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Preliminary Ecological Appraisal

**Land northeast of 15 Billett Avenue,
Waterlooville**

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22nd September 2016

Project No: 1607

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Report Summary

1. A Preliminary Ecological Appraisal was carried out on 5th September 2016 on land northeast of 15 Billett Avenue, Waterloooville by Sam Lunn. This assessment was undertaken to evaluate the site for habitats potentially suitable to support EU and UK protected species further to a potential proposal to erect four new residential buildings.
2. The centre of the site is composed of species-poor semi-improved grassland with thin strips of woodland along the east and south boundaries which link up to dense scrub habitat along the north boundary. A thin species rich hedgerow runs along the west boundary and in the southeast corner, a small strip of land extends out to the southeast which is the existing footpath that leads to the site which is bordered by a hedgerow on both sides.
3. Some suitable features were identified that could support badgers, reptiles and bats.
4. Further surveys are required for bats, reptiles and badgers.
5. It is important that no trees or scrub are cleared or cut back during the bird nesting season (1st March- 31st August), unless a hand search is first conducted by a suitably qualified ecologist.

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1 INTRODUCTION

1.1 Purpose of the Report

This report gives details of a preliminary ecological appraisal for the potential of protected species and or valuable habitats to be present on land northeast of 15 Billett Avenue, Waterloooville. The grid reference for the site centre is SU688099.

This survey assessment was carried out by Sam Lunn, an associate member of the Chartered Institute for Ecology and Environmental Management (CIEEM)

This survey and report was carried out and produced at the request of Peter Ernest Homes Ltd.

This report describes the results of a preliminary ecological appraisal for the potential presence or likely absence of protected species. Where necessary this report outlines mitigation measures considered necessary to protect wildlife as well as compensate for any potential harm to habitats of value that could take place.

1.2 Background

This report is intended to assess the current ecological value of land northeast of 15 Billett Avenue in Waterloooville (See Figure 1). It is proposed to build four residential dwellings with the potential to convert the underground culvert that runs north to south into an above ground stream.

The site is situated in the urban setting of Waterloooville surrounded by residential streets with the A3 about a km to the east and a large parcel of ancient woodland approximately 195m to the north. A culvert runs underneath the site running from north to south.

The centre of the site is composed of species-poor semi-improved grassland which has become overgrown and is comprised of false-oat grass (*Arrhenatherum elatius*), Yorkshire fog (*Holcus lanatus*), common ragwort (*Jacobaea vulgaris*), bird's foot trefoil (*Lotus corniculatus*), creeping buttercup (*Ranunculus repens*), rough hawkbit (*Leontodon hispidus*) and common sorrel (*Rumex acetosa*).

There are thin strips of woodland along the east and south boundaries which link up to dense scrub habitat along the north boundary. The south boundary woodland strip is mostly bare underfoot with patches of nettles (*Urtica dioica*) or brambles (*Rubus fruticosus*) in places. The tree composition consists of scots pine (*Pinus sylvestris*), holly (*Ilex aquifolium*), ash (*Fraxinus excelsior*), weeping willow (*Salix babylonica*), hazel (*Corylus avellana*), elder (*sambucus nigra*) and oak (*Quercus robur*). Along the east boundary, the woodland has



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several rubbish piles with patches of ivy, nettle and bramble. The woodland contains hazel, oak, scots pine, laurel (*Laurus nobilis*), sycamore (*Acer pseudoplatanus*) and beech (*Fagus sylvatica*).

A thin species rich hedgerow runs along the west boundary composed of ash, buddleia (*Buddleja spp.*), bramble, cypress (*Cupressus sempervirens*), hazel and laurel. There is a mature fruit tree covered in ivy at the north end. In the southeast corner of the grassland field in front of the woodland strip to the south, there is a small section of vegetation that differs from the main grassland field in the centre and is dominated by creeping thistle (*Cirsium arvense*), timothy grass (*Phleum pratense*), common bind weed (*Convolvulus arvensis*), bramble, common ragwort, common flea bane (*Pulicaria dysenterica*) and pendulus sedge (*Carex pendula*).

In the southeast corner, a small strip of land extends out to the southeast which is the existing footpath that leads to the site which is bordered by hedgerow on both sides consisting of hazel, ash, bramble, oak, box (*Buxus sempervirens*), hornbeam (*Carpinus betulus*), scots pine, common bind weed and holly.

