



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

Phase 2 Ecology Surveys

Land South of Arundel Road, Fontwell

Rev 03

Authors: Sophie Bradfield BSc

Kristina Lewis BSc, MSc, MCIEEM

Reviewed by: Paul Whitby BSc, MCIEEM, CEcol

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The Ecology Co-operation Ltd

Registered Office: Greens Court, West Street, Midhurst, West Sussex, GU29 9NQ

Company number: 8905527



Report Summary

1. Crayfern Homes instructed the Ecology Co-op to undertake a Phase 1 Habitat survey and Preliminary Ecological Appraisal on an area of land to the south of Arundel Road, Fontwell. A site walkover survey visit was completed on the 29th March 2018 and based on the findings of this assessment presence/absence surveys for reptiles and dormice and a Habitat Suitability Index (HSI) assessments for great crested newts were recommended, together with activity transect and static logger surveys for bats and a tree climbing inspection of trees with bat roosting potential. This report presents the findings of these surveys, which were carried out between May and September 2018.

2. The site is approximately 1.3 hectares in area and comprises of rough grassland, scrub, standard trees, a large area of recently cleared woodland and a small hazel dominated woodland in the southwest of the site. The landowners undertake occasional woodland management at the site, which has a designation of 'Deciduous Woodland' on the Natural England 2014 Woodland Inventory and the broadleaved woodland on the site is a Habitat of Principal Importance (HPI) under the Natural Environment and Rural Communities (NERC) Act. In addition, a number of standard mature pedunculate oak trees on the site are subject to a group Tree Protection Order (TPO) by Arun District Council. A number of ancient woodland indicator plants are present including wild daffodil, snowdrop and spindle. The proposed development is create an access road from Arundel Road in the north and construct 8 large residential dwellings with associated garages, driveways, gardens and associated soft and hard landscaping.

3. Habitat suitability index (HSI) assessments and environmental DNA surveys for great crested newts at ponds within 250m from the site did not reveal evidence of their presence and no further surveys are considered necessary with respect to these species. The surveys for reptiles indicated a high population of slow worms present on site and a mitigation strategy will be required, including an off-site reptile translocation to prevent killing and injury of reptiles.

4. The surveys confirmed the presence of hazel dormouse in the hedgerows, tree-lines around and scrub within the site with dormice individuals and/or their nests recorded in one bird box and ten nest tubes. The potential impacts on this European Protected Species (EPS) would potentially include habitat loss, negative impacts on breeding and foraging behaviours, and risk of increased predation by domestic pets. Because of the unavoidable habitat loss and risk of harm to dormice, an EPS licence will be required, with a Mitigation Statement produced that details how the conservation status of this species will be preserved.

5. One tree (T6) protected under a Tree Preservation Order, has low potential to support roosting bats. A total of nine species of foraging and commuting bats were



recorded using the site during bat activity transects and static detector monitoring surveys over the three visits in Spring, Summer and Autumn 2018. These are common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, brown long-eared, noctule, serotine, unidentified Myotis species, unidentified pipistrelle and barbastelle. The barbastelle is a rare bat listed on Annex II of the Habitats Directive, whilst noctule, soprano pipistrelle and brown long-eared bats are Species of Principal Importance (SPI) for nature conservation on the NERC Act.

6. Eight bird species were recorded on the site over two breeding bird surveys and five species blackcap, blue tit, robin, coal tit and wren exhibited behaviours that signify they are likely breeding on site.

7. It is recommended that a detailed Mitigation Strategy statement and Habitat Creation and Management Plan (HCMP) is developed as part of the detailed design for the scheme and post construction monitoring is undertaken to ensure that woodland habitat that supports dormice and bats is preserved in line with the Mitigation Strategy. Potential impacts on all bat species include loss of foraging habitat, flight paths and effects from artificial light. It is recommended that a lighting assessment is undertaken that can be used by an ecologist to plan a bat friendly lighting scheme and other appropriate mitigation including dark vegetation buffers, screening walls and fences.

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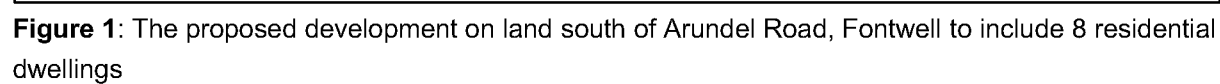
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1 INTRODUCTION

1.1 Background to the Proposed Development

Crayfern Homes intend to submit a planning application for residential development of an area of land south of Arundel Road, Fontwell, West Sussex. The National Grid Reference for the centre of the site is approximately SU 960 067 and the closest postcode to the site is BN18 0QP. The ecological impact assessments in this report are based on the proposed layout for the Scheme provided by Crayfern Homes (Proposed Site Layout Development Adjacent to Land at Woodroft West Walberton Lane. Drawing no SK03a. Jan 18.) (see Figure 1).





1.2 The Site

The site is approximately 1.3 Ha in area and can be seen in Figure 2. The site comprises of semi-improved species-poor rough grassland, scrub, standard trees and large areas of recently cleared woodland. The grassland is not intensively managed; however, there is evidence that the owners regularly conduct woodland management. The area is privately owned and used lightly for recreational use, with no public access.

The site is bordered to the north by the old Arundel Road, and beyond this the Arundel Road (A27), a busy dual carriageway passing between Arundel and Chichester. Immediately north of the A27 is arable land and Slindon Common, which connects to Slindon Bottom, a Site of Nature Conservation Importance (SNCI) and Local Wildlife Site (LWS) approximately 890m west of the site. This is semi-natural woodland with conifers and mixed plantations and part of it is also designated Ancient & Semi-Natural Woodland (ASNW).

To the east of the site is a residential property with a large expanse of grassland, waterbodies and woodland. This property further connects to a small woodland block south-east of the site. Residential properties are present south of the site, a bed and breakfast and residential dwellings to the west, connected by woodland and scrub. The site falls within a well-wooded area that interconnects with three designated Ancient Woodland parcels within 1km of the site: Wanley's Copse ASNW located approximately 350m southwest, and two parcels of Potwell Copse ASNW located approximately 350 and 370m east. An unnamed parcel of ASNW lies on the northern side of the A27 dual carriageway, which is part of Slindon Bottom LWS.

1.3 Purpose of This Report

A Phase 1 Habitat survey and Preliminary Ecological Appraisal, completed by the Ecology Co-op on the 29th March 2018¹, identified the potential for breeding birds, reptiles, dormice *Muscardinus avellanarius*, bats and great crested newts *Triturus cristatus* to be present on the site. As such, Phase 2 ecology surveys for each of these species/taxonomic groups were recommended.

These surveys commenced in May 2018 and were completed by October 2018. This report provides details of the findings of these surveys and an outline of the potential impacts of the proposed development together with an indication of impact avoidance and mitigation measures likely to be required for the development to proceed.

This work has been overseen by Kristina Lewis, a Full member of the Chartered Institute for Ecology and Environmental Management (MCIEEM).

These surveys and report were carried out and produced at the request of Crayfern Homes Ltd.

¹ The Ecology Co-op (2018). Preliminary Ecological Appraisal and Phase 1 Habitat Survey Report. Land at Arundel Road, Fontwell. 11th May 2018.



1.4 Policy and Legislation

Legal protection applying to relevant bird, mammal, herpetofauna and invertebrate species and current nature conservation planning policy at national level is outlined in Appendix 1 of this report. Local planning policy relevant to nature conservation is identified in Appendix 2.



Figure 2. An aerial image showing the location of the site. The approximate site boundary is outlined in red. Images produced courtesy of Google maps (Map data ©2018 Google).

2 SURVEY METHODOLOGY

All methodologies used in the Phase 2 ecology surveys are in accordance with current best practice guidance for the respective specie/taxonomic groups, as detailed below.

2.1 Bats

2.1.1 Natural Roosting Habitats - Trees

The Phase 1 Habitat and PEA identified a number of mature trees along the boundaries of the site and within the site that could provide potential bat roosting opportunities.

Therefore, in accordance with the Bat Conservation Trust guidelines a tree climbing survey was conducted to assess the features that could potentially support roosting bats, in accordance with Collins

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2016². Each tree was climbed and each feature was inspected with the use of an endoscope for evidence of use by roosting bats, or for the suitability of the feature to potentially support roosting bats. Each feature was categorised as supporting a high, medium, low or negligible suitability to support roosting bats in accordance with Collins (2016) (see Table 1 below). Potential roosting features include woodpecker holes, loose bark, cracks and splits in limbs, natural holes and hollows and other cavities.

The tree climbing inspection was undertaken on 14th June 2018 by Dr Ryan Walker, MCIEEM, CEnv Natural England Bat Survey Level 2 licence holder 2015-16736-CLS-CLS and an assistant. Dr Walker is qualified to climb trees using ropes and harnesses through a City & Guilds qualification.

The trees inspected included all boundary trees (from the site side only) and all trees within the site including those (T1 to T11) subject to tree protection order (TPO) TPO/WA/2/09 by Arun District Council, as illustrated on Figure 3. T3 was viewed from the site side only.

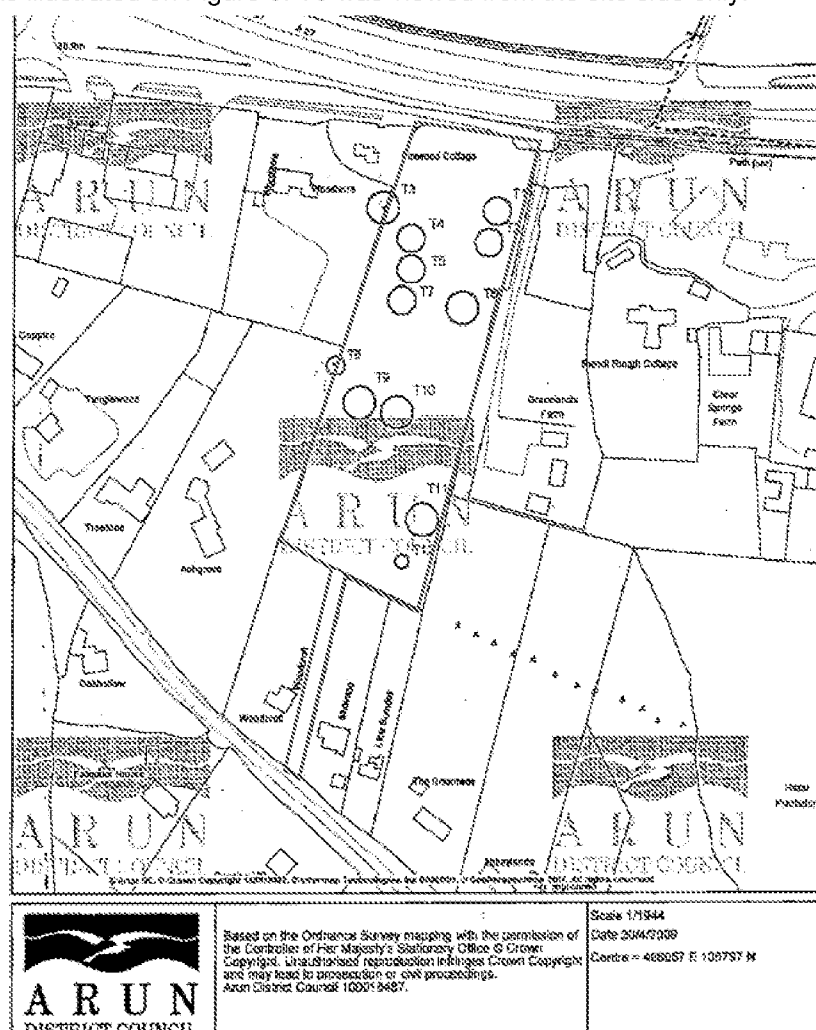


Figure 3. An image showing the location of 11 trees (T1 – T11) with a group Tree Protection Order at the site. Map courtesy of Arun District Council.

² Collins, J.(ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London.



Table 1. Characterising potential roost features in trees.

Category	Description
Negligible	A tree with negligible roosting habitat features likely to be used by bats.
Low	A tree of sufficient size to potentially support roosting features, but with none seen from the ground or features identified of limited roosting potential.
Medium	A tree with one or more potential roost sites that could be used by bats due to their size, conditions and surrounding habitat, but unlikely to support a roost of high conservation status such as a maternity or hibernation roost.
High	Trees with one or more potential roost sites that appear suitable for large numbers of bats or use as maternity or hibernation roosts.

