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Bat Activity Survey Report - Draft

**Bonhams, Hoe Lane, Flansham,
West Sussex, PO22 8NP**

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Report Summary

1. Bat activity surveys are being carried out on land at Bonhams, Hoe Lane, Flansham to ascertain the use of the site by bats as there is a proposal for a residential development at this site. This was completed further to a Phase 1 Habitat survey completed by the Ecology Co-op in March 2017 which recommended 3 bat activity surveys, the deployment of bat loggers for a period of 5 days within two seasons and a single emergence survey on a mature beech and wooden shed.
2. To date, one bat activity survey has been undertaken and two static bat loggers have been deployed once during April. Two more bat activity surveys are scheduled for the 12th June and 2nd August 2017 and static bat loggers are scheduled to be deployed in June. This draft report will be updated following these additional surveys and analysis of static logger data from April. The two scheduled activity surveys will include a single emergence survey of a mature beech identified as having roosting potential for crevice dwelling bats and a shed with low-negligible bat roosting potential.
3. The bat activity survey was led by Paul Whitby and completed according to Bat Conservation Trust Guidelines.
4. During the bat activity survey on the 12th April only common and soprano pipistrelles were recorded indicating low species diversity at the site. Activity was concentrated along the tree line to the south west of the garden space, within the area of scattered broadleaved trees, at the south-western corner of the site and along the western site boundary.
5. A Mitigation Statement that details protection measures for important habitats for bats and enhancements measures for bats should support any future planning application. Outline mitigation is detailed within section 5.

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We disclaim responsibility to the client and others in respect of any matters outside the scope of the above.

This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.



CONTENTS PAGE

1 INTRODUCTION	4
1.1 Purpose of the Report	4
1.2 Background	4
1.3 Site Description	6
2 LEGAL PROTECTION	7
3 METHODOLOGY	7
3.1 Bat Activity Surveys	7
3.2 Static Bat Logger Deployment	8
4 RESULTS	9
4.1 Bat Activity Surveys	9
1.1.1 12 th April 2017	9
4.2 Static Bat Logger Deployment	11
1.1.2 April bat logger data	11
4.3 Constraints/Limitations	11
5 DISCUSSION AND RECOMMENDATIONS	11
6 APPENDIX 1 – LEGISLATION AND POLICY	13
7 APPENDIX 2 – ARTIFICIAL LIGHTING AND WILDLIFE	15



1 INTRODUCTION

1.1 Purpose of the Report

This report gives details of bat activity surveys conducted on Land at Bonhams, Hoe Lane, Flansham by The Ecology Co-op. These were led by Paul Whitby a full member of the Chartered Institute of Ecology and Environmental Management and licensed bat surveyor (class license WML – CL08) and assisted by Briony Hill Grad CIEEM. The grid reference for this site is SU 96149 01172.

The objective of this survey work was to collect information relating to the use of the site by bats, including species, activity levels and important features across the site and where necessary prescribe further surveys and/or mitigation advice.

At the time of writing this report one bat activity survey has been undertaken on the 12th April 2017 with the next two bat activity surveys scheduled for the 12th June and 2nd August 2017. Two static bat loggers were deployed in April and their recordings are saved for analysis in due course. A further session of static loggers is scheduled for June. This report will be updated appropriately following these additional surveys and the analysis of static logger data from April.

This survey and report was carried out and produced at the request of Pallant Homes Limited.

1.2 Background

The Ecology Co-op was instructed to undertake bat activity surveys on land at Bonhams, Hoe Lane, Flansham, following a Phase 1 habitat survey of the site conducted by The Ecology Co-op in March 2017 which concluded that the site has the potential to be used by foraging and commuting bats (see figure 1). In line with the bat conservation guidelines, 3 bat activity surveys were recommended with these to be timed across the three seasons; spring (May/April), summer (June/July) and autumn (August/September). In addition to this it was recommended that bat loggers are deployed at the site for a period of 5 days within two seasons.

It was also recommended that a single emergence survey is undertaken on a mature beech, identified as having moderate roosting potential for crevice dwelling bats, and the shed with low-negligible bat roosting.

Furthermore, biodiversity records requested from the Sussex Biodiversity Records Centre identified records for serotine (*Eptesicus serotinus*), whiskered (*Myotis mystacinus*), noctule (*Nyctalus noctula*), common pipistrelle (*Pipistrellus pipistrellus*) and brown Long-eared bats (*Plecotus auritus*) within 2km of the site. Records for western barbastelle bats (*Barbastella barbastellus*) from 2015 were also identified within the parish of Yapton and Barnham, with the exact location unspecified due to the sensitive nature of this information. However as detailed within the phase 1 habitat report the site is unlikely to be of any importance for this woodland associated species given that it supports only a small area of mixed scattered parkland trees.

The assessment was carried out further to a proposal to construct 34 residential properties at this site (see figure 2).



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



Figure 2. Existing site plan with the site boundary shown in red.

