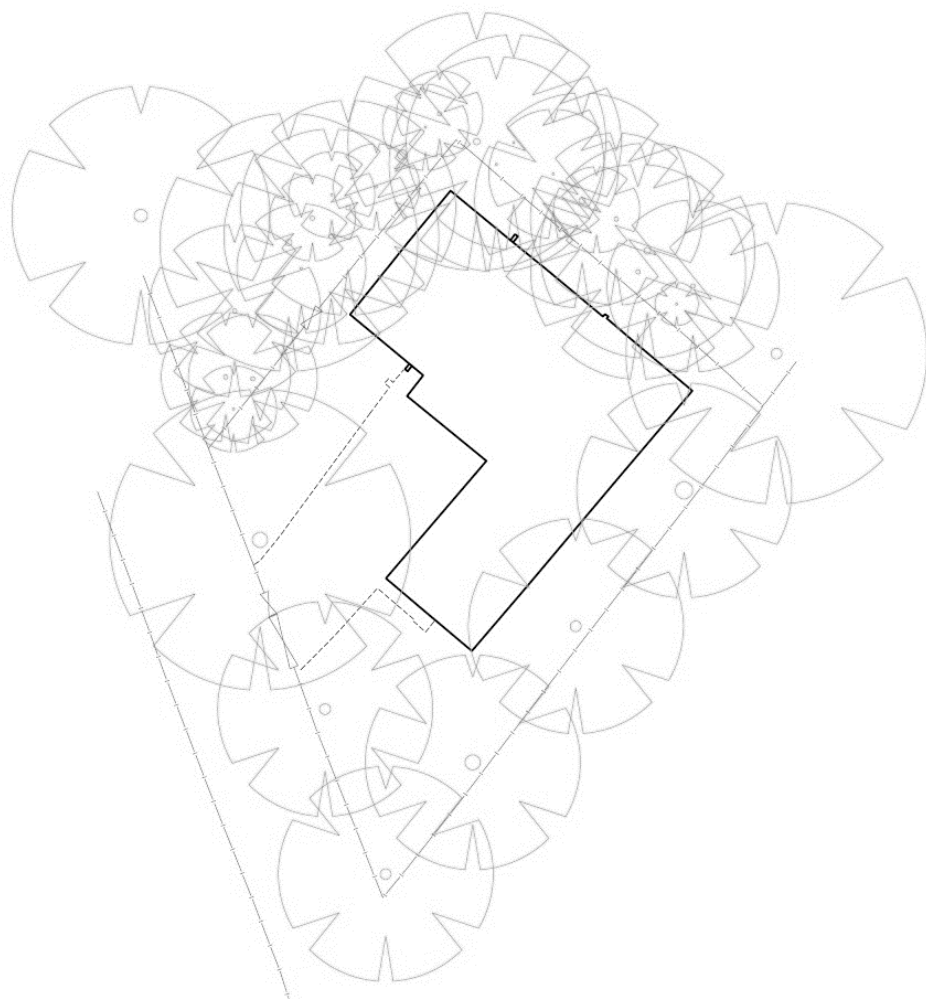


# Preliminary Ecological Appraisal Report

Land at Knutsford Scout Hut HQ,  
The Moor, Knutsford, Cheshire

**Client:** Hive Architects Studio Ltd



**Report Ref:** SE0706-01/H/01b/JD  
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**Issue Date:** 10<sup>th</sup> September 2015  
**Issue Version:** Final approved report issued to client

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This report has been prepared with all reasonable skill, care and diligence, within the terms of the contract with the client. This report is confidential to the Client. Solum Environmental Limited accepts no responsibility of whatever nature to third parties to whom this report may be made known.

This report is based on survey data gathered in January and February 2015 at Knutsford Scout Hut HQ, The Moor, Knutsford, Cheshire WA16 6JD.

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## 1.0 Summary

- 1.1 Solum Environmental was commissioned in January 2015 by Rob McGinnes of Hive Architects Studio Ltd to undertake a Preliminary Ecological Appraisal survey, along with an Arboricultural Implications survey, at Knutsford Scouts HQ, The Moor, Knutsford, Cheshire, WA16 6JD. Survey was commissioned to support a planning application to demolish the existing Scout Hut and replace it with a new building on a similar footprint.
- 1.2 Desktop and field survey of the area within the red-line boundary was conducted by David Hackett (Director at Solum Environmental) on 3<sup>rd</sup> February 2015 during daylight hours. Joe Dance (Graduate Ecologist at Solum Environmental) assisted with this survey.
- 1.3 Taking both desktop and field survey combined, the following were recorded at this site:

Site Characteristics and Surroundings	
Protected habitats present on site	None
Protected sites within 2km	Yes; Tatton Mere (SSSI) and Midland Meres and Mosses (Phase 1- RAMSAR)
Buildings on site	Yes; 1 corrugated metal and breezeblock structure- the Scout Hut
Waterbodies on site	None
Waterbodies within 500m	Yes; 2 waterbodies and 3 issues/ drains

Protected Species Recorded		
	By desktop survey (within 1 km)	By field survey
Great crested newt	No	No
Bats	Yes	No
Otter	No	No
Badger	Yes	No
Water vole	No	No
Reptiles	No	No
Breeding birds	Yes	Old Magpie nest in tree on northern boundary

- 1.4 Subsequently, the following further ecological survey, licensing or mitigation is recommended:

Further Actions Required	
Great crested newt	<ul style="list-style-type: none"> <li><i>All demolition work to be conducted taking Reasonable Avoidance Measures</i></li> </ul>
Bats	<ul style="list-style-type: none"> <li><i>Single dusk and/or pre-dawn roost survey in optimal season (May-August).</i></li> <li><i>No works to Scout Hut or trees until bat roost survey conducted.</i></li> <li><i>All tree felling/ works to limes to be conducted taking Reasonable Avoidance Measures.</i></li> <li><i>Bat boxes to be provided (specification to be informed by May bat survey).</i></li> <li><i>Planting required to attract insects to enhance bat foraging.</i></li> <li><i>Re-assessment of site's ecological value required following results of May bat survey.</i></li> </ul>
Otter	None
Badger	None
Water vole	None
Reptiles	None
Breeding birds	<ul style="list-style-type: none"> <li><i>All vegetation clearance/ tree felling/ works to be conducted outwith the core nesting season (March to September) or to be immediately preceded by check for active birds' nests.</i></li> <li><i>Bird boxes to be provided.</i></li> </ul>

**Further Actions Required****Vegetation and trees**

- *Retain as many limes as possible*
- *Use Ecological Constraints and Opportunities Plan to inform detailed site layout and planting plans*

- 1.5 For further information on this survey report, contact:  
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## 2.0 Introduction

### 2.1 Background and Commission

2.1.1 Solum Environmental was commissioned in January 2015 by Rob McGinnes of Hive Architects Studio Ltd to undertake a Preliminary Ecological Appraisal survey at Knutsford Scouts HQ, The Moor, Knutsford, Cheshire, WA16 6JD. Survey was commissioned to support a planning application to demolish the existing Scout Hut and replace it with a new building on a similar footprint.

2.1.2 In January 2015 Solum Environmental was also commissioned to undertake a tree survey and prepare an Arboricultural Implication Study of the same site, reported in:

*"SE0706-01/H/02a/NE Knutsford Scout Hut – Arboricultural Implication Study, September 2015".*

2.1.3 Our understanding is that the proposed re-development will include:

- Demolition of the existing Scout Hut;
- Removal of some trees and vegetation as necessary;
- Construction of a single new, purpose-built Scout Hut; and
- Associated, limited landscaping of this small site.

2.1.4 The following documents were provided by Hive Architects to inform the extent of proposed re-development works, prior to survey:

- a topographical survey of the site: 1:200 @ A1;
- a sketch illustration of the proposed site layout: not to scale; and
- proposed plans layout, elevations and sections: 1:50.

Design proposals supplied are provided at *Plan 3* below.

### 2.2 Aims of the Survey

2.2.1 This preliminary ecological appraisal survey aimed to:

- Identify and evaluate the site's current ecological value;
- Identify any protected habitats or species within or adjacent to this site;
- Assess the site's general potential to support protected species;
- Highlight any potential ecological constraints to the proposed re-development of this site; and
- Advise on any further ecological survey, mitigation or licensing requirements, where re-development is likely to impact on either protected species or habitats.

### 2.3 Site Context

2.3.1 The site survey area is shown as a red-line boundary at Plan 1 below. The site's wider location is shown at Plan 2 below.

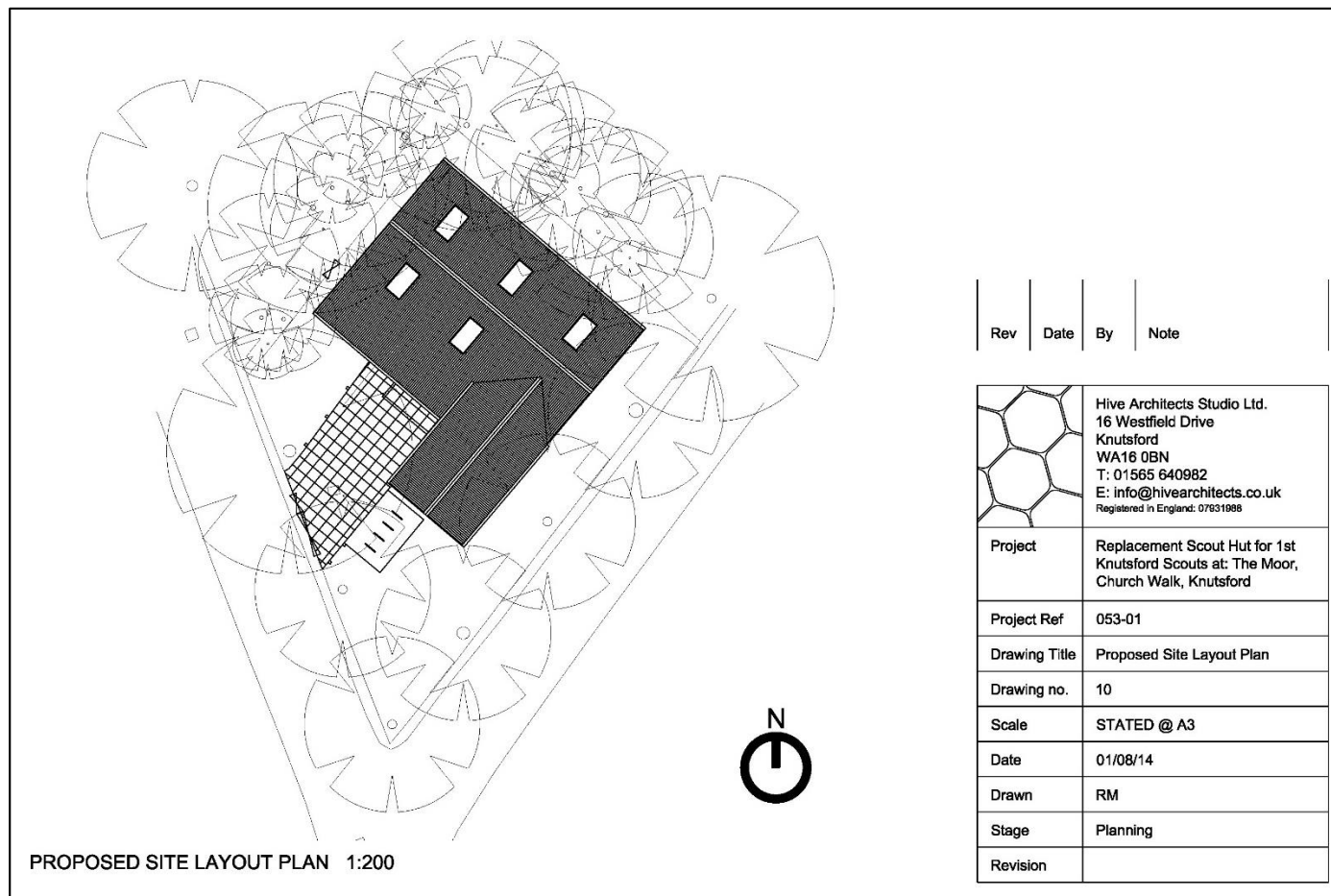
2.3.2 The survey area comprises approximately 0.06 hectares, including an old Scout Hut in poor repair, surrounded by a small area of amenity grassland and a perimeter of common lime, *Tilia x europaea*.