2.1.2 Bat Activity Surveys – Walked Transects

The scope of the bat activity surveys comprising walked transect surveys and automated static monitoring surveys at the site was designed using best practice guidance (Collins (2016) Table 6.3, page 58) on the assumption that the site is of low habitat quality for bats (Collins (2016) Table 4.1, page 35). The relative value of the site for bats is based on the presence of recently felled woodland habitat that could be used by small numbers of commuting bats as well as non-native laurel *Laurus* spp. hedges and suitable, but isolated habitat that could be used by small numbers of foraging bats such as isolated standard trees or patches of scrub.

Two bat activity transect routes were selected to assess bat activity (foraging and commuting) throughout the site by surveying suitable bat foraging habitat and potential bat flight lines. The bat activity transect survey scope was for one survey visit per season (Spring (April/May), Summer (June/July/August) and Autumn (September/October)). Two pre-determined transect routes were followed by surveyors, focussing on all linear features within the site boundary (tree-lines, woodland edge and hedgerows) (see Figure 4). The bat activity transect survey in Spring was delayed by a period of poor, wet weather experienced at the end of May 2018; however, this is not considered to be a significant limitation to the survey.



Figure 4: Transect routes walked during bat activity surveys around the site, with blue arrows indicating the northern transect and amber indicating the southern transect. The position of static bat detectors deployed along each transect is indicated with a green star.

The transect routes were walked at a slow pace during the period from either sunset to 1.5 hrs after sunset, or 2 hours before sunrise until sunrise, by a team of surveyors such that each part of the route was passed approximately every 15 minutes. All surveys were undertaken during weather conditions suitable for bat activity and at ambient temperatures above 10°C. Weather conditions, timings and temperature during each survey visit is presented in Table 2. The surveyors recorded bat activity using 'Echo Meter Touch' and 'Echo Meter Touch Pro' bat detectors featuring auto-identification of bat species and automatically triggered recording for later review. The locations of all bat call 'registrations' was recorded onto a field map during the survey to correspond with all sound recordings.

Table 2. Weather conditions during bat activity transect surveys

Date	Survey start time/end time	Temp. degrees centigrade, weather conditions throughout survey	Surveyors
08/06/2018	Start time: 02:50 Sunrise: 04:50 End Time: 04:50	Max/Min temp: 13.0°C 10% - 90% cloud cover and 0-1mph wind.	Kristina Lewis (Level 1 bat licence holder - WML – 2015 – 15379 – CLS CLS). Emma Baker
08/08/2018	Start time: 20:12 Sunset: 20:37 End Time: 22:07	Max/Min temp.: 17.0-19.0°C 95-100% cloud cover and 0-11mph wind.	Kristina Lewis (Level 1 bat licence holder - WML – 2015 – 15379 – CLS CLS) Sophie Bradfield



Date	Survey start time/end time	Temp. degrees centigrade, weather conditions throughout survey	Surveyors
26/09/2018	Start time: 18:38 Sunset: 18:53 End Time: 20:23	Max/Min temp.: 13.0-14.0°C 0% cloud cover and 0-5mph wind.	Kristina Lewis (Level 1 bat licence holder - WML – 2015 – 15379 – CLS CLS) Sophie Bradfield

2.1.3 Bat Activity Surveys - Automated Static Bat Detection

The automated static monitoring survey scope was for one location per transect (see locations on Figure 4) with data to be collected on a minimum of five consecutive nights per season: Spring (12th-19th June 2018), Summer (8th-14th August 2018) and Autumn (26th September-1st October 2018)). Bat activity surveys using automated static bat detectors followed current standard best practice guidelines (Collins (2016) with at least one visit per season of survey effort; in Spring, Summer and Autumn on the assumption that the site is of low habitat quality for bats.

Two static bat detectors (Peersonic Detector and Full Spectrum Recorder RPA2 enclosed within a waterproof IP67 box and BatLogger A+ devices) were deployed across the site on three separate occasions and left in the field for a minimum of five nights to automatically record bat calls from 30 minutes before sunset until 30 minutes after sunrise. These are passive recording devices with real time full spectrum calls that can be viewed in detail once downloaded on analysis software, allowing accurate identification of most bat calls to species level (or genus level in the case of *Myotis* and long-eared *Plecotus* spp.).

The walked transect and automated static bat detecting methodologies complement each other with the transect surveys providing information on foraging and commuting patterns across the site and automated static detector surveys giving more extensive coverage over several nights during the active foraging period for bats, thus increasing the likelihood of detecting rare or scarce species.

2.2 Breeding Birds

An adapted version of The Common Birds Census (CBC) territory mapping methodology, as defined by the British Trust for Ornithology³, was used to survey the site for likely use by breeding birds. Two surveys were undertaken on the 25th of May and 3rd of July 2018.

A transect encompassing all fields, boundary hedgerows and margins fringing the site was walked slowly. Each bird seen or heard during the course of the survey was recorded. Notes about the behaviour of the birds were made, where possible, to determine their breeding status. Birds were said to be breeding and, therefore, within a breeding territory, if:

- They were observed displaying or heard singing.
- Nests, eggs, or recently fledged young were identified.

³ British Trust for Ornithology (2011). Common Birds Census.



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- Adults were heard repeatedly alarm-calling.
- Distraction displays were seen.

The survey visits were made during appropriate weather conditions, avoiding heavy rain, poor visibility or strong winds. A summary of the weather conditions for these surveys is shown in Table 3.

Table 3. Weather conditions recorded during breeding bird surveys at Fontwell.

Survey date	Survey time	Weather notes	Surveyor
25/05/2018	07:00-08:15	14°C, 0-5 mph wind, 20% cloud cover and good visibility.	Paul Whitby
03/07/2018	05:30-06:20	16°C, 5mph wind, 100% cloud cover, excellent visibility.	Ryan Walker

2.3 Great Crested Newts

2.3.1 Habitat Suitability Index (HSI) Assessment

There are no ponds within the site and the Phase 1 Habitat Survey and Preliminary Ecological Appraisal desk study identified 6 ponds within 500m of the site boundary. Access permission was requested and granted for all six ponds and a Habitat Suitability Index (HSI) (Oldham *et al* 2000) assessment undertaken at each waterbody in accordance with best practice guidance to assess their potential to support breeding great crested newts. Those ponds assessed to have at least 'below average' suitability, or above, were then subject to further environmental (eDNA) surveys to detect the presence of great crested newts.

2.3.2 Presence/Absence Surveys – eDNA Surveys and eDNA Testing

eDNA surveys are used to determine if great crested newts are present and whether to conduct population size class surveys on ponds. Two eDNA tests were carried out. These were on Pond 2 and 3 which are connected to each other and have been assessed as single waterbodies for this reason as are and Pond 5a and 5b.

One visit is made in the daytime, between 15th April and 30th June in line with an approved methodology by the Department for Environment Farming and Rural Affairs (Defra)⁴. This method involves taking 20 separate water samples at evenly spaced locations around the pond edge and placing these into a whirl-pack bag. These 20 samples are then mixed together and 15 millilitres (ml) of the mixed water is added to six 50ml test tubes containing preservative solution.

These were then sent to a specialist Natural England approved laboratory for analysis to test for great

⁴ Biggs J, Ewald N, Valentini A, Gaboriaud C, Griffiths RA, Foster J, Wilkinson J, Arnett A, Williams P and Dunn F 2014. *Analytical and methodological development for improved surveillance of the Great Crested Newt*. Defra Project WC1067. Freshwater Habitats Trust: Oxford.



crested newt eDNA, before the results were returned.

2.4 Dormouse

Dormouse surveys are undertaken by attaching purpose built 'nest tubes' to trees and shrubs in suitable habitat such as woodland, scrub and hedgerows. Nest tubes are used by dormice as places of shelter as they will often construct their nests within them during their periods of activity (typically between April and November). In accordance with current best practice guidelines⁵, 100 nest tubes are deployed approximately 20m apart and left in situ for the survey season. These are checked on a monthly basis for a set period for presence of individual dormice and evidence of dormouse presence (distinctively woven nests).

Since the likelihood of use by dormice varies through the year, an index of probability score is used to determine confidence in a particular survey (see Table 4) comprising checks over several months. A minimum score of 21 is normally accepted to establish 'likely absence' in the event that no signs of dormice are found during the survey. The scores may be doubled if the site is large enough to accommodate 100 or more nest tubes, though the size and context of the site should be taken into account when designing the survey scope.

Table 4. Index of probability of finding dormice present in nest tubes in any one month (Taken from The Dormouse Conservation Handbook)

Month of check	Index of Probability (based on 50 tubes)	Index of Probability (based on 100 Tubes)
April	1	2
May	4	8
June	2	4
July	2	4
August	5	10
September	7	14
October	2	4
November	2	4

For this survey, a total of 100 dormouse nest tubes were deployed on 21st May 2018 along hedgerows, treelines and scrub along the boundaries of the site (see Figure 5). Dormice survey checks were undertaken in the mornings and the first survey took place on 20th June 2018, approximately 1 month after the nest-tubes were first positioned. Following the incidental sighting of a dormouse in a bird box along the southern boundary of the site during the first dormouse survey check on 20th June 2016 further surveys were suspended since presence of dormouse on the site was confirmed by this sighting and once dormice have been found it can be assumed that they are present in all suitable habitat on the site⁶. The dormouse tubes were left in situ until the final reptile survey visit and were checked and, if empty, removed on 29th September 2018. Any nest tubes supporting dormice or other small mammals were left in-situ. Surveys were undertaken by accredited agents of licensed dormouse surveyor Kristina Lewis (2016-21929-CLS-CLS).

⁵ Bright, B., Morris, P., Mitchell-Jones, A.J. and Mitchell-Jones, T (1997). *The Dormouse Conservation Handbook*. English Nature.

⁶ Natural England (2015). *Hazel or common dormice: surveys and mitigation for development projects. Standing advice for local planning authorities to assess the impacts of development on hazel dormice*. Available at: <https://www.gov.uk/guidance/hazel-or-common-dormice-surveys-and-mitigation-for-development-projects>



Figure 5. The arrays of dormouse nest tube locations indicated in amber across all suitable habitat for dormice. The site boundary is indicated by a red outline.

2.5 Reptiles

Standard reptile presence/likely absence surveys involve setting out artificial refugia (reptile ‘mats’) in potentially suitable habitat for reptiles. Reptile mats are either pieces of roofing bitumen felt or corrugated metal sheets, which absorb heat from the sun more rapidly than the surroundings and provide cover and basking places attractive to reptiles. These are then checked for presence of animals under suitable weather conditions. There are no up to date guidelines for reptile surveys, but a minimum of seven survey visits under suitable weather conditions is generally considered to be sufficient to determine their presence/likely absence. Guidelines suggest laying out a density of 10 reptile mats per hectare, but a higher density of mats were deployed. Shading from adjacent tall trees was the primary reason for increasing the number of refugia.

A total of 100 50cm x 50cm bitumen and corrugated metal sheets were used in this survey and placed along the site boundaries, around deadwood, scrub and throughout the grassland, in sunny locations around the site (see Figure 6). Much of the site provides suitable reptile habitat and therefore the mats covered the majority of the site. The mats were left in situ for a minimum of one week to ‘bed in’ and allow reptiles to locate them before the first check.

