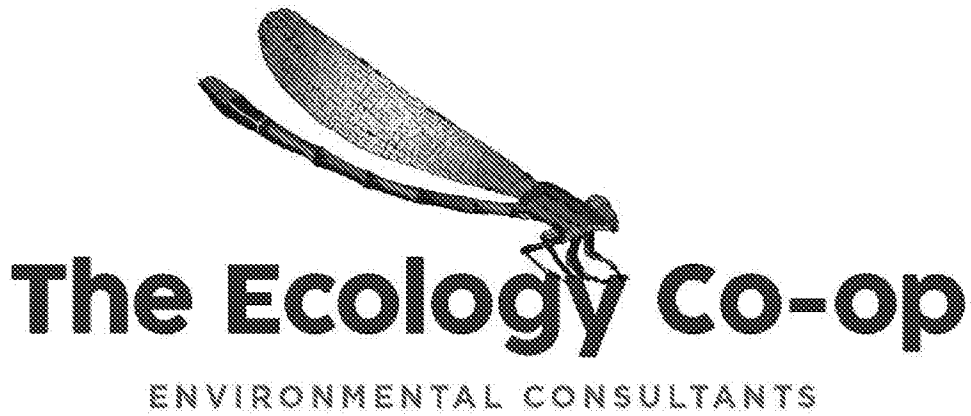




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Preliminary Ecological Appraisal, Phase 1 Habitat Assessment

Mayflower Way, Angmering

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Report Commissioned by: Crayfern Homes Ltd

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Report Summary

1. The Ecology Co-operation has been commissioned by Crayfern Homes Ltd to undertake a Phase 1 Habitat survey and Preliminary Ecological Appraisal at Mayflower Way, Angmering. A site walkover survey visit was carried out on the 17th August 2017, to evaluate the site for habitats potentially suitable to support EU and UK protected species. The purpose of this report is to record the findings of the survey and identify potential ecological constraints to a proposed new residential development.

2. This survey was undertaken by Sam Lunn BSc, MSc, ACIEEM.

3. The land at Mayflower Way, Angmering, which is situated to the south of Angmering and north of the A259 is approximately 2.2 acres and consists of ephemeral / short perennials growing on bare ground and hard standing with mixed parkland/scattered trees and species-poor hedgerow along the boundaries.

4. The habitats contained within the site have potential to support a reptile population and the boundary trees and hedgerow have potential to support common nesting birds. A reptile presence / absence survey has been recommended.

5. Enhancements to the site have been recommended in the form of new species-rich hedgerows as well as bat and bird boxes.

This report has been prepared by The Ecology Co-operation Ltd, with all reasonable skill, care and diligence within the terms of the Contract with the client. This report only becomes the property of the client once payment for it has been received in full.

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.



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1 INTRODUCTION

1.1 Purpose of the Report

This report gives details of a combined preliminary ecological appraisal and Phase 1 Habitat Survey for the potential presence or likely absence of protected species and or valuable habitats to be found at land on Mayflower Way, Angmering. The grid reference for the site centre is TQ072033.

Where necessary appropriate mitigation measures to protect wildlife as well as compensate for any potential harm to habitats of value that could take place are outlined.

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 Crayfern Homes Ltd.

1.2 Background

The Ecology Co-operation was commissioned to assess the current ecological value of land at Mayflower Way, Angmering, which is situated to the south of Angmering and north of the A259 (see Figure 1). The area of land surveyed is approximately 2.2 acres and consists of ephemeral/ short perennials growing on bare ground and hard standing with mixed parkland/scattered trees and species poor hedgerow along the boundaries.

The assessment was carried out further to a proposal to build a new residential development within the site boundaries.



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



1.3 Legal Protection of Protected Species

Legal protection applying to relevant bird, mammal, herpetofauna and invertebrate species and current nature conservation planning policy is outlined in Appendix 1 of this report.

2 METHODOLOGY

2.1 Phase 1 Habitat Survey

A phase 1 habitat survey¹ presents a standardised system for classifying and mapping wildlife habitats in all parts of Great Britain, including urban areas. The aim of Phase 1 survey is to provide, relatively rapidly, a record of the vegetation and wildlife habitats present over large areas of countryside. The habitat classification is based principally on vegetation, augmented by reference to topographic and substrate features, particularly where vegetation is not the dominant component of the habitat.