This survey has been carried out to assess what impact (if any) a residential development at this land might have upon protected or notable wildlife and habitats as there is a proposal to build 4 new residential buildings on this site.



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

2 METHODOLOGY

A preliminary ecological appraisal was carried out on 5th September 2016 to evaluate the site for its potential to support EU and UK protected species. The populations of the following species or taxonomic groups are often recorded within rural settings; badgers (*Meles meles*), bats, nesting birds, great crested newt (*Triturus cristatus*), dormice (*Muscardinus avellanarius*) and the more widespread species of reptiles such as common lizard (*Zootoca vivipara*), slow worm (*Anguis fragilis*) and grass snake (*Natrix natrix*).

The methods developed by CIEEM and the following authors were used in the assessment of either suitable habitat to support the above species or taxonomic groups or in some cases direct evidence that the species were present¹²³⁴⁵⁶

¹ Bright, B., Morris, P., Mitchell-Jones, A.J. and Mitchell-Jones, T (1997) *The Dormouse Conservation Handbook*. English Nature.

² English Nature (2001) *Great Crested Newt Mitigation Guidelines*. English Nature, Peterborough.

³ Harris, S, Cresswell, P. and Jefferies, D. (1989) *Surveying Badgers*. Mammal Society.

⁴ Oldham, R.S., Keeble, J., Swan, M.J.S. and Jeffcote, M. (2000) Evaluating the suitability of habitat for the great crested newt (*Triturus cristatus*). *Herpetological Journal* 10, 143-155.



In addition, observations of any important plant communities or other valuable ecological features will have been recorded and detailed. Details of initial survey method for each species are given below.

Following the appraisal of this site it was decided that a biodiversity record search was required for all protected species within a 1km radius of the site.

2.1 Badger

An initial assessment was carried out to identify areas that might be used by badgers (*Meles meles*). Signs of badgers including setts, incidental foraging signs, runs and latrines, are recorded if encountered during the survey.

2.2 Bats

Trees, buildings, and other structures were assessed for the potential to support roosting bats. Bats can use a variety of roost areas including trees with holes, splits, cracks, cavities, Ivy and loose bark as well as a variety of roosting areas within buildings.

A detailed survey was carried out looking for any evidence indicating the presence of bats using buildings or trees, such as rub marks, staining or droppings inside or outside any potential roost sites.

If any definite signs of bats or other evidence had been found (such as actual sightings, droppings, urine stains, odour, scratch marks, grease stains and feeding remains), they would have been recorded.

2.3 Breeding Bird Habitat

Habitats were assessed for their suitability for nesting birds. This could include ground nesting species, such as skylark (*Alauda arvensis*) and lapwing (*Vanellus vanellus*) or birds that favour urban environments. Where buildings were present, possible use by starlings (*Sturnus vulgaris*) house sparrow (*Passer domesticus*), or barn owls (*Tyto alba*).

2.4 Dormice

The site was assessed for its value for dormice, including woodland and suitable hedgerows,

⁵ Collins, J.(ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edn). The Bat Conservation Trust, London..

⁶ CIEEM (2013) *Guidelines for Preliminary Ecological Appraisal*



which form either a continuous or connected area of habitat at least 2 hectares in area. Particular note was made of the presence of trees which are valuable for foraging dormice, particularly hazel. If possible a nut search to look for evidence of nuts that have been chewed by dormice would also be made.

2.5 Great Crested Newt

Initial surveys centre on identifying suitable habitat. If there are ponds or wet ditches that are considered to be suitable breeding habitats for great crested newt within 500 m that are not isolated from the site by unsuitable habitat or physical barriers, then this species could be using terrestrial habitat on the site.

2.6 Reptiles

The site was assessed for reptiles, with particular attention paid to those features that provide suitable basking areas (e.g. south-facing slopes), hibernation sites (e.g. banks, walls, piles of rotting vegetation) and opportunities for foraging (rough grassland and scrub).

3 LEGAL PROTECTION

Legal protection applying to relevant bird, mammal, herpetofauna and invertebrate species is detailed in Appendix 1 of this report.

4 RESULTS

4.1 Badgers

Two push throughs were identified in the northwest corner, one along the west boundary and the other into dense bramble into a small area in the northwest corner that could not be accessed. The two push throughs are less than 10m apart with some digging activity by larger mammals evident nearby.

