
Preliminary Ecological Appraisal

Battisford Hall, Battisford

for

Trustees of TA Harwood

10 October 2016



Client

Trustees of TA Harwood

Battisford Hall, Battisford**Preliminary Ecological Appraisal**

Planning authority

Mid Suffolk District
Council
131 High Street
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<i>The information, data, advice and opinions provided in this report which I have provided is true and has been prepared in accordance with the Chartered Institute of Ecology and Environmental Management's Code of Professional Conduct. I confirm that the opinions expressed are my true and professional bona fide opinions.</i>		
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Summary

- This report considers the ecological aspects relating to a proposed development at Battisford Hall, Battisford, Stowmarket, Suffolk, IP14 2HG. An ecological survey and protected species assessment has been carried out.
- The proposed works involve the conversion of the existing cart lodge and barns on site to residential use and the demolition of some buildings.
- The survey and assessment were completed by independent qualified and experienced ecologists with Natural England survey licences for the relevant protected species.
- The findings of the assessment are that the vegetation habitats on the site are of low to moderate ecological value but some of the barns are of high ecological value to bats. Mitigation measures to avoid potential harm to animals are outlined below. Biodiversity enhancements recommended for bats and birds are also included below. If these are undertaken, it would provide a net gain for biodiversity, as encouraged by the National Planning Policy Framework.

Protected habitats/species	Status	Potential effect	Recommended mitigation and enhancements
Protected sites	Two Sites of Special Scientific Interest and seven County Wildlife Sites within 2km.	No effects owing to relatively small scale of development. No indirect impacts on protected sites.	None required.
Protected habitats	Priority Habitat Inventory (Deciduous Woodland) located in northwest corner of site.	No impacts predicted. Proposed plans retain deciduous woodland.	<i>Enhancement</i> Tree and shrub planting within the gardens of the dwellings.
Bats	High bat roosting potential on site. Evidence of a probable <i>Myotis sp.</i> maternity roost and occasional non-breeding roosts of barbastelle, pipistrelle and brown long-eared bats. Moderate value foraging and commuting habitat adjacent to site.	Potential loss of roosting locations within the mill, grain store and open barn. Potential disturbance/harm to bats during active season for construction and maintenance. Potential for light disturbance effects on foraging and commuting bats.	<i>Mitigation</i> Further activity surveys are required on the mill, grain store and open barn to determine the species present, the nature of their use of the buildings, and recommended mitigation. A European Protected Species Mitigation License will probably be required for the proposed development works. We consider that this should be granted as the development is able to accommodate mitigation such as a bat loft or new crevice roosting opportunities.
Water voles, otters, white-clawed crayfish	No suitable habitat on site, but water vole records within 2km.	No impacts predicted.	None required.

Protected habitats/species	Status	Potential effect	Recommended mitigation and enhancements
Great crested newts	Terrestrial habitat on site is of moderate quality. Aquatic habitat near site is suitable. No GCN records within 2km.	No direct impacts on aquatic habitat but potential loss of terrestrial habitat. Harm to animals if present during groundworks.	<i>Mitigation</i> Further surveys are required to determine GCN presence/likely absence and recommended mitigation. If GCN are found, a European Protected Species Mitigation License might be required.
Breeding birds	Barn owl pellets present. Several other bird nests present.	Loss of barn owl roosting and other bird nesting habitat predicted. Potential disturbance during nesting period for construction and maintenance.	<i>Mitigation</i> Works to the buildings to be conducted outside bird nesting season or precautionary check one week in advance of works commencing. Installation of one barn owl nest box to be incorporated into the scheme. <i>Enhancement</i> Installation of four woodcrete small bird boxes, two swallow nests and one further barn owl nest box. Recommended tree and shrub planting will provide additional nesting habitat.
Badgers	No badger setts or signs found on or near the site. Badger records within 2km.	No impacts predicted.	None required.
Reptiles	Suitable habitat present on site within semi-improved grassland, scrub, rank vegetation and hedgerow margins Grass snake and adder records within 2km.	Harm to animals if present on site during groundworks. Loss of reptile habitat.	<i>Mitigation</i> Further reptile surveys are required to determine the population classes of reptile species present, and to determine an appropriate mitigation plan, which would include trapping and translocation of animals to a suitable receptor area. Creation of two amphibian and reptile hibernaculum on site or in close vicinity.
Other animals	N/A	N/A	<i>Mitigation</i> Any excavations on the construction site should be covered during the night to prevent animals from falling in. Lighting of the construction site at night should be minimised as far as practicable, to reduce the risk of possible disruption to nocturnal animals such as bats. Construction materials should be stored off the ground on pallets, to prevent providing shelter for animals and subsequent harm when materials are moved.