2.3.3 The grid reference for the approximate centre of this site is SJ 75424 78552.



The map shows a study area with a red dashed line indicating a path or boundary. The area is surrounded by a large, irregular shape representing a field or park. The path starts at a 'Water pipe (temporary)' on the left, goes through a 'Concrete' area, and ends at a 'Gravel Walk' on the right. The path is marked with numbers 1 through 10. The map also shows a 'North' arrow in the top left corner.

## A detailed topographic map of Knutsford, Cheshire, showing the town's layout, surrounding areas like Buxton and Shaw Heath, and a red circle highlighting a specific location in the center of the town. The map includes roads, railways, water bodies, and various landmarks.

**Plan 3: Proposed Re-development Plans and Illustrations (Supplied by Client, August 2015)**



## 3.0 Methodologies

### 3.1 Desktop Survey Methodology

- 3.1.1 Desk study was carried out to identify any nearby national and local nature conservation designations, and any protected species records which already exist for this area. The *MagiC* website was interrogated to determine whether any statutory or non-statutory conservation sites lay within 1km of the survey area. The data supplied was subsequently assimilated and reviewed.
- 3.1.2 A thorough examination of Ordnance Survey base maps, *MagiC* maps, Bing maps and Google Earth aerial photographs was conducted, to locate any waterbodies lying within 500m of this site's boundaries. These waterbodies could include not only ponds, but also streams, brooks, rivers, canals, ditches, ash lagoons and temporary pools of water where GCNs could potentially breed.
- 3.1.3 Ecological records were requested from the local ecological records centre in Cheshire, rECOrd. Details were obtained of all protected species recorded within a 1km radius of the site using results provided by all parties. The National (UK) and local (Cheshire East) Biodiversity Action Plans were also interrogated for protected habitats and species relevant to this site.

### 3.2 Field Survey Methodology

- 3.2.1 Field survey of the area within the red-line boundary was conducted by David Hackett (Director at Solum Environmental) on 3<sup>rd</sup> February 2015 during daylight hours. Joe Dance (Graduate Ecologist at Solum Environmental) assisted with this survey. Weather was cool and dry, with an air temperature of 4°C, 0mph wind, 5% cloud cover and no rain.
- 3.2.2 **Extended Phase 1 Habitat Survey** was conducted following best practice methodology (JNCC, 1993, as amended 2010). This survey work included visual inspection of the site and adjacent habitat. Broad habitat compartments around the site were noted in order to establish the potential for movement of fauna between habitats. The presence of (or potential to support) protected species was noted, and particular note was made of any invasive species present. Target notes were recorded of any points of ecological value and photographs were taken throughout this survey.
- 3.2.3 **Great crested newt:** An assessment was made of terrestrial habitat within this site to support Great crested newt *Triturus cristatus* (GCN) and other amphibians. The potential of the large waterbody lying within 150m of the survey boundaries to support GCN was assessed, using the Habitat Suitability Index (HSI, Oldham et al<sup>1</sup> 2000) relevant to the sub-optimal season during which field survey was conducted. Although HSI is not a substitute for optimal-season full protected species survey, it provides an objective score for each waterbody, which can then inform a decision as to whether or not further detailed survey should be undertaken. In addition, terrestrial habitats on site were assessed for their potential to support GCN and other amphibians, and any suitable refugia that could be lifted were examined for amphibians. Throughout this survey, best-practice methodologies as set out by Froglife and Natural England were employed.
- 3.2.4 **Bats:** The survey followed best practice guidance for preliminary bat roost assessment survey, as set out by the Bat Conservation Trust<sup>2</sup> and Natural England. This included both an external and internal inspection of the building on site, to identify any potential roosts (such as cracks or holes in brickwork or trees, loose roofing tiles, gaps between the eaves, soffit board and outside walls etc) and any suitable entry points into internal voids around the eaves (including soffits, fascia and barge boarding and under tiles). Any walls, windows (and ledges) beneath these features were examined for the presence of bat droppings. Any trees with suitable features for bat roosting were also assessed visually from the ground. A general assessment was made of the habitat available for foraging and commuting bats both within and immediately beyond the survey area.
- 3.2.5 **Otter:** The banks of any waterbodies and watercourses within the survey area were examined for spraints (faeces), slides (areas of worn bank at favoured entry points into the water), feeding remains and otter prints.
- 3.2.6 **Badger:** A walkover of the site and its boundaries was conducted to identify any evidence of badger activity within the site and within approximately 30m from its boundaries. This survey followed best-practice guidelines as set out by Natural England, the Badger Trust and Harris, Creswell & Jeffries (1989)<sup>3</sup>. Specifically, surveyors checked for setts, latrines,

<sup>1</sup> Oldham, R. S., Keeble, J., Swan, M. J. S. and Jeffcote, M. (2000) *Evaluating the suitability of habitat for the great crested newt* (*Triturus cristatus*). *Herpetological Journal*, 10, 143 - 155.

<sup>2</sup> Hundt L (2012) *Bat Surveys: Good Practice Guidelines*, 2<sup>nd</sup> Edition, Bat Conservation Trust.

<sup>3</sup> Harris S, Creswell P and Jeffries D (1989). *Surveying Badgers*. Mammal Society.

pathways and fence/ hedge crossing points and any associated trapped hairs, scratching posts and ground disturbed by foraging.

3.2.7 **Water vole:** Any banks bordering static or flowing water are examined for burrow entrances, terrestrial nests, latrines, feeding platforms and prints that would suggest evidence of water vole activity.

3.2.8 **Reptiles:** Both the habitat within the survey area and that of the surrounding landscape was assessed for its potential to support reptiles.

3.2.9 **Breeding birds:** The survey area was assessed for its breeding bird potential. This included an assessment of trees, vegetation and ground cover. In addition an external and internal examination of the single building on site was made to identify any evidence of previous season nesting by birds, such as visible old nests or droppings beneath wall cavities etc.

### 3.3 Great Crested Newt Reasonable Avoidance Measures Methodology

3.3.1 Following field survey and liaison with Cheshire East's Nature Conservation Officer (James Baggaley) Joe Dance, Licensed GCN Graduate Ecologist worked with Dr David Hackett (Director) and Richard Castell (Senior Ecologist) to draw up site-specific Reasonable Avoidance Measures to ensure protection of any GCNs during the site clearance and construction phases of the proposed works.

### 3.4 Timing of Field Surveys in Relation to Optimal Seasons

3.4.1 February is considered sub-optimal for Extended Phase 1 Habitat Surveys, upon which this survey is based. However, meaningful and accurate assessments of broad compartments could still be made.

3.4.2 Survey was conducted outwith the optimal season for badger activity survey, however vegetation was sufficiently thin to allow for the effective identification of any protected features (such as badger setts) and regular travelling routes within and surrounding the survey area.

3.4.3 Survey was conducted outwith the optimal seasons for bat, reptile and breeding bird activity. However it was possible to assess habitat potential for bats, reptiles and breeding birds during survey.

### 3.5 Survey Team Members

3.5.1 **Dr David Hackett BSc MLD PhD MCIEEM CEnv** is Director and Senior Ecological Project Manager at Solum Environmental. David Hackett is a highly experienced ecological project manager and surveyor with over 17 years' professional experience of project managing and coordinating ecological survey, and specialises in plant, bat and badger ecology. He is Ecological Project Manager for a 1000 ha redevelopment site in Bishopton, Scotland, supporting bats, otters, barn owls and twelve badger clans of over 60 badgers, and works closely with SNH to ensure that the resident protected species populations continue to thrive. David is a full member of the Chartered Institute of Ecology and Environmental Management and a Chartered Environmentalist and a member of Cheshire Bat Group.

3.5.2 **Joe Dance BSc** is a Graduate Ecologist at Solum Environmental. Joe has a double first-class honours degree and has worked in the ecological sector for two years. Joe is competent in the field identification of breeding birds, plants, amphibians, small mammals and is experienced in conducting and leading habitat surveys and protected species surveys. Joe has contributed to the design and conduct of bat activity transects, automated bat detector and roost categorisation surveys. Over the past two years Joe has assisted in the preparation of three successful Natural England bat mitigation licences and is part of the team currently discharging conditions of all three licences. Joe is licensed to survey for great crested newt in all counties of England.

### 3.6 Survey Constraints

3.6.1 Whilst the entirety of the land within 30m of the site's boundaries could not be directly accessed (in particular to the southwest and east), an accurate assessment of this land from the site's boundaries and surrounding roads could be made.

## 4.0 Survey Results

### 4.1 Desktop Survey Results

4.1.1 The MagiC site check returned one site of local, national or international protected status within 2km of the survey site: Tatton Meres (SSSI) and Midlands Meres and Mosses (RAMSAR) Phase 1:

#### 4.1.1.1 Tatton Meres

*"Tatton Meres consists of two meres which have been selected as some of the best examples in the county of meres with moderate fertility and a rich and well developed aquatic flora. The site also includes a large area of fen, flushed acidic grassland and woodland."*<sup>4</sup>

#### 4.1.1.2 Midland Meres and Mosses Phase 1 citation:

*"The Meres & Mosses form a geographically discrete series of lowland open water and peatland sites in the north-west Midlands of England. These have developed in natural depressions in the glacial drift left by receding ice sheets which formerly covered the Cheshire/Shropshire Plain. The 16 component sites include open water bodies (meres), the majority of which are nutrient-rich with associated fringing habitats; reed swamps, fen, carr & damp pasture. Peat accumulation has resulted in nutrient poor peat bogs (mosses) forming in some sites in the fringes of meres or completely infilling basins. In a few cases the result is a floating quaking bog or schwingmoor. The wide range of resulting habitats support nationally important flora & fauna."*<sup>3</sup>

4.1.2 Whilst desktop survey identified no waterbodies within the site boundaries, interrogation of the Magic site revealed two large waterbodies and three watercourses lying within 500m of the site boundaries (see Plan 4 below for their locations. Please note that the survey area is illustrated by the small red triangle at the centre of this plan; the red-circle denotes land lying within 500m of this site).

