



Unit 4, Langham Stables, Langham Lane, Lodsworth, Petworth, West Sussex, GU28 9BU

Tel: 01798 861 800 – E-Mail: info@ecologyco-op.co.uk – www.ecologyco-op.co.uk

Preliminary Ecological Appraisal, Phase 1 Habitat Assessment

**Land at Wandleys Farm, Wandleys Lane,
Walburton, West Sussex**

Author: Jess Burkitt BSc, Grad CIEEM

Reviewed by: Paul Whitby BSc, MCIEEM, CEcol

4th October 2017

Project No: 2265

The Ecology Co-operation Ltd
Registered Office: Greens Court, West Street, Midhurst, West Sussex, GU29 9NQ
Company number: 8905527



Report Summary

- 1. A combined Phase 1 Habitat Survey and Preliminary Ecological Appraisal was undertaken for land at Wandleys Farm on the 14th of February 2017. This assessment was undertaken to evaluate the site for the potential of protected species and or valuable habitats at the request of Mr and Mrs Lillywhite, who wish to make a planning application to build 5 residential properties on this land.**
- 2. This assessment was undertaken by Jess Burkitt a Graduate member of Chartered Institute for Ecology and Environmental Management (CIEEM).**
- 3. The site is made up of a large field of species poor grassland with species-poor and species-rich hedgerows with trees surrounding the site along with some dense scrub patches.**
- 4. The site has potential to support nesting birds, reptiles, great crested newt, dormice, and bats. Further surveys for these species have been outlined in section 4.**
- 5. In addition, if any protected species are found during the proposed work, an ecologist must be contacted immediately for advice.**

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



CONTENTS PAGE

1 INTRODUCTION	4
1.1 Purpose of the Report	4
1.2 Background	4
1.3 Legal Protection of Protected Species	6
2 METHODOLOGY	6
2.1 Phase 1 Habitat Survey	6
2.2 Preliminary Ecological Appraisal	7
2.2.1 Badger.....	7
2.2.2 Bats.....	7
2.2.3 Breeding Bird Habitat.....	8
2.2.4 Dormice.....	8
2.2.5 Great Crested Newt	8
2.2.6 Reptiles	8
3 RESULTS.....	8
3.1 Phase 1 Habitat Survey/site Context.....	8
3.2 Preliminary Ecological Appraisal	13
3.2.1 Badgers.....	13
3.2.2 Bats.....	13
3.2.3 Breeding Birds.....	15
3.2.4 Dormice.....	16
3.2.5 Great Crested Newts.....	16
3.2.6 Reptiles	17
3.2.7 Designated Sites and Wider Ecological Impact Significance.....	17
3.3 Constraints/Limitations	18
4 DISCUSSION AND RECOMMENDATIONS.....	18
4.1 Preliminary Ecological Appraisal	18
4.1.1 Badgers.....	18
4.1.2 Bats.....	19
4.1.3 Breeding Birds.....	19
4.1.4 Dormice.....	19
4.1.5 Great Crested Newts.....	20
4.1.6 Reptiles	21
4.2 Development Impact Assessment.....	21
5 Appendix 1 – Legislation and Policy	22
6 Appendix 2 - Artificial Lighting and Wildlife	23



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 or likely absence of protected species and or valuable habitats to be present at Land at Wandleys Farm, Wandleys Lane, Fontwell, West Sussex. The grid reference for the site is SU 953 065.

Where necessary appropriate mitigation measures considered necessary 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 Jess Burkitt, a Graduate member of the Chartered Institute for Ecology and Environmental Management (CIEEM).

This survey and report was carried out and produced at the request of Mr and Mrs Lillywhite.

1.2 Background

The Ecology Co-operation was commissioned to assess the current ecological value of Land Wandley's Farm, which is situated just off Wandley's Lane in Walberton, Chichester (see Figure 1). The site is made up of a large field of species poor semi-improved grassland and species-rich and species-poor hedgerows with trees surrounding the site. There are dense scrub patches along the eastern boundary of the land. It is proposed to build 5 residential properties within the site shown in figure 1.