Data is gathered through a site walk-over survey and use of on-line aerial photography to broadly categorise the habitats present using the JNCC Phase 1 classifications. The results are presented as a map showing the distribution of habitat categories across the site. Target notes are used to describe particular features of biodiversity interest and record indicator species where appropriate. In addition to this, notable habitats, such as local and national Biodiversity Action Plan habitats are highlighted.

The Phase 1 Survey methodology is a recognised tool for initial scoping of potential ecological constraints and identifying potential impacts as part of the planning application process.

2.2 Preliminary Ecological Appraisal

In accordance with the Guidelines for Preliminary Ecological Appraisal², habitats and features at the site were also evaluated for their potential to support legally protected species and habitats during the Phase 1 walkover survey. In addition, observations of any important plant communities, bird assemblages or other potentially valuable ecological features are recorded.

Details of initial survey methods for each species are given below.

2.2.1 Badgers

Habitats within the site and surrounding areas were broadly assessed for their potential to support badgers. Any signs of badger activity, for example setts, footprints, latrines, well-worn paths, foraging marks in the survey area were recorded. The survey methodology followed that of Harris et al (1989).³

2.2.2 Bats

Bats can use a wide range of features including loft spaces, cavity walls, loose tiles, mortice joints and cracks/gaps in a variety of built structures. They can also be found in trees with holes, splits, cracks,

¹ JNCC (2010) *Handbook for Phase 1 habitat survey: A technique for environmental audit*. Joint Nature Conservation Committee, Peterborough.

² CIEEM (2013) *Guidelines for Preliminary Ecological Appraisal*

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



cavities, ivy and loose bark.

Trees, buildings, and other structures were broadly assessed for their potential to support roosting bats and further surveys are recommended as appropriate.

The potential for roosting bats for each feature, or group of features was assessed as either negligible, low, moderate or high, in accordance with best practice⁴. Any evidence confirming the presence of bats that was found was clearly recorded including photos and samples where appropriate.

2.2.3 Breeding Bird Habitat

The habitats contained within the site and adjacent areas were broadly assessed for their potential to support important bird species/assemblages, and breeding birds. . Any birds identified during the site visit were recorded. Particular attention was paid to notable species such as red-listed Birds of Conservation Concern⁵ and those species afforded special protection on Schedule 1 of the Wildlife and Countryside Act (1981).

2.2.4 Dormice

The site was broadly assessed for its potential to support hazel dormouse. This included use of on-line mapping resources to assess the surrounding area for connectivity to large blocks of woodland, scrub and extensive hedgerow networks. Further surveys are recommended as appropriate in accordance with best practice guidance⁶

2.2.5 Great Crested Newts

A desk study was undertaken to identify ponds within 500m of the site. Where access permission was granted, all ponds were assessed for their potential to support great crested newts using the Habitat Suitability Index (H.S.I.)⁷ in accordance with best practice guidance⁸. Further surveys are recommended as appropriate and limitations to this survey are clearly set out in Section 3.11.

2.2.6 Reptiles

Habitats on the site were broadly assessed for their potential to support reptiles. 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). The common lizard (*Zootoca vivipara*), slow-worm (*Anguis fragilis*) grass snake (*Natrix natrix*) and adder (*Vipera berus*) are widespread and smooth snake (*Coronella austriaca*) and sand lizard (*Lacerta agilis*) have more restricted and isolated populations.

⁴ Collins, J.(ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edn). The Bat Conservation Trust, London.

⁵ Eaton, M., Aebischer, N., Brown, A., Hearn, R., Lock, Leigh., Musgrove, A., Noble, D., Stroud, D., Gregory, R. (2015) *Birds of Conservation Concern 4: the population status of birds in the UK, Channel Islands and Isle of Man*. British Birds 108, pp 708-746.

⁶ Bright, P., Morris, P. and Mitchell-Jones, T. (2006) *The dormouse conservation handbook 2nd Ed*. English Nature, Peterborough.

⁷ 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.

⁸ English Nature (2001) *Great Crested Newt Mitigation Guidelines*. English Nature, Peterborough.



2.2.7 Riparian Mammals

Any watercourses identified during the desk study or field survey were assessed for their suitability to support otter, water vole and American mink.