**Plan 4: Location of Waterbodies within 500m of Site Boundaries**



4.1.3 Further details of each waterbody and watercourse are provided at Table 1.

<sup>4</sup> [http://www.sssi.naturalengland.org.uk/citation/citation\\_photo/1003604.pdf](http://www.sssi.naturalengland.org.uk/citation/citation_photo/1003604.pdf), January 2015

**Table 1: Waterbodies and watercourses lying within 500m of site boundaries**

Waterbody No.	Description	Approx distance from site & direction	Separated from site by major barrier to newt migration?	Further survey required?
Waterbodies on site- None				
	N/a – no waterbodies within site boundaries.			
Waterbodies beyond site boundaries but within 500m				
WB01	‘The Moor Pool’	160m North	No	Sub-optimal HSI assessment possible, no further survey required.
WB02	Tatton Meres	260m North	No	Sub-optimal HSI assessment possible, no further survey required.
WC01	Issue/ drain	350m North	No	Beyond 250m; no further survey required.
WC02	Issue/ drain	300m Southeast	No	Beyond 250m; no further survey required.
WC03	Issue/ drain	15m West	Yes	Separated from site; no further survey required.

- 4.1.4 Relevant local records for this area were obtained from rECOrd, the local ecological record centre for Cheshire. *Table 2* below, outlines the protected species recorded within 1km of the survey area within the last ten years:

**Table 2: Protected species recorded within 1km of site over past ten years**

Scientific Name	Common Name	Recorded	Protection (see Appendix 1)
<i>Pipistrellus pipistrellus</i>	Common pipistrelle	2008- 2010	All bat species are protected under the Conservation of Habitats and Species Regulations 2010 (as amended).
<i>Nyctalus noctula</i>	Noctule bat	2005	
<i>Pipistrellus sp.</i>	Pipistrelle species	2008 & 2013	
<i>Myotis sp.</i>	Unidentified <i>Myotis</i> sp.	2008 & 2013	
<i>Pipistrellus pygmaeus</i>	Soprano pipistrelle	2008- 2010	
<i>Myotis mystacinus</i>	Whiskered bat	2006	
<i>Meles meles</i>	Badger	2005- 2010	Protected under the Protection of Badgers Act 1992 (as amended).
<i>Fringilla montifringilla</i>	Brambling	2009	Protected under the Wildlife and Countryside Act 1981 (as amended)- Schedule 1 bird species <sup>5</sup>
<i>Turdus pilaris</i>	Fieldfare	2009	Protected under the Wildlife and Countryside Act 1981 (as amended)- Schedule 1 bird species <sup>1</sup> , Birds of Conservation Concern (RSPB)- Red List
<i>Bucephala clangula</i>	Goldeneye	2011	Protected under the Wildlife and Countryside Act 1981 (as amended)- Schedule 1 (part ii) <sup>6</sup> , Birds of Conservation Concern (RSPB)- Red List

- 4.1.5 One of the badger records from 2008 was for a reported badger burrow which lies approximately 60m southeast of the site on the eastern side of the railway embankment.
- 4.1.6 Desktop survey also identified the following national and local Biodiversity Action Plan (BAP) and species of conservation concern within 1km of the site:

<sup>5</sup> Whilst Brambling and Fieldfare are Schedule 1 birds, for which they are afforded additional protection during the nesting season, neither nest in England. As such, this additional protection is not applicable within the scope of this report.

<sup>6</sup> Goldeneye are only afforded additional protection during the closed season (1<sup>st</sup> February to 31<sup>st</sup> August).



**Table 3: BAP/Species of Conservation Concern records within 1km of site over past ten years**

Scientific Name	Common Name	Recorded	Protection (see Appendix 1)
<i>Hirundo rustica</i>	Swallow	2011- 2014	Birds of Conservation Concern (RSPB)- Amber List
<i>Chroicocephalus ridibundus</i>	Black-headed Gull	2012- 2014	Birds of Conservation Concern (RSPB)- Amber List
<i>Delichon urbicum</i>	House Martin	2012- 2013	Birds of Conservation Concern (RSPB)- Amber List
<i>Pyrrhula pyrrhula</i>	Bullfinch	2012- 2014	Birds of Conservation Concern (RSPB)- Amber List, Local Biodiversity Action Plan Species
<i>Larus argentatus</i>	Herring Gull	2009	Birds of Conservation Concern (RSPB)- Red List
<i>Larus canus</i>	Common Gull	2009	Birds of Conservation Concern (RSPB)- Amber List
<i>Falco tinnunculus</i>	Kestrel	2012 & 2014	Birds of Conservation Concern (RSPB)- Amber List
<i>Sturnus vulgaris</i>	Starling	2012- 2013	Birds of Conservation Concern (RSPB)- Red List, Local Biodiversity Action Plan Species
<i>Apus apus</i>	Swift	2012- 2013	Birds of Conservation Concern (RSPB)- Amber List
<i>Sterna hirundo</i>	Common Tern	2012	Birds of Conservation Concern (RSPB)- Amber List
<i>Passer montanus</i>	Tree Sparrow	2007	Birds of Conservation Concern (RSPB)- Red List, Local Biodiversity Action Plan Species, UK BAP Priority Species, NERC S.41 Species
<i>Prunella modularis</i>	Dunnock	2012- 2014	Birds of Conservation Concern (RSPB)- Amber List
<i>Passer domesticus</i>	House Sparrow	2007, 2012- 2014	Birds of Conservation Concern (RSPB)- Red List, Local Biodiversity Action Plan Species, UK BAP Priority Species, NERC S.41 Species
<i>Dendrocopos minor</i>	Lesser Spotted Woodpecker	2006	Birds of Conservation Concern (RSPB)- Red List
<i>Anas platyrhynchos</i>	Mallard	2012- 2013	Birds of Conservation Concern (RSPB)- Amber List
<i>Poecile palustris</i>	Marsh Tit	2005	Birds of Conservation Concern (RSPB)- Red List
<i>Turdus viscivorus</i>	Mistle Thrush	2012- 2013	Birds of Conservation Concern (RSPB)- Amber List
<i>Emberiza schoeniclus</i>	Reed Bunting	2011	Birds of Conservation Concern (RSPB)- Amber List, Local Biodiversity Action Plan Species, UK BAP Priority Species, NERC S.41 Species
<i>Riparia riparia</i>	Sand Martin	2012	Birds of Conservation Concern (RSPB)- Amber List
<i>Turdus philomelos</i>	Song Thrush	2012- 2014	Birds of Conservation Concern (RSPB)- Red List, Local Biodiversity Action Plan Species
<i>Columba oenas</i>	Stock Dove	2009	Birds of Conservation Concern (RSPB)- Amber List
<i>Aythya fuligula</i>	Tufted Duck	2012- 2013	Birds of Conservation Concern (RSPB)- Amber List
<i>Phylloscopus trochilus</i>	Willow Warbler	2011	Birds of Conservation Concern (RSPB)- Amber List
<i>Erinaceus europaeus</i>	Hedgehog	2005, 2008, 2014	NERC S.41 Species, UK BAP Priority Species
<i>Micromys minutus</i>	Harvest Mouse	2005	Local Biodiversity Action Plan Species, NERC S.41 Species, UK BAP Priority Species

## 4.2 Field surveys: Surveyors, dates and weather conditions

4.2.1 Table 4 below sets out dates, times and weather conditions for each survey conducted, along with names of surveyors present.

**Table 4: Surveyors, dates and weather conditions**

Survey Type	Survey Date + Start Time	Surveyors	Weather Conditions
Preliminary Ecological Appraisal	Tuesday 3 <sup>rd</sup> February 2015, 13:00	David Hackett (Lead surveyor), Joe Dance	4° C, 0mph wind, 5% cloud cover and no rain

## 4.3 Habitats, vegetation, hedgerows, trees

4.3.1 Vegetation within the site's boundaries was assessed as having limited biodiversity value. The amenity grassland, which surrounds the Scout Hut to the west, north and east, contains species of *Poa sp.* (locally dominant), herb Robert *Geranium robertianum* and broad-leaved dock *Rumex obtusifolius*. Several specimens of bramble *Rubus fruticosus agg.*, nettle *Urtica dioica* and wild mustard *Sinapis arvensis* were also recorded within the site's boundaries, mainly growing beneath the

Scout Hut. A perimeter of common lime trees also runs along the site's boundaries to the east and south, all of which have previously been pollarded at approximately 6m and subsequently allowed to grow to a structurally unstable state.

- 4.3.2 *Table 5* below lists the broad habitat compartments recorded within the survey area (these compartments are also mapped at Section 5.0):

**Table 5: Habitat types recorded on site**

JNCC Code	Habitat Type
J1.2	Amenity Grassland
A3.1	Scattered broadleaved trees
J4	Hardstanding/ bare ground
J2.4	Fence
J3.6	Building

- 4.3.3 No waterbodies or watercourses are present within the site's boundaries. The closest water feature to the site, WC03 (an issue) runs on the western side of the lane 'Moorside' which bounds the site to the west. WB01, 'The Moor Pool' is clearly visible from the site's boundaries in an area of public access.
- 4.3.4 The only building within the site's boundaries is the Scout Hut, which is constructed predominantly of corrugated metal (elevations and roof), with a small section of breezeblock. *Table 6* sets out a description of this building along with photographs and an assessment of its potential to support roosting bats.




#### 4.4 Target Notes

- 4.4.1 No target notes were recorded within the site's boundaries, other than the Scout Hut building which offered 'Low' potential for roosting bats.

#### 4.5 Great Crested Newt *Triturus cristatus*

- 4.5.1 Whilst no waterbodies lie within the survey boundaries, field and desktop survey identified two waterbodies and three issues lying within 500m of the site boundaries. Desktop records obtained did not include any record of GCN within 1km of this site over the past 10 years.
- 4.5.2 Although the terrestrial habitat within the site's boundaries and surrounding the site (particularly to the south) is limited in its suitability to support GCNs, broken earth and crevices underneath the Scout Hut might possibly offer suitable refugia and hibernacula for GCNs during the winter months, should GCNs use the two nearby waterbodies for breeding. The land separating this small site from these two potential breeding ponds (WB01 and WB02) is predominantly amenity grassland, which would not impede GCN dispersal into this site.
- 4.5.3 King Edward Road, Toft Road, Adams Hill and Brook Street, which all run to the west and south of the site, were all assessed as being sufficiently busy to act as a significant barrier to newt dispersal.
- #### 4.6 Bats *Chiroptera*
- 4.6.1 Desktop survey revealed many records of different bat species within 1km of the site over the last 10 years (see *Table 2* for a complete list of bat species recorded by desktop survey).
- 4.6.2 The single building on site, the Scout Hut, was assessed for its potential to support roosting bats. The results are set out at *Table 6* overleaf.

Table 6: Assessment of building on site for bat roost potential (including photographs)

Bldg No.	Building Name	Photographs	Description	Bat Roost Potential
B1	Scout Hut	  	<p>Single storey structure used as headquarters of Knutsford Scouts and Cubs. Majority of building constructed of corrugated metal sheeting sitting atop red-brick foundation. With exception of entrance foyer (which is breezeblock and with a flat roof – see photograph), roofs of different sections of Scout Hut are all corrugated metal and pitched, to height of approx 1m (bottom of pitch to apex). Roofs are supported with wooden beams (see photograph).</p> <p>Only loft void present within structure is inaccessible and lies above northwest portion of Scout Hut, which has very shallow pitch (&lt;30cm). Other ‘loft voids’ are open to internal space, not sealed off and are used as storage. No insulation within building to offer a stable temperature throughout seasons. Many small crevices throughout exterior of building leading under wooden fascias and possibly into inaccessible loft void and roof spaces. No evidence of bat activity or droppings recorded.</p> <p>Some limited potential for bat roosts within crevices and inaccessible loft void.</p>	<b>Low</b>

- 4.6.3 This survey area was assessed as having low potential to support roosting bats. Whilst the design and construction of the Scout Hut (i.e. corrugated metal, no insulation etc.) limits the suitability of this building to support roosting bats, the wooden supporting beams and crevices observed throughout the hut may possibly offer suitable roosting habitat during summer months. As such the building overall was assessed as having low potential to support roosting bats.
- 4.6.4 The lime trees around this site's boundaries were all assessed as 'Category 2' for their potential to support roosting bats. In line with current BCT guidelines, 'Category 2' trees are classified as:

*"Trees with no obvious potential, although the tree is of size and age that elevated surveys may result in cracks or crevices being found; or the tree supports some features which may have limited potential to support bats"*<sup>7</sup>.