1. INTRODUCTION

- 1.1. Greenlight Environmental Consultancy Ltd has been commissioned to carry out an ecological survey and protected species assessment of a proposed site for development at Battisford Hall, Battisford, Stowmarket, Suffolk, IP14 2HG. The site is located at grid reference TM 05638 54597
- 1.2. This report provides an ecological appraisal of the site within the context of the surrounding area. It outlines the habitat features on the site, the likelihood of protected species being present and any potential effects of the proposed development on protected species.

2. METHODOLOGY

- 2.1. A desktop review of published data, such as records of protected sites and species, OS maps and satellite images has been carried out.
- 2.2. A field survey visit was carried out on 29th September 2016 to confirm the findings of the desktop review and to record habitats and species located on site. Survey conditions were good, with temperature at 18° Celsius, light wind, sunny and dry conditions. The survey was carried out by Etienne Swarts, ACIEEM and Nathan Duszynski.
- 2.3. There were no significant constraints to the survey in terms of seasonality for the relevant protected species, although the survey was carried out outside the maternity roosting season for bats. An assessment of the suitability of the site for roosting bats was made.
- 2.4. Equipment available for use during the survey were a digital camera, endoscope, ladders and binoculars.

Bats

- 2.5. An assessment of the habitats on and surrounding the site for bat interest was made, in accordance with latest bat survey guidelines (Collins, 2016).
- 2.6. Buildings were assessed for their potential to support roosting bats and involved a thorough internal and external search of all suitable cavities, holes and crevices. All suitable areas, including objects, ledges and floors were inspected for the following signs:
 - Bat droppings
 - Stains around roosting places and entrance points
 - Urine marks
 - Prey remains
 - Areas devoid of cobwebs
 - Live or dead bats

- Suitable cracks and crevices for bats to enter

2.7. An evaluation system was applied to the buildings using the following criteria.

- **Low probability of bat interest.** Buildings in this category fall in to two main types: Generally well maintained without cracks and crevices, no gaps between bargeboard or soffit and wall or without an attic space. Or those which contain some or all of the above features, but are both draughty and thick in cobwebs or contain strong odours such as solvents, diesel etc. It must be borne in mind that a building from this latter group can become suitable for bats following refurbishment. This often happens to houses once the attic space has been cleaned and under-felted prior to timber treatment. No licence is required for development to a building classified as Low probability of bat interest.
- **Medium probability of bat interest.** The buildings here contain many sites suitable for roosting bats although no obvious signs are recorded during the survey. In exposed conditions on large buildings the signs of bat usage such as droppings and urine marks can be obliterated by heavy rain. Occasionally a light scattering of droppings will be recorded in an attic or a semi derelict building, which is considered by the surveyor unsuitable for use as a bat roost. The medium probability of bat interest category can be used based on the surveyor's experience. Whilst no licence is generally required for development to a building classified as *Medium probability* of bat interest, and if no evidence of a bat roost is found, it is often best practice to conduct sensitive roof stripping or architectural salvaging to minimise any possible disturbance.
- **High probability of bat interest.** This group includes buildings with known roosts or signs of bat occupancy such as droppings and staining at a roost entrance. The description of high probability buildings will also contain an indication as to the time of the year when it will be occupied by bats i.e. summer – nursery roost, winter – hibernation. In some cases, sites with High probability of bat interest will require further survey and licensing.

2.8. Trees on and around the site were assessed for their suitability to support roosting bats. The assessment involved a ground level inspection of the exterior of the trees to search for features offering roosting potential to bats such as split limbs, woodpecker holes, cavities, lifted bark and dense thick-stemmed ivy.

Great crested newts

- 2.9. Water features on and near the site were assessed for suitability for occupation by great crested newts (“GCN”). The HSI (Appendix F) is a theoretical index of a waterbody’s suitability to support a breeding population of GCN and is calculated from a series of ten variables recorded on site, as detailed in Table 1.