2.2.8 Other notable species

The site habitats were broadly assessed for their potential to support species of principle importance for nature conservation (Section 41 NERC Act 2006) and other notable species. This includes mammals such as harvest mouse, hedgehog, brown hare and several bird species. The site was broadly assessed for its potential to support important invertebrate assemblages with particular attention paid to features such as standing dead-wood, wet flushes, bare earth banks and botanically rich areas.

2.3 Desk Study

A search for existing records of protected species, species of conservation concern and invasive non-native species was requested from the Sussex biological records centre within a radius of 1km of the site.

A search of on-line mapping resources was undertaken to identify the location of any features of potential ecological interest including ponds within 500m (great crested newts), watercourses (riparian mammals, crayfish) and connectivity to woodland, scrub and hedgerow networks (dormice and bats).

The MAGIC website resource (www.magic.gov.uk) was used to identify the location of designated sites for nature conservation and EPS licences granted in relation to the survey site.



3 RESULTS

3.1 Phase 1 Habitat Survey/site Context

This site includes an area of hard standing that extends from the gate on the east boundary west towards the centre of the site. The remainder of the site is comprised of ephemeral/short perennial flora upon bare earth and rubble, including several large piles of rubble over 3m high. Mixed scattered trees and species-poor hedgerow make up two of the boundaries, whilst the other two comprises various fences and a brick wall.

Table 1 details the habitats present within the site's boundaries. The public park to the west of the site supports a small pond.

Table 1. The habitats mapped at Mayflower Way, Angmering.

Habitat type	JNCC Code	Area(Ha)/ Length (meters)	Target note including general species composition
Mixed Parkland / scattered trees	A3.3	60m	Lining the south boundary are several cypress trees and three poplar (<i>Populus spp.</i>). There are large gaps in between some of the trees and they do not stretch the length of the southern boundary but start a third of the way in from the east.
Cultivated / disturbed land – ephemeral / short perennial	J1.3 [Grey with black crosses]	1.95 acres	This habitat covers the majority of the site and is dominated by bristly ox tongue (<i>Helminthotheca echinoides</i>) and thistles (<i>Asteraceae spp.</i>) as well as buddleja, sea mayweed (<i>Tripleurospermum maritimum</i>), willowherb (<i>Epilobium sp.</i>), common fleabane (<i>Pulicaria dysenterica</i>), common nettle (<i>Urtica dioica</i>), field bindweed (<i>Convolvulus arvensis</i>), smooth cat's ear (<i>Hypochaeris glabra</i>), common ragwort (<i>Jacobaea vulgaris</i>), spearmint (<i>Mentha spicata</i>), bird's foot trefoil (<i>Lotus corniculatus</i>), lesser burdock (<i>Arctium minus</i>), hogweed (<i>Heracleum sphondylium</i>), early forget-me-not (<i>Myosotis ramosissima</i>), creeping cinquefoil (<i>Potentilla reptans</i>), verbena (<i>verbena bonariensis</i>), teasel (<i>Dipsacus sp.</i>), ribwort plantain (<i>Plantago lanceolata</i>) and cowslip (<i>Primula veris</i>).
Intact hedge – species poor	J2.1.2	100m	This is entirely hawthorn (<i>Crataegus monogyna</i>) hedgerow that runs the length of the west boundary and connects with the scattered trees along the south boundary.
Fence	J2.4	140m in total	Fences run along the south, north and east boundaries comprising of wooden, metal and wire fencing including the metal access gate on the east boundary.
Wall	J2.5	40m	Brick wall that runs from the northeast corner south for 40m before tying in with the boundary fence.
Bare ground	J4 [Grey with black dots]	0.25 acres	Extending west from the access gate on the east boundary, the area is part hard standing, part bare earth and is surrounded by rubble piles to the north and south.

