

## **Blackthorn Farm, Meopham**

### **Hazel Dormouse Survey Report and other Terrestrial Mammals**

Prepared on behalf of

Esquire Developments

Final Report

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# Blackthorn Farm, Meopham

## Hazel Dormouse Survey Report and other Terrestrial Mammals

### Report Release Sheet

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# **Blackthorn Farm, Meopham**

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# **Blackthorn Farm, Meopham**

## **Hazel Dormouse Survey Report and other Terrestrial Mammals**

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### **Executive Summary**

Ecological Planning & Research conducted a Hazel Dormouse *Muscardinus avellanarius* survey in relation to the Proposed Development on land at Blackthorn Farm, Culverstone Green.

Tubes and boxes were deployed on the 6<sup>th</sup> of May 2025, and four survey visits were conducted between June and November 2025. No field evidence of Hazel Dormouse was recorded during the survey, and it is therefore considered likely absent.

No field evidence of Badger was recorded during any of the other ecology survey work that was completed during the 2025 field season, nor was there field evidence of other priority mammal species. Therefore, the terrestrial mammal assemblage is of ecological importance at the **Zone of Influence Level** only.

## Blackthorn Farm, Meopham

### Hazel Dormouse Survey Report and other Terrestrial Mammals

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## 1. INTRODUCTION

### Brief

- 1.1 Ecological Planning & Research (EPR) was commissioned by Esquire Developments to conduct a Hazel Dormouse *Muscardinus avellanarius* survey in relation to the Proposed Development on land at Blackthorn Farm, Culverstone Green (hereafter referred to as 'the Site').
- 1.2 **Figure 1** shows location of the Site.

### Relevant Legislation

- 1.3 **Appendix 1** provides further information about:
  - The Environment Act 2021;
  - The Conservation of Habitats and Species Regulations 2017 (as amended);
  - The Wildlife and Countryside Act 1981 (as amended);
  - The Countryside and Rights of Way (CROW) Act 2000; and
  - The Natural Environment and Rural Communities (NERC) Act 2006.

### Likely Biophysical Changes

- 1.4 Biophysical change means an "... alteration in biological and/or physical conditions of the environment (e.g. changes in the atmospheric concentration of carbon dioxide, altered soil pH or change in the frequency of a plant species in an area)" (CIEEM, 2018).
- 1.5 The predicted biophysical changes that could be generated from the Proposed Development and be of relevance to Hazel Dormouse are summarised in **Table 1.1**, along with their likely Zone of Influence (ZoI).

**Table 1.1: Activities and Biophysical Changes associated with the Proposed Development that may give rise to ecological impacts on Hazel Dormouse and other terrestrial mammals, and the associated Zone(s) of Influence.**

Activity	Potential Impacts	Zone of Influence
<b>Site Clearance and Construction Phase</b>		
Vegetation clearance and ground works	Loss and fragmentation of suitable habitat. Direct harm or death of individual animals.	Site and areas within 400m of it.
Access and travel on / off the Site	Disturbance to animals (e.g., via ground vibration).	The Site and locations around access points.
Assembly and storage areas for machines, materials and construction compounds	Loss and fragmentation of suitable habitat. Direct harm or death of individual animals. Disturbance (e.g., via ground vibration).	The Site and locations around access points.
Construction of new roads and buildings	Habitat fragmentation.	The Site and immediate surrounds in the most part.
Creation of new habitats through implementation of a soft landscaping scheme.	Beneficial impact from the creation of new habitat, including scrub planting.	Site and areas within 400m of it.
<b>Operational Phase</b>		
Access and travel on / off the Site, including increased number of people visiting the Site for recreational purposes.	Disturbance (e.g., increased interactions with people and their pets). Potential increase in mortality rates from increased access, interactions with people.	Site and areas within 400m of it.
Occupation of new houses: urban effects.	Disturbance. Loss and fragmentation of habitats. Degradation and pollution of habitats through urban effects (such as fly tipping and introduction of non-native species).	Site and areas within 400m of it.
Implementation of habitat management plans.	Enhancement of existing habitats and beneficial management of new habitats.	Site and areas within 400m of it.

### **Zone of Influence (ZoI)**

- 1.6 The ZoI of a development is defined by the Guidelines for Ecological Impact Assessment (EIA) as “... *the area over which ecological features may be affected by biophysical changes as a result of the proposed project and associated activities*” (CIEEM, 2018).
- 1.7 The ZoI of the Proposed Development associated with the Hazel Dormouse population is, for the purposes of this assessment, considered to be the Site and up to 400m beyond it.