This report describes the results of a preliminary ecological appraisal for the potential presence or likely absence of protected species and the results of a Phase 1 Habitat survey. 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.

A phase 1 Habitat Map has been provided to show all of the habitats within the site proposed for development that could be potentially affected through the construction process.



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

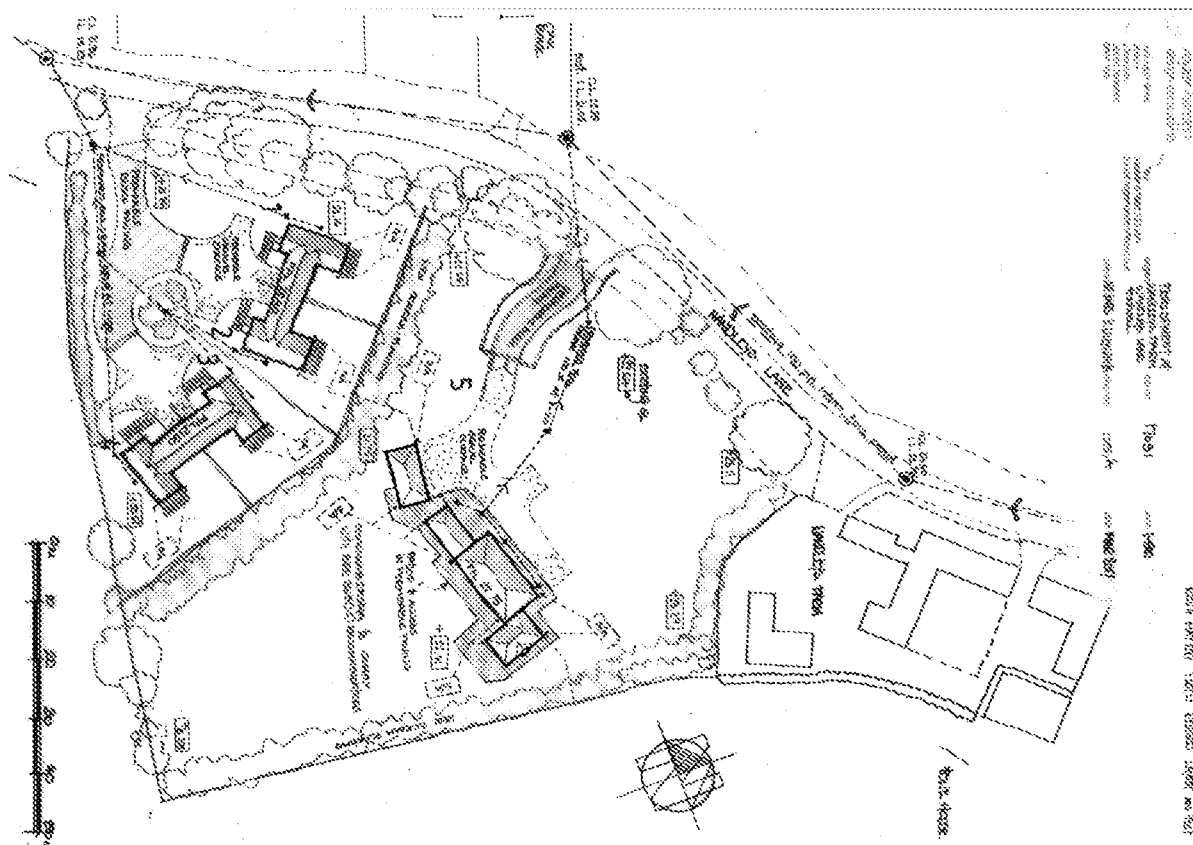


Figure 2. The proposed development on the land at Wandleys Farm.

1.3 Legal Protection of Protected Species

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

2 METHODOLOGY

2.1 Phase 1 Habitat Survey

A phase 1 habitat survey 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 habitat¹.

Data is gathered through walking over a site and physically describing the dominating habitats present taking note of species compositions of these habitats and making target notes for any important features identified. In addition to this, notable habitats, such as local and national Biodiversity Action Plan habitats are described where appropriate.