The previous pollarding of these trees at approximately 6m has introduced wounds and cavities at this height which may be suitable for roosting bats. The new growth above this height is in good condition and was not observed to provide any cavities or hollows suitable for use by roosting bats.

- 4.6.5 The survey area overall was assessed as having low to medium potential to support foraging bats. The sheltered nature of the site, beneath the canopy of surrounding lime trees, will present a suitable environment in which bats could forage free of disturbance. There is some potential for a low-lit building close to good foraging habitat to provide a feeding perch for Brown long-eared bats *Plecotus auritus*. The proximity of 'The Moor' and associated waterbodies, as well as the mosaic of grassland, woodland and amenity planting immediately surrounding this site will further increase the likelihood of land both within and immediately beyond the survey boundaries supporting foraging bats.
- 4.6.6 Whilst there are no hedgerows within or immediately adjacent to this site, a line of trees connects the site to 'The Moor' to the north of the site, thus presenting a suitable habitat corridor between the site and an area of good foraging habitat for bats within nearby waterbodies.

#### 4.7 Otter *Lutra lutra*

- 4.7.1 Neither desktop nor field survey produced any record of otter activity and there are no suitably-sized watercourses or waterbodies on site or within 30 m of its boundary with the potential to support this species. The nearest suitable waterbody, WB01, lies over 150 m north of the site's boundaries.

#### 4.8 Badger *Meles meles*

- 4.8.1 No setts or any other evidence of badger activity was recorded on site or within 30 m of its boundaries where accessible. The areas of land which were not directly accessible during survey were viewed from the roads surrounding the site and were also assessed as having no features suitable for sett building. Desktop survey results for the past ten years provided several records of badger within 1k m of the site. One such record, from 2008, reported a badger burrow lying approximately 60 m to the southeast of the current site on the furthest side of the railway embankment.

#### 4.9 Water Vole *Arvicola amphibius*

- 4.9.1 Neither desktop nor field survey recorded any water vole activity. There are no waterbodies or watercourses on site or within 50m of its boundaries with the potential to support water vole. The nearest suitable waterbody, WB01, lies over 150 m north of the site's boundaries.

#### 4.10 Reptiles

- 4.10.1 Neither desktop nor field survey recorded any reptile activity. Habitat within the survey area and the predominantly residential nature of the land surrounding the site was considered to be of poor quality and unlikely to support reptile species.

#### 4.11 Breeding Birds

- 4.11.1 Survey was conducted outwith the main British bird breeding season and consequently, no breeding activity was recorded within the site's boundaries. However, a previous seasons Magpie *Pica pica* nest was observed within a tree along the northeast boundary of the site. Several boxes suitable for Tit species were also noted on trees within close proximity of the site's boundaries; one of which had evidence of previous usage.
- 4.11.2 The trees within the site's boundaries and the Scout Hut itself will offer potential habitat for breeding birds, as will the group of trees and area of scrub which surrounds the site to the east and north.

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<sup>7</sup> Hundt L (2012) Bat Surveys: Good Practice Guidelines, 2<sup>nd</sup> Edition, Bat Conservation Trust.

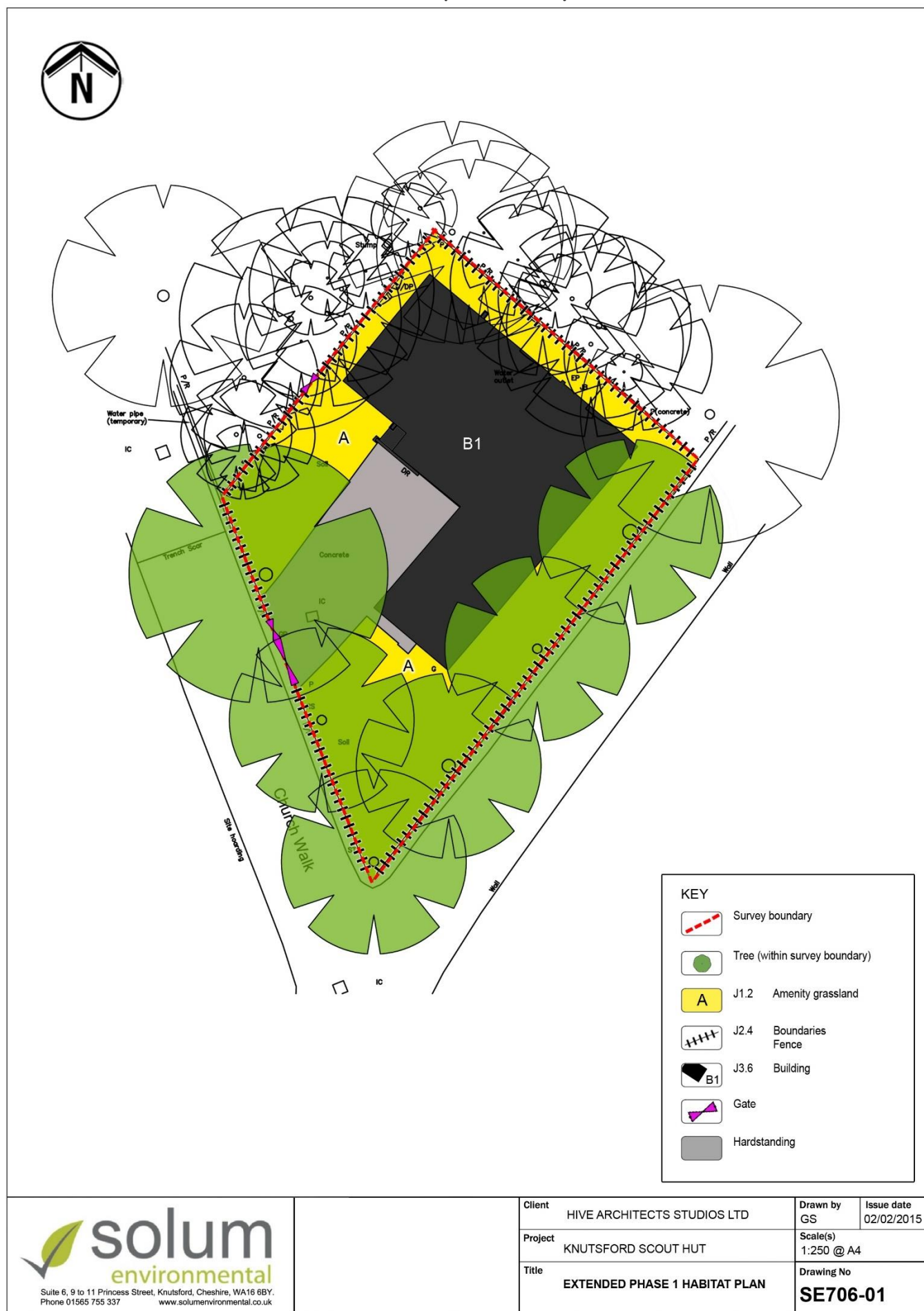


- 4.11.3 Desktop survey revealed no records of Barn Owl within 1 km of the site's boundaries within the last ten years and there are no buildings or trees on site with features suitable for use by Barn Owl for nesting.

#### **4.12 Other Species Recorded During Field Survey**

- 4.12.1 No other fauna was recorded during survey.

## 5.0 Extended Phase One Habitat Map of Survey Area



## 6.0 Ecological Conclusions

### 6.1 Assessment of Site's Current Ecological Value

- 6.1.1 This Preliminary Ecological Appraisal identified a small number of features of ecological value which have the potential to support the protected species targeted by this survey (including those protected by European Law). Until further survey for these species has been conducted, an assessment of the site's current ecological value cannot be accurately made. It would appear, however, when viewing the narrow range of habitats present within the site (and taking into account the small size of the site) that the site has limited ecological value. Upon completion of the required protected species survey, this provisional assessment of the site's ecological value must be re-assessed.

### 6.2 Assessment of Proposed Re-development's Likely Impacts on Designated Sites

- 6.2.1 Tatton Mere (a SSSI), which lies approximately 200 m north of the site's boundaries, will not be affected by the small scale re-development of this site. It is also unlikely that the proposed re-development will affect the dispersal of species (including possible protected species) between the site itself and Tatton Mere SSSI, nor will it impact upon the integrity of this SSSI.

### 6.3 Assessment of Proposed Re-development's Likely Impacts on Site's Biodiversity

- 6.3.1 Provided the single bat survey recommended does not reveal evidence of an active bat roost within this site's boundaries, it is unlikely that the proposed development will impact negatively on this site's biodiversity. Given the community and educational uses planned for the proposed new building, the client is keen to provide biodiversity enhancements as part of the proposed development, particularly in relation to both integrated bat and bird boxes.

### 6.4 Habitats, Hedgerows, Vegetation, Trees

- 6.4.1 The vegetation within the site's boundaries, including the perimeter of lime trees, offers limited biodiversity value. The small area of amenity grassland within the site is in poor condition and has very poor species-diversity. There are no sections of scrub or tall ruderal planting within the site's boundaries to offer a more layered and biodiverse environment.

- 6.4.2 The trees around this site should be retained and managed in accordance with the recommendations set out in the tree report prepared by Solum Environmental for this site:

*"SE0706-01/H/02a/NE Knutsford Scout Hut – Arboricultural Implication Study, September 2015".*

### 6.5 Great Crested Newt

- 6.5.1 Desktop survey returned no records of GCN within 1 km of the application site over the past 10 years. It should be noted that an absence of records does not necessarily indicate absence of this species and can instead be a result of under-recording in this area.

- 6.5.2 **There are no waterbodies or water features within the application site to offer potential breeding locations for GCN.** The closest water feature potentially suitable for GCN breeding lies approximately 160 m north of this site (WB01). This waterbody, along with WB02, lies within the terrestrial range for this species (<500 m) and is not separated from the site by any barrier to GCN dispersal. There is also habitat present within the boundaries of the application site with the potential to support GCN terrestrially (i.e. underneath foundations of Scout Hut).

- 6.5.3 Following liaison with the local authority ecologists, it is concluded that **the implementation of non-licensed Reasonable Avoidance Measures for GCN will be appropriate and proportionate** with respect to the small scale and low-impact nature of the proposed re-development. These measures are set out in Appendix 3.

- 6.5.4 **No further licensing, survey or mitigation for GCN or other amphibians will be required at this site.**

### 6.6 Bats

- 6.6.1 Desktop survey revealed several records of different bat species within 1 km of the site over the past ten years.

- 6.6.2 The only building onsite, B1, was assessed as having **Low potential** to support roosting bats. This assessment was based on a general lack of suitable features with higher potential to support roosting bats (including a lack of roof tiles, limited entrances for bats to fly through, and absence of large roof voids). However, there are a small number of features associated with B1 which could potentially be used by roosting bats (including wooden supporting beams in undisturbed roof space, crevices in brick work and underneath wooden fascia boards). Therefore, in line with current BCT guidelines, **a single dusk emergence and/ or pre-dawn re-entry bat survey is required** at this site between **May and August** to assess the presence/ likely absence of active bat roosts within the building prior to any works commencing.

