.
2. The site totals approximately 1 hectare in area and includes the following habitats – species poor semi-improved grassland, species poor and species rich hedgerows with trees along with some dense scrub patches.
3. Protected species identified during Phase 2 surveys at this site includes the presence of a low population of slow worms and commuting and foraging bats.
4. The surveys confirmed the likely absence of dormice and great crested newts.
5. Some outline mitigation measures for bats and reptiles has been outlined in the relevant parts of section 6, however a separate detailed mitigation statement and Habitat Creation and Management Plan is recommended to detail how these species will be protected through the development and where possible net benefits to the conservation of these species will be provided.

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1 INTRODUCTION

1.1 Purpose of the Report

A Phase 1 Habitat survey and Preliminary Ecological Appraisal was completed by The Ecology Co-op on the 14th of February 2017 on land at Wandleys Farm, Wandleys Lane, Fontwell. This assessment identified the potential for reptiles, bats, dormice and great crested newts to be present on the site. As such, phase 2 surveys for each of these species/taxonomic groups were recommended along with a repeat botanical assessment.

This document summarises the findings of the suite of Phase 2 protected species surveys carried out on land at Wandleys Farm, Wandleys Lane, Fontwell. The grid reference for the site is SU 953 065. Where necessary this report outlines mitigation measures required to protect wildlife as well as compensate for any potential harm to habitats of value that could take place.

These phase two surveys were managed and overseen by Paul Whitby, a Full member of the Chartered Institute for Ecology and Environmental Management (CIEEM) and a Chartered Ecologist (CEcol) and Jess Burkitt, a graduate member of CIEEM.

These surveys and report were carried out and produced at the request of Mr and Mrs Lillywhite.

1.2 Background

1.2.1 The Site

The site surveyed is a plot of land at Wandleys Farm, which is 1 hectare in areas and is situated on the east side of Wandleys Lane in Fontwell. The grid reference for the site is SU 953 065. The site is made up of a large field of mown species poor grassland with species rich and species poor hedgerows with trees surrounding the site. There are scrub patches along the eastern boundary of the land. It is proposed to build 5 residential properties within the site shown in Figure 1.

Further detailed information about the site, including descriptions of all habitats present and biodiversity records for all protected species in the area can be found in the separate Phase 1 habitat survey report for the site.



Figure 1. An aerial image showing the location of the site. The site boundary is outlined in red.

1.2.2 The Development proposal

Mr and Mrs Lillywhite, the owners of this land, intend to submit a planning application for 5 residential units (see Figure 2).

The development proposal is for 5 residential dwellings with associated gardens within the site and to create two new access points from Wandleys Lane along the eastern boundary (Figure 2). The areas within the red line boundary is to be cleared of species-poor semi-improved grassland and some scrub habitat in order to make way for this development, with the existing hedgerows and garden habitat areas to be enhanced for wildlife.

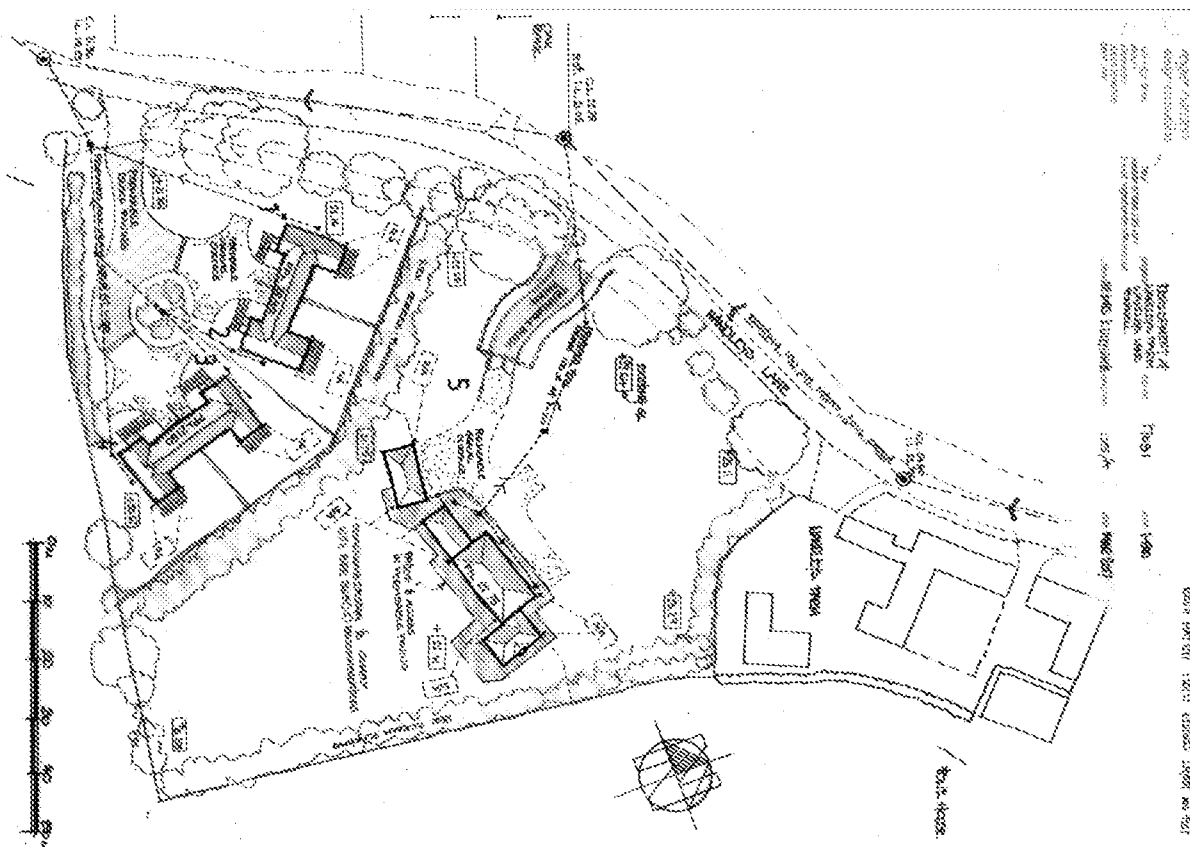


Figure 2. The proposed layout of the Wandleys Farm development.

1.2.3 Findings of the Preliminary Ecological Appraisal

1.2.3.1 Bats

The site was identified to include features of value for foraging bats, mainly the hedgerows with trees and the good connectivity to woodland in the surrounding area. Bat roosting habitat potential was identified along the eastern boundary with four mature oak trees covered in ivy.