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



Finally, the results are presented as a map which is provided within this report to show all of the habitats within the site proposed for development that could be potentially affected through the construction process.

2.2 Preliminary Ecological Appraisal

A preliminary ecological appraisal was carried out on 14th February 2017 to evaluate the site for its potential to support EU and UK protected species. Taking into consideration the geographical region and habitat type, species that could be encountered are:

- Badger (*Meles meles*)
- Bats;
- Nesting birds;
- Hazel dormouse (*Muscardinus avellanarius*);
- Great crested newt (*Triturus cristatus*); and
- Reptiles;

In addition, observations of any important plant communities or other valuable ecological features will have been recorded and detailed.

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 present²³⁴⁵⁶⁷. 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 and species within a 2km radius of the site. These were obtained from the Sussex Biodiversity Record Centre.

2.2.1 Badger

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

2.2.2 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

² Bright, B., Morris, P., Mitchell-Jones, A.J. and Mitchell-Jones, T (1997) *The Dormouse Conservation Handbook*. English Nature.

³ English Nature (2001) *Great Crested Newt Mitigation Guidelines*. English Nature, Peterborough.

⁴ Harris, S, Cresswell, P. and Jefferies, D. (1989) *Surveying Badgers*. Mammal Society.

⁵ 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.

⁶ Collins, J.(ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edn). The Bat Conservation Trust, London.

⁷ CIEEM (2013) *Guidelines for Preliminary Ecological Appraisal*



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.

2.2.3 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*).

2.2.4 Dormice

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

2.2.5 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 meters that are not isolated from the site by unsuitable habitat or physical barriers, then this species could be using terrestrial habitat on the site.

2.2.6 Reptiles

The site was assessed for reptiles with the following three species widespread; common lizard (*Zootoca vivipara*), slow-worm (*Anguis fragilis*) and grass snake (*Natrix natrix*), with adder (*Vipera berus*) having a more restricted distribution and smooth snake (*Coronella austriaca*) and sand lizards (*Lacerta agilis*) having restricted and isolated populations. 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 RESULTS