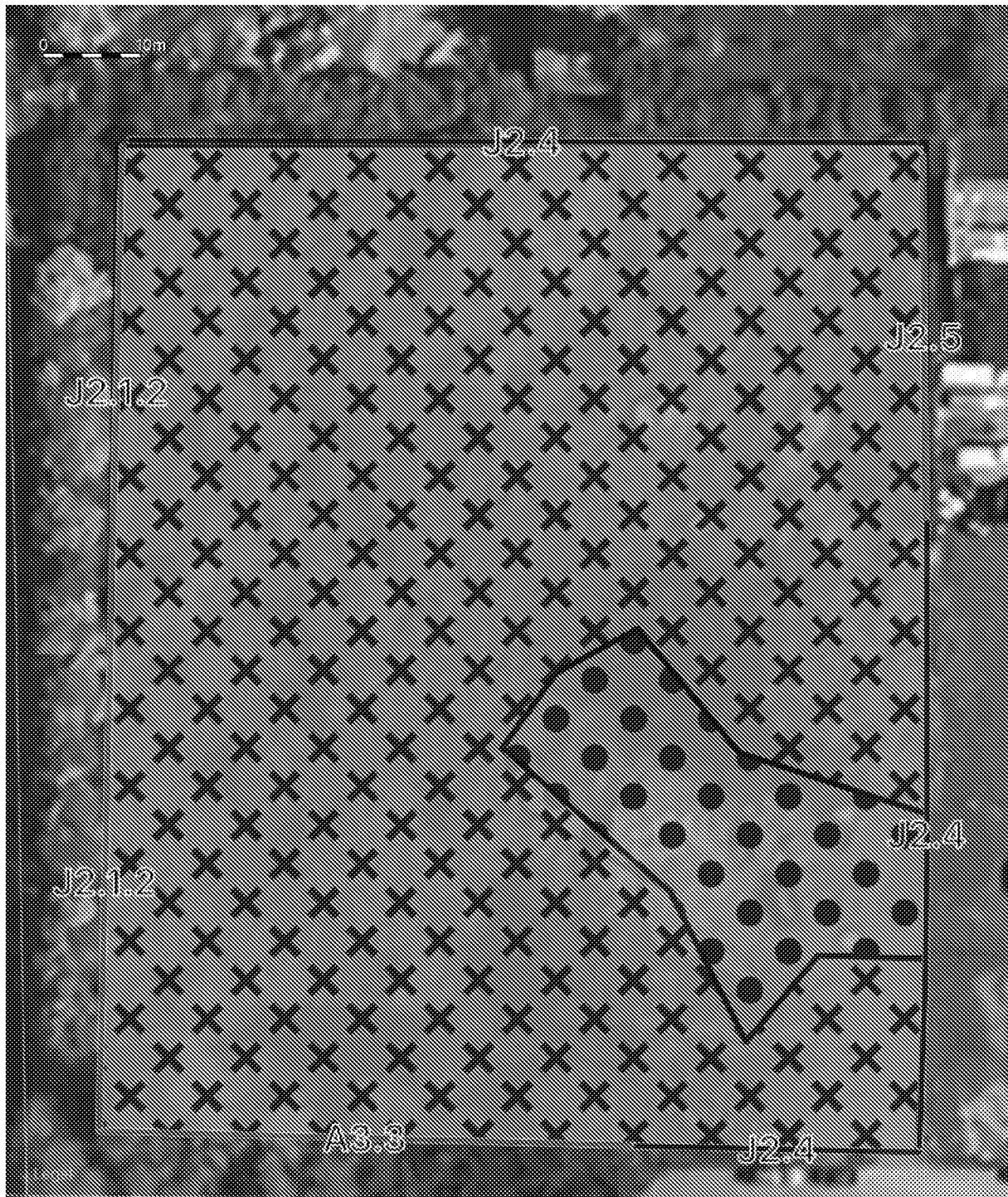


Figure 2. Phase 1 map of the Mayflower Way, Angmering site.



Polygons		
	J1.3	Cultivated/disturbed land - ephemeral/short perennial
	J4	Bare ground
Lines		
	A3.3	Mixed Parkland/ scattered trees
	J2.1.2	Intact hedge - species-poor
	J2.4	Fence
	J2.5	Wall

Figure 3. Key for Phase 1 habitat map.



Figure 4. Majority of the site comprised of ephemeral / short perennial.



Figure 5. Cypress trees along south boundary.



Figure 6. Bare ground extending west from east boundary.



Figure 7. Hawthorn hedgerow along west boundary viewed from outside site.

3.2 Preliminary Ecological Appraisal

3.2.1 Badgers

No signs of any badger activity were seen during the survey assessment, and there are no habitats of value for this species within the landscape. It is likely that if any setts were situated within 30 metres of the site boundary, then some evidence of badger activity would have been observed.