As such bat activity surveys were recommended on land at Wandleys Farm and the findings are discussed in section 6.4.

1.2.3.2 Dormice

Habitat suitable for dormice was identified surrounding the site and within the site boundary. The site includes scrub patches, hedgerows with trees and good connectivity to the wider landscape where there are numerous records for dormouse presence.

There is connectivity between the site and Wandleys Copse which is 2.3 hectares in size and designated Ancient woodland. There is one record for dormouse presence within Wandleys Copse dated 2004.

As such a dormice presence/absence survey was recommended on land at Wandleys Farm and the findings of this survey are discussed in section 6.4.



1.2.3.3 Great Crested Newts

No ponds were identified on the site during the survey however an assessment of background mapping and aerial imagery identified two ponds located within 500m of the site boundary. Pond 1 is located within land adjacent to Wandleys Farm, 65m away from the site boundary and Pond 2 is located within the land in close-proximity of Wandleys Copse, 134m away from the site boundary. Access was not permitted for Ponds 1 and 2 at the time of Phase 1 Habitat survey however due to both ponds being present with 250m of the site, further surveys were recommended.

Resultantly, environmental DNA assessments were recommended for Pond 1 and Pond 2 due to the suitable terrestrial habitat and the location of the ponds. Findings of this survey are discussed in Section 6.4.

1.2.3.4 Reptiles

The entire site comprises suitable foraging habitat for reptiles, with the species poor grassland and the longer, rough grassland verge along the western boundary of the site providing suitable cover for this group of species. Features such as hedgerows and scrub may be used for hibernating. The field adjacent to the site is made up of long, rough grassland which could provide suitable habitat for reptiles and there is good connectivity between the two sites.

Due to this a reptile presence/absence survey was recommended across all the suitable pasture fields and a discussion of the results of this reptile survey is provided in section 6.5.

2 SURVEY METHODOLOGY

The methodology for the phase 2 surveys were specific to the initial recommendations and the species or taxonomic groups being surveyed. The methods for each phase 2 survey is detailed below.

2.1 Bat Surveys

2.1.1 Bat Activity Surveys

The survey followed best practice techniques as outlined by the BCT¹. Three bat activity surveys were undertaken by two ecologists, who each walked a specific assigned route across the site to collect bat activity data from the whole of the site (See Figure 3 below). Corresponding weather conditions and details for the survey are detailed in Table 1 below.

During the bat surveys, surveyors walked a specific assigned route across the entire site to collect bat activity data. During all three bat activity surveys, one surveyor walked the transect encompassing the eastern boundary of the site with the other surveyor walking the transect encompassing the northern, western and southern boundaries of the site.

The surveyors recorded bat activity using Echo Meter Touch bat detectors featuring auto-identification of bat species and automatically triggered recordings for later review. The number of bat passes along



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the transect were recorded, together with the species and time of detection. All bats were identified to species level, where possible, on site. Echolocation calls were analysed using Kaleidoscope computer software which facilitates species identification. Where possible, additional notes on type of flight (for example, commuting or foraging) and direction of flight were also recorded.

Table 1. Weather conditions during bat activity surveys carried out at Wandleys Farm

Date	Survey start time/end time	Temp. degrees centigrade, weather conditions throughout survey	Surveyors
20-04-17	19:58-21:10 Sunset – 20:05 Sudden temperature drop to 5 degrees Celsius led to survey finishing after 1 hour.	Max/Min temp.: 10 / 5°C 80% cloud cover, 0-5mph wind and dry.	Paul Whitby, BSc, MCIEEM, CEcol, (Natural England License holder: 2015-15959-CLS-CLS). Briony Hill, BSc, Grad CIEEM
12-06-17	20:55-22:45 Sunset – 21:16	Max/Min temp.: 16 / 16°C 5% cloud cover and 0-5mph wind and dry.	Sam Lunn, BSc, MSc, ACIEEM, (Natural England Licence holder: 2017-28250-CLS-CLS). Briony Hill, BSc, Grad CIEEM
5-09-17	19:23-21:02 Sunset – 19:40	Max/Min temp.: 17.4 / 15°C 100% cloud cover, 0-5mph wind, dry but recent rain.	Paul Whitby BSc, MCIEEM, CEcol Sam Lunn, BSc, MSc, ACIEEM



Figure 3. Map of routes walked during the bat activity survey on the 20th of April and 5th of September around the site, outlined in red and blue.



Figure 4. Map of route walked during the bat survey on the 12th of June around the site, outlined in red and blue.



2.1.2 Static Bat Logger Deployment

One static bat logger has been deployed across the Wandleys Farm site on three occasions, the 20th of April, the 12th June and the 31st August. Figure 5 shows the location of the loggers on each deployment.

For all surveys a Peersonic detector and full spectrum RPA2 recorder within a Waterproof IP67 Enclosure was left in the field for at least 5 days, which is the maximum lifetime of the battery. The Peersonic detector is a passive recording device with real time full spectrum calls that can be viewed in detail once downloaded on to Analysis Software so that the species of bat making a call can (where possible) be identified.

By undertaking these surveys in April, June and September, the data gathered will cover the most active periods for bats along with the activity surveys undertaken. Whilst the data gathered from bat loggers cannot be used to establish information on commuting and foraging bats, it does provide information throughout the night, rather than the period immediately after bat emergence, which is observed during activity surveys.



Figure 5. The yellow circle indicated the location of static bat loggers deployed on 20th April, 12th June and the 9th September.

2.2 Dormouse Assessment

A dormouse presence/likely absence survey is undertaken by placing nest tubes upon trees and shrubs in suitable habitat where dormouse habitat is most favourable. Nest tubes are small plastic tubes with

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wooden trays that dormice will use to build their summer nests in. Nest tubes are effective between April and November and typically 50 nest tubes are deployed in suitable habitat and left for several months over the survey season. An adequate 'thoroughness' score must be achieved, which is dependent on how many tubes are used and over how many months they are deployed. An index of probability is used to determine how effective checks within particular months of the year will have been in establishing 'likely absence' of dormice. A minimum score of 21 should be achieved to establish 'likely absence' in the event that no signs of dormice are found.

Month	Index of Probability
April	1
May	4
June	2
July	2
August	5
September	7
October	2
November	2

Table 2. Index of probability for Dormouse Presence.