1.8 Whilst recreational disturbance to Hazel Dormouse and other mammals from new residents may occur, this is likely to be less significant compared to a potential increase in predation by domestic cats because Hazel Dormouse are mainly arboreal (i.e., they spend most of their time in trees, scrub hedgerows etc and not on the ground).

1.9 In relation to cats, there is evidence cats have a home range of approximately 300 to 400m (Thomas, *et al.*, 2014). Whilst the main predators of Hazel Dormouse might be other predators (e.g., see Juškaitis, 2013), cats have been recorded preying on Hazel Dormouse.

1.10 In general, Hazel Dormouse do not appear to move significant distances. For example, Bracewell and Downs (2017) recorded a maximum distance of 50m when collecting nesting material. In a radio tracking study in the UK (Somerset), Bright and Morris (1991) found that Hazel Dormouse were entirely arboreal and would make considerable detours rather than crossing open ground. In general, animals did not move more than 100m from their nest.

1.11 Whilst the mean distance travelled per night for males was 184m and 132m for females, the maximum straight-line distance between a nest and an animal was 156m. Bright and Mitchell-Jones (2006) indicate the home range of a single dormouse is 300m in hedgerows or 1-1.5ha in woodland.

1.12 All the above would also support a likely Zol of up to 400m, whilst acknowledging that post-juvenile dispersal may exceed this distance (e.g., Juškaitis, 1997).

1.13 In some places, the Zol might be less than 400m when there are significant barriers to dispersal and/or movement because of the highly arboreal nature of Hazel Dormouse, and their avoidance behaviour of open ground, with animals generally only crossing gaps of 1m-8m. Therefore, the A227 (South Street) along the western boundary will reduce the Zol westwards (i.e., individuals are unlikely to cross the A227), and large open areas of farmland with few connecting hedgerows may also limit the extent of the Zol.

### **Survey Objectives**

1.14 The objectives of the survey and report are to:

- Identify suitable Hazel Dormouse habitat within the Site;
- Assess the use of the Site by Hazel Dormouse;
- Report the results of the Hazel Dormouse survey; and
- Assess the ecological importance of the Site for Hazel Dormouse.

## 2. METHODS

### Desk Study

- 2.1 A biological records data search was commissioned from Kent and Medway Biological Record Centre (KMBRC) on 5<sup>th</sup> March 2025.
- 2.2 In addition, the Government's Multi-Agency Geographic Information for the Countryside (MAGIC) was used to look for records of granted European Protected Species Mitigation Licences within 5km of the Site.

### Field Survey

#### *Habitat Assessment*

- 2.3 The habitats were assessed for their suitability for Hazel Dormouse by Senior Ecologist Sean Manley BSc (Hons) and Ecologist Holly Pay BSc (Hons) MSc ACIEEM during the Preliminary Ecological Appraisal.
- 2.4 The methods used to assess the suitability of habitats for Hazel Dormouse focused on four main factors: -
  - The **quality** of the habitat for food resource and diversity, and (to a lesser degree) the availability of favoured nesting material available for Dormice;
  - The **structure** of the arboreal habitat, in terms of what is known to be optimal for Dormice;
  - The **extent** (area) of potentially suitable arboreal habitat for Dormice; and
  - The **connectivity** that exists between habitats on and adjacent to the Site, and other potentially suitable habitat in the wider landscape (in terms of arboreal links).

- 2.1 Further information is provided in **Appendix 2**.

#### *Hazel Dormouse Survey*

- 2.5 The nest tube survey followed the guidance within the Dormouse Conservation Handbook 2<sup>nd</sup> Edition (Bright *et al.*, 2006). These guidelines recommend that a minimum of 50 nest tubes are deployed in suitable and connected habitat to determine the presence or likely absence of Dormice.
- 2.6 A total of 50 nest tubes and 2 nest boxes were set up in suitable habitat on the 6<sup>th</sup> May 2025 by Holly Pay BSc (Hons), Becky Sanders BSc (Hons), and Rhys Davies BSc (Hons).
- 2.7 Dormouse nest tubes were installed at roughly 20m intervals in suitable habitat throughout the Site in accordance with best practise guidance. Nest Boxes were also installed in woodland.
- 2.8 Nest tubes were secured just below branches in all hedgerows and woodlands to encourage Dormice to nest within them. The location of the nest tubes and boxes are shown in **Figure 2**.