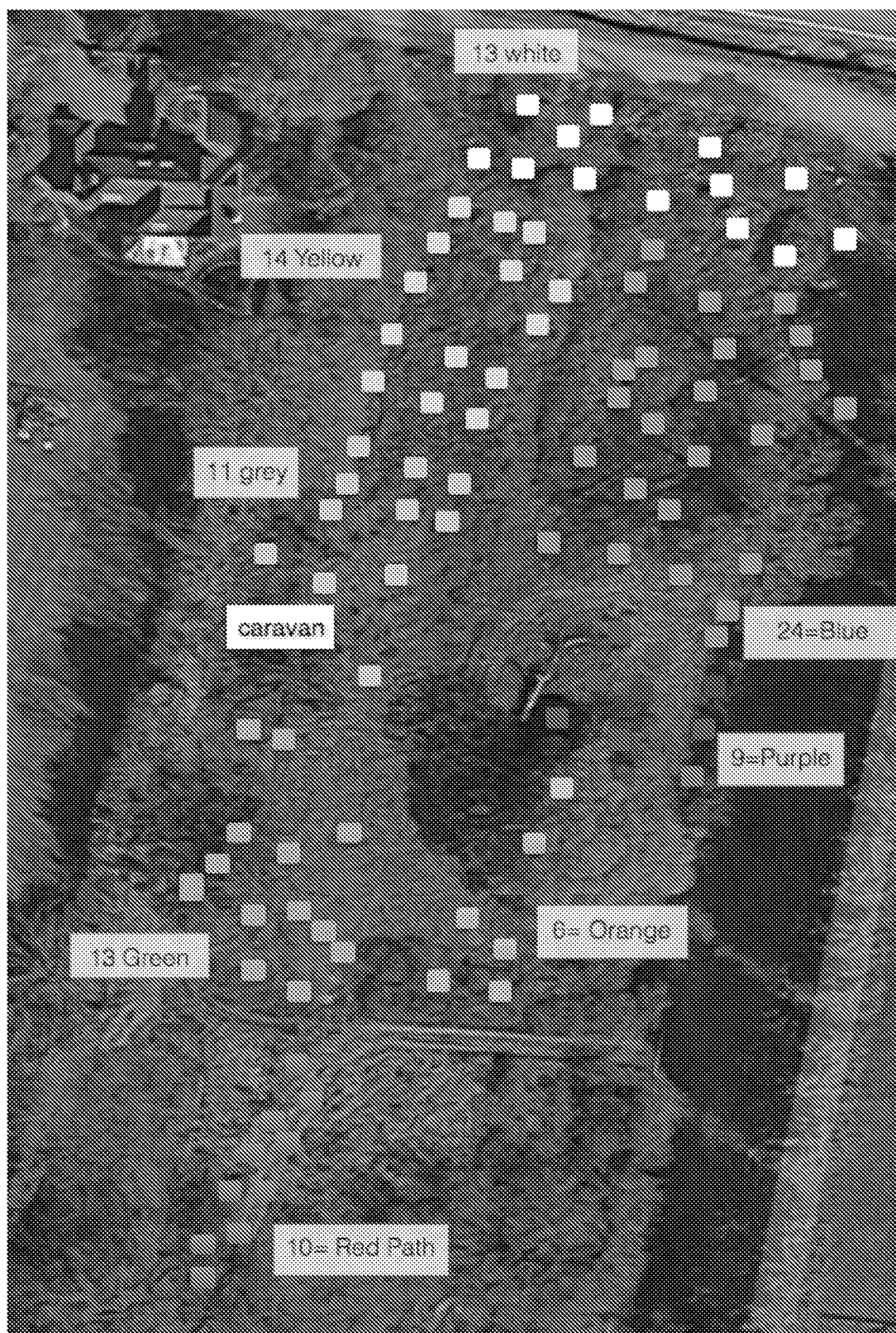


Figure 6. Location of reptile refugia 'mats', grouped by distinct habitat areas for ease of reptile refugia checks.

2.6 Assessment Methodology

The assessment of ecological impacts in Section 4 of this report follows best practice guidelines for



impact assessment⁷.

The mitigation hierarchy underpins this assessment:

- Avoidance - “Seek options that avoid harm to ecological features (for example, by locating on an alternative site).”
- Mitigation - “Adverse effects should be avoided or minimised through mitigation measures, either through the design of the project or subsequent measures that can be guaranteed – for example, through a condition or planning obligation.”
- Compensation – “Where there are significant residual adverse ecological effects despite the mitigation proposed, these should be offset by appropriate compensatory measures.”
- Enhancements – “Seek to provide net benefits for biodiversity over and above requirements for avoidance, mitigation or compensation.”

Six steps are required as part of an ecological impact assessment (EcIA). These are summarised below and explained in more detail in Appendix 3:

1. Identify important ecological features (habitats, species, ecosystems and their functions/processes);
2. Identifying and characterising impacts to important ecological features;
3. Incorporating measures to avoid and mitigate these impacts;
4. Assessing the significance of any residual effects after mitigation;
5. Identifying appropriate compensation measures to offset significant residual effects; and
6. Identifying opportunities for ecological enhancement.

Significant effects should be qualified with reference to an appropriate geographic scale. For example, a significant effect on a Site of Special Scientific Interest (SSSI) is likely to be of national significance. European case law is specific regarding significance in relation to European sites and Annexed habitats. However, the scale of significance of an effect may not be the same as the geographic context in which the feature is considered important. For example, an effect on a species that is on a national list of species of principal importance for biodiversity may not have a significant effect on its national population. Examples of other relevant scales include regional and county. It should be noted that effects may be significant at the local scale, particularly in view of policies for no net loss of biodiversity.

In many cases (e.g. for species and habitats of principal importance for biodiversity), there may be an existing statement of the conservation status of a feature and objectives and targets against which the effect can be judged. However, not all species or habitats will be described in this way and the conservation status of each feature being assessed may need to be agreed with the relevant statutory nature conservation body and set out in the EcIA. The conservation status of a habitat or species will vary depending on the geographical frame of reference.

2.7 Constraints/Limitations to Surveys

These surveys record any flora or fauna that is present at the time of the survey visits. It is, therefore,

⁷ CIEEM (2016). *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal* (2nd ed.). Chartered Institute of Ecology and Environmental Management, Winchester.



possible that some species may not have been present during the survey, but may be evident at other times of the year and may appear or disappear from the site if habitat conditions change. For this reason, the surveys are considered valid for up to 18 months for bats, two years for reptiles and three years for great crested newts and dormice. If the habitat conditions change significantly beyond that time, it is recommended that the surveys are updated.

Only two breeding bird surveys were undertaken out of three as recommended by the CBC (Visit 1- March - Optional reconnaissance visit, Visit 2-Early April to mid-May and Visit 3- Mid-May to late June) and the first survey was undertaken later than mid-May, but this is not considered to be a significant limitation to the survey.

Some bat logger data was corrupted but overall an average of a minimum of five nights of data has been collected and analysed and this is not considered to be a significant limitation to the survey.

3 RESULTS

3.1 Bats

3.1.1 Natural Roosting Habitats – Trees

One of the trees climbed Tree 6 (T6) has low potential to support roosting bats although no evidence of bats was found within the potential roost features inspected. T6 supports a branch cavity that is of quite low suitability as shown in Figure 7. This tree is currently protected with a Tree Preservation Order.

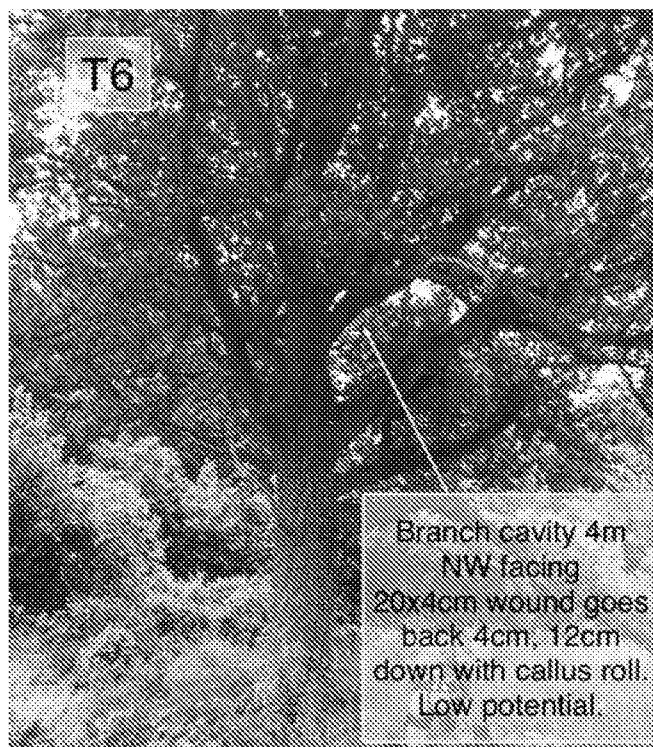


Figure 7: Tree 6 (T6) a mature pedunculate oak tree with identified low potential roost features for bats.



3.1.2 Bat Activity Surveys – Walked Transects

The bat activity transect results are summarised in Tables 5a-f.

The bat species seen and or heard and the number of passes per survey date for each species can be used as an indicator of general activity for comparison from visit to visit across the site.

A total of five species were recorded in the north of the site during the transect surveys over the three visits in Spring, Summer and Autumn 2018. These are common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmeus*, Nathusius' pipistrelle *Pipistrellus nathusii*, noctule *Nyctalus noctule* and Myotis spp. A total of six species or species groups were recorded during the transect surveys in the south of the site over the three survey visits in Spring, Summer and Autumn 2018. The species were common pipistrelle, soprano pipistrelle, Myotis *Myotis* spp., brown long-eared *Plecotus auratus*, noctule, serotine *Eptesicus serotinus* and barbastelle *Barbastella barbastellus*. Unidentified pipistrelle *Pipistrellus* spp. bats were also recorded on both transects during the surveys.

The most notable is the recording of a barbastelle *Barbastella barbastellus* bat, a rare bat species (receiving special protection by being listed on Annexe II of the Habitats Directive) recorded once at 19:59 in the southwest corner of the site on 26th September 2018 during the transect surveys. The barbastelle is a UK Biodiversity Action Plan species, which means that it is a nature conservation priority on both a local and national scale. Barbastelle bats tend to forage over a wide area and their core sustenance zone (CSZ) is believed to be 6km from their roosts ⁸.

Three bat species recorded during the transect surveys are listed as species of principal importance (SPIs) for nature conservation (listed on Section 41 of the Natural Environment and Rural Communities (NERC) Act). These are: noctule, soprano pipistrelle and brown long-eared bat species.

Northern Transect - Visit 1

Moderate levels of bat activity were recorded on this visit. Mostly common pipistrelle bats were recorded and were seen flying along tree lines along the western part of the site with a couple of Myotis *Myotis* spp passes heard in the north-western corner of the site. One Nathusius' pipistrelle *Pipistrellus nathusii* bat was seen flying over the grassland in the centre of the site towards the western boundary tree line and one soprano pipistrelle *Pipistrellus pygmeus* bat was seen along the eastern boundary of the site.

Table 5a. Bat species recorded during Survey Visit 1 in Spring in the northern transect.

Survey Date	Common pipistrelle	Nathusius' pipistrelle	Soprano pipistrelle	Myotis sp. passes
08/06/2018	18	1	1	2

Southern Transect - Visit 1

Moderate levels of bat activity were recorded on this visit. Bats were recorded along all boundaries of the southern part of the site. The most frequently recorded species was common pipistrelle with almost

⁸ Bat Conservation Trust (2016) *Core Sustenance Zones: Determining zone size 04.02.16*. Available at: http://www.bats.org.uk/data/files/Core_Sustenance_Zones_Explained_-_04.02.16.pdf



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the same number of soprano pipistrelle bat passes. Brown long-eared bats were recorded on three occasions along the eastern boundary of the site and in the very south of the site near West Walberton Lane.

Table 5b. Bat species passes recorded during Survey Visit 1 in Spring in the southern transect.

Survey Date	Common pipistrelle	Soprano pipistrelle	Brown long-eared
08/06/2018	7	6	3

Northern Transect - Visit 2

The majority of bats heard seemed to be foraging around mature trees on the site and along the northern and eastern boundaries of the site. The majority of passes were of common pipistrelle bat passes with, two soprano pipistrelle passes along the east of the site and one noctule pass also recorded towards the northeast of the site.

Table 5c. Bat species recorded during Survey Visit 2 in Summer in the northern transect.

Survey Date	Common pipistrelle	Soprano pipistrelle	Pipistrelle sp.	Noctule
08/06/2018	9	2	1	1

Southern Transect - Visit 2

A couple of common pipistrelle passes were recorded in the centre of the site around mature trees. A soprano pipistrelle was also heard in this area.

Table 5d. Bat species recorded during Survey Visit 2 in Summer in the southern transect.

Survey Date	Common pipistrelle	Soprano pipistrelle
08/08/2018	2	1

Northern Transect - Visit 3

Two species of bats were recorded at this transect. The majority of common pipistrelle bats, with 3 soprano pipistrelle passes.

Table 5e. Bat species recorded during Survey Visit 3 in Summer in the northern transect.

Survey Date	Common pipistrelle	Soprano pipistrelle
08/08/2018	9	3

Southern Transect - Visit 3

Six species of bats were recorded on the southern section, including one pass of barbastelle bat, one unidentified pipistrelle social calls, two serotine passes and four noctule passes. The first bat was recorded at 19:21, approximately 28 minutes after sunset. Bats were not seen but heard along all boundaries in the south of the site. One pass of a barbastelle bat was recorded at 19:59 in the southwest corner of the site at 48 minutes after sunset and 1 hour and 9 minutes. Serotine bats were recorded in the south and western part of the site.