3.1 Phase 1 Habitat Survey/site Context

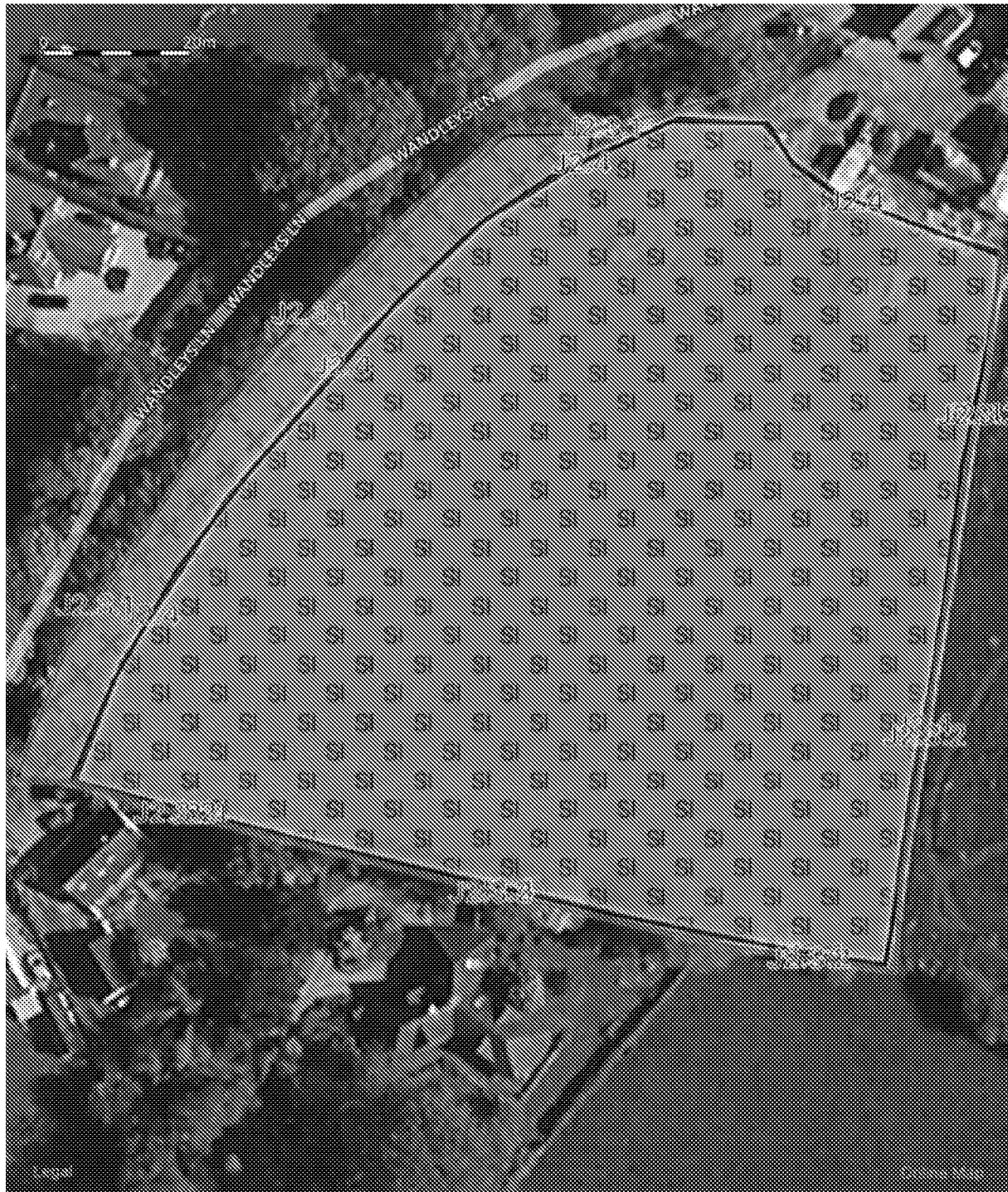
The majority of the site is species poor grassland with species-rich and species-poor hedgerows with trees, dense bramble scrub and a wooden post and wire fence line running along the east and north boundaries and a post and rail fence line along the west and south boundaries of the site.

Whilst this survey only details the habitats present within the sites boundaries, some adjacent habitats have also been described below.

Table 1. The habitats mapped at Land Wandleys Farm.



Habitat type	JNCC Code	Area(Ha)/ Length (meters)	Target note including general species composition
Poor semi-improved grassland	B6	0.96 Ha	The grassland within the site is species-poor semi-improved grassland that is short towards the southern boundary but gets longer towards the northern section of the site. Species identified include Yorkshire fog (<i>Holcus lanatus</i>), common sorrel (<i>Rumex acetosa</i>), white clover (<i>Trifolium repens</i>), creeping buttercup (<i>Ranunculus repens</i>), common thistle (<i>Cirsium vulgare</i>), ribwort plantain (<i>Plantago lanceolata</i>), mosses, and ragwort (<i>Jacobaea vulgaris</i>).
Hedge with tree- Species-rich	J2.3.1		Along the eastern boundary running along Wandleys Lane is species-rich hedgerow consisting of holly (<i>Ilex aquifolium</i>), ivy (<i>Hedera helix</i>), dense bramble (<i>Rubus fruticosus</i>) scrub, field maple (<i>Acer campestre</i>), three mature oak (<i>Quercus spp.</i>), ash (<i>Fraxinus excelsior</i>), hazel (<i>Corylus avellana</i>), hawthorn (<i>Crataegus monogyna</i>), sycamore (<i>Acer pseudoplatanus</i>), willow, and cherry laurel (<i>Prunus laurocerasus</i>).
Fence	J2.4		Wooden posts and rabbit wire fencing run along the northern and eastern boundaries. A post a rail fence line runs along the southern and western boundaries of the site.
Hedge with trees- Species-poor	J2.3.2		The northern and western boundary of the site are made up of species-poor hedgerows. The northern boundary consists of hawthorn, bramble, ivy, field maple, hazel, and ash. The western boundary is comprised of young hawthorn trees with some oak and sycamore.
Scrub-scattered	A2.2	0.09 Ha	A strip of dense scrub scattered along the eastern boundary of the site comprising of bramble, hawthorn, blackthorn (<i>Prunus spinosa</i>) common nettle (<i>Urtica dioica</i>) and ivy. The scrub has grown into the hedgerow and around some of the mature trees along the boundary.