2.9 The nest tubes were then checked between April and November. **Table 3.1** shows the dates and weather conditions for each survey visit.

**Table 3.1: Dates and weather conditions during surveys.**

Date of survey	Temperature (°C)	Cloud Cover (% cover)	Wind (Beaufort scale)	Rain
20/06/2025	19-24	10	1	0
22/08/2025	12-14	20-30	1-2	0
22/09/2025	8-10	0	1-2	0
19/11/2025	3-1	100	2	Light rain to heavy rain and snow later

2.10 The thoroughness of a Dormouse survey can be measured using an index of probability score as detailed within the Dormouse Conservation Handbook (**Table 3.2**), assuming that 50 tubes have been placed in suitable habitat. All monthly scores for the period over which the nest tubes were in place are added together (irrespective of whether the nest tubes are inspected in that month) on the assumption these are checked monthly or bi-monthly (i.e. once every two months). Scores reflect the probability of finding Dormice in nest tubes or boxes, in the given month.

2.11 Assumed absence should not be based on a search effort score of less than 20 (Chanin and Woods 2003). The points system can be multiplied if using more than 50 tubes for the survey (for example, doubled where using 100 tubes for example). However, the point system is no longer of relevance once Dormice are confirmed as being present.

**Table 3.2: Index of Probability of Finding Dormice Present in Nest Tubes in Any One Month (Bright et al., 2006).**

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

### *Ecological Evaluation*

2.12 The importance value used in this report is based on the recommended geographical context. For the purposes of this assessment, the following geographical contexts are used; Zol, Local, County, Regional, National, United Kingdom, European or International level.

### *Considerations*

2.13 There were no material constraints to the survey.

### 3. RESULTS

#### *Desk Study*

3.1 No records of Hazel Dormouse were returned within 1km of the Site and no European species licence returns are shown on MAGIC within 2km of the Site.

#### *Habitat Assessment*

3.2 The Site provides suitable habitat for Hazel Dormouse, including Blackthorn *Prunus spinosa* scrub, low Bramble *Rubus fruticosus* agg. scrub, a woodland shaw, treelines and hedgerows.

3.3 The Site is well connected to 'Willow Wood,' as well as to treelines and shaws that link the Site to the wider landscape. This connectivity increases the likelihood of Hazel Dormice being present.

#### *Field Survey*

3.4 No field evidence of Hazel Dormouse was recorded.

3.5 On the last visit, on the 19<sup>th</sup> November 2025, a nest of an *Apodemus* species (probably Wood Mouse *Apodemus sylvaticus*) was recorded **Plate 1 of Appendix 3**.

3.6 Whilst the field evidence was challenging to interpret, on balance the professional judgement is that due to the quantum of decaying leaves, that the thin material present appears to be grass and given the lack of weaving, the nest is likely a Wood Mouse. However, it is acknowledged that Hazel Dormouse can create 'sloppy nests' or re-use Wood Mouse nests.

**Table 3.1. Results of Dormouse Survey. Survey effort points for a given month have been multiplied by 1.04 to account for 52 tubes and boxes were used for the survey**

Survey Visit	Date	Cumulative point score	Results and Observation
1	20/06/2025	2.08	No field evidence recorded.
2	22/08/2025	9.36	No field evidence recorded.
3	22/09/2025	16.64	No field evidence recorded.
4	19/11/2025	20.8	Wood Mouse nest found in tube 40

#### *Other Terrestrial Mammal Records*

3.7 No field evidence of Badger *Meles meles* was recorded during any of the other ecology survey work across the 2025 field season. Nor was any field evidence of any other priority mammal species recorded during survey work.