1.3 Site Description

Land at Bonhams, Hoe Lane, Flansham, is situated just north of Flansham, West Sussex. The site is approximately 1.9 hectares in area and is split into two distinct areas. The first area comprises a field of poor semi-improved grassland with ruderal vegetation.

The second area comprises two residential properties (which will remain undisturbed by the proposals) and associated garden spaces and various outbuildings. Here, terrestrial habitats comprise amenity grassland, herbaceous flower beds, scattered parkland/broadleaved trees, species-poor hedgerow, bare ground, areas of hard-standing and bare ground tarmac, concrete and gravel.

Overall the site has low value for foraging bats with the mown amenity grassland, hard standing bare



Bonhams, Flansham – Bat Emergence Survey

ground and semi improved rough grassland covering the majority of the site. The scattered parkland and broadleaved trees within the garden space of Bonhams has moderate value for foraging bats whilst the SUDS ponds located a few meters of the south-eastern site boundary has high value because it is likely to support a variety of invertebrate prey.

2 LEGAL PROTECTION

This section briefly describes the legal protection afforded to reptiles. 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.

All species of bats within the UK are protected via The Conservation of Species and Habitats Regulations (2010) and also the Wildlife and Countryside Act (1981), as amended. Therefore, it is an offence to kill or injure a bat or interfere with any roosting or resting site. A bat roost is interpreted as "any structure or place used for shelter or protection by bats" whether or not bats are present at the time. Details of legislation and legal protection afforded to all species of British bats are given in Appendix 1.

The results of this survey will guide any necessary mitigation to ensure that no individuals or populations of bats and their roosting habitat are negatively affected by the proposed works, and therefore no offence is committed under UK and EU wildlife legislation.

3 METHODOLOGY

3.1 Bat Activity Surveys

At the time of writing this report one bat activity survey has been undertaken by two ecologists on the 12th April 2017. This survey followed best practice techniques as outlined by the Bat Conservation Trust (BCT) (Collins, J 2016)¹. Corresponding weather conditions and details for the survey are detailed in the table below.

The next two bat activity surveys are scheduled for the 12th June and 2nd August 2017. This report will be updated appropriately following their completion.

Table 1: Details of surveys undertaken on land at Bonhams, Hoe Lane, Flansham.

Date	Survey start time/end time	Temp. degrees centigrade, weather conditions throughout survey	Surveyors
12-04-17	19:44- 21:10 Sunset – 19:53	Max/Min temp: 12.5-8°C. 0% cloud cover and 0-5 mph wind.	Paul Whitby, BSc, MCIEEM, CEcol (Natural England bat licence no: 2015-15959-CLS-CLS). Briony Hill BSc Grad CIEEM
12-06-17			
2-08-17			

¹ Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn).

Bonhams, Flansham – Bat Emergence Survey



One surveyor walked a transect encompassing the garden area of Bonhams which supports scattered trees. Another surveyor walked a second transect which encompassed the grassland field (see figure 3).

All surveyors used Echometer Touch bat detectors to identify species through call frequencies and recorded all bat activity on and in close proximity to the site. Recordings were identified during the fieldwork where possible and, since all echolocations were recorded automatically, confirmed later where necessary using call frequency identification software.



Figure 3. Aerial photo of the site. The transect routes are shown with dashed lines with orange indicating the garden transect and yellow indicating the field transect. The sites boundaries are shown in red.

3.2 Static Bat Logger Deployment

Two static bat loggers were deployed across land at Bonhams, Flansham on the 12th April 2017. For all surveys a Peersonic detector and full spectrum recorder RPA2 enclosed 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 Analysis software so that the species of bat making a call can (where possible) be identified.

The next date for the static loggers to be deployed is scheduled for the 12th June 2017. This report will be updated appropriately following this.



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



Figure 3. Aerial photo of the site. Location of the two static bat loggers colour coded as yellow and orange, deployed on 12th April. The sites boundaries are shown in red.

4 RESULTS

4.1 Bat Activity Surveys

1.1.1 12th April 2017

Garden Transect

Bat activity was recorded between 20:10 and 21:01 with a number of common pipistrelles and soprano pipistrelles recorded commuting and foraging throughout this time.

Regular foraging by common pipistrelles was recorded across parts of the garden space from 20:10 until 20:45 with bat activity trailing off after this time (see figure 4).

Bonhams, Flansham – Bat Emergence Survey

Activity was concentrated along the tree line to the south west of the garden space and within the area of scattered broad leaved trees at the eastern corner, with regular foraging by common pipistrelles recorded in these locations.



Figure 4. Bat activity recorded in the garden space on the 12th April, with blue representing common pipistrelle bats and orange representing soprano pipistrelle. Thicker lines represent greater activity observed.

Field Transect

Bat activity was recorded between 20:19 and 21:03 with a number of common pipistrelles recorded foraging and commuting and a single soprano pipistrelle being heard only. Social calling by common pipistrelles was also recorded on three occasions.