10

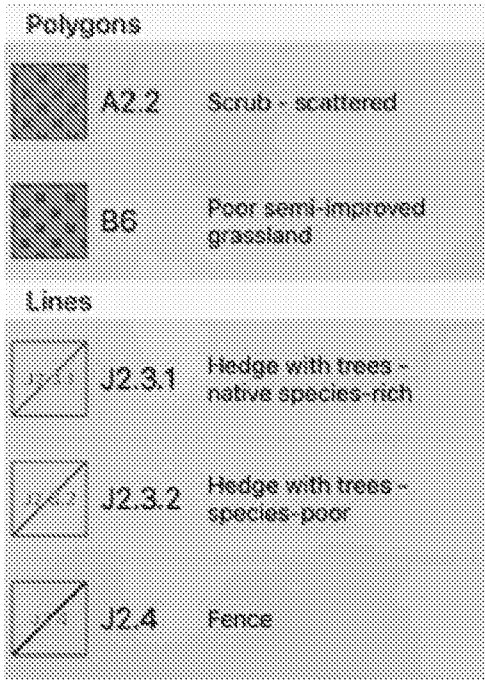


Figure 4. Key for Phase 1 habitat map for Land Wandley's Farm.



Figure 5. A view of the across site to the north.



Figure 6. The hedgerow running along Wandleys Lane on the eastern boundary.



Figure 7. The western boundary of the site.



Figure 8. The northern boundary of the site.

3.2 *Preliminary Ecological Appraisal*

3.2.1 Badgers

No signs of any badger activity were seen during the survey assessment, though there are 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

A number of mature trees were identified to have potential to support roosting bats within the site. Four mature oak trees and one mature hawthorn tree have moderate bat roosting potential due to the presence of broken limbs, cracks and holes along with being covered in ivy (see Figures 9 and 10).

In addition, the hedgerows and trees along the boundaries of the field within the site could all act as commuting and foraging habitat for bats in the area (Figure 11).

Records identified within the Sussex Biodiversity Record Centre (SxBRC) dataset show that the following species were recorded within 2km of the site. Western barbastelle bats in as recent as 2015, 2014 and 2013, serotine bats in 2004, 2010 and 2013, myotis bats in 1986, alcathoe bats in 2013, bechstein bats



in 2006, brandts bats in 2013, whiskered bats in 2013, natterers bats in 2013, 2010 and 2006, pipistrelle bats in 2015, 2014, 2013, common pipistrelle in as recent as 2015, 2013 and early as 1984, soprano pipistrelle bats as recent as 2015, long-eared bats in 2015, 2013 and 2007, and brown long-eared bats in 2014, 2013, 2010 and as early as 1986.



Figure 9. One of the mature oak trees along the eastern boundary with bat roosting potential.



Figure 10. A large mature oak with cracks and broken limbs.

3.2.3 Breeding Birds

All of the scrub, hedgerows, trees have the potential to support a variety of common nesting birds. There is little potential for ground nesting birds, largely owing to a lack of suitable ground cover.

Records from SxBRC show barn owls and tawny owl identified within 2km of the site as early as 1997 and as recent as 2012.



Figure 11. The hedgerow along the eastern boundary.

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). There is some potentially suitable habitat for dormice within the site and wider landscape. The eastern and northern boundaries of the site are species poor but offer the best connectivity to Wandleys Copse which is 2.3 hectares in size and designated as Ancient woodland. There is dense scrub, hazel, hawthorn and oak along the eastern boundary which provide suitable foraging habitat for this species.

Numerous records from SxBRC show dormice are present within 2km of the site, with most of the records identified in Potwell Copse as early as 2006 and as recent as 2011. There is one record of dormice presence within Wandleys Copse in 2004.