## 4. ECOLOGICAL EVALUATION

- 4.1 No confirmed field evidence of Hazel Dormouse was recorded. One nest on the last visit was likely Wood Mouse, although it is acknowledged that Hazel Dormouse can create 'sloppy nests' and/or re-use Wood Mouse nests. Therefore, precautionary mitigation will be included in the detailed Ecological Impact Assessment report. However, for the purposes of this report – given no other field evidence was recorded, Hazel Dormouse is likely absent.
- 4.2 In the event a Hazel Dormouse is found prior or during construction, a licence from Natural England will be sought to facilitate development; and the favourable conservation status of the population will be maintained. The project includes several impact avoidance measures to habitats, which have already been described in the Outline EclA report, and additional proposals to sensitively manage the on-site woodland shaw for ecology are also included.
- 4.3 Additional restoration of on-site hedgerows, and the planting of native mixed species hedgerows and/or scrub further enhance the Site for ecology. Therefore, even if Hazel Dormouse were to be recorded, when taken together, there is no reason to consider a licence from Natural England is unlikely to be granted.
- 4.4 No field evidence of Badger was recorded during any of the other ecology survey work that was completed during the 2025 field season. The terrestrial mammal assemblage is of ecological importance at the **Zone of Influence Level** only.

## 5. REFERENCES

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## Figures

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**Figure 1** Site Location

**Figure 2** Dormouse Box and Tube Locations



EPR

CLIENT: Esquire Developments Ltd

PROJECT: Blackthorn Farm, Meopham

DATE: 24 November 2025

Y:\Blackthorn Farm, Meopham 3274\GIS\Domouse\Figure1\_SiteLocation\_P3274\_4278\_241125.aprx

Aerial Image: Microsoft, Vantor



Figure 2 Hazel Dormouse Tube and Box Locations

KEY

- Site boundary
- Tube
- Box

SCALE: 1:1,250 at A3

0 20 40 60 80 Metres



CLIENT: Esquire Developments Ltd

PROJECT: Blackthorn Farm, Meopham

DATE: 24 November 2025

Y:\Blackthorn Farm, Meopham\3274\GIS\Hazel\Figure02\_Dormouse\_Box\_and\_Tube\_Locations\_P3274\_4278\_241125.aprx

Aerial Image: Microsoft, Vantor

# Appendix 1

## Summary of Relevant National Legislation

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### The Environment Act 2021

The Environment Act 2021 placed a requirement on the Secretary of State to make regulations setting out long-term targets for air quality, water, biodiversity, resource efficiency and waste reduction. It also required the Government to produce an Environmental Improvement Plan, to report on progress towards its goals annually, to meet the targets that are set in relation to the improvement of the natural environment and to produce remedial plans should this not be achieved.

In relation to water quality, the Act placed new duties on the Government, Environment Agency and sewerage undertakers to reduce the frequency and harm of discharges from storm overflows on the environment, and for monitoring the quality of watercourses affected by those overflows.

It also included a requirement for an independent Office for Environmental Protection (OEP) to be established, with responsibilities for monitoring and reporting on progress against environmental improvement plans and targets. The OEP also has investigation and enforcement powers against public authorities failing to comply with environmental law when exercising their functions.

The Act made provision for 10% biodiversity gain to become a condition of planning permission in England, through amendments to the Town and Country Planning Act 1990. These amendments came into force on the 12<sup>th</sup> February 2024 (delayed to 2<sup>nd</sup> April 2024 for 'small sites') and are implemented through a series of new statutory instruments collectively referred to in this document as the 'Biodiversity Net Gain Regulations' (detailed further below). The 10% biodiversity gain is measured through a biodiversity metric published by the Department of the Environment, Food and Rural Affairs (DEFRA) on behalf of the Secretary of State. The Act also establishes Biodiversity Net Gain as a requirement for Nationally Significant Infrastructure Projects (NSIPs).

The Act also strengthens the biodiversity duty placed on public authorities through amendments to the Natural Environment and Rural Communities Act 2006 Section 40, requiring such authorities to not only conserve but also enhance biodiversity when exercising their functions. Public authorities will also be required to publish summary reports of actions taken under Section 40 at least every five years.

The Act provides the legal basis for the creation of Local Nature Recovery Strategies (LNRSs) for England (including specifying their content), and the preparation and publication of species conservation strategies and protected sites strategies.

The Act also created a new legal vehicle known as a 'Conservation Covenant' which is a voluntary, legally binding private agreement between landowners and responsible bodies (the latter designated by the Secretary of State) which conserve the natural or heritage features of the land, enabling long-term conservation. Conservation Covenants are designed to 'run with the land' when it is sold or passed on and are intended to become a primary mechanism for the delivery of Biodiversity Net Gain (BNG).

The Act provides new powers for the Government to amend in future Regulation 9 and Part 6 of the Conservation of Habitats and Species Regulations 2017 (as amended) (the 'Habitats Regulations') – but "only if satisfied that the regulations do not reduce the level of environmental protection provided by the Habitats Regulations".