On the 29th of March 2017, a total of 20 nest tubes were spread within the hedgerows on land at Wandleys Farm on Wandleys Lane, Fontwell, West Sussex. Figure 6 below illustrates the linear routes used to place the dormouse tubes in distinct areas within the site. The nest tubes are spread out amongst the hedgerows within the site. A target of 50 nest tubes typically used for this survey assessment was not achieved due to the small area of suitable habitat present along the site boundaries and the lack of suitable features to install nest tubes across the site.

Dormice checks are undertaken in the mornings and may commence 1 month after the nest tubes have been deployed. A suitably qualified ecologist is able to determine the difference between the nests of dormice and other animals as well as actual sightings of dormice and other species. Dormice typically build a compact nest using green leaves, honeysuckle bark, grasses and occasionally other materials such as moss and lichens.



Figure 6. The linear placement of dormouse nest tubes within suitable habitat on land at Wandleys Farm.

2.3 Great Crested Newts

Environmental DNA (eDNA) assessments were carried out on Pond 1 and Pond 2 within 500m of the nearest site boundary. An eDNA assessment was made by taking at least 20 water samples from suitable locations spaced around the banks of the ponds between mid-April and the end of June. The samples are mixed, added to ethanol and sent for testing by Surescreen Scientifics. A report is produced by Surescreen Scientifics indicating the presence or absence of great crested newt DNA.

2.4 Reptiles

The survey was carried out by placing artificial refugia around the site, in areas of suitable habitat for reptiles, which heat up in the sun and provide cover. A total of 20 roofing felt sheets were used and placed according to Figure 7 below. Reptiles are attracted to these refugia to warm up in the mornings and late afternoon to regulate their temperature and a suitably qualified surveyor is able to count the number and in some cases the sex of each species present.

A total of seven surveys are undertaken and the highest count of reptiles from these visits is used to estimate the population of each reptile species on the site as low, medium or exceptional.

The survey refugia were placed around the site, focusing on the areas of suitable grassland habitat where they would warm up in the morning or afternoon sun. The coverage of the survey sheets was



spaced evenly around the site where possible avoiding areas that would be constantly shaded by trees.



Figure 7. The position of reptile refugia spread across land at Wandleys Farm.

3 LEGAL PROTECTION

Legal protection applying to relevant bird, mammal, herpetofauna and invertebrate species is detailed in Appendix 1 of this report. This includes both national and European legislation that protects badgers, bats, dormice, reptiles, roman snails and breeding birds.

4 RESULTS

4.1 Bat Surveys

4.1.1 Bat Activity Surveys

The results of the bat activity surveys undertaken at Wandleys Farm are described below with maps illustrating the use of the site by bat species. A key to the maps is provided below and the colour coding for bat species is provided in the figure reference for each map.

Throughout the three activity surveys, a total of five species were recorded: common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistrellus pigmaeus*), *Myotis spp.*, serotine (*Eptesicus serotinus*), common noctule (*Nyctalus noctula*), long-eared bat (*Plecotus spp.*).

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Where possible, species identification was carried out to species level, except for the six *Myotis* and two *Plecotus* bat species, as they are often inseparable through sound analysis alone, and therefore were identified to genus level only.

Key to bat activity maps

- ↔ = Bat foraging activity
- = Bat commuting activity and direction of flight observed
- = Bat heard, but not observed in flight.

20th April 2017

Bat activity was recorded between 19:58 and 21:10 by four species including common pipistrelle, soprano pipistrelle, serotine and common noctule commuting and foraging throughout this time. Activity was recorded along the eastern, northern and western boundaries of the site. The results of the surveys are detailed in Figure 8.



Figure 8. Bat activity at Wandleys Farm on the 20th April, with blue representing common pipistrelle bats, green representing soprano pipistrelle bats and red representing serotine bats. Grey represents a non-echo-locating bat flying along the hedge. Thicker lines indicate greater activity observed.

12th June 2017

Bat activity was recorded between 20:55 and 22:45 by three species including common pipistrelle, soprano pipistrelle and serotine bats foraging and commuting throughout this time. Activity was recorded along all boundaries of the site. Social calling by common pipistrelle bats was recorded. The results of the survey are detailed in Figure 9.



Figure 9. Bat activity at Wandleys Farm on the 12th of June 2017, with the blue representing common pipistrelle bats, green representing soprano pipistrelle bats and red representing serotine bats foraging and commuting throughout the site. Thicker lines represent greater activity observed.

5th September 2017

Bat activity was recorded between 19:23 and 21:02 by six species including common pipistrelle, soprano pipistrelle, serotine, long-eared bats, common noctule bat, and *Myotis spp.* foraging and commuting throughout this time. Activity was recorded along the western, southern and eastern boundaries of the site. The results of the surveys are detailed in Figure 10.



Figure 10. Bat activity recorded at Wandleys Farm on the 5th of September 2017, with blue representing common pipistrelle bats, green for soprano pipistrelle bats, red for serotine bats, yellow for *Myotis* bats, orange for noctule bats and purple for long eared bats foraging and commuting throughout the site. Thicker lines represent greater activity.

4.1.2 Static Logger Deployment

Below, the data recorded for each of the bat logger surveys is provided.

April Logger

This detector was positioned along the eastern boundary of the site (Figure 5). The detector was located within the tree line that runs along Wandleys Lane where it was thought that there was a high likelihood of detecting commuting and foraging bats. This is also the only boundary that will be cut through to provide new site access. The detector recorded echolocation calls for four consecutive nights from the 21st of April 2017 to the 24th of April 2017.

A total of eight species were recorded during the survey including common pipistrelle, soprano pipistrelle, nathusius's pipistrelle, serotine, common noctule, long eared bats, natterers bat, nathusius' pipistrelle and daubentons bat. Common pipistrelle, serotine and soprano pipistrelle activity was recorded on all four nights with a peak count of 212 passes by common pipistrelles, 27 passes by serotines and 64 passes by soprano pipistrelles.

Noctule bats were recorded on one night with a peak of 2 passes recorded. Brown-long eared bats were recorded on one night with a peak count of 1 pass recorded. Nathusius' pipistrelle was recorded on one night with a peak of 1 pass and *Myotis spp.* were recorded on two nights with a peak count of 3 recorded.

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The table below shows the full results from the static logger deployment in April 2017.