- 6.6.3 Habitat within the survey area also provides a suitably sheltered environment (beneath a perimeter of tall trees) which will increase the likelihood of bats using this site for foraging. In addition, the site is also well connected to The Moor Pool (a wetland) to the north of the site through a line of mature trees which flank a predominantly unlit minor road. The Moor Pool and associated meres (including Tatton Meres) offer more suitable foraging grounds for bat species (in comparison with the current site), due to the mosaic of wetland, scrub, rough grassland and broadleaved woodland habitats present. The proximity of these features and the suitable connection between these features and the survey area further increases the likelihood of bat foraging and commuting activity in and around the site's boundaries. **The required dusk emergence and/ or pre-dawn re-entry survey should also aim to identify key areas of foraging and commuting activity, to subsequently inform specific recommendations to safeguard the favourable conservation status of any bats recorded by survey.**
- 6.6.4 The perimeter of lime trees on site were all assessed as 'Category 2' for their potential to support roosting bats. In accordance with BCT guidelines, **disturbance and/or felling of these trees should be avoided where possible.** The separate tree report for this site "*SE0706-01/H/02a/NE Knutsford Scout Hut – Arboricultural Implication Study, September 2015*" recommends that these trees are retained but re-pollarded to alleviate safety concerns over their diminished structural integrity. **Any works to these trees must be undertaken using Reasonable Avoidance Measures for bats,** to avoid any impacts on bat species which might be present within these trees.
- 6.6.5 These Reasonable Avoidance Measures for bats should consist of the following procedures:
- Felling the trees in sections, with all upper limbs being carefully lowered to the ground.
  - Once all of the sections of all trees have been felled, each should be visually assessed and each section allowed to remain on the ground undisturbed for a rest period of 24 hours. This allows any bats which might be present the opportunity to relocate naturally. All timber should then be removed from the site at the earliest possible opportunity.
  - **If any bats are found during the felling process, all works and activity must stop immediately and the advice of a licensed bat ecologist must be sought.**
- 6.6.6 Due to the likelihood of bats being present within and around the survey area, it would be best practice to enhance the potential of this site to support bats. These measures should include specifically:
- Incorporating bat-friendly external lighting throughout the proposed re-development (suitable guidance provided by the Bat Conservation Trust is reproduced at Appendix 5).
  - Including in the detailed planting scheme a number of native, insect-attracting shrubs, which will in turn enhance foraging areas for bats at this site (NB: a list of suitable species is provided at Appendix 4); and
  - Erection of a minimum of two summer bat boxes on new buildings or mature trees at this site, at a suitable height and aspect to encourage bat species to roost at this site. Examples of suitable boxes will be provided on completion of the required bat survey.
- 6.7 Otter**
- 6.7.1 No desktop records of otter, current or historic, were found. No evidence of otter was found and there is no habitat with the potential to support this species within the survey area; with the nearest suitable habitat being over 150 m distant to the north within The Moor Pool. The site is sufficiently distant from this waterbody and the adjacent Tatton Meres to avoid any impacts on otters which may be present within and around either.
- 6.7.2 **Subsequently no further survey, licensing or mitigation is required.**
- 6.8 Badger**
- 6.8.1 No evidence of badger was found and there is very limited habitat with the potential to support this species within the survey area. No setts were recorded within 30 m of the site boundaries where accessible. Observation of the inaccessible land made from surrounding roads found similarly low potential to support sett excavation. Whilst desktop survey returned several records of badger within 1 km of the site over the past ten years (one record being of a burrow approximately 60 m southeast of the site), no setts are present within 30 m of the site's boundaries and the proposed re-development will not incur any loss of suitable foraging habitat for this species.
- 6.8.2 Due to the proximity of busy roads and Knutsford town centre, encouraging badgers into the site may have implications for the safety of this species and prove to be detrimental to the local badger population. As such, the favourable conservation status of this species within the area may be jeopardised. **No measures should be taken to encourage badger foraging within the site's boundaries. Subsequently no further survey, licensing or mitigation is required.**



## 6.9 Water Vole

- 6.9.1 No desktop records of water vole, current or historic, were found. No evidence of water vole was identified during survey and there is no habitat with the potential to support this species within the survey area; with the nearest suitable habitat being over 150 m distant to the north within The Moor Pool. The site is sufficiently distant from this waterbody and the adjacent Tatton Meres to avoid any impacts on water vole which may be present within and around either. **Subsequently no further survey, licensing or mitigation is required.**

## 6.10 Reptiles

- 6.10.1 No desktop records of reptiles, current or historic, were found. Field survey failed to identify any habitat within the boundaries of the application site with the potential to support reptile species and the surrounding landscape (e.g. amenity grassland/road networks/residential and commercial development is also similarly limited in its potential to support reptiles. The probability of reptiles being present within the boundaries of the application site can, therefore, be considered extremely low.
- 6.10.2 **Subsequently no further survey, licensing or mitigation is required.**

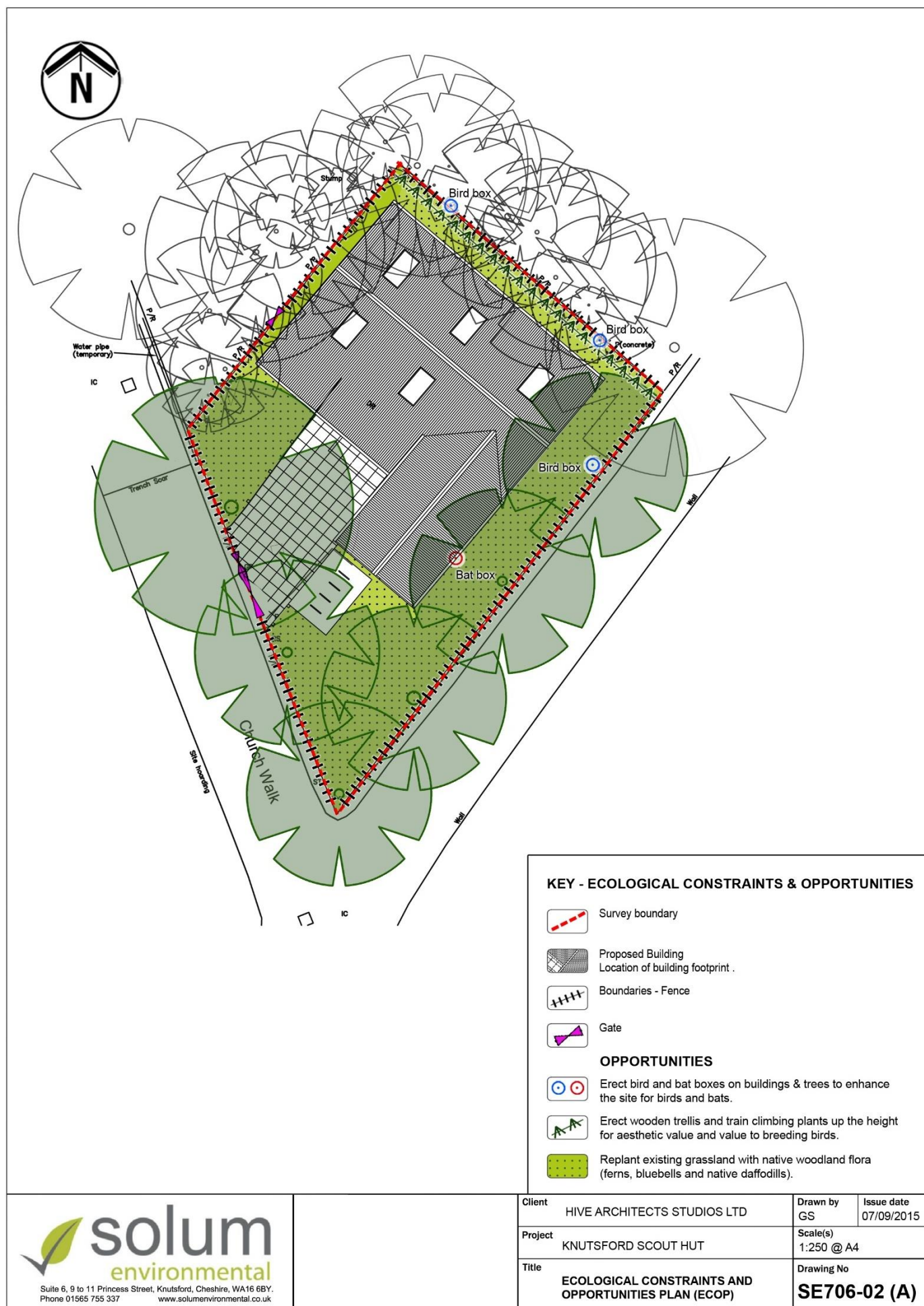
## 6.11 Breeding Birds

- 6.11.1 Survey was conducted outwith the main British bird breeding season and consequently, no breeding or nesting activity was recorded within the site's boundaries. However, a previous seasons Magpie *Pica pica* nest was observed within a tree along the northeast boundary of the site. Several boxes suitable for Tit species were also noted on trees within close proximity of the site's boundaries; one of which had evidence of previous usage.
- 6.11.2 The lime trees along the perimeter of the site and the Scout Hut itself offer potential habitat for nesting birds. **Any necessary works to trees should be timetabled outwith the core bird nesting season, ie March to August inclusive. Where the development programme requires such works being completed within the core nesting season, any tree to be felled or to undergo works must be checked by a suitably qualified and experienced ecologist immediately prior to works commencing.** Such works should only take place once the ecologist has confirmed that no active bird nests will be affected by the works.
- 6.11.3 **A variety of nest boxes targeting Tit species** (evidence of previous nesting within a Tit box was observed in close proximity to the site's boundaries) **and red-list species, e.g. House Sparrow *Passer domesticus* and Starling *Sturnus vulgaris* should be provided in trees and buildings in the re-developed site, as additional nesting sites.** Appendix 6 provides examples of suitable nesting boxes. Breeding bird habitat within any proposed re-development site can also be enhanced by selecting planting schemes which aim to provide food, cover and nesting sites for birds. This is best achieved by providing a layered structure through the selection of plants which will grow to different heights and which provide a dense shrub layer. Species which attract insects and/ or produce berries will provide seasonal food resources. Shrubs, trees and climbers can disguise bare walls or sheds and create an attractive backdrop for lower-level species planted in front. In addition climbers can be trained over new or existing structures or trellis, and shrubs and trees can be managed to provide dense growth at low levels. **The introduction of a wooden trellis along the northern boundary of the site could provide such a structure for climbing plants and would also provide suitable screening between the site and adjacent land.**

## 6.12 Biodiversity Enhancement Measures

- 6.12.1 As set out above, it is likely that a net gain in biodiversity could be achieved through the enhancement of this site for bat and bird species and through the use of native plant species in the landscaping of the re-developed site.
- 6.12.2 A provisional Ecological Constraints and Opportunities Plan is provided at Section 7.0 and this **should be used to inform both the final site layout and detailed planting plans for the proposed re-development scheme.**