Several aspects of protected species licensing have also been adjusted by the Act. These include the removal of several inconsistencies between the Habitats Regulations and the Wildlife & Countryside Act 1981 (as amended), ensuring that licences issued under the former piece of legislation also apply under the latter, and making it now possible for licences to be issued under Section 16(3) of the Wildlife & Countryside Act 1981 (as amended) for purposes of overriding public interest. The maximum term of a licence that can be issued by Natural England has also been extended from 2 to 5 years.

### **The Conservation of Habitats and Species Regulations 2017 (as amended)**

The Conservation of Habitats and Species Regulations 2017 (as amended) (known as the “Habitats Regulations”) were originally drawn up to transpose the European Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the “Habitats Directive”) into UK legislation. Following the UK’s exit from the European Union, the Habitats Regulations – as amended by Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 – remain in force until such a time as they are superseded by new or updated domestic legislation.

The Regulations prohibit certain actions relating to European Protected Species (EPS), which include *inter alia* Hazel Dormouse *Muscardinus avellanarius*.

### **Wildlife and Countryside Act 1981 (as amended)**

The Wildlife and Countryside Act 1981 is a key mechanism for the legislative protection of wildlife in Great Britain. Various amendments have occurred since the original enactment. Hazel Dormouse are afforded protection under Schedule 5 of the Act.

### **The Natural Environment and Rural Communities Act 2006**

The Natural Environment and Rural Communities (NERC) Act 2006 was intended to raise the profile of biodiversity amongst all public authorities (including local authorities, and statutory undertakers) and to make biodiversity an integral part of policy and decision-making processes. The NERC Act also improved wildlife protection by amending the Wildlife and Countryside Act 1981.

Section 40 (S40) of the Act places a ‘Biodiversity Duty’ on all public bodies to have regard to the conservation of biodiversity when carrying out their normal functions. This includes giving consideration to the restoration and enhancement of species and habitats.

Section 41 (S41) of the Act requires the Secretary of State to publish a list of habitats and species which are of Principal Importance for the conservation of biodiversity in England. This was published in 2007 and is commonly referred to as the “S41 list”. Public authorities have a responsibility to give specific consideration to the S41 list when exercising their normal functions. For planning authorities, consideration for Species and Habitats of Principal Importance will be exercised through the planning and development control processes. Further information on Species and Habitats of Principal Importance is provided in the relevant sub-sections of this Appendix.

#### ***Hazel Dormouse***

Based on the above legislation, the Hazel Dormouse *Muscardinus avellanarius* is a Species of Principal Importance in England. It is legally protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and is afforded significant further protection as a European Protected Species under the

Conservation of Habitats and Species Regulations 2017 (as amended). Collectively, this legislation makes it an offence to:

- Intentionally or deliberately kill, injure or capture Dormice;
- Intentionally, deliberately or recklessly disturb Dormice in such a way as to be likely to significantly affect the ability of any significant group of Dormice to survive, breed, or rear or nurture their young or the local distribution of or abundance of the species;
- Intentionally or recklessly damage, destroy or obstruct access to places used by Dormice for shelter or protection (whether occupied or not) or intentionally or recklessly disturb a Dormouse whilst it is occupying such a place;
- Damage or destroy a breeding site or resting place of a Dormouse;
- Possess or transport a Dormouse (or any part thereof) unless under licence; and
- Sell or exchange Dormice.

Development proposals affecting the Dormouse require a European Protected Species mitigation licence from Natural England.

### *European Badger*

The Protection of Badgers Act 1992 (as amended in Scotland) offers considerable protection to both Badgers and Badger setts. This legislation was enacted to protect the European Badger *Meles meles* against baiting and not as a means of species recovery as it is common in England. It is an offence to cruelly treat, kill or take Badgers, but it is also illegal to intentionally or recklessly damage or disturb a Badger sett while it indicates signs of current use by a Badger.

The Government website contains information to help developers and their proponents avoid sett disturbance and to identify setts that are in current use. It is important to maintain adequate foraging territory in development proposals affecting Badgers as the destruction or severance of large areas of foraging territory could also be taken to include habitat loss. Licences to disturb Badgers and their setts in respect of development may be issued by Natural England provided provisions are made to minimise disturbance.