Date	<i>Eptesicus serotinus</i>	<i>Nyctalus noctula</i>	<i>Myotis sp.</i>	<i>Pipistrellus pipistrellus</i>	<i>Pipistrellus pygmaeus</i>	<i>Barbastella barbastellus</i>	<i>Pipistrellus nathusii</i>	<i>Plecotus auritus</i>
21.04.17	27	2	0	77	43	0	0	0
22.04.17	6	0	0	212	64	0	0	1
23.04.17	1	0	3	33	12	0	1	0
24.04.17	13	0	1	164	56	0	0	0

June Logger

This detector was placed along the eastern boundary again within the tree line along Wandleys Lane in the same position as the April logger. The detector recorded echolocation calls for five consecutive nights from the 12th of June to the 16th of June. Only four nights of data was recorded due to the logger memory reaching its capacity.

A total of eight species were recorded during the survey including common pipistrelle, soprano pipistrelle, nathusius' pipistrelle, serotine, barbastelle, brown long-eared, and *Myotis spp.*

Common pipistrelle and soprano pipistrelle activity were recorded on all four nights with a peak count of 584 passes by common pipistrelle and 338 passes by soprano pipistrelles. Nathusius' pipistrelles were recorded on all four nights with a peak count of 2 passes recorded.

Serotine bats were recorded on three nights with a peak of 4 passes recorded. *Myotis spp.* were recorded on two nights with a peak count of 1 recorded. Brown long-eared bats were recorded on two nights with a peak of 4 passes recorded. Barbastelle were recorded on two nights with a peak count of 2 passes.

The table below shows the full results from the static logger deployment in June 2017.

Date	<i>Eptesicus serotinus</i>	<i>Nyctalus noctula</i>	<i>Myotis sp.</i>	<i>Pipistrellus pipistrellus</i>	<i>Pipistrellus pygmaeus</i>	<i>Pipistrellus nathusii</i>	<i>Barbastella barbastellus</i>	<i>Plecotus auritus</i>
12.06.17	4	0	1	358	105	1	1	0
13.06.17	3	0	1	584	314	1	0	0
14.06.17	0	0	0	518	338	2	0	2
15.06.17	1	0	1	440	234	1	2	4

August Logger

This detector was placed along the eastern boundary again within the tree line along Wandleys Lane in the same position as both the April and June logger. The detector was set out for five consecutive nights from the 29th of August to the 2nd of September however only one night of echolocation calls were recorded due to there being high activity and the logger reaching its memory capacity. This was in a large part due to the detector being triggered by the stridulation calls of crickets and is very difficult to

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eliminate from the triggering parameters used without also eliminating bats calls.

The table below shows the full results from the static logger deployment in August/September 2017.

Date	<i>Eptesicus serotinus</i>	<i>Nyctalus noctula</i>	<i>Myotis sp.</i>	<i>Pipistrellus pipistrellus</i>	<i>Pipistrellus pygmaeus</i>	<i>Pipistrellus nathusii</i>	<i>Barbastella barbastellus</i>	<i>Plecotus auritus</i>	<i>Lei</i>
29 th / 30 th August	34	2	79	451	1249	0	0	41	13

4.2 Dormouse Assessment

Six dormouse checks have been completed on land at Wandleys Farm according to best practice. The dormouse surveys were carried out on the 25th April, 24th May, 28th of June, 31st July, 29th August and the 25th September 2017. The dormouse survey at Wandleys Farm was not affected by any significant constraints though suitable locations to install dormouse tubes was constrained by a lack of suitable habitat, and no dormouse activity was identified. A single wood mouse (*Apodemus sylvaticus*) nest with an active wood mouse was identified in one of the tubes along the eastern boundary of the site on the final survey on the 25th of September 2017. As the survey process was conducted according to best practice guidance, it can therefore be determined that there is a 'likely absence' of dormouse within this site.

4.3 Great Crested Newts

Two ponds were identified within 500m of the nearest site boundary in the Phase 1 report. Access was not permitted for the two ponds at the time of the survey therefore a Habitat Suitability Index Assessment (HSI) could not be carried out on these ponds. However, the owners of both ponds were contacted and access was granted to carry out environmental DNA assessments on both ponds. The results from the eDNA assessments are shown in Figure 12.

These results show that whilst no great crested newt DNA could be detected in Pond 2 one of the 12 test samples came back as positive for Pond 2. Ponds where a positive score of 1 is achieved under the replicates typically indicates that either there is a very low population of great crested newts present, or that DNA contamination may have taken place, whereby samples from separate ponds, or within the laboratory may have taken place.