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Table 5f. Bat species recorded during Survey Visit 3 in Autumn in the southern transect.

Survey Date	Barbastelle	Common pipistrelle	Soprano pipistrelle	Serotine	Noctule	Myotis sp.
26/09/2018	1	11	1	2	4	1

3.1.3 Bat Activity Surveys - Automated Static Bat Detection

A total of eight bat species or species groups were recorded in total at the two locations across the site. These are: common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, brown long-eared bats, Myotis spp., serotine, noctule and barbastelle.

The greatest diversity of species of bats recorded across the site was in Spring when 7 species of bats were recorded, with barbastelle detected only during this period; 6 species recorded in Summer and 5 species recorded in Autumn.

Location 1 (North-western part of the site)

Seven species or species groups were recorded on the bat logger located in the north-western part of the site on Visit 1 in June. Most bats recorded were noctule, followed in descending order by common pipistrelle, serotine, common or soprano pipistrelle, and one recording each of Nathusius' pipistrelle, Myotis spp and brown long-eared bats.

Table 6a. Bat species recorded by a bat logger in Location 1 in June 2018

Survey Date	Common pipistrelle	Soprano pipistrelle	Nathusius' pipistrelle	Brown long-eared	Noctule	Serotine	Myotis sp.
13/06/2018	14	2	0	0	24	4	1
14/06/2018	39	0	1	0	62	7	0
15/06/2018	38	0	0	0	37	25	0
16/06/2018	19	1	0	1	43	2	0
17/06/2018	4	0	0	0	19	0	0
Total	114	3	1	1	185	38	1

Location 2 (South-eastern part of the site)

Six species or species groups were recorded on the bat logger located in the southeast corner of the site on Visit 1 in June. Most bats recorded were common pipistrelle followed in descending order by soprano pipistrelle, Myotis spp, serotine and brown long-eared bats. Notably, one barbastelle bat call was detected on 13th June 2018.

Table 6b. Bat species recorded by a bat logger in Location 2 in June 2018

Survey Date	Common pipistrelle	Soprano pipistrelle	Brown long-eared	Myotis sp.	Serotine	Barbastelle
13/06/2018	24	1	0	3	1	1
14/06/2018	24	7	0	1	0	0
15/06/2018	39	27	0	1	1	0



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Survey Date	Common pipistrelle	Soprano pipistrelle	Brown long-eared	Myotis sp.	Serotine	Barbastelle
16/06/2018	24	4	0	1	1	0
17/06/2018	11	11	3	0	1	0
Total	122	50	3	6	4	1

Location 1 (North-western part of the site)

A relatively low number of bat species were recorded in Location 1 in June 2018 with 48 common pipistrelle and 3 soprano pipistrelle calls. No bat calls were recorded on 11th and 12th June 2018.

Table 6c. Bat species recorded by a bat logger in Location 1 in June 2018

Survey Date	Common pipistrelle	Soprano pipistrelle
08/08/2018	22	0
09/08/2018	17	1
10/08/2018	9	2
11/08/2018	N/A	N/A
12/08/2018	N/A	N/A
Total	48	3

Location 2 (South-eastern part of the site)

Six species or species groups of bats were recorded in Location 2 in August 2018. The most commonly recorded species was common pipistrelle, following by soprano pipistrelle, three serotine passes, two brown long-eared passes and one pass each of noctule and unidentified Myotis species bats. No bats were recorded on 10th August.

Table 6d. Bat species recorded by a bat logger in Location 2 in Summer – August 2018

Survey Date	Common pipistrelle	Soprano pipistrelle	Brown long-eared	Serotine	Noctule	Myotis sp.
08/08/2018	17	3	0	1	1	0
09/08/2018	17	10	2	1	0	0
10/08/2018	N/A	N/A	N/A	N/A	N/A	N/A
11/08/2018	13	4	0	0	0	1
12/08/2018	1	1	0	1	0	0
Total	48	18	2	3	1	1

Location 1 (North-western part of site)

Four species or species groups of bats were recorded in Location 1 in September/October 2018. The most commonly recorded species was soprano pipistrelle, with five unidentified Myotis species, followed by three common pipistrelle, three serotine passes and three brown long-eared passes also recorded.



Table 6e. Bat species recorded by a bat logger in Location 1 in Autumn – September/October 2018

Survey Date	Common pipistrelle	Soprano pipistrelle	Brown long-eared	Myotis sp.
26/09/2018	1	0	0	0
27/09/2018	1	1	0	3
28/09/2018	1	1	1	1
29/09/2018	0	2	1	0
30/09/2018	0	2	1	1
Total	3	6	3	5

Location 2 (South-eastern part of site)

Five different species were recorded in Location 2 in September/October 2018. The most frequently recorded species was soprano pipistrelle, followed by Myotis spp, common pipistrelle and three passes each of brown-long eared bats.

Table 6f. Bat species recorded by a bat logger in Location 2 in Autumn – September/October 2018

Survey Date	Common pipistrelle	Soprano pipistrelle	Brown long-eared	Myotis sp.	Serotine
26/09/2018	2	5	0	4	0
27/09/2018	4	1	0	0	2
28/09/2018	2	2	0	1	0
29/09/2018	0	3	0	0	0
30/09/2018	8	8	1	11	0
01/10/2018	2	5	1	6	0
02/10/2018	10	12	1	10	1
Total	28	36	3	32	3

3.2 Breeding Birds

Table 7 details the bird species, number of individuals and estimated number of territories and fledglings recorded during breeding bird surveys. In addition, the protected and or notable species designation of each species recorded on the site is also identified.

A total of eight bird species were recorded on the site over the two breeding bird surveys. Of these, five species exhibited behaviours, such as territory calling, that signify they are likely on-site breeders, with either territory displays, fledglings (f) or nests recorded. These are: blackcap *Sylvia atricapilla*, blue tit *Cyanistes caeruleus*, robin *Erithacus rubecula*, coal tit *Periparus ater* and wren *Troglodytes troglodytes*.

In addition, the species recorded have been identified as red, amber or green according to their conservation status, on the Birds of Conservation Concern (BoCC) list by the Royal Society for the Protection of Birds (RSPB)⁹. Under this traffic-light coding system, green represents species of little

⁹ Eaton MA, Aebischer NJ, Brown AF, Hearn RD, Lock L, Musgrove AJ, Noble DG, Stroud DA and Gregory RD (2015) Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. British Birds 108, 708–746.



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current conservation concern, amber represents species with moderate declines in recent decades and red represents species that are threatened or have seen significant population declines. There are no red listed or amber listed bird species recorded on the site during the breeding bird surveys, all eight are green listed.

There are no bird species recorded during the breeding bird surveys on the site that are specially listed on Schedule 1 of the Wildlife & Countryside Act 1981, for which it is an offence to intentionally or recklessly disturb birds and their young at, on or near an 'active' nest.

None of the bird species recorded are listed on Section 41 of the NERC Act as species of principal importance (SPIs) for nature conservation.

Importantly, no ground-nesting or notable farmland birds were identified upon the site during any of the surveys.

Table 7. Bird species, number of individuals and estimated number of territories recorded during breeding bird surveys.

Bird Species Common Name/ BTO ¹⁰ Code	RSPB Red / Amber/ Green List	Breeding Status and Territories					
		Visit 1 – 25/05/2018		Visit 2 – 03/07/2018		Overall	
		No. of individuals	Behaviour	No. of individuals	Behaviour	Breeding status	Estimated no. of territories
Blackbird (B.)	Green	1	-	2	-	-	0
Blackcap (BC)	Green	1	Territory calling	-	-	-	1
Blue tit (BT)	Green	1	Territory calling	1	-	-	1
Coal tit (CT)	Green	1	Territory calling	0	0	-	1
Chiffchaff (CC)	Green	0	-	1	-	-	0
Robin (R.)	Green	3	Territory calling	1	Fledgling robin	-	3
Wren (WR)	Green	3	Territory calling	1	-	-	3
Woodpigeon (WP)	Green	0	-	6	-	-	0

¹⁰ British Trust for Ornithology (BTO) species code. Available at:
https://www.bto.org/sites/default/files/u16/downloads/forms_instructions/bto_bird_species_codes.pdf



Figure 8: The location of each individual bird recorded exhibiting breeding behaviour or fledglings recorded during the breeding bird surveys using its BTO code. The colouration indicates the species' green listing under the BoCC list by the RSPB.



3.3 Great Crested Newts

3.3.1 HSI Assessments

The Phase 1 Habitat survey and PEA identified six waterbodies within 250m of the proposed development (see Figure 9). Of these, one (P6) was discounted from further survey as it is a well, and the land ownership was identified for five ponds (P1, P2, P3, P4 and P5a) with access permission requested for further surveys. An additional pond outside of the 250m buffer from the site but close to Pond 5a marked on Ordnance Survey (OS) maps was included in the HSI assessment survey and labelled 5b.

Access permission was secured to undertake a HSI assessments of ponds P1, P2, P3, P4, and P5 within 250m of the site by the Ecology Co-op. HSI values were obtained for Pond 1, Pond 2 & 3 combined, Pond 4 and Pond 5a & Pond 5b combined. Ponds 2 and 3 and Ponds 5a and 5b are connected to each other and have been assessed as single waterbodies for this reason.

The calculated HSI values, together with a brief description of the ponds and a summary of the full survey results is provided in Table 8. Full details of the HSI calculations survey results are presented in Appendix 4.

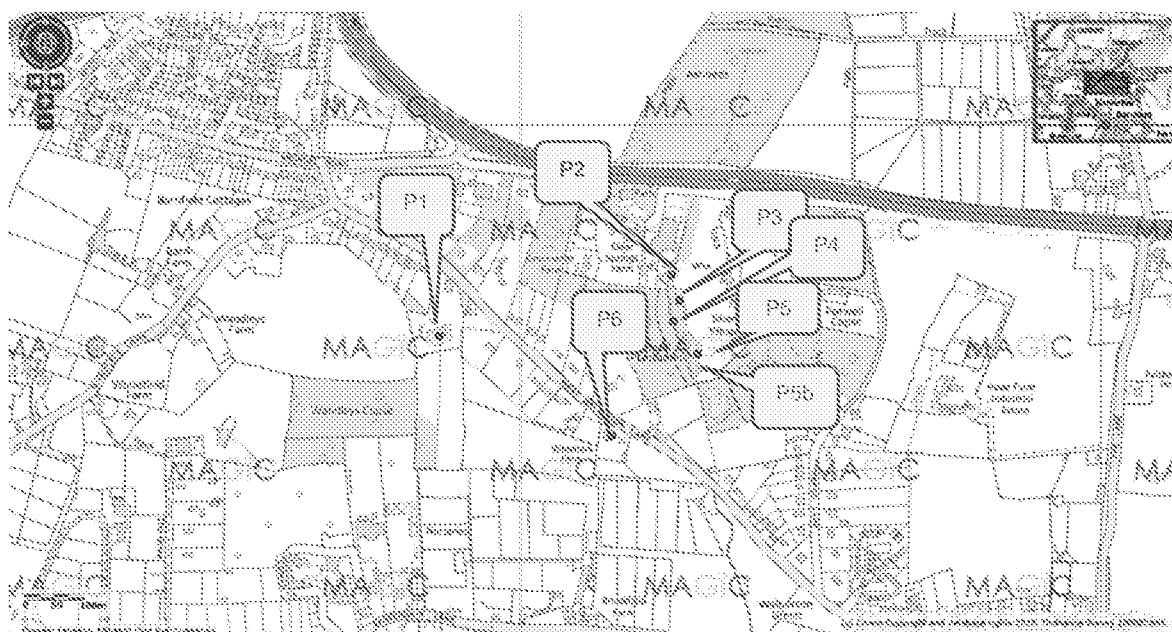


Figure 9. Ponds within 250m of the site boundary.

Table 8. Summary of habitat suitability and surveys carried out on ponds within 250m of the site.