### *Wild Mammals*

All wild mammals are protected against cruelty under the Wild Mammals (Protection) Act 1996, which makes it an offence to mutilate, kick, beat, nail or otherwise impale, stab, burn, stone, crush, drown, drag or asphyxiate any wild mammal with intent to inflict unnecessary suffering.

### **Licences for Development**

Licences are required to permit activities prohibited under wildlife legislation, namely the disturbance or capture of protected species or damage to their habitats. Natural England is the licensing authority in England. Licences are only issued for certain purposes, which are set out in the legislation, and only where there is a valid justification. The licences most relevant to development scenarios are discussed below.

### *European Protected Species Mitigation Licences*

A European Protected Species mitigation licence (EPSML) is required from Natural England to undertake any development that is reasonably likely to result in an offence in respect of a European Protected Species protected under Schedule 2 of the Conservation of Habitats and Species Regulations 2017 (as amended); including Hazel Dormouse. Natural England must be satisfied that the following three tests are satisfied before it will issue a licence covering a European Protected Species:

1. The proposal is necessary to preserve public health or public safety, or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment;
2. There is no satisfactory alternative; and
3. The proposal will have no detrimental effect to the maintenance of the population of the species concerned at a favourable conservation status in their natural range.

### *Badger Licences*

Licences to disturb Badgers and their setts in respect of development (including closure of setts if required) may be issued by Natural England, provided provisions are made to minimise disturbance.

### **Species of Principal Importance in England**

943 species have been identified as being of Principal Importance for the conservation of biodiversity in England under Section 41 (S41) of the NERC Act 2006. The S41 list includes species, including certain mammals, found in England that have been identified as requiring action under the now superseded UK Biodiversity Action Plan 2007 (plus the Hen Harrier). While many of these species may not be legally protected (some are protected under the legislation described above), there is a clear responsibility on local planning authorities to further their conservation. These species can be a material consideration in development control decisions and so developers are advised to take reasonable measures to avoid or mitigate impacts to prevent the net loss of these species, and to enhance their habitats where possible. Additional guidance to developers is typically provided in local level planning policies.

## Appendix 2

### Hazel Dormouse Habitat Suitability Assessment

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#### Habitat Suitability Assessment Methodology

##### Assessing Quality

Areas of arboreal habitat (woodland areas, scrub, tree lines, bramble patches) within the Site were assessed for their suitable for Hazel Dormouse.

In general, the species considered likely to be of importance to Dormice include those that directly provide flowers, soft or hard mast fruit that is edible to Dormice, such as Hazel *Corylus avellana*, Sweet Chestnut *Castanea sativa* or Bramble *Rubus fruticosus* agg., or where the species is associated with a high insect biomass, such as Oak *Quercus spp*, or where the species provides nesting material favoured by Dormice, such as Honeysuckle *Lonicera periclymenum*.

In addition, the general level of soft and hard (seed) mast fruit being produced by the trees and shrubs in each habitat patch was considered, either from direct observation or from indirect evidence (for example the presence of the fruit itself, remains of nut shells on the floor, or a high density of catkins on the tree/shrubs).

Factors affecting the habitat quality is illustrated in **Table A2.1** below:

**Table A2.1. Considerations in Assigning Habitat Quality**

Poor Quality	High Quality	Note
Low diversity of tree and shrub species (fewer than 7 native species)	High diversity of tree and shrub species (at least 7 native species)	Dormice require a seasonal succession of different food sources to survive, and consequently increased diversity of trees and shrubs are more likely to sustain a continuous supply of flowers and fruits for Dormice (Bright and Morris, 1996).
Absence or low incidence of key tree and shrub species known to be valuable to Dormice	Presence or high incidence of key tree and shrub species known to be valuable to Dormice	
Habitat primarily coniferous or comprised of non-native species	Habitat primarily deciduous / broadleaved and comprised of native species	Whilst Dormice are known to occur on occasion in coniferous habitats (Eden and Eden 2001; 2003) it is generally accepted that these are sub-optimal habitats.
Apparent low level of soft and hard mast fruit being produced	Apparently high level of soft and hard mast fruit being produced	

##### Assessing Structure

In addition to recording tree and shrub species, the general structure of each area of arboreal habitat was also recorded and assessed in terms of whether it is likely to provide good conditions for Dormice.

Extensive research by Bright and Morris (1990, 1991, 1992 and 1996), Bright (1998) and Bright and MacPherson (2002) has revealed that Dormice occur more often, and are more likely to thrive, in arboreal habitat that has certain key structural characteristics.