No setts, latrines, runs or hairs were found within the site although the woodland strips on the north and east boundaries could potentially support a badger population.

Due to the immediate surrounding habitat being mostly residential dwellings the activity is more likely to be caused by fox than badger, with human conflicts with badgers ensuring that they are more likely to establish setts away from an urban environment.

Records of badgers are not provided by the records center, due to the sensitive nature of this information.



Figure 2. A push through that leads into the neighbouring garden along the south boundary.

4.2 Bats

No buildings were identified within the site however several trees were identified that have suitable features, such as rot holes and cracks, for crevice dwelling bats.

Within the woodland on the southern boundary one mature ash, one mature weeping willow covered in ivy and two mature oaks covered in ivy were identified as having moderate to high potential for roosting bats.

Within the woodland on the eastern boundary a mature hazel covered in ivy, three mature oaks and a mature beech tree were identified as having low to moderate potential for roosting bats.

All of the trees and hedgerows have foraging potential for bats, which may also use linear features for commuting between habitats and roost locations.



Figure 3. Mature tree covered in ivy.



Figure 4. Mature oak with large hole in the bark.

4.3 Breeding Birds

All of the hedgerows, dense scrub and woodland habitat have a high potential to support a variety of nesting birds. It will be essential for any future development to consider the nesting bird season and any vegetation removal or building demolition should be timed outside of the nesting bird season (1st March to 31st August) unless features are first hand search by a suitably qualified ecologist.

4.4 Dormice

There is suitable habitat within the site that could support dormice in the form of the woodland along the south and east boundaries, which is connected to a thin woodland strip



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that extends approximately 200m south of the site.

However, there are no other suitable areas that are connected to the site and therefore this small narrow woodland strip is isolated from the wider landscape, with no migrating corridors available. Typically dormice require 2hectares of connected suitable habitat to maintain a viable population in the long-term. There is a large parcel of ancient woodland approximately 195m to the north but Highfield Avenue and Highfield Close create a significant barrier against movement.

The site is disconnected from any surrounding woodland habitats in the wider landscape which makes the potential for dormice to be present within the site vegetation very low.

There are no records for dormice within 1 km of the site from the Hampshire Biodiversity Information Centre (HBIC).

4.5 Great Crested Newts

No waterbodies were identified within 500m of the site at Billett Avenue, Waterloooville. There is an underground culvert that runs north to south through the site but great crested newts are unable to breed in flowing water.

The value of the proposed construction zone for foraging newts is high with suitable woodland and scrub habitat around the boundaries as well as rubbish piles within the woodland that contain tree cuttings and compost. However due to a lack of water bodies in the area the likelihood of great crested newts being present is low.

There are no records for great crested newts within 1km of the site from the Hampshire Biodiversity Information Centre (HBIC).



Figure 5. The beginning of the culvert at the northern end of the site that runs north to south underneath the site.

4.6 Reptiles

The majority of the site is composed of poor semi-improved grassland surrounded by either a species-rich hedgerow, broad-leaved woodland or dense bramble scrub. The field could provide suitable foraging habitat for reptiles and the hedgerows, woodland and scrub are potentially suitable hibernating habitat.

Two records for slow worms were identified in the HBIC data search, with the most recent record in 2011 approximately 500m from the site.



Figure 6. Unmanaged species poor semi-improved grassland with bramble scrub to the north and woodland to the east.

4.7 Designated sites and wider Ecological Impact Significance

A search was undertaken on the MAgiC website resource (www.magic.gov.uk) and a 32 hectare ancient replanted woodland called the queen's inclosure is situated approximately 195m north of the Billet Avenue site. There is no suitable habitat connection between the ancient woodland and the survey site because Highfield avenue and Highfield close are in between and create a physical barrier to movement.

To the south of the site is a thin strip of Priority Habitat Inventory – Deciduous woodland which is surrounded by residential properties and isolated from any other suitable habitat.