3.2.5 Great Crested Newts

No ponds were identified within the site during the survey however an assessment of background mapping and aerial imagery identified two ponds located within 500m of the site boundary (see Figure 12). Pond 1 is located within land adjacent to Wandleys Farm, 65m away from the site boundary and Pond 2 is located within land in close proximity of Wandleys Copse, 134m away from the site boundary. Access for both ponds at the time of the survey was unavailable.

No records for great crested newt were identified within the SxBRC dataset. Records for palmate and smooth newt were identified by SxBRC at Wandleys Farm with the most recent record being from 2009.



Figure 12. The location of the two ponds outlined in blue in relation to the site outlined in red.

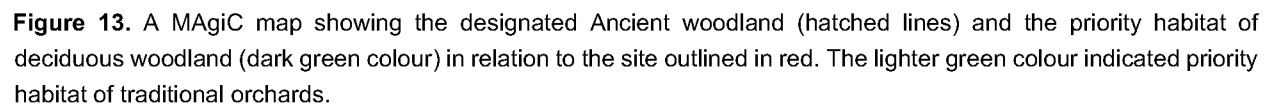
3.2.6 Reptiles

The site is suitable for reptiles with rough grassland in the northern half of the site, the field edges and the surrounding hedgerows of the entire site (see Figures 6 and 7). There is suitable habitat in the field adjacent to the site where reptiles could commute easily between the two sites. There is dense scrub in patches along the eastern boundary and thick grassy patches along the western boundary that could provide cover for foraging reptiles.

Records for slow worm, grass snake and common lizard were identified within 2km of the site with records as early as 1989 and as recent as 2011 and 2014.

3.2.7 Designated Sites and Wider Ecological Impact Significance

A search was undertaken on the MAgiC website resource (www.magic.gov.uk) and Wandleys Copse was identified 218 metres away from the site boundary and it is designated both as ancient woodland and as a priority habitat of deciduous woodland (see Figure 13). There are no statutory designated sites located within 2km of the site.



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.

4.1 Preliminary Ecological Appraisal

4.1.1 Badgers

No signs of badger activity were identified during the assessment and no badger setts are situated within the sites boundaries. Although, there are habitats of value for this species within the wider landscape. However, if any signs of digging by large animals were identified within or near to the sites boundaries prior to construction then an ecologist should be contacted for advice.



4.1.2 Bats

A number of mature trees were identified to support roosting bats within the site. There are three mature oak trees and one hawthorn that have moderate bat roosting potential that are also covered in dense ivy that could support solitary roosting bats or obscure suitable roosting features.

Records for the rare barbastelle and bechsteins bats were returned within the 2km biodiversity records search produced by SxBRC. Further to the identification of these records, a consultation was made with BatCRU, who undertook monitoring surveys of barbastelle bats within the area surrounding Slindon in 2015 and identified flight lines used by these bats approximately 1km to the north.

In order to accurately assess the use of the site by foraging and commuting bats, three activity surveys will need to be undertaken across the seasons of spring, summer and autumn by two surveyors. Also, the trees suitable for roosting bats will be monitored during the three activity surveys. Additionally, bat loggers must be deployed within the site for a week at a time for three separate weeks spread across these seasons. This information will establish the value of any habitats present for foraging bats, whilst the importance of any commuting features, such as hedgerows can also be identified.

It is likely that as a rural development, any residential proposal will need to incorporate a sensitive scheme for artificial lighting, so that the impact of light upon bats and other wildlife is minimized where possible. In Appendix 2, guidelines produced by the Bat Conservation Trust are included and it is likely that the development would need to strictly follow these guidelines.

4.1.3 Breeding Birds

All of the hedgerows and scrub habitat has 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.

4.1.4 Dormice

Habitat suitable for dormice is present both surrounding the site and within the site boundary. The site includes scrub patches, hedgerows with trees and good connectivity to the wider landscape where there are numerous records for dormice presence. Due to this connectivity, it is considered that the site has potential to support a population of dormice. Further surveys are therefore recommended to establish presence or likely absence of the species.