Activity was concentrated at the south-western corner of the site over the ruderal habitat and along the western boundary close to the tree line located beyond the fence at this boundary with regular foraging by common pipistrelles recorded (see figure 5).



Figure 5. Bat activity recorded within the field on the 12th April, with blue representing common pipistrelle bats and orange representing soprano pipistrelle. Thicker lines represent greater activity observed.

4.2 Static Bat Logger Deployment

1.1.2 April bat logger data

This section of the report will be updated following the completion of call analysis.

4.3 Constraints/Limitations

Despite the temperature being 10°C at the start of the activity survey undertaken on the 12th April this dropped to 8°C at 21:00. This coincided with a drop in bat activity at this time leading to the survey being cut short. Subsequent surveys will be undertaken in optimal conditions later in the year which will improve the confidence in the assessment.

5 DISCUSSION AND RECOMMENDATIONS

During the bat activity survey on the 12th April only common and soprano pipistrelles were recorded indicating low species diversity at the site. Activity was concentrated along the tree line to the south west of the garden space, within the area of scattered broadleaved trees, at the south-western corner of the site overhead of the ruderal habitat and along the western site boundary.

It is difficult to draw conclusions on the importance of the site for bats from a single activity survey undertaken in April, but taken together with further scheduled survey visits, to include two bat activity surveys, an additional session of static loggers and a single emergence survey on a mature beech tree



Bonhams, Flansham – Bat Emergence Survey

and wooden shed, will allow an accurate assessment to be made. This will inform the need for avoidance and/or mitigation and compensation measures for the potential impacts to foraging and roosting habitat as a result of the development. Such measures could include:

- Retention of existing trees and shrubs wherever possible to maintain existing foraging and commuting routes
- 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 1)
- New roosting opportunities for bats incorporated into the fabric of buildings or on trees close to the boundaries of the site e.g. 1FR Schwegler bat tubes, 2FE Schwegler wall mounted bat shelters and 1MF bat boxes which can easily be incorporated into the build or onto external faces of properties to provide net gain in bat roosting habitat.
- Soft landscape planting scheme using native species that encourage invertebrate prey which should include the enhancement of the western site boundary for foraging and commuting bats through the planting of native hedgerow species.

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



6 APPENDIX 1 – LEGISLATION AND POLICY

Bats

All species of British bat are fully protected under the Wildlife and Countryside Act 1981 as amended through inclusion in Schedule V. All bat species in the UK are also included in Schedule II of the Habitats Regulations 2010 which transpose Annex II of the Council Directive 92/43/EEC 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora ("EC Habitats Directive") which defines European protected species of animals.

Bat species are afforded further protection by the Countryside and Rights of Way (CROW) Act 2000; and the Natural Environment and Rural Communities Act 2006.

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
- deliberate disturbance in such a way as to be 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;
- keep (possess), transport, sell or exchange, or offer for sale or exchange, any live or dead bat, or any part of, or anything derived from a bat.

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 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.

A European Protected Species License (EPSL) in relation to bats is required from Natural England for any work that would result in an otherwise unlawful activity (e.g. damage to a bat roost). A license can only be issued to permit otherwise prohibited acts if Natural England are satisfied that all of the following three tests are met:

- The proposal is for 'preserving public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment';
- There is no satisfactory alternative; and
- The action authorised by the license will not be detrimental to the maintenance of bat populations at a favourable conservation status in their natural range.

A bat roost is defined by the Bat Conservation Trust publication Bat Surveys—Good Practice Guidelines



Bonhams, Flansham – Bat Emergence Survey

2nd Edition as “the resting place of a bat”¹. Generally, however, the word roost is interpreted as “any structure or place, which any wild bat uses for shelter or protection.”

Bats tend to re-use the same roosts; therefore legal opinion is guided by recent case law precedents, that a roost is protected whether or not the bats are present at the time. This can include for summer roosts, used for breeding; or winter roosts, used for hibernating.



7 APPENDIX 2 – ARTIFICIAL LIGHTING AND WILDLIFE

Interim Guidance: Recommendations to help minimise the impact of artificial lighting – produced by The Bat Conservation Trust.

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

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

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, *Asio otus*. *Ibis*, 148(1), pp.133-145

Bonhams, Flansham – Bat Emergence Survey



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 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:

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

⁶See also: Institution of Lighting Professionals – Professional Lighting Guide (PLG 04) Guidance on undertaking lighting environmental impact assessments)



Bonhams, Flansham – Bat Emergence Survey

- 1.2 When is obtrusive light / light pollution relevant to planning?
- 1.3 What factors should be considered when assessing whether a development proposal might have implications for obtrusive lighting / light pollution?
- 1.4 What factors are relevant when considering where light shines?
- 1.5 What factors are relevant when considering how much the light shines?
- 1.6 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

Bonhams, Flansham – Bat Emergence Survey



- **consider employing a competent lighting designer** who will apply the principals 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 at, or near horizontal 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
- **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 where white 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