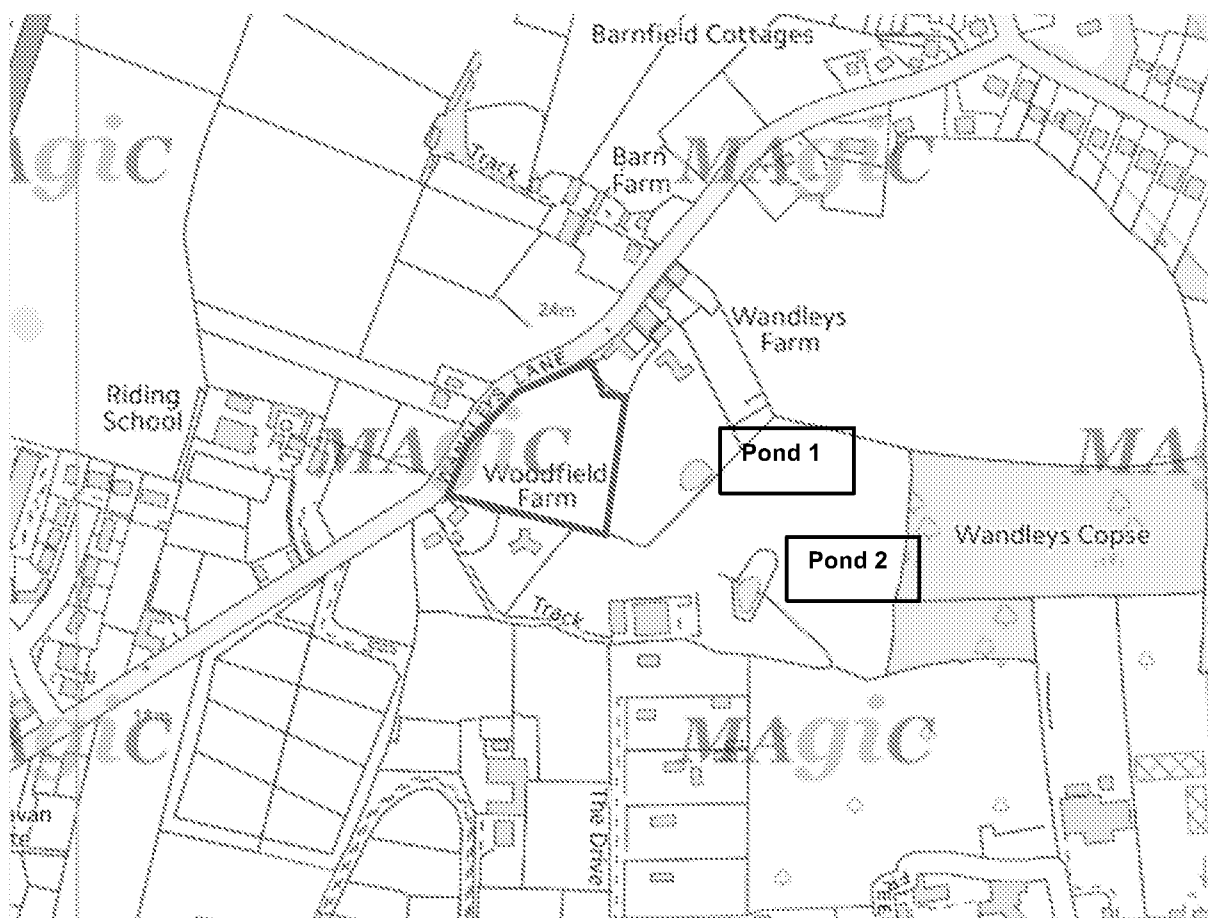


Figure 11. A MagiC map showing the location of the ponds in relation to the site outlined in red and Pond 1 and Pond 2 which were eDNA tested.

RESULTS							
Lab Sample No.	Site Name	O/S Reference	SIC	DC	IC	Result	Positive Replicates
30790	Wandleys Farm Pond 2	SV 9551 0644	Pass	Pass	Pass	Negative	0
30802	Wandleys Farm Police House (Pond 1)	SV 954 066	Pass	Pass	Pass	Positive	1

Figure 12. The eDNA results from Surescreen Scientific.

4.4 Reptiles

A total of 20 survey sheets were placed across the land at Wandleys Farm on the 24th of March 2017 and left for a minimum of ten days to 'bed in' before the commencement of the survey process. Below, Table 6 provides all of the weather data and findings from each reptile survey.

The single individual slow worm was identified along the western boundary of the site that is linked to a field of long, rough grassland. The site boundaries were allowed to grow over the course of the survey

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due to the placement of the mats. The site itself is regularly mown but the grass is longer in sections and therefore it is possible that the slow worm migrated from the field adjacent to the site as no other reptiles were identified on any of the other boundaries of the site during the survey. The identification of a single slow worm is representative of a 'low' population under Froglife guidelines (see Figure 12).

Table 3: Results of reptile survey undertaken at Wandleys Farm. SW – Slow worm, GS – Grass snake, CL – Common Lizard, Juv – Juvenile, SA – Sub adult, F- Female, M – Male.

Date	Time	Air/Refugia Temp °C	Weather Notes, cc = Cloud cover	Species Total
5/04/17	10:20am	12/14.5°C	20%cc, sunny, light breeze	0
7/04/17	10:52am	13/25°C	0% cc, hazey, still	0
10/04/17	10:25am	12/26°C	30%cc, light breeze	0
12/04/17	1:40pm	13/28°C	30% cc, light breeze	0
19/04/17	10:10am	9/15°C	70%cc, light breeze	0
25/04/17	11:03am	9/15°C	50%cc, still	1 x SA F SW
4/05/17	3:00pm	15/18°C	100%cc, light breeze	0

	Low population Score 1	Good population Score 2	Exceptional population Score 3
Adder	<5	5 - 10	>10
Grass snake	<5	5 - 10	>10
Common lizard	<5	5 - 20	>20
Slow-worm	<5	5 - 20	>20

Figure 12. The classification of reptile population from Froglife Advice Sheet 10.

5 CONSTRAINTS/LIMITATIONS

An initial site assessment such as this is only able to act like a 'snapshot' to record any flora or fauna that is present at the time of the survey. It is therefore possible that some species may not have been present during the survey, but may be evident at other times of the year. For this reason, habitats are assessed for their potential to support some species, even where no direct evidence (such as droppings) has been found.

Bat survey

All bat surveys can only reflect activity recorded at that time. The movement of bats throughout the year means that certain species might be present without having been identified despite an appropriate survey effort being employed. The final logger survey in August was hampered by the presence of crickets, repeatedly triggering the recording mode of the static bat detector and filling the memory card and only a single evening of data was therefore recorded.



6 DISCUSSION AND RECOMMENDATIONS

6.1 Bats

6.1.1 Bat Activity Survey

The results of the bat activity survey indicate bat activity is concentrated along the eastern boundary of the site with lower levels of activity along the southern, northern and western boundaries. Bat activity along the northern boundary seems to be limited (see Figures 8, 9 and 10).

Moderate species diversity has been recorded during the bat activity surveys undertaken with seven species; common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, serotine, common noctule, brown long-eared and *Myotis spp.*, with barbastelle bats detected only by the static loggers. Common pipistrelle bats are the most common species foraging and commuting at this site (which is typical for the majority of habitats in the UK).

A peak count of 2 barbastelle records was identified across two separate days in April and June along the eastern boundary of the site indicating very low levels of activity. Barbastelles are an Annex II species which are rare in the UK and found only in the south with an estimated population of 5,000 individuals according to the Bat Conservation Trust website. Barbastelle bats are very sensitive to light and it is important that a detailed lighting plan is put in place to ensure that the use of this flight corridor is not impacted by artificial light sources.

There are four mature oak trees along the eastern boundary of the site which could have potential to support roosting bats due to suitable features such as broken limbs and cracks being visible. There are no plans to remove any of the mature trees and therefore it is important that a detailed lighting scheme is put in place to ensure these trees are not impacted by artificial light.