## 7.0 Ecological Constraints and Opportunities Plan



## 8.0 Ecological Recommendations

	Protected Species	Recommendation	Applicable legislation/ best practice compliance:
R1	Great Crested Newt	All demolition works <u>must</u> be conducted taking <u>Reasonable Avoidance Measures</u> for GCNs. These measures must comply with the method statement specified at Appendix 3.	Great Crested Newts are protected under the <u>Conservation of Habitats and Species Regulations 2010 (as amended)</u> , making them a European Protected Species. As such, disturbance and/ or killing/ injuring this species is illegal. The Reasonable Avoidance Measures, specified above, will ensure that there are no negative impacts on this species.
R2	Bats	No works to the Scout Hut or to trees within the site boundary are to be carried out until R3 bat survey has been conducted.	All bats are protected under the <u>Conservation of Habitats and Species Regulations 2010 (as amended)</u> , making them a European Protected Species. As such, disturbance of any structure with a bat roost is a strict offence and will be liable to prosecution. Applicable Best Practice Guidelines: For a building classified as 'Low Roosting Potential', best practice guidance set by the Bat Conservation Trust requires that a single dusk emergence and/ or pre-dawn re-entry survey is carried out in optimal season (April to September).
R3	Bats	Before any works to the Scout Hut commence, a single dusk emergence and/ or dawn re-entry bat survey <u>must</u> be conducted to assess presence/ likely absence of an active bat roost within the building and trees on site.	
R4	Bats	All works required to perimeter of lime trees around the site <u>must</u> be conducted taking <u>Reasonable Avoidance Measures</u> for bats. These measures must comply with the method statement specified at Section 6.6.5 above.	
R5	Birds	Any vegetation clearance, tree felling and works should take place outside the bird breeding season (March to September inclusive). Should the development timetable require such works to be carried out during the bird breeding season then all trees, hedgerows and buildings to be affected must be checked for the presence of breeding birds by a fully qualified and experienced bird surveyor 24 hours prior to the works taking place. Such works should only take place once the ecologist is satisfied that no active nests will be affected.	All wild birds, including their nests and eggs are protected under the Wildlife and Countryside Act 1981 (as amended). Some birds are afforded special protection during the nesting season (Schedule 1 Birds)
R6	Trees and planting	Masterplanning and landscape proposals for this re-development should retain those features with ecological value, including as many lime trees as possible, and to further develop biodiversity throughout the site through the use of native planting schemes.	Planning policy guidance NPPF: all developments to result in a net gain in biodiversity.
R7	Bats and Birds	Measures should be applied to enhance the site for bird and bat species through the provision of bird nesting and bat roosting boxes and the use of native plant species in the landscaping of the completed re-development.	Planning policy guidance NPPF: all developments to result in a net gain in biodiversity.
R8	Overall biodiversity value of site	Following completion of required bat survey, ecological value of site, all mitigation measures and ecological recommendations to be re-assessed. Specification to be provided for summer bat boxes.	Requirement of British Standard for Biodiversity, 2013.

R9	<b>Overall biodiversity value of site</b>	<b>Detailed site layout and planting plans to be informed by Ecological Constraints and Opportunities Plan provided.</b>	Requirement of British Standard for Biodiversity, 2013.
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# APPENDICES

Appendix 1	UK Legal Protection and Planning Guidance
Appendix 2	Seasonal Survey Constraints
Appendix 3	Great Crested Newt – Reasonable Avoidance Measures Method Statement
Appendix 4	Planting List to Encourage Bat Foraging
Appendix 5	Specification for low-level External Lighting (Bats)
Appendix 6	Specification for Bird Boxes
Appendix 7	References and Bibliography



## APPENDIX 1: UK Legal Protection and Planning Guidance

### A1 National Planning Policy Framework (NPPF)

The NPPF came into force in March 2012. It sets out the Government's planning policies for England and how these are expected to be applied. It gives guidance to local planning authorities on the content of their local plans but is also a material consideration in determining planning applications. **The NPPF states that the planning system should provide a net gain for biodiversity wherever possible.** The NPPF replaces much of the previous planning policy guidance, including PPS9: Biodiversity and Geological Conservation. However, the Government Circular 06/05: Biodiversity and Geological Conservation – Statutory Obligations and Their Impact within the Planning System (which accompanied PPS9) remains valid.

### A2 Biodiversity Action Plans

**UK Biodiversity Action Plans:** The **UK Biodiversity Action Plan (UKBAP)** was established in response to the **Convention on Biological Diversity 1992**, signed by 150 members at the Rio Earth Summit, which aimed to promote sustainable development amongst all signatories. Specific action plans have been prepared for highly protected species. As well as a national Biodiversity Action Plan, local Biodiversity Action Plans identify species of note at local level throughout the UK.

### A3 Priority Habitats and Species

Under the terms of the Natural Environment and Rural Communities Act 2006, all public bodies are required to have regard to the conservation of biodiversity when carrying out their activities. This means that efforts must be made to consider priority and protected species and habitats in particular. There would be a presumption in the land-use planning process against any development that would result in loss to an area of priority habitat or harm to the population of any priority species.

### A4 Vegetation

The Wildlife and Countryside Act 1981 (as amended) lists plants which are statutorily protected. In relation to development these plants are rare and are not often encountered. The bluebell is scheduled, with commercial bulb-picking from the wild being prohibited. There is also a category of plants which it is an offence to introduce to the wild. This category includes Japanese knotweed, which is often found on brownfield sites. Care is needed to avoid spreading the species around the site during earthworks, and to ensure that any removal of infested soils off-site is to a licensed tip. Giant hogweed and Himalayan balsam are also listed in this category of invasive alien plant species. In addition the Ragwort Control Act came into force on 20 February 2004 and enables the Secretary of State to make a Code of practice to prevent the spread of common ragwort.

### A5 Hedgerows

As a priority habitat for conservation concern, hedgerows also receive further protection under the Hedgerow Regulations 1997. Under the Hedgerows Regulations 1997 it is against the law to remove or destroy certain hedgerows without permission from the local planning authority. Local planning authority permission is normally required before removing hedges that are at least 20 metres (66 feet) in length, more than 30 years old and contain certain plant species. The authority will assess the importance of the hedgerow using criteria set out in the regulations. The local planning authority is also the enforcement body for offences created by the Regulations. If a hedgerow is removed without permission, there may be an unlimited fine and the hedgerow may have to be replaced.

### A6 Great Crested Newt

A European Protected Species (EPS) and fully protected under the Conservation of Habitats and Species Regulations 2010 and the Wildlife and Countryside Act 1981 (as amended). Under the legislation it is an offence to:

- *Intentionally or deliberately capture, kill or injure great crested newts (GCNs).*
- *Intentionally or recklessly disturb them in a place used for shelter or protection.*
- *Damage or destroy a breeding site or resting place.*
- *Intentionally or recklessly damage, destroy or obstruct access to a place used for shelter or protection.*
- *Possess a great crested newt, or any part of it, unless acquired legally.*
- *Sell, barter, exchange or transport or offer for sale great crested newts or parts of them.*

Where Great crested newts (GCNs) are present at a proposed development site it is usually possible to continue with the project, re-locating the animals in advance of development, but only upon receipt of a site-specific licence from Natural England. The licence application process can be complex and can only be conducted by a suitably qualified GCN-specialist ecologist. Each licence application must be supported by:

- Full optimal-season great crested newt survey results and analysis;

- A suitable mitigation strategy that ensures that the favourable conservation status of the GCN population will be maintained (this usually involves the provision by the developer of additional land with ponds as compensation for loss of habitat and breeding sites). This mitigation strategy should usually be agreed by the ecologist through liaison with Natural England; and
- A method statement explaining how GCNs will be accommodated legally if found during the development process.

## A7 Bats

All species of bats are European Protected Species and their breeding and nesting sites (roosts) are given a high degree of legal protection under the terms of the Wildlife and Countryside Act 1981 (as amended) and the Conservation of Habitats and Species Regulations 2010. In addition, all bats are the subject of a UK-wide Biodiversity Action Plan (BAP). This combined legislation offers bats, their roost sites and resting places strict protection from intentional or reckless disturbance (see wording of GCN legislation above). It should be noted that, under the legislation, a bat roost is defined as any structure or place which is used by bats to shelter, breed or perch whilst feeding. As bats tend to reuse the same roosts, the roost is legally protected, whether the bats are present at the time or not.

**Where bats are present at a proposed development site it is usually possible to continue with the proposed project, but only upon receipt of a site-specific licence from Natural England. The licence application process can be complex and can only be conducted by a suitably qualified bat-specialist ecologist.** Each licence application must be supported by:

- Full optimal-season bat survey results and analysis;
- A suitable mitigation strategy that ensures that the favourable conservation status of the bat population will be maintained (this usually involves the provision by the developer of replacement permanent bat roosts, additional bat boxes and both bat-friendly planting and lighting within the development site). This mitigation strategy should usually be agreed by the ecologist through liaison with Natural England; and
- A method statement explaining how bats will be accommodated legally if found during the development process.

## A8 Otter

Otters are a European Protected Species (EPS) and fully protected under the Conservation of Habitats and Species Regulations 2010 and the Wildlife and Countryside Act 1981 (as amended). Otters and their resting places are fully protected, it is an offence to deliberately, capture, injure or kill them or to damage, destroy or obstruct their breeding or resting places. It is also an offence to disturb otters in their breeding or resting places.

**Where otters are present at a proposed development site it is usually possible to continue with the proposed project, but only upon receipt of a site-specific licence from Natural England. The licence application process can be complex and can only be conducted by a suitably qualified otter-specialist ecologist.** Each licence application must be supported by:

- Full optimal-season otter survey results and analysis;
- A suitable mitigation strategy that ensures that the favourable conservation status of the otter population will be maintained (this usually involves the provision by the developer of replacement waterbodies and holts within the development site). This mitigation strategy should usually be agreed by the ecologist through liaison with Natural England; and
- A method statement explaining how otters will be accommodated legally if found during the development process.

## A9 Badger

All badgers are protected from harm under the Protection of Badgers Act (1992). Under this act it is an offence:

- To kill, injure or take a badger, or to attempt to do so;
- To use badger tongs in the course of killing or taking, or attempting to kill or take, any badger;
- To kill or take a badger with a firearm which does not fall within the specifications laid down in the Act;
- To dig for a badger;
- To cruelly ill-treat a badger;
- To possess or control a live badger;
- To sell or offer for sale a live badger;
- To mark, or attach any ring, tag or marking device to a badger;
- To possess or control any dead badger, any part of one, or anything derived from one;
- To interfere with a badger sett by (a) damaging a sett or any part of one; (b) destroying a sett; (c) obstructing access to or any entrance of a sett; (d) causing a dog to enter a sett; or (e) disturbing a badger when it is occupying a sett.

**Where badgers are present at a proposed development site, it is usually possible to continue with the proposed project, but only upon receipt of a site-specific licence from Natural England. A licence is always required to shut down a badger sett or for works within 30m of a badger sett. The licence application process can be complex and can only be conducted by a suitably qualified badger-specialist ecologist.** Each licence application must be supported by:

- Full optimal-season badger survey results and analysis;

- A suitable mitigation strategy that ensures that the favourable conservation status of the badger population will be maintained (this usually involves the provision by the developer of replacement artificial setts, planting of suitable fruit-bearing shrubs, erection of badger gates and underpasses within the development site). This mitigation strategy should usually be agreed by the ecologist through liaison with Natural England; and
- A method statement explaining how badgers will be accommodated legally if found during the development process.

## A10 Water Vole

From 6th April 2008, water voles and their resting places gained full protection under the Wildlife and Countryside Act (1981). It is an offence to deliberately, capture, injure or kill them or to damage, destroy or obstruct their breeding or resting places. It continues to be an offence to disturb them in their breeding or resting places.