In general, the relevant beneficial structure characteristics are those that enable Dormice to move freely through arboreal layers to disperse through habitat, find food and reach suitable sites for breeding and hibernating.

A thick understorey has been found to be beneficial to Dormice, although some older canopy trees are also good because these are more likely to provide the hollows that Dormice use for nesting, and/or a variety of different food sources such as insects, which are important food sources in early summer. Too many tall trees can cause the canopy to close and shade out understorey shrubs, preventing them from producing mast fruit. This effect can also occur in coppices that have been abandoned for some time, because as the coppice trees stretch upward for the light it reduces contact between trees and productivity. **Table A2.2** below sets out how various considerations have affected the assessment of habitat structure.

**Table A2.2. Considerations relating to Habitat Structure (some content adapted from Forest Commission (2007)).**

Poor Structure	Good Structure
Woodland: Thin or absent understorey / shrub layer, densely shaded - Hazel, Honeysuckle and Bramble scarce or absent.	Woodland: Thick or dense understorey layer/scrub (particularly at edge of habitat patch if a woodland), especially with Hazel, Honeysuckle or Bramble.
Many standard trees present with closed canopy.	Standard trees may be present, but the canopy is gappy at least in places.
Open/thin or pasture woodland with no arboreal connections between trees and shrubs.	Woodland dense enough for tree and shrub branches to meet in understorey and canopy.
History of clear-felling of large coupes, or recent woodland. Short rotation (approx <7 years) coppice cycle.	Mixed or longer rotation coppice cycle, with some older stools. Ancient woodland.
Scrub: 10- to 15-year-old scrub of same age at high density – tall and spindly growth.	Scrub: mixed age scrub maintained to prevent monocultures.
General: Flat ground and apparent susceptibility for waterlogging / flooding in winter (i.e. poor ground-level and below hibernation opportunities).	General: Exposed banks, large tree stools, and apparent absence of waterlogging / flooding in winter (i.e. good ground-level and below hibernation opportunities).

### **Determining the Importance of Habitat from Quality and Structure**

The habitat quality and structure considerations set out above were used to assess the potential importance of habitats for Hazel Dormouse.

**Table A2.3: Assessing Habitat Importance using Habitat Quality and Structure**

Assessment	Improving Structure		
Criteria			
Improving Quality	Poor Structure	Good Structure	
Quality	Poor Quality	Low Importance (Levels 1 and 2)	Moderate Importance (Level 3)
	Good Quality	Moderate Importance (Level 3)	High Importance (Levels 4 and 5)

### *Habitat Connectivity and Gaps*

Whilst capable of rapid terrestrial locomotion, radio tracking experiments have shown that Dormice are strongly averse to crossing open ground (Bright 1998; Bright and MacPherson, 2002). The 1998 experiments found that 1m gaps in arboreal habitat were crossed on 55% of approaches by Dormice, whilst 3m gaps were crossed in only 6% of cases, and 6m gaps were never crossed.

More recent work has found that Dormice are capable, and will on occasion, cross gaps of up to 12 metres to exploit small fragments of habitat (<1 ha) separated by roads (Chanin and Gubert, 2012).

The aversion to descending to the ground and crossing gaps is thought to be a behavioural adaptation that makes the Dormouse less vulnerable to predation from predators such as the Tawny Owl *Strix aluco*. This behaviour however is likely to mean that significant gaps between habitat areas reduce the rate at which Dormice cross between the areas.

This is likely to reduce the ability of Dormice to exploit remote habitat areas as a food source regardless of their quality and reduce the gene flow between small subpopulations of Dormice in isolated habitat patches, leading over time to inbreeding and making the population more vulnerable to adverse stochastic events such as disease. In such circumstances where a small population experiences localised extirpation, significant gaps would also reduce the chances of an otherwise suitable habitat area from being re-colonised by Dormice from outside – hence causing its effective subtraction from the overall habitat area available to Dormice.

In view of the above, in addition to determining the likely importance of habitat for Dormice within the Zol, gaps in habitat were also considered. These gaps were assessed in terms of their likely effect of causing severance in the Dormouse habitat network.

## Appendix 3

### Survey Results: Photos

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#### Photos



**Plate 1:** Wood Mouse nest: Side View. The quantum of decaying leaves, lack of weaving and the thin strands appearing to be grass all indicate the nest is Wood Mouse.



**Plate 2:** Top View.