Pond	NGR	Description	H.S.I. value	Interpretation
1	SU 9506 8663	A large ornamental garden pond initially created in 1935 and enlarged in 1998 in a setting with manicured lawns, tree lines and hedgerows. The water in the pond is still but there are two flowing inlets. The pond has an irregular outline and variable depth and the pond is lined with clay. Aquatic plants present include yellow flag <i>Iris pseudacorus</i> and mare's-tail <i>Hippuris vulgaris</i> . Plant species	0.51	Below average



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Pond	NGR	Description	H.S.I value	Interpretation
		around the banks include pendulous sedge <i>Carex pendula</i> , reed mace <i>Typha latifolia</i> and some bramble <i>Rubus fruticosus</i> scrub. The pond is shaded by overhanging trees for about 30% of the pond area.		
2	SU 9606 2674	A large, shallow pond approximately 490m ² in a woodland area of a large garden. The water is deep and the substrate has a thick leaf litter with some deadwood. There is evidence of pollution affecting the waterbody, which has an oily sheen. Spearwort <i>Ranunculus</i> spp. is the only aquatic plant species present within the waterbody with pendulous sedge <i>Carex pendula</i> around the margins and banks. The surrounding land provides good quality terrestrial habitat with mature trees including willow <i>Salix</i> spp, oak <i>Quercus</i> sp, silver birch <i>Betula pendula</i> and Rhododendron <i>Rhododendron</i> spp. Pond 2 is connected to Pond 3 by a ditch, which is shallow and has a deep leaf litter. The water surface of the ditch is oily.	0.81	Excellent
3	SU 9606 2769	The surrounding land is a mature canopy woodland with an understory with moderate connectivity with open glades and mostly shaded. This provides good quality terrestrial habitat with mature trees including willow <i>Salix</i> spp, oak <i>Quercus</i> spp, silver birch <i>Betula pendula</i> and Rhododendron <i>Rhododendron</i> spp. Other species include ornamental roses <i>Rosa</i> spp, iris <i>Iris</i> spp, sedge <i>Carex</i> spp. water mint <i>Mentha aquatica</i> around the pond margins and patches of bramble. Pond 2 is connected to Pond 3 by a ditch, which is shallow and has a deep leaf litter. The water surface of the ditch is oily.	0.66	Average
4	SU 9627 0664	This is a long and linear ditch with variable depth along its length with a number of stagnant sections with still and flowing parts passing through an area with mature woodland. Plant species within the waterbody are starwort and plant species in the banks include pendulous sedge with hazel <i>Coryllus avellana</i> , oak, holly <i>Ilex aquifolium</i> with bramble <i>Rubus fruticosus</i> agg. and ivy <i>Hedera helix</i> also present.	0.63	Average
5a	SU 9606 3061	A large pond, approximately 615m ² within a woodland setting with 2 inlets and 1 outlet within a large residential garden. The pond has shallow edges with leaf litter thought the substrate and some silt deposition. The pond is well shaded by the surrounding woodland, approximately 50%. Moorhen were recorded on the pond. Damselflies <i>Zygoptera</i> spp were recorded in the vicinity of the pond.	0.85	Excellent
5b	SU 9606 3157	A moderately sized pond approximately 120m ² connected to the south of Pond 5a by a clay pipe. The water quality is moderate and is heavily shaded by surrounding woodland, approximately 80% of the water surface. The surrounding habitat is good and there are log piles around the pond. Damselflies were recorded in the vicinity of the pond.	0.70	Average



3.3.2 eDNA Assessments

Pond 2 and 3 combined were subjected to an eDNA test. Pond 5a and 5b combined were subjected to an eDNA test. The eDNA results for both were negative, indicating that no great crested newt DNA was present within the waterbodies. It is plausible that as Pond 4 – a linear wet ditch, provides connectivity between Pond 2 and 3 and Pond 5a and 5b great crested newts would also be absent from this water body. The eDNA results are presented in Appendix 5.

3.4 Dormice

During the first dormouse survey on 20th June 2018, one dormouse was recorded incidentally in a bird's nest box in the southwest of the site. Following this, as confirmation of the presence of dormouse was confirmed, it can be assumed that dormice are present in all suitable habitat at the site and no further dormouse surveys were undertaken. The dormouse nest tubes were left in situ until the final reptile survey at the site, with the removal of dormouse tubes also undertaken on this date – the 21st September 2018.

Four dormice and nine nests were found in a total of ten dormouse nest tubes and one dormouse was recorded incidentally in one bird box (see Figure 10 (9a, 10a, 12, 13a, 19a, 21, 24, 70, 85 and 90). In addition, two records of other small mammals, including woodmouse, were also recorded in two nest tubes (49 and 52). Those tubes found to contain dormouse, dormouse nests and other small mammals have been left in situ. These tubes will need to be checked by a licensed dormouse surveyor before they are finally removed. Since the hedgerows across the site are ecologically connected to each other and the woodland within the south of the site, it should be assumed that dormice use all the hedgerows, tree belts and scrub across the site.

It should be noted that dormice frequently move around within their large home range and that the number of occupied tubes does not represent the number of animals present in the area. The location of dormice and or their nests are presented in Figure 9 and detailed results of each nest tube check in Appendix 6.



Figure 10. Location of nest tubes occupied by a dormouse at any one time during the surveys in 2018 is indicated by a blue dot. The approximate location of dormouse tubes deployed at the site is indicated by a red line. A dormouse was recorded incidentally in a bird nest box in the southwest of the site.

3.5 Reptiles

Slow worms were recorded during each of seven survey visits. No other reptile species were recorded. The peak count of animals was recorded on visit 1 with 80 slow worms recorded, which represents an exceptional population. The detailed reptile survey results can be seen in Table 9. The locations of the group of mats where reptiles were found can be seen in Figure 6.



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Table 9: Results of reptile survey undertaken at Fontwell. All recordings are slow worm, with the separate sexes and age classes defined as follows; Juv – Juvenile, SA – Sub adult, F- Female, M – Male.

Date	Start Time of Survey	Air Temp/Refugia Temp oC	Weather Notes, cc = Cloud cover	Species Total	Area Total
Visit 1 - 20/06/18	8:30	16/19	100% cc, still, cool	White – 5 F, 2M, 1J Yellow – 3 F, 6 J, 2 M Blue – 6J, 4SA, 7F, 3M Grey – 5M, 4F, 2J Purple - 4M, 5F, 1SA Green - 6 F, 3M, 1J, 2SA Orange – 2F, 1M, 1SA Red – 3M,1SA	80 slow worms under 44 mats
Visit 2 - 29/06/2018	7:40	18/27	0% cc, 14mph wind	White – 1M, 1F, 1J Yellow – 4J, 2M, 3F Grey – 1F, Green – 1M, 1J, 3F Red – 1fsw, Purple – 5F, 1M, 1J Blue – 2SA, 1J, 3F, 1M	33 slow worms found under 22 mats
Visit 3 - 05/07/2018	7:55	18/26	5%cc 8mph wind	White – 2F, 1M Yellow – 1, 1F, 1J Purple: 1M, 1J Grey – 2F Green – 1SA Red: 2SA, Blue – 4F, 1SA	18 found in total under 14 mats
Visit 4 - 12/07/2018	8:30	18/35	0%cc still	White – 1M 1F Yellow – 6F Green – 2F 1J Red – 2SA, Orange – 1F Purple – 2SA Blue – 2F	18 found under 14 mats
Visit 5 - 01/08/2018	8:15	17/26	0%cc 6mph wind	White – 2F, 1J Yellow – 3J 1F Green – 1J, 1F Orange – 1J 1F Purple – 1F	18 found under 16 mats



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				Blue – 3F, 2SA, 1J	
Visit 6 - 05/09/2018	9:00	17/24	50%cc 11mph wind	White - 1M, 5F, 6J Yellow - 12J, 2M, 3F Grey - 6J Green - 4F, 4J Orange - 1F Red - 1F, 1J Purple - 5F, 1M, 1J Blue - 7F, 2M, 9J 2sSA	73 found under 43 mats
Visit 7 - 21/09/2018	10:24	15/25	5%CC 15mph wind	White - 4J, 1SA Yellow - 3SA, 1J Grey - 3J 1SA, Green - 2SA, 1M, 1F Red - 1J Purple - 2F Blue - 4F, 7J 4SA, 1M	37 under 23 mats

4 POTENTIAL IMPACTS AND OUTLINE MITIGATION RECOMMENDATIONS

In the sections below, the important ecological features are summarised and the impacts and effects which would result from the development characterised. This has been undertaken in accordance with the methodology set out in Section 2.6. Given that the scale of significance of an effect on an ecological feature may not be the same as the geographic context in which the feature is considered important, the level of importance of given in this report takes into account the distribution of the ecological features in the context of the proposed development site. Measures to avoid, mitigate and compensate the impacts and their effects are outlined.

A site-specific detailed Mitigation, Habitat Creation and Management Plan should be produced for the site to outline site-wide ecological mitigation for protected species and habitats, compensation and enhancement measures. Targeted enhancement measures should include; native tree and shrub planting, creation of woodland habitat, removal of non-native plant species and the inclusion of bat boxes, bird boxes and dormouse boxes. A reptile mitigation strategy, to be agreed in advance by the local planning authority, involving translocation of reptiles from the site to an off-site receptor site will be required. Submission of a European Protected Species licence for dormice to Natural England will be required. It is recommended that a planning condition is produced to secure the production of these documents and subsequent implementation of all mitigation and enhancement measures.



4.1 Habitats

4.1.1 Potential Impacts

The results of the Phase 1 Habitat Survey suggest that the habitats contained within the site are of high ecological value. Much of the northern portion of the site is recently cleared woodland and a small area of hazel *Coryllus avellana* dominated woodland is present in the southwest of the site, both of which support a number of ancient woodland indicator (AWI^{*11}) plant species. The site boundaries are marked with a mixture of species rich hedgerows supporting AWI and species poor hedgerows. The site is covered by a designation of Deciduous Woodland listed on the Natural England 2014 Woodland Inventory and the Broadleaved Woodland on the site is a habitat of principal importance (HPI) under the NERC Act. In addition, a number of standard mature pedunculate oak *Quercus robur* trees present at the site are subject to a group Tree Protection Order (TPO) by Arun District Council.

The hazel woodland in the southwest corner of the main body of the site is dominated by mature, multi-stemmed hazel stools with occasional holly *Ilex aquifolium*, honeysuckle* *Lonicera periclymenum*, spindle* *Euonymus europaeus* and raspberry. Wild daffodils* *Narcissus pseudonarcissus* are abundant in the understorey along with snowdrop* *Galanthus nivalis* and occasional bramble *Rubus fruticosus*. Along the western hedgerow are mature hazel stools, holly, honeysuckle, cherry laurel *Prunus laurocerasus*, and bramble *Rubus fruticosus*. In the ground flora beneath the hedgerow is snowdrop* and wild daffodil*.

The eastern hedgerow of the site comprises cherry laurel, conifers, cotoneaster, hazel and privet *Ligustrum ovalifolium* with hawthorn *Crataegus monogyna* and spindle*. Within the ground layer there is field rose* *Rosa arvensis*, privet, holly and honeysuckle. The ground flora includes wild strawberry* *Fragaria vesca* and violet *Viola* spp.

The proposed development plan for the site outlined in Figure 1 proposes that the hedgerows along the western and eastern boundaries will be largely retained, with removal of the hedgerow along the northern boundary to accommodate an access road.

The construction zone comprises largely of recently cleared woodland supporting ancient woodland indicator plant species and mature trees that have a high ecological value. Based on the CIEEM (2016)⁷ methodology for assessment of ecological impacts (Appendix 3) the habitats within this site are deemed to have **Local** importance. The recently cleared woodland at the site will be permanently lost as a result of the development and the standard oak trees and the species rich and species poor boundary hedges will be retained. Overall the development is considered to have a **High (certain) impact** upon the woodland habitats within the site.

4.1.2 Outline Mitigation and Compensation Measures

The hedgerows are being retained, with much of the recently felled woodland habitats falling within the development footprint that will be changed to landscaped garden space, therefore there will be a

¹¹ * = Ancient woodland indicator (AWI) plant species, after Francis Rose (Author), Clare O'Reilly (Author updated edition) (2006). The Wild Flower Key (Revised Edition) - How to identify wild plants, trees and shrubs in Britain and Ireland.



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requirement to undertake mitigation through woodland planting. It is also recommended that the non-native species, including laurel dominating the hedges, is removed and replaced with native species. It is recommended that woodland planting is undertaken in the south of the site following removal of non-native species such as laurel and cotoneaster. Species should be characteristic of broadleaved woodland, including pedunculate oak, hazel and holly. As a habitat type of principal importance under S41 of the NERC Act, broadleaved and mixed woodland is considered to be of national importance. However, the areas of woodland within the site are small in comparison with the amount of woodland found within the county of West Sussex. They support moderate species and structural diversity, including ancient woodland indicator ground flora species. The area of woodland within the site boundary is therefore considered to be of local nature conservation importance.