**Where water voles are present at a proposed development site it is usually possible to continue with the project, re-locating the animals in advance of development, but only upon receipt of a site-specific licence from Natural England. The licence application process can be complex and can only be conducted by a suitably qualified water vole-specialist ecologist. Each licence application must be supported by:**

- Full optimal-season water vole survey results and analysis;
- A suitable mitigation strategy that ensures that the favourable conservation status of the water vole population will be maintained (this usually involves the provision by the developer of additional land with ponds as compensation for loss of habitat and breeding sites). This mitigation strategy should usually be agreed by the ecologist through liaison with Natural England; and
- A method statement explaining how water voles will be accommodated legally if found during the development process.

## A11 Reptiles

The four widespread species of reptile in the UK (ie common lizard, slow-worm, grass snake and adder) are all protected under the terms of the Wildlife and Countryside Act 1981 (as amended), however they are not fully protected under European law. This level of protection prohibits the intentional killing and injuring and trade of these reptiles. Where a survey identifies potential habitat for reptiles at a development site, a reptile survey may be needed prior to submission of a planning application and mitigation may be required by Natural England for any loss of reptile habitat as a result of a site's re-development

## A12 Breeding Birds

All wild birds, their nests and their eggs are protected by the Wildlife & Countryside Act 1981 (as amended). It is an offence (with certain exceptions), to intentionally or recklessly kill, injure or take any wild bird (this includes chicks); to take, damage or destroy any wild bird's nest while it is use or being built; and to take or destroy the egg of any wild bird. The definition of a wild bird is 'any bird of a kind which is resident in or a visitor to Great Britain in a wild state'.

Species named in Schedule 1 of the Act are given special protection and it is an offence to disturb these species at the nest or while they are caring for dependant young. The RSPB and the UK's leading bird conservation organisations work together to regularly review the status of birds within the UK. A total of 246 species are assessed against a set of objective criteria to place each on one of three lists - green, amber and red – indicating an increasing level of conservation concern. These lists provide a tool for guiding conservation actions for birds in the UK and for setting priorities for action on individual species. The last review of these lists was completed in May 2009.

For certain species, eg feral pigeon, general licences are available for an authorised person to lawfully carry out the actions outlined above providing that it is in the overriding interest of public health or air safety and that all other attempts to prevent the problem caused by the species have failed.

The Barn owl has seen significant declines in recent history primarily due to habitat loss and the destruction, removal or renovation of traditional nesting sites. It is currently included in the amber-list of species of medium conservation concern, having been classified as a Species of European Conservation Concern (SPEC). In Great Britain it is listed on Schedule 1 of the Wildlife & Countryside Act (1981) as amended. It is an offence to disturb any wild bird included in Schedule 1 while it is building a nest or is at, on or near a nest containing eggs or young; or disturbs dependent young of such a bird. Note that if any of the above resulted from a person being reckless, even if they had no intention of committing the offence, their action would still be considered an offence. A person is not guilty of an offence if it can be shown that the act was 'the incidental result of a lawful operation and could not have been reasonably avoided'; only a court can decide what is 'reasonable' in any set of circumstances.

## Appendix 2: Ecological Survey Calendar

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Habitats / Vegetation	Phase 1 + NVC (sub-optimal)			Phase 1 + NVC						Phase 1 + NVC (sub-optimal)			
Badgers	Limited sett/ bait surveys	Bait marking + sett surveys			Limited bait marking + sett surveys				Sett surveys		Limited sett/ bait surveys		
Bats	Hibernation roost inspections		Limited activity	Summer roost emergence + activity surveys					Limited activity	Hibernation roost inspections			
	Possible to survey potential roost sites + carry out internal building inspections all year round, trees are best surveyed in winter												
Birds	Winter species	Breeding birds/ migrants		Breeding birds		Low activity		Migrant species		Winter species			
	Survey for Barn Owl (Schedule 1 species) possible all year round, although may be limited by weather												
Dormice				Nest tube survey									
	Gnawed hazelnut search (sub-optimal)									Gnawed hazelnut search (optimal)			
Great crested newts	Newts hibernating	Adults: ponds + terrestrial survey; Eggs: April to mid-June; Larvae: from mid-May			Habitat + larvae survey		Habitat survey		Newts hibernating				
Otters	Limited only by vegetation cover + weather conditions												
Reptiles	Reptiles hibernating	Peak survey: May + June				Sub-optimal (reduced basking)		Peak survey	Limited activity	Reptiles hibernating			
Water voles	Limited activity	Initial habitat survey	Habitat + activity surveys (can be limited by vegetation cover + weather)								Initial habitat survey	Limited activity	
White-clawed crayfish	Limited activity		Search, torches, traps	Breeding: torches only		Substrate hand search, torches, traps				Limited activity			
Optimal surveys		Sub-optimal surveys				Surveys not possible							

## APPENDIX 3: GREAT CRESTED NEWT REASONABLE AVOIDANCE MEASURES

### METHOD STATEMENT

#### Legislation

Great crested newts (GCN) and their habitat are fully protected under national (Wildlife & Countryside Act 1981 (as amended)) and European law (The Habitats and Species Regulations 2010) as a European Protected Species (EPS). The combined legislation makes it illegal to:

- Intentionally or deliberately capture, kill or injure a great crested newt;
- intentionally or recklessly damage, destroy or obstruct access to any place used for shelter and protection including resting and breeding places, whether occupied or not;
- deliberately, intentionally or recklessly disturb a great crested newt when in a place of shelter;
- possess a great crested newt, or any part of it, unless acquired lawfully; or
- sell, barter, exchange or transport or offer for sale great crested newts or parts of them.

Anyone carrying out activities which may affect EPS must consider the presence of EPS, their breeding sites and resting places. Good practice guidance is available from Natural England, which advises on assessing for the presence of EPS, and the possible impact of operations (including strategies for avoiding committing offences). If an offence cannot be avoided, then a derogation licence should be sought from Natural England.

#### Method Statement Objectives

The objectives of this method statement are, therefore, to:

- Avoid committing an offence under the above legislation; and
- ensure that favourable conservation status of GCN is maintained.

Any development related activities on the site, such as vegetation clearance or excavations in areas of suitable newt habitat may potentially affect this species. As a result, safeguards must be implemented to protect this species and the Method Statement below details measures to be implemented to ensure these objectives are achieved. If these measures are followed then both objectives will be achieved without the need for a derogation license from Natural England.

#### METHOD STATEMENT

The following measures will be adopted throughout the construction period of the proposed development:

- 1.0 For the initial stages of the development when vegetation clearance is to be undertaken an experienced amphibian ecologist who holds a Natural England great crested newt survey licence will be employed by the developer to oversee the works.
- 2.0 In order to ensure that the method statement is adhered to a copy MUST be available on site at all times during the works.
- 3.0 As part of the site induction process, all staff working on site will be made aware of the potential presence of great crested newts on site and their status as a UK and European Protected Species. This induction should be conducted by an experienced amphibian ecologist
- 4.0 Images of great crested newts are to be displayed in the site office so that all staff can be familiar with what these animals look like.
- 5.0 If a great crested newt is identified it should **not** be moved or handled and all works on site should cease until advice from an ecologist or the ECoW is obtained – it is possible in such circumstances that development may need to be suspended until a development licence is obtained.
- 6.0 All potential refugia sites within the working areas will be hand-searched by the licensed ecologist prior to any form of digging, excavation or final vegetation clearance works being started. Where tree removal is required, this will be supervised by the licensed ecologist or ECoW who will inspect the root ball for amphibians.
- 7.0 All demolition rubble to be placed into skips or other containers or removed from site before the close of the working day to prevent GCN use as refugia sites.



- 8.0 All stock-piled and loose materials should be stored atop pallets or a similar support to keep them raised off the ground to prevent them being used by GCN as refugia sites.
- 9.0 All excavations left open overnight or longer must be gently ramped at one end to allow trapped animals to escape and must be checked for great crested newts prior to the continuation of works or infilling.
- 10.0 Any pipe work laid must have its open end blocked off at the conclusion of each working day to ensure that no GCNs can enter the pipe and be trapped within.
- 11.0 Following the initial construction phase, the site will require regular bi-monthly monitoring visits from a licensed ecologist employed by the developer to ensure that compliance with all measures outlined above.

## APPENDIX 4: Planting List to Encourage Bat Foraging

Planting to enhance a site for bats should aim to provide a habitat rich in insects, and with the potential for alternative roosting sites. The following are examples of plant species, which can be used where appropriate, to enhance a landscape for bats.

### Night-scented flowers

As bats usually feed at dusk and dawn it is advantageous to use night-scented flowers which will attract moths and other night-flying insects.

### Re-seeding

Where re-seeding is to take place the choice of a 'conservation mix' of grass seed would be preferential. The management of grassland areas as hay meadows, without use of herbicides/fertilisers and allowing the grass to go to seed prior to cutting is beneficial in allowing larval stages of the insects to develop.

English Name	Latin Name
<b>Trees and Shrubs (of local provenance where possible)</b>	
Oak	<i>Quercus robur</i>
Ash	<i>Fraxinus excelsior</i>
Silver Birch	<i>Betula pendula</i>
Field Maple	<i>Acer campestre</i>
Hawthorn	<i>Crataegus monogyna</i>
Alder	<i>Alnus glutinosa</i>
Goat Willow	<i>Salix caprea</i>
Guelder Rose	<i>Viburnum opulus</i>
Hazel	<i>Coryllus avellana</i>
Blackthorn	<i>Prunus spinosa</i>
Elder	<i>Sambucus nigra</i>
<b>Night-scented flowers</b>	
Nottingham Catchfly	<i>Silene nutans</i>
Night -flowering Catchfly	<i>S. noctiflora</i>
Bladder Campion	<i>S. vulgaris</i>
Night-scented Stock	<i>Matthiola bicornis</i>
Dame's-violet	<i>Hesperis matronalis</i>
Common Evening-primrose	<i>Oenothera biennis</i>
Soapwort	<i>Saponaria officinalis</i>
<b>Scented herbs</b>	
Chives	<i>Allium schoenoprasum</i>
Sage	<i>Salvia officinalis</i>
Marjoram	<i>Origanum vulgare</i>
Borage	<i>Borago officinalis</i>
Mint	<i>Mentha</i> sp.
<b>Climbers</b>	
Honeysuckle (native)	<i>Lonicera periclymenum</i>
Traveller's-joys	<i>Clematis vitalba</i>
Dog-rose	<i>Rosa canina</i>
Sweet-briar	<i>R. rubiginosa</i>
Field-rose	<i>R. arvensis</i>
Ivy	<i>Hedera helix</i>
Bramble	<i>Rubus fruticosus</i> agg

## APPENDIX 5: SPECIFICATION FOR LOW-LEVEL EXTERNAL LIGHTING (BATS)

### Bat Conservation Trust



### Artificial lighting and wildlife

#### Interim Guidance: Recommendations to help minimise the impact artificial lighting

Wherever human habitation spreads, so does artificial lighting. This increase in lighting has been shown to have an adverse effect on our native wildlife, particularly on those species that have evolved to be active during the hours of darkness. Consequently, development needs to carefully consider what lighting is necessary and reduce any unnecessary lighting, both temporally and spatially. When the impacts on different species groups are reviewed, the solutions proposed have commonalities that form the basis of good practice. These are outlined in the following document.