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

3.2.2 Bats

There are no built structures contained within the site. None of the trees within the site or along the boundaries support features that could be used by roosting bats.

There is limited foraging potential within the site with only Cypress, poplar and hawthorn trees along two boundaries and no connectivity to areas of higher foraging value.

The SxBRC data search identified serotine (*Eptesicus serotinus*), natterer's bat (*Myotis nattereri*), common noctule (*Nyctalus noctula*), common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistrellus pygmaeus*) and brown long-eared bat (*Plecotus auritus*) within 1km of the site.



3.2.3 Breeding Birds

The hedgerows and trees have the potential to support a variety of common nesting birds. The vegetation across the site is too young to support ground nesting birds having only established in the current year and no notable species have been identified within the SxBRC data search within 1km of the site.

3.2.4 Dormice

This arboreal species favours mixed broadleaved woodland, where there are clear sources of food for as long of their active season as possible (March to October). The site is situated close to urban development and the species-poor hedgerows and scattered trees are not ecologically connected to woodlands or a wider network of hedgerows. There are therefore no habitats of value within the site that could support a dormouse population.

The biodiversity records obtained from SxBRC found no records for dormice within 1km of the site.

3.2.5 Great Crested Newts

A single small pond was identified approximately 40m to the west of the site in the middle of a public park surrounded by gravel and short amenity grass. The pond is completely dominated by reed *typha latifolia* with an oily film over the water, potentially from the litter than has been thrown in in places. The pond was assessed as having 'below average' suitability for great crested newts (Figure 8). In addition, the SxBRC data search found no records for great crested newts within 1km of the site and the terrestrial habitat within the site is of low value to amphibians, based on the sparse vegetation cover and recent disturbance.

Habitat Suitability Index				SI value
SI1.	Map location	A/B/C	A	1.00
SI2.	Surface area	rectangle/ellipse/irregular	irregular	
		length (m)		
		width (m)		
		OR estimate (m ²) if irregular		
		area (m ²) =	300	0.60
SI3.	Dessication rate	never/rarely/sometimes/frequently	sometimes	0.50
SI4.	Water quality	good/moderate/poor/bad	poor	0.33
SI5.	Shade	% of margin shaded 1m from bank	5	1.00
SI6.	Waterfowl	absent/minor/major	minor	0.67
SI7.	Fish population	absent/possible/minor/major	possible	0.67
SI8.	Pond density	number of ponds within 1km	0	0.10
SI9.	Terrestrial habitat	good/moderate/poor/isolated	poor	0.33
SI10.	Macrophyte cover	%	100	0.80
Note: Guidance in undertaking the HSI is available at				HSI score = 0.51
HSI calculation formulae adapted from Rob Oldham				Pond suitability = below average

Figure 8. HSI score for pond 40m west of the site.



Figure 9. Pond approximately 40m to the west of the site.

3.2.6 Reptiles

Most of the site, comprised of disturbed land with ephemeral / short perennial species dominating the vegetation cover, is of low value to reptiles. The rubble piles and hedgerow boundary could provide some shelter for reptiles and rubble piles are often good sources of prey and shelter for common lizards. The presence of reptiles cannot therefore be completely discounted and the site is therefore assessed as having 'low' potential to support reptiles.

The biodiversity records obtained from SxBRC identified a single record for common lizard, slow worm and grass snake within 1km of the site with the most recent record from 1996.

3.2.7 Riparian Mammals

No suitable habitats that could support riparian mammals were present within the site. No further surveys are required.

3.2.8 Other notable species

No other notable species were identified within the site and no habitats of special interest were identified during the initial scoping survey.

3.2.9 Designated Sites and Wider Ecological Impact Significance

A search was undertaken on the MAgIC website resource (www.magic.gov.uk) and no designated sites were identified within 1km of the site.



Figure 9. MAGiC map showing no designated sites within 1km, site boundary in red.

3.3 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.

4 DISCUSSION AND RECOMMENDATIONS

4.1 Preliminary Ecological Appraisal

The overall ecological value of the site is low, with the majority of the site comprised of either bare ground or disturbed land with ephemeral / short perennial species dominating the area. The habitats of highest value are the boundary trees and hedgerow which could provide nesting bird potential and limited foraging potential for bats.