The residual impact is considered to be a **likely Moderate impact** at a **Local level** since mature and ancient woodland habitat cannot be recreated in the short to medium term.

4.2 Bats

4.2.1 Potential Impacts

Roosting

The proposed development does not require the demolition of any buildings or felling of any trees that are known to support roosting bats, or have potential roosting features suitable for bats. There is one tree within the site, T6, that has moderate potential to support roosting bats, but as this tree is not to be felled or subject to tree surgery, there are therefore no predicted direct impacts on bat roosts. There may be indirect impacts to potential bat roosts through change of habitat from felled woodland to housing and residential gardens and lighting for the new proposed development. Overall the development is considered to result in a **Low** impact at a **Local level**.

Foraging and commuting

The bat activity transect surveys and static monitoring surveys identified the presence of at least eight species of bats foraging and commuting across the site and along the treelines and hedges fringing the site and around mature trees on the site. These are: common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, brown long-eared bats, *Myotis* spp., serotine, noctule and barbastelle *Barbastella barbastellus*. Most species are known to be relatively common, wide spread species. The most notable is the recording of a Barbastelle bat, a rare bat species (receiving special protection by being listed on Annex II of the Habitats Directive) recorded during activity transect surveys in the southwest corner of the site and along the western boundary of the site and on a static detector in the south of the site. It should be noted, however, that barbastelle bats are very wide ranging and tend to forage over a wide area, with their core sustenance zone believed to be 6km from their roosts. Three bat species recorded during the transect surveys are listed as Species of Principal Importance for nature conservation (listed on Section 41 of the Natural Environment and Rural Communities (NERC) Act). These are: noctule, soprano pipistrelle and brown long-eared bat species. There were slightly elevated levels of bat activity by a wider group of species towards the southern part of the site.

This site is considered to have regional ecological value in relation to foraging and commuting bats given that the bat species recorded are scarce in the local area.



The proposed development has potential for disturbance to commuting and foraging bats, both temporary, during construction and permanently after completion, through increased artificial lighting which would illuminate foraging and commuting habitats. The direct loss of the semi-improved grassland and recently felled woodland habitat will likely reduce the source of insect prey for bats.

Overall this is considered a **Medium impact**, which is considered a **negative impact** at a **County level** in the absence of appropriate mitigation due to the presence of barbastelle bats using the site for foraging and commuting.

4.2.2 Outline Mitigation Measures

Roosting

It is recommended that a 'no construction buffer zone' of 5m is maintained around the tree (T6) with potential to support roosting bats and that there will be no lighting falling on this tree.

Incorporating bat roosting opportunities into the new buildings will be appropriate to provide a net gain in roosting opportunities for bats such as bat tiles and access points for bats. The creation of no less than eight new roosting features is recommended across the development. This will include Schwegler 2FR bat tubes within the gable end walls of proposed new houses to be constructed at the site. These will be positioned at least 3 metres from the ground and should face one of the linear hedgerow features, where possible. It is important that all new roosting features are protected from any artificial light spillage and are positioned near to the site boundaries so that they are easily accessed by bats along flight lines to and from the site from surrounding areas.

The residual impact is considered to be a **significant (positive) impact** at a **neighbourhood level**.

Foraging and Commuting

To minimise impacts on existing hedgerow habitat features used by foraging and commuting bats, the proposed development layout has been designed to retain the existing hedgerows and trees along the site boundaries, except for a small section of hedgerow to be removed along the northern boundary to provide access.

To minimise impacts on existing habitat features used by bats, the proposed development layout has been designed to retain the existing field boundaries largely intact including the woodland parcel south of the site. Woodland planting in this area and retention of existing hedgerow and tree lines currently used for commuting and foraging bats will be required. The minor loss of hedgerow and tree belt habitat along the north of the site to accommodate the access road through the housing development are offset by a landscape planting scheme using native species of trees and shrubs, which will be used to form new hedgerows and tree lines throughout the development, forming new foraging and commuting habitat. It is recommended that the garden and ornamental planting schemes should include species known to be beneficial to insects that contribute towards the food resource for bats.

It is important that the proposed scheme incorporates a 'sensitive lighting plan' developed as part of the detailed design, in accordance with guidelines set out by the Bat Conservation Trust, which are provided in Appendix 7 for reference. It is recommended that lighting specialists assess existing lighting



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levels at the site and that this lighting assessment is used to assist ecologists to design an appropriate lighting plan to mitigate the impact of the proposed lighting scheme on bats, in particular the rare and specially protected barbastelle bat. This should include measures to create 'dark corridors' through the development site along the retained hedgerows and tree belts, and measures including screening walls or fences or double parallel hedgerows to minimise light spill onto all semi-natural habitats, including the belt of woodland to be retained and enhanced in the south of the site. All street lighting should be directed downwards and use light sources that are not attractive to insects. Reflective white line marking should be used in preference to artificial lighting in all non-essential applications.

The residual impact is considered to be a **likely Low impact** at a **Local level**.

4.3 Breeding Birds

4.3.1 Potential Impacts

The following species included in the Birds of Conservation Concern (BoCC) green list have confirmed breeding status on the site: black cap, blue tit, coal tit robin and wren. No species afforded BoCC Amber or Red list status were confirmed as breeding on the site. The birds with confirmed breeding status on the site are not ground nesting birds or notable farmland birds and they are common and widespread species within the UK that are mobile and will readily form nests in any available suitable habitat in new locations each year.

The site is therefore considered to have a **neighbourhood** ecological value in relation to breeding birds.

4.3.2 Outline Mitigation Measures

Much of the breeding bird habitat such as scattered trees, hedgerows, tree lines and woodland will be retained as part of the development. A portion of the hedgerow along the northern boundary of the site will be lost to accommodate the access route from Arundel Road, whilst areas of hazel coppice, scrub and scattered trees will also need to be removed to accommodate the housing development. It is essential that vegetation removal on the site is also timed outside of the nesting bird season (typically 1st March to 31st August), unless the feature is first searched by a suitably qualified ecologist and no active nests are found.

However, overall, given the planned native shrub and tree planting, there will be no net loss of breeding bird habitat on the site. To further enhance the site for breeding birds, bird boxes can be affixed to trees across the site. This could include 1B Schwegler Nest Boxes with entrance holes of 26 millimetres (mm) and 32 mm to encourage a range of bird species and 2H Schwegler Robin Boxes (see Figure 11), placed at a density across the site of 10 per hectare, evenly spaced throughout vegetation.

It is also recommended to create nesting opportunities and to enhance the site for other bird species that nest in or on buildings such as swallows *Hirundo rustica* and house sparrows *Passer domesticus*. No.10 Schwegler Swallow Nest boxes (see Figure 11) can be affixed to garages with open aspects that are planned for the housing development or designed into bespoke shelters for this species. RSPB Sparrow Terrace Nest Boxes providing three separate nest boxes in one timber terrace, each with its own 32mm entrance hole, would also provide nesting value.



Overall the development impact is considered to be a **low impact** at a **local level** that has a **high degree of certainty**.

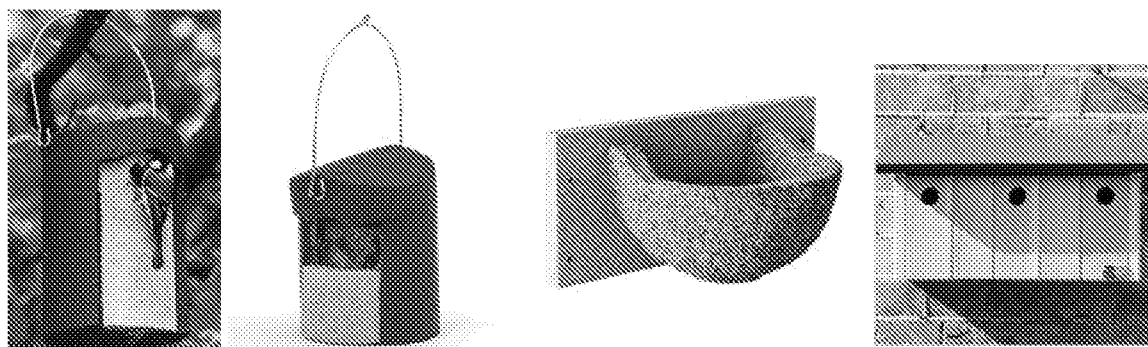


Figure 11. Clockwise from left - 1B Schwegler Nest Box, 2H Schwegler Robin Box, No. 10 Schwegler Swallow Box and RSPB Sparrow Terrace Nest Box.

4.4 *Great Crested Newts*

4.4.1 Potential Impacts

No great crested newt eDNA was detected in Pond 2 and 3 combined and 5a and 5b combined and therefore great crested newts are also assumed absent from Pond 4 – a wet ditch, which provides connectivity between the waterbodies. Pond 1 was identified from the HSI to have poor suitability to support great crested newts, it has good connectivity to tree lines and woodland with high value for foraging and is situated across a road which is likely to act as a barrier to movement for the species. Therefore, the proposed development is considered to have a 'low risk' of impacts on great crested newts.

4.4.2 Outline Mitigation Measures

Based on the above analysis, the proposed development does not require mitigation under a European Protected Species (EPS) licence. However, the presence of individual great crested newts in the suitable terrestrial habitats cannot be completely discounted and therefore it is recommended that the development proceeds under 'reasonable avoidance measures'. The preparation of the site for construction should include a period of careful habitat management (i.e. grass cutting to maintain a short sward) to reduce the habitat suitability for great crested newt as set out by a brief method statement, coupled with a tool box talk and watching brief by a licenced ecologist. In the unlikely event that a great crested newt is encountered at any stage during this process, all works should be ceased until this assessment has been re-evaluated.

4.5 *Dormice*

4.5.1 Potential Impacts

The common dormouse is present at the site and could be found in any woody habitat on the site including scrub, introduced shrub, hedgerows and tree belts forming the existing field boundaries to the site. The current proposed development layout means that there will be loss of approximately 1.3ha of suitable habitat, including hazel coppice and scrub present within the site, although it is anticipated that



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most of the existing hedgerows and tree belts along the boundaries of the site will remain intact. However, impacts on this habitat type are unavoidable where the proposed construction area of houses, gardens and access roads pass through the proposed housing development. The tree and scrub removal required represents a permanent loss of habitat used by dormouse.

In the absence of mitigation the clearance of scrub, hedgerow and tree lines could potentially result in the destruction of nests and mortality of dormice. Severance of habitat connectivity, including by removal of the hedgerow along the north of the site along Arundel Road could potentially reduce access by dormice to the remaining fragments of hedgerow habitat to dormice in the longer term.

Finally, once constructed, the proposed development has potential for indirect impacts on dormice through disturbance from artificial lighting and increased predation risk by domestic cats.

Overall this is considered a **Medium impact**, which is considered **negative effect** at a **County level** in the absence of appropriate mitigation.

4.5.2 Outline Mitigation Measures

The proposed development layout will retain the majority of the existing field boundaries to minimise impacts on dormouse habitats. The entrance to the development will require a new access point, resulting in the removal of the hedgerow along the north of the site, from Arundel Road.

The layout of the proposed scheme will cause severance of ecological connectivity by removal of the felled woodland habitat from the majority of the site and some fragmentation and isolation of the existing hedgerow along the northern boundary.

A European Protected Species (EPS) mitigation licence is required for the development to proceed legally. In order to grant planning permission for a proposed development that will impact upon dormice and their habitat, the local authority and Natural England must also be satisfied that there is a) an imperative reason of overriding public or economic interest, and b) the conservation status of the dormouse population will be maintained (or enhanced). This is likely to involve the retention and creation of suitable dormouse habitat in a dedicated area of the site, followed by translocation of dormice into the dedicated area, if necessary.

A detailed mitigation strategy would form part of the licence conditions that deals with both the immediate effects of clearance of dormouse habitat and long-term impacts. Standard best practice for vegetation clearance where dormice are present involves timing the initial above-ground works in late autumn and winter, when animals are in hibernation at ground level. This is followed by stump removal in spring, when dormice become active and can move away from the construction zone. This method can also avoid the bird breeding season and therefore prevents impacts on birds' nests, eggs and young.