#### Overview of impacts

##### Invertebrates

Artificial light significantly disrupts natural patterns of light and dark, disturbing invertebrate feeding, breeding and movement, which may reduce and fragment populations. Some invertebrates, such as moths, are attracted to artificial lights at night. It is estimated that as many as a third of flying insects that are attracted to external lights will die as a result of their encounter.<sup>1</sup> Insects can become disoriented and exhausted making them more susceptible to predation. In addition, the polarisation of light by shiny surfaces attracts insects, particularly egg laying females away from water. Reflected light has the potential to attract pollinators and impact on their populations, predators and pollination rates. Many invertebrates natural rhythms depend upon day-night and seasonal and lunar changes which can be adversely affected by artificial lighting levels.

It is not always easy to disentangle the effects of lighting on moths from other impacts of urbanisation. However, it is known that UV and green and blue light, which have short wavelengths and high frequencies, are seen by most insects and are highly attractive to them. Where a light source has a UV component, male moths in particular will be drawn to it. Most light-induced changes in physiology and behaviour are likely to be detrimental. They discern it to be 'light', so they do not fly to feed or mate.<sup>2</sup>

##### Birds

There are several aspects of changes to bird behaviour to take into account. The phenomenon of robins and other birds singing by the light of a street light or other external lighting installations is well known, and research has shown that singing did not have a significant effect on the bird's body mass regulation. However, it was felt that the continual lack of sleep was likely to be detrimental to the birds' survival and could disrupt the long-term circadian rhythm that dictates the onset of the breeding season<sup>3</sup>. Many species of bird migrate at night and there are well-documented cases of the mass mortality of nocturnal migrating birds as they strike tall lit buildings. Other UK bird species that are particularly sensitive to artificial lighting are long-eared owls, black-tailed godwit and stone curlew.<sup>4</sup>

<sup>1</sup> Bruce-White C and Shardlow M (2011) A Review of the Impact of Artificial Light on Invertebrates - See more at: <http://www.buglife.org.uk/advice-and-publications/publications/campaigns-and-reports/review-impact-artificial-light#sthash.s7GPA1vL.dpuf>

<sup>2</sup> As above

<sup>3</sup> Pollard A. (2009) Visual constraints on bird behaviour. University of Cardiff

<sup>4</sup> Rodríguez A., García A.M., Cervera F. and Palacios V. (2006) Landscape and anti-predation determinants of nest site selection, nest distribution and productivity in Mediterranean population of Long-eared Owls, *Asio otus*. *Ibis*, 148(1), pp. 133-145

## Mammals

A number of our British mammals are nocturnal and have adapted their lifestyle so that they are active in the dark in order to avoid predators. Artificial illumination of the areas in which these mammals are active and foraging is likely to be disturbing to their normal activities and their foraging areas could be lost in this way. It is thought that the most pronounced effect is likely to be on small mammals due to their need to avoid predators. However, this in itself has a knock-on effect on those predators.

The detrimental effect of artificial lighting is most clearly seen in bats. Our resident bat species have all suffered dramatic reductions in their numbers in the past century. Light falling on a bat roost exit point, regardless of species, will at least delay bats from emerging, which shortens the amount of time available to them for foraging. As the main peak of nocturnal insect abundance occurs at and soon after dusk, a delay in emergence means this vital time for feeding is missed. At worst, the bats may feel compelled to abandon the roost. Bats are faithful to their roosts over many years and disturbance of this sort can have a significant effect on the future of the colony. It is likely to be deemed a breach of the national and European legislation that protects British bats and their roosts.

In addition to causing disturbance to bats at the roost, artificial lighting can also affect the feeding behaviour of bats and their use of commuting routes. There are two aspects to this: one is the attraction that short wave length light (UV and blue light) has to a range of insects; the other is the presence of lit conditions.

As mentioned, many night-flying species of insect are attracted to lamps that emit short wavelength component. Studies have shown that, although noctules, serotines, pipistrelle and Leisler's bats, take advantage of the concentration of insects around white street lights as a source of prey, this behaviour is not true for all bat species. The slower flying, broad-winged species, such as long-eared bats, barbastelle, greater and lesser horseshoe bats and the *Myotis* species (which include Brandt's, whiskered, Daubenton's, Natterer's and Bechstein's bats) generally avoid external lights.

Lighting can be particularly harmful if it illuminates important foraging habitats such as river corridors, woodland edges and hedgerows used by bats. Studies have shown that continuous lighting along roads creates barriers which some bat species cannot cross<sup>5</sup>. It is also known that insects are attracted to lit areas from further afield. This could result in adjacent habitats supporting reduced numbers of insects, causing a further impact on the ability of light-avoiding bats to feed.

These are just a few examples of the effects of artificial lighting on British wildlife, with migratory fish, amphibians, some flowering plants, a number of bird species, glow worms and a range of other invertebrates all exhibiting changes in their behaviour as a result of this unnatural lighting.

## Recommendations

### Survey and Planning

The potential impacts of obtrusive light on wildlife should be a routine consideration in the Environmental Impact Assessment (EIA) process<sup>6</sup>. Risks should be eliminated or minimised wherever possible. Some locations are particularly sensitive to obtrusive light and lighting schemes in these areas should be carefully planned.

In August 2013, Planning Minister Nick Boles launched the new National Online Planning Guidance Resource aimed at providing clearer protection for our natural and historic environment. The guidance looks at when lighting pollution concerns should be considered and is covered within one of the on line planning practice

<sup>5</sup> Stone E. L., Jones G and Harriss (2009) Street lighting disturbs commuting bats. *Current Biology*, 19, pp 1-5

<sup>6</sup> See also: Institution of Lighting Professionals – Professional Lighting Guide (PLG 04) Guidance on undertaking lighting environmental impact assessments)



guides<sup>7</sup>. The guide provides an overview for planners with links to documents that aim to give planners an overview of the subject through the following discussion points:

1. When is obtrusive light / light pollution relevant to planning?
2. What factors should be considered when assessing whether a development proposal might have implications for obtrusive lighting / light pollution?
3. What factors are relevant when considering where light shines?
4. What factors are relevant when considering how much the light shines?
5. What factors are relevant when considering possible ecological impact?

This can help planners reach the right design through the setting of appropriate conditions relating to performance and mitigation measures at the planning stage.

The Institution of Lighting Professionals (ILP) recommends that Local Planning Authorities specify internationally recognised environmental zones for exterior lighting control within their Development Plans<sup>8</sup>. In instances lacking classification, it may be necessary to request a Baseline Lighting Assessment/Survey conducted by a Lighting Professional in order to inform the classification of areas, particularly for large-scale schemes and major infrastructure projects.

When assessing or commissioning projects that include the installation of lighting schemes, particularly those subject the EIA process, the following should be considered and relayed to applicants:

- **Ecological consultants should confirm the presence of any sensitive fauna and flora**, advising the lighting designers of bat routes and roosts and other areas of importance in order to ensure that reports correspond with each other.
- **Ecological consultants should consider the need for quantitative lighting measurements**. In some instances it may be necessary for further lighting measurements to be taken. For example, outside an important bat roost. These should follow best practice guidance from the ILP and would ideally be conducted by a Lighting Professional.
- **Where appropriate, professional lighting designers should be consulted** to design and model appropriate installations that achieve the task but mitigate the impacts. This should be done at the earliest opportunity. Early decisions can play a key role in mitigating the impact from lighting.
- **Reports submitted should outline the impacts of lighting in relation to ecology**, making clear reference to the ecological findings, highlighting any sensitive areas and detail proposed mitigation. Consideration should also be given to internal lighting where appropriate.
- **Post-installation checks and sign off upon commissioning should be carried out** by the lighting designer to ensure that the lighting installation has been installed in accordance with the design, that predictions were accurate and mitigation methods have been successful.

## Principles and design considerations

### **Do not**

- **provide excessive lighting**. Use only the minimum amount of light needed for the task.
- **directly illuminate bat roosts** or important areas for nesting birds

### **Avoid**

- **installing lighting in ecologically sensitive areas** such as: near ponds, lakes, rivers, areas of high conservation value; sites supporting particularly light-sensitive species of conservation significance (e.g. glow worms, rare moths, slow-flying bats) and habitat used by protected species.
- **using reflective surfaces under lights**.

<sup>7</sup><http://planningguidance.planningportal.gov.uk/blog/guidance/light-pollution/when-is-light-pollution-relevant-to-planning/>

<sup>8</sup> Institution of Lighting Professionals (2011) Guidance Notes for the Reduction of Obtrusive Light GN01:2011.



**Do**

- **consider employing a competent lighting designer** who will apply the principals of providing the right light, in the right place, at the right time and controlled by the right system.
- **minimise the spread of light** to at, or near horizontal and ensure that only the task area is lit. Flat cut-off lanterns or accessories should be used to shield or direct light to where it is required.
- **consider the height of lighting columns.** It should be noted that a lower mounting height is not always better. A lower mounting height can create more light spill or require more columns. Column height should be carefully considered to balance task and mitigation measures.
- **consider no lighting solutions where possible** such as white lining, good signage and LED cats eyes. These options can also be effective. For example, light only high-risk stretches of roads, such as crossings and junctions, allowing headlights to provide any necessary illumination at other times.
- **use temporary close-boarded fencing until vegetation matures,** to shield sensitive areas from lighting.
- **limit the times that lights are on to provide some dark periods.** The task being lit often varies, for example roads are less used after 23.00hrs and car parks are empty. A lighting designer can vary the lighting levels as the use of the area changes reducing lighting levels or perhaps even switching installations off after certain times. This use of adaptive lighting can tailor the installation to suit human health and safety as well as wildlife needs.

**Technological specifications**

Research from the Netherlands has shown that spectral composition does impact biodiversity.

- **Use narrow spectrum light sources** to lower the range of species affected by lighting.
- **Use light sources that emit minimal ultra-violet light**
- **Lights should peak higher than 550 nm**
- **Avoid white and blue wavelengths of the light spectrum** to reduce insect attraction and where white light sources are required in order to manage the blue short wave length content they should be of a warm / neutral colour temperature <4,200 kelvin.

Further guidance on the spectral composition of artificial lighting will be made available following the publication of research from the Netherlands.

**Further reading:**

- A review of the impact of artificial light on invertebrates. Buglife. 2011
- Royal Commission on Environmental Pollution. 2009. Artificial light in the environment. London, HMSO
- The Ecological Consequences of Artificial Night Lighting" edited by Longcore and Rich
- Shedding Light: A survey of local authority approaches to lighting in England. CPRE 2014

For more information on lighting and wildlife see:

- Bat Conservation Trust (BCT) — [www.bats.org.uk](http://www.bats.org.uk)
- Campaign for Dark Skies (CfDS) — [www.britastro.org/dark-skies](http://www.britastro.org/dark-skies)
- Bats and Lighting Research project — [www.batsandlighting.co.uk/index.html](http://www.batsandlighting.co.uk/index.html).
- Institution of Lighting Professionals (ILP) — [www.theilp.org.uk](http://www.theilp.org.uk)
- Lichtopnatuur - Impact of artificial light on flora and fauna in The Netherlands - <http://www.lichtopnatuur.org/>

## APPENDIX 6: SPECIFICATION FOR BIRD NEST BOXES

No 2GR Schwegler Nest Box (Blue and great tits)



Height: 19cm  
Width: 14cm  
Hole diameter: 2.7cm  
Weight: 6.7kg

No 35 Schwegler Starling Nest Box



Height: 28cm  
Width: 19cm  
Depth: 20cm  
Entrance hole: 45mm  
Weight: 4.4kg

No 1MR Schwegler Avianex (for House sparrow)



Height: 27cm  
Width: 19cm  
Depth: 23cm  
Entrance hole: 32mm

## APPENDIX 7: References and Bibliography

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