4.1.1 Badgers

No signs of badger activity were identified during the assessment and no badger setts are situated within the sites boundaries. There is limited suitable habitat within the wider landscape and therefore no further surveys are required.



4.1.2 Bats

There are no buildings within the site and none of the trees along the boundaries support any features that could potentially support roosting bats. In addition, there is low foraging value for bats in the form of the Cypress trees and hawthorn hedgerow along the south and west boundary. No further surveys are recommended.

Enhancements for bats should be incorporated into the new development in the form of new species-rich hedgerow along all possible boundaries.

As rural development always has the potential to impact upon bats and other wildlife that are sensitive to sources of artificial light, it is strongly recommended that light sources, within this proposed development are restricted where possible. Guidance from the Bat Conservation Trust is outlined in Appendix 2 and it is recommended that this advice is incorporated into the development.

4.1.3 Breeding Birds

All of the trees and hedgerow have a high potential to support a variety of common 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.

4.1.4 Dormice

There are no habitats within this site that have the potential to support a dormouse population and the site is not connected to any suitable habitats in the surrounding landscape.

No further surveys are recommended for this species.

4.1.5 Great Crested Newts

The proposed development site habitats are of low value to great crested newts, although rubble piles could provide shelter and foraging opportunities. The only pond within 250m of the site was also assessed as having 'below average suitability', and is surrounded by amenity grassland and bare gravel that has low value to great crested newts. There are no other ponds within 500m of the site and it is therefore considered unlikely that great crested newts will be found within the construction zone.

No records were identified within the SxBRC data search. Based on all available information, great crested newts are considered highly unlikely to be present at the site and no further surveys have been recommended.

4.1.6 Reptiles

The site has low suitability for reptiles with the ephemeral / short perennial vegetation providing limited foraging habitat and cover for reptiles, however there are rubble piles that could provide some limited shelter for common lizards and therefore reptile presence cannot be completely ruled out. The SxBRC data search identified a single record for common lizard, grass snake and slow worm.

Due to the site supporting some low potential suitable habitat for this species 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. Mitigation strategies are designed according to both the species, population and distribution of reptiles across the site and a reptile presence/absence survey is recommended to gather this information.

A reptile presence/absence survey can be conducted between April and mid-October by placing 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 this survey are April, May and September.

Should reptiles be identified at the site suitable mitigation would need to be outlined and put in place. This could include either an on-site receptor area or more likely given the habitat within the site, a reptile translocation to an off-site receptor area to ensure this group of species would not be injured or killed during earth removal by heavy machinery.

4.2 Development Impact Assessment

This development would see the loss of a large section of ephemeral / short perennial vegetation on disturbed land as well as the potential loss of some scattered mixed trees.

Enhancements to the site should include new species-rich hedgerow and the inclusion of bat and bird boxes attached to the new buildings or any mature trees within the site.

If any protected species are found during the proposed work, an ecologist must be contacted immediately for advice. Please do not hesitate to contact The Ecology Co-op.



APPENDIX 1 –PLANNING POLICY AND WILDLIFE LEGISLATION

Introduction

The following text is intended for general guidance only and does not constitute comprehensive professional legal advice. It provides a summary of the current legal protection afforded to wildlife in general and particular species. It includes current national planning policy relevant to nature conservation.

The ‘Birds Directive’, ‘Habitats Directive’ and ‘Natura 2000 Sites’.

The Council Directive 79/409/EEC on the Conservation of Wild Birds (“the Birds Directive”) sets a framework for the protection of wild birds. Under the directive, a number of provisions are made including the designation and protection of ‘Special Protection Areas’ (SPAs) – areas which support important bird populations, and the legal protection of rare or vulnerable species.

The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the “Habitats Directive”) directs member states of the EU to take measures to maintain favourable conservation status of important habitats and species. This requires the designation of a series of sites which contain important populations of species listed on Annex II of the directive. Together with ‘Special Areas of Conservation’ (SPAs), designated under the Birds Directive, SACs form a network across Europe of protected areas known as the ‘Natura 2000’.

Annex IV lists species in need of more strict protection, these are known as “European Protected Species (EPS)”. All bat species, common dormice *Muscardinus avellana*, otter *Lutra lutra* and great crested newts *Triturus cristatus* are examples of EPS that are regularly encountered during development projects.