The losses of woodland and scrub will only be partially compensated for by the establishment of new native species hedgerows, together with tree and shrub planting schemes as part of the soft landscape design for the proposed development that will be linked to the existing habitat network. It will be important to retain and enhance individual trees and features where possible in the south of the site



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and to retain and enhance the existing hedgerows by removing non-native species including laurel *Laurus* spp. and cotoneaster *Cotoneaster* spp. and replacing these with native woody species of benefit to dormice for feeding, commuting and nesting. It may be necessary to install dormouse boxes in the site to increase the availability of suitable nesting habitat. Overall, the extent of native hedgerows to be planted around each individual housing unit within the proposed development is expected to increase should the proposed development go ahead, providing a net benefit to dormice. It is recommended that a double hedgerow or planted 'buffer zone' is created parallel to the site boundaries that is comprised of thorny woody species, including blackthorn *Prunus spinosa* and hawthorn *Crataegus monogyna* to minimise egress by people and cats to the perimeter of the site and to the retained woodland belt in the south of the site. It is also recommended that any lighting is directed away from hedgerows, tree lines and woodland. The developer will consider placing a covenant that restricts the owners from keeping cats as pets within the new homes on the proposed development.

Overall this is considered a **Medium impact**, which is considered **negative** at a **County level** following mitigation given that mature woodland habitat providing optimal dormouse habitat has been recently lost through at this site.

4.6 Reptiles

4.6.1 Potential Impacts

Based on the results of the presence/absence survey during which a peak count of 80 slow worms were recorded, this indicates that the site supports an exceptional population of slow worms. The site is considered to have **Local** ecological value in relation to reptiles.

There is the potential for individual reptiles to be killed or injured during site preparation and construction and also suffer predation by domestic cats owned by the residents of the proposed development.

Overall this is considered a **Medium (certain) impact**, which is considered a **significant negative impact** at a **Local level**.

4.6.2 Outline Mitigation and Compensation Measures

In order to comply with legislation and best practice, and ensure that no reptiles are harmed during site preparation and construction, a reptile mitigation strategy should be developed and agreed with the local planning authority. This strategy would include the capture and translocation of reptiles to a suitable receptor site nearby. If the mitigation is followed the residual impact is considered to be a **significant (positive)** at a **Local level** since the population of reptiles at the site will need to be translocated.

Due to the high number of reptiles on site, it is therefore recommended that a repeat presence/absence survey is undertaken if the commencement of construction does not take place within three years from the date of the 2018 reptile survey.



APPENDIX 1 – Legislation and Policy

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 certain 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



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and, in order to grant a licence, 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 *Satyrrium 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



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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 (2018)

The National Planning Policy Framework (NPPF 2018) 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.

Paragraph 174b, which states that council policies should “promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity.” The Office of the Deputy Prime Minister (ODPM) Circular 06/2005¹², (2005) also states that in accordance with the NPPF, it is important that developments should contribute to and enhance the natural and local environment by:

- Minimising impacts on existing biodiversity and habitats,
- Providing net gains in biodiversity and habitats, wherever possible,
- establishing coherent ecological networks that are more resilient to current and future pressures.

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

¹² Government Circular: Biodiversity and Geological Conservation – Statutory Obligations and Their Impact Within The Planning System. ODPM Circular 06/2005. Office of the Deputy Prime Minister. 16 August 2005



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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.

In Kent, the themes identified as priorities in Biodiversity 2020 are carried forward by the Kent Biodiversity Partnership that administers the Kent Biodiversity Action Plans and Biodiversity Opportunities Areas (Kent BAP, 2014).

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.

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APPENDIX 2 – Arun District Council – Adoption Arun Local Plan 2011-2031 (July 2018)

Policy Number/Title	Policy Summary
C SP1 (Countryside)	Outside the Built-Up Area Boundaries (as identified on the Policies Maps) land will be defined as countryside and will be recognised for its intrinsic character and beauty. Development will be permitted in the countryside where it is: a. for the operational needs of agriculture, horticulture, forestry, the extraction of minerals or the management of waste as part of a waste site allocation within the West Sussex Waste Local Plan; or b. for quiet, informal recreation; or c. for green infrastructure; or d. for the diversification of the rural economy; or e. for road and/or cycle schemes; or f. in accordance with other policies in the Plan which refer to a specific use or type of development. 7 Settlement Structure & Green Infrastructure The Council will take into account cumulative impact of development in the consideration of planning applications. To ensure better management of the rural-urban fringe in those areas where significant new development is proposed, early consideration will need to be given to landscape and biodiversity enhancement, woodland management, recreation provision and access routes.
ENV SP1 (Natural Environment)	Arun District Council will encourage and promote the preservation, restoration and enhancement of biodiversity and the natural environment through the development process and particularly through policies for the protection of both designated and non-designated sites. Where possible it shall also promote the creation of new areas for habitats and species. In relation to designated sites, development will be permitted where it protects sites listed in Tables 17.1-17.7 that are recognised for the species and habitats contained within them.
ENV DM1 (Designated Sites of biodiversity or geological importance)	a. Proposed development likely to have an adverse effect on land with the designated features of any Site of Biodiversity or Geological Importance as listed in Tables 17.1 - 17.7 or any subsequently designated sites (either individually or in combination with other developments), will not normally be permitted. Consideration will be given to the exact designated features present on the site, their scarcity/rarity and recognition of the protection offered by their existing status. Development on wildlife sites with the highest value will only be permitted exceptionally where the following can be demonstrated: i. There is no alternative solution (which shall be adequately demonstrated by the developer). ii. There are reasons of public health or public safety or iii. There are benefits of primary importance to the environment or iv. There are imperative reasons of overriding public interest. Notwithstanding the above however, the presumption in favour of sustainable development does not apply where development requiring appropriate assessment under the Birds or Habitats Directives is being considered, planned or determined. b. In determining any planning application affecting Sites of Biodiversity or Geological Importance the Council will ensure that the intrinsic natural features of particular interest are safeguarded or enhanced having regard to; i. The European, National or Local status and designation of the site; ii. The nature and quality of the site's features, including its rarity value; iii. The extent of any adverse impacts on the notified features of interest; iv. The need for compensatory measures in order to re-create remaining features of habitats on or off the site. c. Where appropriate the Council will ensure the effective management of designated sites through the imposition of planning conditions or Section 106 agreements as appropriate.
Policy ENV DM3	Development shall:

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(Biodiversity Opportunity Areas)	a. Retain and sympathetically incorporate locally valued and important habitats, including wildlife corridors and stepping stones b. Be designed in order to minimise disturbance to habitats Development proposals that do not reasonably address opportunities for enhancing these through their design, layout and landscaping or access/management shall not be permitted. Where a development scheme would result in a habitat loss, mitigation measures will be proposed as part of the proposed scheme and such measures agreed with the Local Planning Authority prior to the determination of any planning application. Within Biodiversity Opportunity Areas (BOAs) identified on the Policies Maps or where likely to have an impact on species or habitats within the BOAs, any application for planning permission shall include a properly conducted survey of the presence must be proposed within the planning permission.
ENV DM4 (Protection of trees)	Development will be permitted where it can be demonstrated that trees protected by a Tree Preservation Order(s), (TPO) identified as Ancient Woodland, in a Conservation Area or contributing to local amenity, will not be damaged or destroyed now and as they reach maturity, unless development: a. Would result in the removal of one or more trees in the interests of good arboricultural practice. This shall be demonstrated by the developer following the advice of a suitably qualified person which shall be guided by BS 5837 (2012). Details of any advice received having regard to BS 5837 (2012) shall be submitted, in writing, as part of a planning application; or b. Would enhance the survival and growth prospects of other protected trees; c. The benefits of the proposed development in a particular location outweigh the loss of trees or woodland, especially ancient woodland. Where planning permission is granted in any of the above instances, conditions shall be used to ensure that, for any trees which are removed as part of a development, at least an equivalent number of a similar species and age (where practical) are planted on the proposed development site. Sufficient space for replacement trees to mature without causing future nuisance or damage shall be provided. The planting of new trees shall form an integral part of the design of any development scheme. Proper provision must be made for the protection and management of trees or areas of woodland on-site when undertaking development. A management plan shall be provided as part of a planning application in accordance with BS 5837 (2012) in order to ensure that trees are adequately protected during development and appropriately maintained in the future. Conditions for the continued protection of trees on sites shall be included in any planning permission given. Where there are existing trees on or adjacent to a development site, developers shall be required to provide: d. Land and tree surveys e. A tree constraints plan f. An arboricultural impact assessment to include a tree protection plan and arboricultural method statement These will ensure that development is planned to take a comprehensive view of tree issues at an early stage in the design process and that development works do not have a negative impact on existing trees.
ENV DM5 (Development and biodiversity)	Development schemes shall, in the first instance, seek to achieve a net gain in biodiversity and protect existing habitats on site. They shall also however incorporate elements of biodiversity including green walls, roofs, bat and bird boxes as well as landscape features minimising adverse impacts on existing habitats (whether designated or not). Development schemes shall also be appropriately designed to facilitate the emergence of new habitats through the creation of links between habitat areas and open spaces. Together, these provide a network of green spaces which serve to reconnect isolated sites and facilitate species movement. Where there is evidence of a protected species on a proposed development site, planning applications shall include a detailed survey of the subject species, with details of measures to be incorporated into the development scheme to avoid loss



	of the species. This involves consideration of any impacts that will affect the species directly or indirectly, whether within the application site or in an area outside of the site, which may be indirectly affected by the proposals. All surveys shall be carried out at an appropriate time of year and shall be undertaken by a qualified and, where appropriate, suitably licensed person. All developments shall have regard to Natural England's standing advice for protected species.
W SP1 (Water)	Arun District Council will encourage water efficiency measures in order to protect the District's water resources and enhance the quality of the water environment which supports a range of habitats and ecosystems. Development will be encouraged to make active use of surface water as a design feature and permitted where it identifies measures to improve and enhance waterbodies, coastal habitats or provides additional flood relief. The Council will also support development that: a. is appropriately located, taking account of flood risk and promotes the incorporation of appropriate mitigation measures into new development, particularly Sustainable Drainage Systems that reduces the creation and flow of surface water and improves water quality; 63 Water stressed areas - final classification (July 2013) b. reduces the risk to homes and places of work from flooding whilst increasing biodiversity; c. delivers a range of community benefits including enhancing the quality of life and providing greater resistance to the impact of climate change.



APPENDIX 3 – Methodology for Assessment of Ecological Impacts

The assessment of ecological impacts follows best practice guidelines for impact assessment¹³. Six steps are required as part of an ecological impact assessment which are detailed below:

1. Identify important ecological features (habitats, species, ecosystems and their functions/processes)

A summary of the approach to valuing important ecological features is detailed in Table 1.

Table 1: Categorisation of the level of value an important ecological feature has at geographical scale

Level of value	Example
International	Internationally designated site; Special Protected Area (SPA), Special Areas of Conservation (SAC), Ramsar, Biosphere Reserves. A viable area of a habitat or area important for maintaining viability listed as in Annex 1 of the Habitats Directive. Regularly occurring population of internationally important species listed in Annex 1, 2 or 4 of the Habitats Directive and Annex 1 of the Birds Directive.
National	Nationally designated sites; Site of Special Scientific Interest (SSSI), National Nature Reserve (NNR), Local Nature Reserves (LRN). Regularly occurring population of nationally important species listed in UK BAP, Schedules 1, 5 and 8 of the Wildlife and Countryside Act or UK Red Data Book Species.
County / Regional	Non-statutory designated sites; Local Wildlife Sites (LWSs), Sites of Nature Conservation (SNCs) and Site of Importance for Nature conservation (SINCs). Ancient woodland more than 0.25ha. A viable area of a habitat or area important for maintaining viability identified in local/county BAPs listed as in Annex 1 of the Habitats Directive. Regularly occurring population of a species listed as being nationally scarce or a local/county BAP due to its rarity or localisation.
Local	Sites designated at a local level due to meeting ecological selection criteria. Habitats and species which are scarce in the local area.
Neighbourhood	Common widespread habitats (poor-semi improved grassland, arable fields, coniferous plantations etc).
Less than neighbourhood / negligible	Habitats with little to no ecological value (amenity grassland and hardstanding)

2. Identifying and characterising impacts to important ecological features

Impacts are characterised based on the changes expected to the extent and integrity of the important ecological features. This takes in to account permanent and temporary effects, timings and reversibility.

¹³ CIEEM (2016). *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal* (2nd ed.). Chartered Institute of Ecology and Environmental Management, Winchester.



Impacts can be high, medium, low or neutral – see table 2. Each impact has a varying probability of occurring – see table 3. Impacts can either be negative or positive.