Avoidance, mitigation and compensation measures for the potential impacts to foraging, commuting and roosting habitat as a result of the proposed plans will need to be incorporated into the development. Measures will be detailed in full within the Mitigation Statement. Such measures could include:

- A sensitive lighting plan that maintains dark areas of suitable foraging and commuting habitat in accordance with guidance provided by the Bat Conservation Trust (see Appendix 2) with a 'no light zone' created along the western boundary of the site.
- Retention of existing trees and scrub wherever possible to maintain existing foraging and commuting routes, in particular the western tree line used as a commuting route for barbastelle bats.
- A soft landscaping planting scheme using native species that encourage invertebrate prey which should include the planting of new species rich hedgerows with trees along eastern and northern boundary and wildflower seeding.
- New roosting opportunities for bats incorporated into the fabric of the buildings close to the boundaries of the site e.g. Schwegler 1FR bat tubes, bat access tiles and Schwegler 2FE wall mounted bat shelters which can easily be incorporated into the build or onto external faces of properties to provide net gain in bat roosting habitat. These features will be suitable for all pipistrelle bat species, including the least common nathusius' pipistrelle.



- The installation of at least four Schwegler woodcrete bat boxes such as the 2F and 2FN bat boxes on suitable mature trees away from sources of artificial light.

6.2 Nesting Birds

Any scrub, trees or hedgerows to be cleared must be removed outside of the nesting bird season (1st of March to 31st of August) unless features are first hand searched

6.3 Dormice

No dormouse activity was identified at any time during the survey at Wandleys Farm.

No further surveys are recommended for dormice however, some precautionary mitigation is recommended in this instance due to the removal of some scrub and trees along the eastern boundary of the site.

Mitigation could include:

- Creation of new species rich hedgerows along the north, south and western boundaries of the site which will benefit wildlife both in creating new foraging habitat and creating new connectivity to the wider landscape. The proposed new hedging will include planting 50% hawthorn, 10% blackthorn, 10% hazel, 10% wild privet, 10% dogwood and 10% wayfaring tree. Honeysuckle could be planted at a density of at least 1 plant per two linear metres. This could lead to future dormouse colonization.
- A hand search of all scrub and hedge to be removed along the eastern boundary is to be carried out by a suitably qualified ecologist to ensure there are no dormice present within the site and to limit to risk in harming any active dormice.

6.4 Great Crested Newts

Great crested newt DNA was not identified within Pond 1, which indicates the likely absence of this species and that it is highly unlikely that great crested newts would be found within the construction zone at any time. The eDNA results for Pond 2 show that 'one positive replicate' out of 12 replicates was identified within the sample. However, this does not definitely mean that great crested newts are using this pond. There is a high possibility that the sample could have been contaminated by the surveyor or in the testing laboratory or it could also be a 'false positive' result, though the presence of a very low population is also possible. No records for great crested newts were identified by Sussex Biodiversity Record Centre (SxBRC) within 2km of the site.

However, some precautionary mitigation is recommended in this instance and this will be detailed in a future Mitigation Statement, to include 'reasonable avoidance measures', such as habitat manipulation to ensure the site remains unfavourable for this species.



6.5 Reptiles

The reptile survey at this site has identified a 'low' population of slow worms, with one individual recorded along the western boundary of the site which is linked to a field of dense, rough grassland suitable to support a population of slow worms. The proposed development will see the majority of the site impacted, with almost 100% of suitable habitat lost or disturbed. Therefore, it is recommended that the site is mown short regularly up to the point of commencement of construction. Temporary reptile fencing will be installed along the western boundary of the site to separate the construction site from all adjacent green habitats where reptiles might migrate onto the site and would need to remain in-situ until all construction work deemed a risk to reptiles has been completed ie. earthworks and associated landscaping.

A suitably qualified ecologist will need to oversee the topsoil strip of the entire site to ensure there are no reptiles present within the site during the construction phase.

All details of the measures necessary for reptile protection and compensation measures will be included in a future Mitigation Statement. The creation of new reptile habitat to provide a net benefit for reptile species is possible through the creation of an area of wildflower meadow that connects to the suitable reptile habitat present on the eastern side of the site.

6.6 Summary of Findings

The detailed phase 2 surveys conducted upon the land at Wandleys Farm have identified a low population of reptiles and suitable habitat for foraging bats including the Annex II species, Barbastelle bats.

Through consultation with the Ecology Co-op, a development scheme has been designed that takes into account the ecological constraints and retains valuable habitats present upon the site where possible (mature oak trees and some scrub). In addition, some new habitats are to be created within the site through the enhancement of existing hedgerows and the creation of new hedgerows to link up existing hedgerow habitat.

To ensure that suitable mitigation measures, habitat creation and enhancement measures are put in place, it is important that a Mitigation Statement is produced for this site that sets out in detail not only the measures required to conserve protected species and notable habitats during the construction phase, but also details habitat creation and management measures that cover the short and long-term life of the development and where possible provide enhancements for biodiversity.

Should you need any further advice on the information provided above, please do not hesitate to contact The Ecology Co-op.



7 Appendix 1 – Legislation and Policy

General

This section briefly describes the legal protection afforded to protected species. It is for information only and is not intended to be comprehensive or to replace specialised legal advice. It is not intended to replace the text of the legislation, but summarises the salient points.

Badger

Badger is protected in Britain under the Protection of Badgers Act 1992 and Schedule 6 of the Wildlife and Countryside Act 1981 (as amended).

The legislation affords protection to Badger and Badger setts, and makes it a criminal offence to:

- wilfully kill, injure, take, possess or cruelly ill-treat a Badger, or to attempt to do so;
- interfere with a sett by damaging or destroying it;
- to obstruct access to, or any entrance of, a Badger sett; or
- to disturb a Badger when it is occupying a sett.

Bats, Dormouse and Great Crested Newt

Dormouse (*Muscardinus avellanarius*), Great Crested Newt (*Triturus cristatus*), and all species of British bat (*Vespertilionidae* and *Rhinolophidae*) are listed on *Schedule 5* of the *Wildlife and Countryside Act 1981* (as amended), and receive full protection under *Section 9*. These species are also all listed as European Protected Species on *Schedule 2* of the *Conservation (Natural Habitats, etc.) Regulations 1994* which gives them full protection under *Regulation 39*. Protection was extended by the *Countryside and Rights of Way Act 2000* (the CROW Act). Under the above legislation it is an offence to:

- kill, injure or take an individual;
- possess any part of an individual either alive or dead;
- intentionally or recklessly damage, destroy or obstruct access to any place or structure used by these species for shelter, rest, protection or breeding;
- intentionally or recklessly disturb these species whilst using any place of shelter or protection; or
- sell or attempt to sell any individual.

It is also an offence to set and use articles capable of catching, injuring or killing bats (for example a trap or poison), or knowingly cause or permit such an action. In the case of Dormouse and all species of British bat there is also protection under *Schedule 6* of *The Wildlife and Countryside Act 1981* (as amended) relating specifically to trapping and direct pursuit of these species.