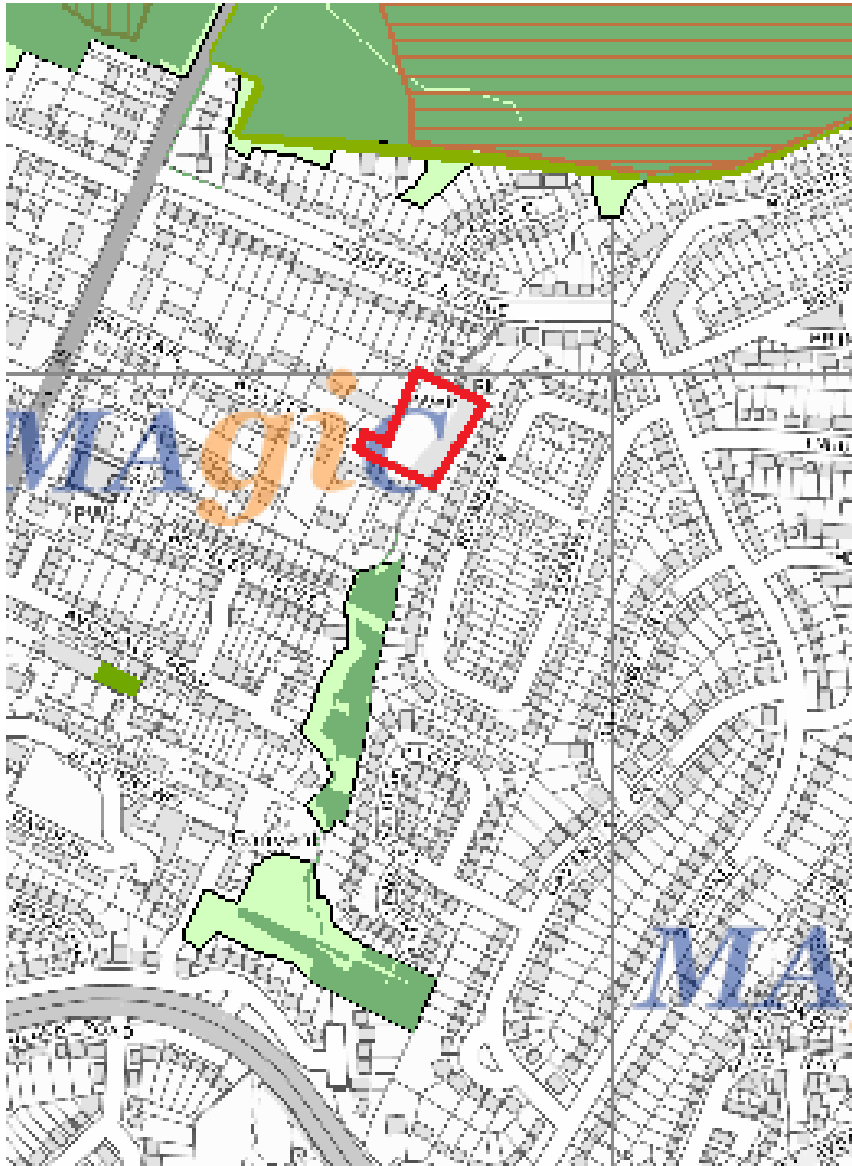


Figure 9. MAgiC map showing the site outlined in red, the ancient woodland to the north in green with brown lines and the priority habitat deciduous woodland to the south.

4.8 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.

In addition, a small area of the site could not be accessed due to dense brambles blocking the way. This area will need to be assessed on future site visits because a potential badger push through enters into it which means the area must be checked for possible evidence of badger activity.



5 DISCUSSION AND RECOMMENDATIONS

5.1 Preliminary Ecological Appraisal

The overall ecological value of the majority of the site is moderate to high, with unmanaged grassland, woodland and dense bramble making up the majority of the site.

5.2 Badgers

Two large mammal push-throughs were identified in the northwest corner of the site as well as some digging activity by mammals nearby. No signs of badger activity in the form of digging activity, latrines, footprints or badger hairs were identified during the assessment and no badger setts were found within the proposed construction zone.

One of the mammal push throughs heads towards a small section of the site that could not be accessed due to dense bramble.

The activity seen is more likely to be fox than badger due to most of the immediate surrounding habitat being residential dwellings however, as no evidence has been found to prove which species has created these push-throughs, at least three further site checks are recommended.

One site visit in early spring to include an assessment of the area that could not be previously accessed as well as sand and hair trapping of the two push throughs identified during this PEA, to be followed by a second check a week later to check the traps for foot prints and hairs. A third site visit should be conducted four weeks before works are due to commence to ensure that new badger setts have not been established unless evidence has already been found to prove that foxes are present and not badgers.