Table 2: Categorisation of the level of impact occurring to important ecological features

Impact type	Description
High	Large-scale, permanent changes to an important ecological feature which will impact on its integrity. This will likely result in changes in the conservation status of a species population or habitat type at the site.
Medium	Moderate-scale, permanent changes to an important ecological feature or large-scale temporary changes which will not impact upon its integrity. This will likely result in temporary changes in the conservation status of a species population or habitat type at the site, however these are unlikely to be reserved long-term.
Low	Small-scale, temporary changes to an important ecological feature or large-scale temporary changes which will not impact upon its integrity. This will likely result in temporary changes in the conservation status of a species population or habitat type at the site, however these are unlikely to be reserved long-term.
Neutral	No change in important ecological features.

Table 3: Categorisation of the probability of an impact occurring to important ecological features

Impact type	Description
Certain	It is reasonable to conclude that the impact will occur as a result of the proposal
Likely	It is reasonable to conclude that the impacts are more likely to occur than not as a result of the proposal.
Unlikely	It is reasonable to conclude that these impacts are less likely to occur than to occur as a result of the proposal.

The following four steps lead on from the information identified in the above two steps:

- 3. Incorporating measures to avoid and mitigate these impacts;**
- 4. Assessing the significance of any residual effects after mitigation;**
- 5. Identifying appropriate compensation measures to offset significant residual effects; and**
- 6. Identifying opportunities for ecological enhancement.**



APPENDIX 4 – Great Crested Newt ‘Habitat Suitability Index’ Values and Survey Data

Table 1. HSI calculation for ponds assessed.

Pond Reference	Pond 1		Pond 2		Pond 3	
National Grid Reference (NGR)	SU 9585 0663		SU 9606 2674		SU 9606 2769	
SI attribute	SI value	Notes	SI value	Notes	SI value	Notes
Location	1.00	SE England	1.00	SE England	1.00	SE England
Pond area	0.93	1,140m ²	0.98	488m ²	0.65	323 m ²
Pond drying	0.90	never	0.90	never	0.90	never
Water quality	0.67	moderate	0.33	poor	0.33	poor
Shade cover	1.00	30	1.00	60	0.40	90
Water-fowl	0.01	major	0.67	minor	0.67	minor
Fish presence	0.01	major	1.00	absent	1.00	absent
No. ponds	1.00	22	1.00	20	1.00	21
Terrestrial habitat	0.67	moderate	1.00	good	1.00	good
Macrophytes	0.46	15	0.61	30	0.31	0
H.S.I. value	0.33	-	0.81	-	0.66	-
Pond suitability	poor	-	excellent	-	average	-

Pond Reference	Pond 4		Pond 5a		Pond 5b	
NGR	SU 9626 0664		SU 9606 3061		SU 9606 3157	
SI attribute	SI value	Notes	SI value	Notes	SI value	Notes
Location	1.00	SE England	1	SE England	1.00	SE England
Pond area	0.37	185 m ²	1.00	615 m ²	0.24	120 m ²
Pond drying	0.50	sometimes	0.90	never	0.90	never
Water quality	0.33	poor	0.67	moderate	0.67	moderate
Shade cover	0.40	90	0.60	80	0.60	80
Water-fowl	1.00	absent	0.67	minor	0.67	minor
Fish presence	1.00	absent	1.00	absent	1.00	absent
No. ponds	1.00	21	1.00	25	1.00	25
Terrestrial habitat	1.00	good	1.00	good	1.00	good
Macrophytes	0.41	10	0.81		0.46	15
H.S.I. value	0.63	-	0.85	-	0.70	-
Pond suitability	average	-	excellent	-	average	-



APPENDIX 5 - Great Crested Newt eDNA Survey Results

Date of Receipt: 04/06/2018

Material Tested: eDNA from pond water samples

Determinant	Result	Method	Date of Analysis
Inhibition Control ¹	2 of 2	Real Time PCR	26/06/2018
Degradation Control ²	Within Limits	Real Time PCR	26/06/2018
Great Crested Newt ³	0 of 12 (GCN negative)	Real Time PCR	26/06/2018
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10 ⁻¹ ng/μl) ⁴	4 of 4	Real Time PCR	As above for GCN
Report Prepared by:	Dr Helen Bees	Report Issued by:	Dr Ben Maddison

Signed:

Position:

Date of preparation:

eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

¹ If all PCR controls and extraction blanks give the expected results a sample is considered: negative for great crested newt if all of the replicates are negative; positive for great crested newt if one or more of the replicates are positive.

² Recorded as the number of positive replicate reactions at expected C_t value. If the expected C_t value is not achieved, the sample is considered inhibited and is diluted as per the technical advice note prior to amplification with great crested newt primer and probes.

³ No degradation is expected within time frame of kit preparation, sample collection and analysis.

⁴ Additional positive controls (10⁻¹, 10⁻², 10⁻³ ng/μl) are also routinely run, results not shown here.

Figure 1. eDNA result for Pond 2 and 3 combined.

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Date of Receipt: 25/06/2018

Material Tested: eDNA from pond water samples

Determinant	Result	Method	Date of Analysis
Inhibition Control ¹	2 of 2	Real Time PCR	26/06/2018
Degradation Control ²	Within Limits	Real Time PCR	26/06/2018
Great Crested Newt ³	0 of 12 (GCN negative)	Real Time PCR	26/06/2018
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10 ⁻⁶ ng/μL) ⁴	4 of 4	Real Time PCR	As above for GCN

Report Prepared by:

Signed:

Position:

Date of preparation:

27/06/2018

Date of issue:

27/06/2018

eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

¹ If all PCR controls and extraction blanks give the expected results a sample is considered: negative for great crested newt if all of the replicates are negative; positive for great crested newt if one or more of the replicates are positive.

² Recorded as the number of positive replicate reactions at expected C_t value. If the expected C_t value is not achieved, the sample is considered inhibited and is diluted as per the technical advice note prior to amplification with great crested newt primer and probes.

³ No degradation is expected within time frame of kit preparation, sample collection and analysis.

⁴ Additional positive controls (10⁻¹, 10⁻², 10⁻³ ng/μL) are also routinely run, results not shown here.

Figure 2. eDNA result for Pond 5a and 5b combined.



APPENDIX 6 – Dormouse Nest-tube Check Results

Abbreviations: DM=dormouse; WM=wood mouse; YN=Yellow-necked mouse; ad=adult; juv=juvenile, N=nest only; NM=nest material, not woven, unspecified; F=food cache (wood mouse); bee=Tree bumblebee *Bombus hypnorum* nest. Bird=bird nest (BTO codes apply to species); E=empty; nf=tube not found.

Month	June	September
Survey date	20/06/2018	29/11/2018
1	E	E
2	E	E
3	E	E
4	E	E
5	E	E
6	E	E
7	E	E
8	E	E
9	E	E
9a	E	DM
10	E	E
10a	E	Green leaves – a possible dormouse nest
11	E	E
12	E	DM-N
13	E	E
13a	E	DM & DM-N
14	E	E
15	E	E
16	E	E
17	E	E
18	E	E
19	E	E
19a	E	DM-N
20	E	E
21	E	DM & DM-N
22	E	E
23	E	E
23a	E	E
24	E DM in bird box located near nest tube 24	E
25	E	E
26	E	E
27	E	E
28	E	E



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Month	June	September
Survey date	20/06/2018	29/11/2018
29	E	E
30	E	E
31	E	E
32	E	E
33	E	E
34	E	E
35	E	E
36	E	E
37	E	E
38	N/A	E
39	N/A	E
40	N/A	E
46	N/A	E
47	N/A	E
48	N/A	E
49	E	WM-N
50	N/A	E
51	N/A	E
52	N/A	WM & WM-N
53	N/A	E
54	N/A	E
55	N/A	E
56	N/A	E
57	N/A	E
58	N/A	E
59	N/A	DM-N
60	N/A	E
61	N/A	E
62	N/A	E
63	N/A	E
64	N/A	E
65	N/A	E
66	N/A	E
67	N/A	E
68	N/A	E
69	N/A	E
70	N/A	DM-N
71	N/A	E
72	N/A	E
73	N/A	E
74	N/A	E
75	N/A	E



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Month	June	September
Survey date	20/06/2018	29/11/2018
76	N/A	E
77	N/A	E
78	N/A	E
79	N/A	E
80	N/A	E
81	N/A	E
82	N/A	E
83	N/A	E
84	N/A	E
85	N/A	DM & DM-N
86	N/A	E
87	N/A	E
88	N/A	E
89	N/A	E
90	N/A	DM-N
91	N/A	E
92	N/A	E
93	N/A	E
94	N/A	E
95	N/A	E
96	N/A	E
97	N/A	E
98	N/A	E
99	N/A	E
100	N/A	E

N/A = Nest tubes not checked following the incidental sighting of a dormouse in a bird box located near nest tube 24.



APPENDIX 7 - Reducing Impacts of Artificial Light

Bright external lighting can have a detrimental impact upon foraging and commuting bat flight paths, but more importantly can also cause bats to remain in their roosts for longer. Artificial lighting can also cause significant impacts on other nocturnal species, most notably moths and other nocturnal insects. It can also result in disruption of the circadian rhythms of birds, reducing their fitness. Guidelines issued by the Bat Conservation Trust¹⁴ should be considered while designing the lighting scheme. A simple process which should be followed where the impact on bats is being considered as part of a proposed lighting scheme. It contains techniques which can be used on all sites, whether a small domestic project or larger mixed-use, commercial or infrastructure development. This includes the following measures:

Avoid lighting on key habitats and features altogether

There is no legal duty requiring any place to be lit. British Standards and other policy documents allow for deviation from their own guidance where there are significant ecological/environmental reasons for doing so. It is acknowledged that in certain situations lighting is critical in maintaining safety, such as some industrial sites with 24-hour operation. However, in the public realm, while lighting can increase the perception of safety and security, measurable benefits can be subjective. Consequently, lighting design should be flexible and be able to fully consider the presence of protected species.

Apply mitigation methods to reduce lighting to agreed limits in other sensitive locations – lighting design considerations

Where bat habitats and features are considered to be of lower importance or sensitivity to illumination, the need to provide lighting may outweigh the needs of bats. Consequently, a balance between a reduced lighting level appropriate to the ecological importance of each feature and species, and the lighting objectives for that area will need to be achieved. The following are techniques which have been successfully used on projects and are often used in combination for best results;

- Dark buffers, illuminance limits and zonation
- Sensitive site configuration, whereby the location, orientation and height of newly built structures and hard standing can have a considerable impact on light spill
- Consider the design of the light and fittings, whereby the spread of light is minimised ensuring that only the task area is lit. Flat cut-off lanterns or accessories should be used to shield or direct light to where it is required. Consider the height of lighting columns. It should be noted that a lower mounting height is not always better. A lower mounting height can create more light-spill or require more columns. Column height should be carefully considered to balance task and mitigation measures. Consider no lighting solutions where possible such as white lining, good signage, and LED cat's eyes. For example, light only high-risk stretches of roads, such as crossings and junctions, allowing headlights to provide any necessary illumination at other times.
- Screening, whereby light spill can be successfully screened through soft landscaping and the installation of walls, fences and bunding
- Glazing treatments, whereby glazing should be restricted or redesigned wherever the ecologist and lighting professional determine there is a likely significant effect upon key bat habitat and features.
- Creation of alternative valuable bat habitat on site, whereby additional or alternative bat flightpaths, commuting habitat or foraging habitat could result in appropriate compensation for

¹⁴ Bat Conservation Trust and Institute for Lighting Professionals (2018) Guidance note 8. Bats and Artificial Lighting. <https://www.theilp.org.uk/documents/guidance-note-8-bats-and-artificial-lighting/>



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any such habitat being lost to the development.

- Dimming and part-night lighting. Depending on the pattern of bat activity across the key features identified on site it may be appropriate for an element of on-site lighting to be controlled either diurnally, seasonally or according to human activity. A control management system can be used to dim (typically to 25% or less) or turn off groups of lights when not in use.

Demonstrate compliance with illuminance limits and buffers

- *Design and pre-planning phase*; It may be necessary to demonstrate that the proposed lighting will comply with any agreed light-limitation or screening measures set as a result of your ecologist's recommendations and evaluation. This is especially likely to be requested if planning permission is required.
- *Baseline and post-completion light monitoring surveys*; baseline, pre-development lighting surveys may be useful where existing on or off-site lighting is suspected to be acting on key habitats and features and so may prevent the agreed or modelled illuminance limits being achieved.
- *Post-construction/operational phase compliance-checking*



Further reading:

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