The ‘Habitats Regulations’

The Conservation of Habitats and Species Regulations 2010 (the Habitats Regulations”) is the principle means of transposing the Habitats Directive and the Birds Directive, and updates the Conservation (Natural Habitats, &c.) Regulations 1994 (“the 1994 regulations”) in England and Wales.

‘Natura 2000’ sites receive the highest level of protection under this regulation which requires that any activity within the zone of influence of these sites would be subject to a Habitats Regulations Assessment (HRA) by the competent authority (e.g. planning authority), leading to an Appropriate Assessment (AA) in cases where ‘likely significant effects on the integrity of the site are identified.

For European Protected Species, Regulation 41 makes it a criminal offence to;

- Deliberately capture, injure or kill any such animal;
- Deliberately disturb wild animals of such species;
- Deliberately take or destroy their eggs (where relevant);
- Damage or destroy a *breeding or resting place* of such an animal;
- Possess, control, sell or exchange any live or dead animal or plant, of such species;
- Deliberately pick, collect, cut, uproot or destroy a wild plant of such species.

The Habitats Directive and Habitats Regulations provide for the derogation from these prohibitions for specific reasons provided certain conditions are met. An EPS licensing regime allows operations that would otherwise be unlawful acts to be carried out lawfully. Natural England is the licensing Authority and, in order to grant a license, ensures that three statutory conditions (sometimes referred to as the ‘three



derogation tests') are met:

- A licence can be granted for the purposes of "preserving public health or safety or for other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment" (Regulation 53 (2) (e)).
- A licence can be granted if "there are no satisfactory alternatives" to the proposed action.
- A licence shall not be granted unless the action authorised will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range.

Wildlife and Countryside Act (1981) as amended.

This remains one of the most important pieces of wildlife legislation in the UK. There are various schedules to the Act protecting birds (Schedule 1), other animals including insects (Schedule 5), plants (Schedule 8), and control of invasive non-native species (Schedule 9).

Under the Wildlife and Countryside Act (WCA) 1981, all wild birds (with the exception of those listed on Schedule 2), their eggs and nests are protected by law and it is an offence to:

- Take, damage or destroy the nest of any wild bird while it is in use or being built.
- Take or destroy the egg of any wild bird.
- Disturb any bird listed on Schedule 1, while it is nest building, or at a nest with eggs or young, or disturb the dependant young of any such bird.

Schedule 5 lists all non-avian animals receiving protection to a varied degree. At its strongest, the Act makes it an offence to intentionally kill, injure or take any wild animal listed on Schedule 5, and prohibits interference with places used for shelter or protection, or intentionally disturb animals while occupying such places. Examples of species with *full protection* include all EPS, common reptile species, water vole *Arvicola amphibius*, white-clawed crayfish *Austropotamobius pallipes* and Roman snail *Helix pomatia*. Other species are protected from sale, barter or exchange only, such as white letter hairstreak *Satyrion w-album*.

The Act makes it an offence to intentionally pick, uproot or destroy any plant or seed, and sell or possess any plant listed on Schedule 8. It is also an offence to intentionally uproot any wild plant not listed on Schedule 8 unless authorised [by the land owner]. Species on Schedules 5 and 8 are reviewed every 5 years when species can be added or removed.

Measures for the prevention of spreading non-native species which may be detrimental to native wildlife is included in the Act, which prohibits the release of animals or planting of plants into the wild of species listed on Schedule 9 (for example Japanese knotweed *Fallopia japonica*, Himalayan balsam *Impatiens glandifera*, New Zealand Pygmyweed *Crassula helmsii*).

The Wildlife and Countryside Act 1981 (as amended) also prohibits certain inhumane methods of traps and devices for the capture or killing of wild animals and certain additional methods such as fixed trap, poisoning with gas or smoke, or spot-lighting with vehicles for killing species listed on Schedule 6 of the Act (this includes all bat species, badger, otter, polecat, dormice, hedgehog and red squirrel).