Due to the small size of the site it is unlikely that any more than that 20 nest tubes, spaced 15-20 metres apart, within potentially suitable habitat can be established. Dormouse surveys should be carried out over a number of months, usually between April and November. Each month of the year is given a score of suitability and a survey effort of up to 21 points will need to be achieved throughout the course of the year for a suitable survey effort to be achieved.

A hazel nut search will also be included in the survey to identify if any nuts have been opened by dormice.



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

Figure 14. The scoring for dormouse survey months.

Typically 50 dormouse nest tubes would be used across a six month period in order to establish the likely presence or absence of dormice according to best practice guidance. Because of the small amount of available habitat present, a reduced number of nest-tubes, coupled with a search of hazelnuts and a direct hand search of the hedgerow is considered suitable in this instance.

If dormice are identified during the survey process, then a European Protected Species Licence would likely be required for the removal or disturbance of any habitats that could be used by this species such as scrub or hedgerows.

4.1.5 Great Crested Newts

No ponds were identified on the site during the survey process however two ponds were identified within 500m of the site, with Pond 1 65m away and Pond 2 134m away from the site boundary (Figure 12). The site has low potential to support great crested newts due to the lack of suitable habitat within the site boundaries, however it is possible that great crested newts could commute across the site when travelling to and from ponds for breeding. The ponds were surveyed previously in 2009 by SJM Ecology (a copy of this report was provided by the landowners) and great crested newt presence was not identified in either of the ponds. Pond 1 was noted to have an 'exceptional population' of smooth newt and some palmate newts and Pond 2 was devoid of newts.

Therefore, it is recommended that a Habitat Suitability Index assessment (HSI) is carried out on both ponds to gauge the current suitability to support a population of great crested newts. If the ponds are deemed suitable (i.e. there has not been a significant change in their condition) then an environmental DNA (eDNA) assessment will be carried out on both ponds. An eDNA assessment is made by taking water samples from a pond between mid-April and the end of June and sending the samples to a laboratory for assessment for the presence of great crested newt DNA. If great crested newt DNA is identified, then a population assessment would be required in order to apply for a European Protected Species Licence to permit any development of this site.

The population survey would follow best practice guidelines as described within Natural England's 'Great Crested Newt Mitigation Guidelines'. In accordance with these guidelines, six surveys are carried out on evenings when the ambient temperature is not less than 5 degrees Celsius between mid-March and mid-June, with three surveys being carried out between mid-April and mid-May. This timing ensures the surveys are carried out when newts are most likely to be breeding, thus maximising the potential to identify newt presence and establish a population.



In the event that great crested newts are found to be present, a suitable mitigation strategy would need to be produced that outlines how the newt population will be protected either throughout the development process.

4.1.6 Reptiles

The site is suitable for reptiles with long grassland in the north of the site, the field edges and the scrub along the hedgerows. There are no barriers to movement between the site and the field adjacent to it and resultantly reptiles would be able to migrate to colonise the suitable habitat with the sites boundaries (Figure 7). It is recommended that a presence/absence survey is carried out at this site owing to the presence of potentially suitable habitat and records for slow worm, common lizard and grass snake within the surrounding landscape.

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 thus survey are April, May and September.

Should reptiles be identified at the site suitable mitigation would need to be outlined and put in place.

4.2 Development Impact Assessment

This development would see the loss of the majority of the species poor grassland along with some species-poor hedgerow and scrub due to the creation of new site access from the adjacent road. Opportunities exist to offset the impacts of developing the site through the planting of native species-rich hedgerows and enhancement of new and existing habitats, particularly bat roosting and bird nesting potential. A mitigation Statement could be produced as part of a planning condition to demonstrate how wildlife will be protected and biodiversity could be enhanced through the development proposals.

If any protected species are found during the proposed work, an ecologist must be contacted immediately for advice.

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



5 Appendix 1 – Legislation and Policy

General

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

Badger

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

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

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

Bats, Dormouse and Great Crested Newt

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

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

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

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

Reptiles

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



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

Nesting Birds

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

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

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

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

Roman Snails

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

6 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 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