5.3 Bats

Nine mature trees were identified as having varying degrees of bat roosting potential all situated in the woodland areas along the south and east boundaries. It is more than likely that these areas of woodland will be retained but if any of the mature trees identified within the woodland habitat are to be removed then they should undergo an endoscope assessment before hand.

There is an area of hedgerow with some semi-mature trees in the southeast corner that borders the pathway leading up to the site that has been earmarked for removal – no trees within that area were found to have any features that would be suitable for roosting bats and can be removed if necessary.



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The site could be of value for foraging bats because the vegetative cover present around the site boundaries and the grassland field in the centre may support a variety of invertebrate prey. If the hedgerows or trees must be removed they should be replaced with new species-rich hedgerows elsewhere within the site as compensation, where there is sufficient space.

The site could also be part of a flight corridor with the broadleaved woodland strip to the south and the ancient woodland to the north.

As the proposed development is only four residential dwellings that will only impact the semi-improved grassland habitat the potential impact to foraging bats is low.

An assessment in line with Bat Conservation Trust guidelines suggests that the site has low suitability habitat for bats (this is taking into account the relative size of the site and development proposal) and therefore one survey visit per season is recommended in appropriate weather conditions for bats. The seasons are Spring (April/May), Summer (June, July and August) and Autumn (September/October).

All effort should be made to avoid removing any trees within the woodland boundaries that have been identified as having roosting potential for bats. If a tree with roosting potential is to be impacted, then an endoscope assessment is recommended before the tree is removed.

As the site has value for foraging bats, it is very important that the impacts of artificial lights are minimised where possible. In Appendix 2, guidelines produced by the Bat Conservation Trust are included and it is important that the development would have to strictly follow these guidelines.

5.4 Breeding Birds

All of the hedgerows, woodland and scrub habitat have potential to support a variety of nesting birds. It will be essential for any future development to consider the nesting bird season and any vegetation removal should be timed outside of the nesting bird season (1st March to 31st August) unless features are first hand searched by a suitably qualified ecologist.

5.5 Dormice

The site is disconnected from woodland habitats in the wider landscape and it is unlikely that dormice would be found at the site at any time despite there being suitable habitat within the proposed construction zone for this species, due to the small area of available suitable habitat.

No further surveys are considered necessary in this instance.



5.6 Great Crested Newts

No ponds were identified within 500m of the proposed construction zone with the only source of water being the culvert that runs north to south underneath the survey area.

The site has moderate terrestrial potential to support foraging great crested newts, however due to the lack of water bodies within the surrounding area it is unlikely that great crested newts will be present within this site. The culvert underneath the site is flowing water. Great crested newts cannot breed in flowing water.

No further surveys are recommended.

In the unlikely event that any newts are identified during the proposed work, an ecologist should be contacted immediately for advice.

5.7 Reptiles

The majority of the site is composed of poor semi-improved grassland surrounded by either species-rich hedgerow, broad-leaved woodland or dense bramble scrub. The field could provide suitable foraging habitat for reptiles and the hedgerows, woodland and scrub are potentially suitable hibernating habitat.

It is important that the use of the site by reptiles (if any) is understood, so that if necessary, an appropriate mitigation strategy can be produced for any future development. Mitigation strategies are designed according to both the species, population and distribution of reptiles and a presence/absence survey designed to gather this information is required.

A reptile presence/absence survey can be conducted between April and mid-October by placing a number of artificial refugia across the site (typically comprising of bitumen and/or corrugated metal sheeting), which are allowed to 'bed in' for a minimum of ten days before commencing the survey process. Seven surveys should be undertaken in the morning or late afternoon when the refugia have warmed in sunlight and the ambient air temperature is above 9 degrees Celsius. Surveys cannot be undertaken during periods of rainfall or strong winds and the optimal months for these survey are April, May and September.

5.8 Development Impact Assessment

This development is small in scale, with a proposal to erect four new residential dwellings, which would result in the loss of some coarse poor semi-improved grassland which is a low/moderate value habitat and a section of hedgerow with trees where the original pathway is in the southeast corner. This development could potentially impact reptiles, nesting birds,



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badgers and bats.

Due to the low impact likely to result from the construction of the four residential wellings, it is not expected to affect the ancient woodland approximately 195m north of the site.

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

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:



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- 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.



7 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, *Asio otus*. *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 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 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 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 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 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.