Dormouse, Great Crested Newt and all species of British bat are included as priority species in the *UK Biodiversity Action Plan* and as species of principal importance for the conservation of biological diversity in England under *Section 74* of the *Countryside and Rights of Way (CROW) Act 2000*.

Reptiles

Common Lizard (*Lacerta vivipara*), Grass Snake (*Natrix natrix*), Slow-worm (*Anguis fragilis*), and Adder (*Vipera berus*) are listed under *Schedule 5* of the *Wildlife and Countryside Act 1981* (as amended), in respect of *Section 9(5)* and part of *Section 9(1)*. This protection was extended by the *Countryside and Rights of Way (CROW) Act 2000*. Under the legislation it is an offence to:

- intentionally or deliberately kill or injure any individual of these species; or
- sell or attempt to sell any part of these species either alive or dead.



Nesting Birds

All species of bird are protected under *Section 1* of the *Wildlife and Countryside Act 1981* (as amended). Protection was extended by the *Countryside and Rights of Way (CROW) Act 2000*. Under the above legislation it is an offence to intentionally:

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

Certain species are listed on *Schedule 1* of the *Wildlife and Countryside Act 1981* (as amended) and receive protection under *Sections 1(4)* and *1(5)*. The protection was extended by the *Countryside and Rights of Way (CROW) Act 2000*. There are special penalties where the offences listed above are committed for any *Schedule 1* species and it is also an offence to intentionally or recklessly:

- disturb any such bird when it is building its nest or while it is in or near a nest containing dependant young; or
- disturb the dependant young of any such bird.

Roman Snails

In 2008, the Roman snail (*Helix pomatia*) was added to *Schedule 5* of the *Wildlife and Countryside Act 1981* (as amended), and it became an offence to intentionally kill, injure or take individuals of this species.



8 Appendix 2 - Artificial lighting and wildlife

Interim Guidance: Recommendations to help minimise the impact of artificial lighting

Wherever human habitation spreads, so does artificial lighting. This increase in lighting has been shown to have an adverse effect on our native wildlife, particularly on those species that have evolved to be active during the hours of darkness. Consequently, development needs to carefully consider what lighting is necessary and reduce any unnecessary lighting, both temporally and spatially. When the impacts on different species groups are reviewed, the solutions proposed have commonalities that form the basis of good practice. These are outlined in the following document.

Overview of impacts

Invertebrates

Artificial light significantly disrupts natural patterns of light and dark, disturbing invertebrate feeding, breeding and movement, which may reduce and fragment populations. Some invertebrates, such as moths, are attracted to artificial lights at night. It is estimated that as many as a third of flying insects that are attracted to external lights will die as a result of their encounter.¹ Insects can become disoriented and exhausted making them more susceptible to predation. In addition, the polarisation of light by shiny surfaces attracts insects, particularly egg laying females away from water. Reflected light has the potential to attract pollinators and impact on their populations, predators and pollination rates. Many invertebrates natural rhythms depend upon day-night and seasonal and lunar changes which can be adversely affected by artificial lighting levels.

It is not always easy to disentangle the effects of lighting on moths from other impacts of urbanisation. However, it is known that UV and green and blue light, which have short wavelengths and high frequencies, are seen by most insects and are highly attractive to them. Where a light source has a UV component, male moths in particular will be drawn to it. Most light-induced changes in physiology and behaviour are likely to be detrimental. They discern it to be 'light', so they do not fly to feed or mate.²

Birds

There are several aspects of changes to bird behaviour to take into account. The phenomenon of robins and other birds singing by the light of a street light or other external lighting installations is well known, and research has shown that singing did not have a significant effect on the bird's body mass regulation. However, it was felt that the continual lack of sleep was likely to be detrimental to the birds' survival and could disrupt the long-term circadian rhythm that dictates the onset of the breeding season³. Many species of bird migrate at night and there are well-documented cases of the mass mortality of nocturnal migrating birds as they strike tall lit buildings. Other UK bird species that are particularly sensitive to artificial lighting are long-eared owls, black-tailed godwit and stone curlew.⁴

¹ Bruce-White C and Shardlow M (2011) A Review of the Impact of Artificial Light on Invertebrates - See more at: <http://www.buglife.org.uk/advice-and-publications/publications/campaigns-and-reports/review-impact-artificial-light#sthash.s7GPA1vL.dpuf>

² As above

³ Pollard A. (2009) Visual constraints on bird behaviour. University of Cardiff

⁴ Rodriguez A., Garcia A.M., Cervera F. and Palacios V. (2006) Landscape and anti-predation determinants of nest site selection, nest distribution and productivity in Mediterranean population of Long-eared Owls, *Asiootus*. *Ibis*, 148(1), pp.133-145



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Mammals

A number of our British mammals are nocturnal and have adapted their lifestyle so that they are active in the dark in order to avoid predators. Artificial illumination of the areas in which these mammals are active and foraging is likely to be disturbing to their normal activities and their foraging areas could be lost in this way. It is thought that the most pronounced effect is likely to be on small mammals due to their need to avoid predators. However, this in itself has a knock-on effect on those predators.

The detrimental effect of artificial lighting is most clearly seen in bats. Our resident bat species have all suffered dramatic reductions in their numbers in the past century. Light falling on a bat roost exit point, regardless of species, will at least delay bats from emerging, which shortens the amount of time available to them for foraging. As the main peak of nocturnal insect abundance occurs at and soon after dusk, a delay in emergence means this vital time for feeding is missed. At worst, the bats may feel compelled to abandon the roost. Bats are faithful to their roosts over many years and disturbance of this sort can have a significant effect on the future of the colony. It is likely to be deemed a breach of the national and European legislation that protects British bats and their roosts.

In addition to causing disturbance to bats at the roost, artificial lighting can also affect the feeding behaviour of bats and their use of commuting routes. There are two aspects to this: one is the attraction that short wave length light (UV and blue light) has to a range of insects; the other is the presence of lit conditions.

As mentioned, many night-flying species of insect are attracted to lamps that emit short wavelength component. Studies have shown that, although noctules, serotines, pipistrelle and Leisler's bats, take advantage of the concentration of insects around white street lights as a source of prey, this behaviour is not true for all bat species. The slower flying, broad-winged species, such as long-eared bats, barbastelle, greater and lesser horseshoe bats and the *Myotis* species (which include Brandt's, whiskered, Daubenton's, Natterer's and Bechstein's bats) generally avoid external lights.