Natural Environment and Rural Communities (NERC) Act (2006)

The NERC Act (2006) places a statutory duty under Section 40 on all public bodies, including planning authorities, to take, or promote the taking by others, steps to further the conservation of *habitats and species of principal importance for the conservation of biodiversity* in England (commonly referred to as the 'Biodiversity Duty'). This duty extends to all public bodies the biodiversity duty of Section 74 of the Countryside and Rights of Way (CROW) Act 2000, which placed a duty only on Government and



Ministers. Section 41 lists the habitats and species of principle importance. This includes a wide range of species from mosses, vascular plants, invertebrates through to mammals and birds. It originates from the priority species listed under the UK Biodiversity Action Plan (UK BAP) with some omissions and additions.

Protection of Badgers Act (1992)

The Badger *Meles meles* is afforded specific legal protection in Britain under the Protection of Badgers Act (1992), and Schedule 6 of the Wildlife and Countryside Act 1981 (as amended) (see above).

Under this legislation, it is a criminal offence to:

- intentionally 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.

A licence may be obtained from Natural England to permit certain prohibited actions for a number of defined reasons including interference of a sett for the purpose of development, provided that a certain number of conditions are met. Note that licenses are not normally granted for works affecting badgers between the end of November and the start of July.

National Planning Policy Framework

The National Planning Policy Framework (NPPF 2012) sets out the Government's view on how planners should balance nature conservation with development and helps ensure that Government meets its biodiversity commitments with regard to the operation of the planning system.

The NPPF states that the wider benefits of an ecosystem should be recognised and the presence of a protected species is a material consideration for a development proposal (Circular 06/2005, 2005).

UK Post-2010 Biodiversity Framework

The UK Biodiversity Action Plan (UK BAP), published in 1994, was the UK's response to the commitments of the Rio Convention on Biological Diversity (1992). The UK BAP was replaced by the UK Post-2010 Biodiversity Framework. This framework covers the period 2011 to 2020 and forms the UK government's response to the new strategic plan of the United Nations Convention on Biodiversity (CBD) published in 2010. This promotes a focus on individual countries delivering target for protection for biodiversity through their own strategies.

The most recent biodiversity strategy for England, 'Biodiversity 2020: A strategy for England's wildlife and ecosystem services' was published by Defra (2011), and a progress update was provided in July 2013 (Defra 2013).

'Biodiversity 2020' builds on the Natural Environment White Paper for England – 'The Natural Choice', published on 7 June 2011, and sets out the strategic direction for biodiversity policy for the next decade. Biodiversity 2020 deliberately avoids setting specific targets and actions for local areas because Government believes that local people and organisations are best placed to decide how to implement the strategy in the most appropriate way for their area or situation.

Birds of Conservation Concern (BoCC)

In 1996, the UK's leading non-governmental bird conservation organisations reviewed the conservation status of all bird species in the UK against a series of criteria relating to their population size, trends and relative importance to global conservation. The lists, known as the 'Red', 'Amber' and 'Green' lists (in order of decreasing concern) are used to inform key conservation policy and decisions. The lists are reviewed every 5 years and are a useful reference for determining the current importance of a particular



site for birds. The most recent review was undertaken in 2015 (Eaton et al, 2015), which provides an up to date assessment of the conservation status of birds in the UK.

References

- Circular 06/2005 (2005). *Government Circular: Biodiversity and geological conservation – statutory obligations and their impact within the planning system*. Office of the Deputy Prime Minister, London.
- Countryside and Rights of Way (CROW) Act* (2000). HMSO London.
- Defra (2011) Biodiversity 2020: A strategy for England's wildlife and ecosystem services. Available at: <https://www.gov.uk/government/publications/biodiversity-2020-a-strategy-for-england-s-wildlife-and-ecosystem-services>. [Accessed July 2014]
- Defra (2013) Progress Update. Available at: <https://www.gov.uk/government/publications/biodiversity-2020-simple-guide-and-progress-update-july-2013>. [Accessed July 2014]
- Eaton, M., Aebischer, N., Brown, A., Hearn, R., Lock, L., Musgrove, A., Noble, D., Stroud, D., and Gregory, R. (2015) Birds of Conservation Concern 4: the population status of birds in the UK, Channel Islands and Isle of Man. *British Birds* 108 • December 2015 • 708–746
- Natural Environment and Rural Communities Act (2006). HMSO London.
- Wildlife and Countryside Act (WCA) (1981). HMSO London.



5 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

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:

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)

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 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