Lighting can be particularly harmful if it illuminates important foraging habitats such as river corridors, woodland edges and hedgerows used by bats. Studies have shown that continuous lighting along roads creates barriers which some bat species cannot cross⁵. It is also known that insects are attracted to lit areas from further afield. This could result in adjacent habitats supporting reduced numbers of insects, causing a further impact on the ability of light-avoiding bats to feed.

These are just a few examples of the effects of artificial lighting on British wildlife, with migratory fish, amphibians, some flowering plants, a number of bird species, glow worms and a range of other invertebrates all exhibiting changes in their behaviour as a result of this unnatural lighting.

Recommendations

Survey and Planning

The potential impacts of obtrusive light on wildlife should be a routine consideration in the Environmental Impact Assessment (EIA) process⁶. Risks should be eliminated or minimised wherever possible. Some locations are particularly sensitive to obtrusive light and lighting schemes in these areas should be carefully planned.

In August 2013, Planning Minister Nick Boles launched the new National Online Planning Guidance Resource aimed at providing clearer protection for our natural and historic environment. The guidance looks at when lighting pollution concerns should be considered and is covered within one of the on line planning practice

⁵ Stone E. L., Jones G and Harriss (2009) Street lighting disturbs commuting bats. *Current Biology*, 19, pp 1-5

⁶ See also: Institution of Lighting Professionals – Professional Lighting Guide (PLG 04) Guidance on

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(undertaking lighting environmental impact assessments)



guides⁷. The guide provides an overview for planners with links to documents that aim to give planners an overview of the subject through the following discussion points:

1. When is obtrusive light / light pollution relevant to planning?
2. What factors should be considered when assessing whether a development proposal might have implications for obtrusive lighting / light pollution?
3. What factors are relevant when considering where light shines?
4. What factors are relevant when considering how much the light shines?
5. What factors are relevant when considering possible ecological impact?

This can help planners reach the right design through the setting of appropriate conditions relating to performance and mitigation measures at the planning stage.

The Institution of Lighting Professionals (ILP) recommends that Local Planning Authorities specify internationally recognised environmental zones for exterior lighting control within their Development Plans⁸. In instances lacking classification, it may be necessary to request a Baseline Lighting Assessment/Survey conducted by a Lighting Professional in order to inform the classification of areas, particularly for large-scale schemes and major infrastructure projects.

When assessing or commissioning projects that include the installation of lighting schemes, particularly those subject to the EIA process, the following should be considered and relayed to applicants:

- **Ecological consultants should confirm the presence of any sensitive fauna and flora**, advising the lighting designers of bat routes and roosts and other areas of importance in order to ensure that reports correspond with each other.
- **Ecological consultants should consider the need for quantitative lighting measurements**. In some instances it may be necessary for further lighting measurements to be taken. For example, outside an important bat roost. These should follow best practice guidance from the ILP and would ideally be conducted by a Lighting Professional.
- **Where appropriate, professional lighting designers should be consulted** to design and model appropriate installations that achieve the task but mitigate the impacts. This should be done at the earliest opportunity. Early decisions can play a key role in mitigating the impact from lighting.
- **Reports submitted should outline the impacts of lighting in relation to ecology**, making clear reference to the ecological findings, highlighting any sensitive areas and detail proposed mitigation. Consideration should also be given to internal lighting where appropriate.
- **Post –installation checks and sign off upon commissioning should be carried out** by the lighting designer to ensure that the lighting installation has been installed in accordance with the design, that predictions were accurate and mitigation methods have been successful.

Principles and design considerations

Do not

- **provide excessive lighting**. Use only the minimum amount of light needed for the task.
- **directly illuminate bat roosts** or important areas for nesting birds

Avoid

- **installing lighting in ecologically sensitive areas** such as: near ponds, lakes, rivers, areas of high conservation value; sites supporting particularly light-sensitive species of conservation significance (e.g. glow worms, rare moths, slow-flying bats) and habitat used by protected species.
- **using reflective surfaces under lights**.

Do

- **consider employing a competent lighting designer** who will apply the principles of providing the right light, in the right place, at the right time and controlled by the right system.
- **minimise the spread of light** to as close to horizontal as possible and ensure that only the task area is lit. Flat cut-off

lanterns or accessories should be used to shield or direct light to where it is required.

- **consider the height of lighting columns.** It should be noted that a lower mounting height is not always better. A lower mounting height can create more light spill or require more columns. Column height should be carefully considered to balance task and mitigation measures.
- **consider no lighting solutions where possible** such as white lining, good signage and LED cats eyes. These options can also be effective. For example, light only high-risk stretches of roads, such as crossings and junctions, allowing headlights to provide any necessary illumination at other times.
- **use temporary close-boarded fencing until vegetation matures**, to shield sensitive areas from lighting.
- **limit the times that lights are on to provide some dark periods.** The task being lit often varies, for example roads are less used after 23.00hrs and car parks are empty. A lighting designer can vary the lighting levels as the use of the area changes reducing lighting levels or perhaps even switching installations off after certain times. This use of adaptive lighting can tailor the installation to suit human health and safety as well as wildlife needs.

Technological specifications

Research from the Netherlands has shown that spectral composition does impact biodiversity.

- **Use narrow spectrum light sources** to lower the range of species affected by lighting.
- **Use light sources that emit minimal ultra-violet light**
- **Lights should peak higher than 550 nm**
- **Avoid white and blue wavelengths of the light spectrum** to reduce insect attraction and wherewhite light sources are required in order to manage the blue short wave length content they should be of a warm / neutral colour temperature <4,200 kelvin.

Further guidance on the spectral composition of artificial lighting will be made available following the publication of research from the Netherlands.

Further reading:

- A review of the impact of artificial light on invertebrates. Buglife. 2011
- Royal Commission on Environmental Pollution. 2009. Artificial light in the environment. London, HMSO
- The Ecological Consequences of Artificial Night Lighting" edited by Longcore and Rich
- Shedding Light: A survey of local authority approaches to lighting in England. CPRE 2014

<http://planningguidance.planningportal.gov.uk/blog/guidance/light-pollution/when-is-light-pollution-relevant-to-planning/> <http://planningguidance.planningportal.gov.uk/blog/guidance/light-pollution/when-is-light-pollution-relevant-to-planning/>

⁸ Institution of Lighting Professionals (2011) Guidance Notes for the Reduction of Obtrusive Light GN01:2011.