Indices	Name	Description
SI1	Geographic Location	Lowland England or upland England, Scotland and Wales
SI2	Pond area	To the nearest 50m ²
SI3	Permanence	Number of years’ pond dry out of ten
SI4	Water quality	Measured by invertebrate diversity
SI5	Shade	Percentage shading of pond edge at least 1m from shore
SI6	Fowl	Level of waterfowl use
SI7	Fish	Level of fish population
SI8	Pond count	Number of ponds within 1km divided by 3.14
SI9	Terrestrial habitat	Quality of surrounding terrestrial habitat
SI10	Macrophytes	Percentage extent of macrophyte cover on pond surface

Table 1, HSI indices.

The HSI score is the geometric mean of the ten suitability indices calculated:

$$HSI = (SI1 \times SI2 \times SI3 \times SI4 \times SI5 \times SI6 \times SI7 \times SI8 \times SI9 \times SI10)^{1/10}$$

Once calculated, the HSI score for a waterbody can be categorised as follows:

Excellent (>0.8)

Good (0.7 – 0.79)

Average (0.6 – 0.69)

Below Average (0.5 – 0.59)

Water voles, otters and white-clawed crayfish

- 2.10. Any water features on the adjacent the site were assessed for use by water vole *Arvicola amphibius*, otter *Lutra lutra* and white-clawed crayfish *Austropotamobius pallipes*.
- 2.11. Otters in England typically use areas of fresh water and streams and ditches for moving between habitats. Otter holts are usually located underneath tree roots, in tunnels. Field signs of presence include spraints on prominent features such as bridges, tree bases or boulders, and footprints.
- 2.12. Water voles inhabit burrows in the banks of ponds, ditches, streams and rivers. Field signs include droppings left in latrine spots, burrow entrances or feeding remains.

- 2.13. White-clawed crayfish inhabit streams and rivers with a moderate flow rate, and lakes. Clear, well-oxygenated water is preferred. Typical habitat features include crevices in rocks, gaps between stones, submerged plants and tree roots.

Birds

- 2.14. We assessed the site and its surrounding habitat for its potential to support breeding birds. Bird nesting habitat could include grassland, hedgerows, scrub, trees and buildings.
- 2.15. Bird species noted during the site visit were recorded.
- 2.16. Mature trees were assessed for their potential to support barn owls *Tyto alba*.

Badgers

- 2.17. An inspection of all habitats with the potential to support badger *Meles meles* sett construction and foraging activities on the application site was undertaken. Any incidental observations of badger signs were also recorded.
- 2.18. The survey comprised searching for evidence of badger activity in the form of setts, faeces, pathways, snuffle holes, hair and footprints.

Reptiles

- 2.19. The habitats on the site and within the proposed area of works were assessed for suitability for reptiles.
- 2.20. Reptiles rely on conditions that allow them to maintain their body temperature through basking. They require access to direct sunlight, shelter from the elements, sufficiently large populations of prey species and hibernation sites.
- 2.21. Reptiles typically favour a habitat mosaic with a diverse vegetation structure, which could include grassland, scrub and woodland.

Other protected species

- 2.22. Particular regard was made to the nature of the proposed development and the potential of impact upon any other protected species from the development work, should it be present.

3. LEGISLATION AND POLICY

Legislation for protected sites and species (see Appendix C for detail by species)

- 3.1 The **Ramsar Convention (1971)** on Wetlands of International Importance especially as Waterfowl Habitat seeks to promote the conservation and wise use of wetlands, particularly those which support internationally significant numbers of water birds. This is achieved through the designation of Ramsar Sites.
- 3.2 The **European Community Council Directive on the Conservation of Wild Birds (79/409/EEC)** sets out general rules for the conservation of all naturally occurring wild birds, their nests, eggs and habitats. It requires member states to designate Special Protection Areas (SPAs) for protection of certain species.
- 3.3 The main piece of legislation relating to nature conservation in Great Britain is the **Wildlife and Countryside Act 1981 (as amended)**. This Act is supplemented by provision in the **Countryside and Rights of Way (CRoW) Act 2000** and the **Natural Environment and Rural Communities Act 2006** (in England and Wales). This act provides varying degrees of protection for the listed species of flora and fauna, including comprehensive protection of wild birds and their nests and eggs.
- 3.4 The **Countryside and Rights of Way Act 2000** strengthens the protection given to SSSIs. It revises the procedures for the notification of SSSIs and for the consenting of operations which may damage the special interest of a SSSI. Local authorities have a duty to take steps, consistent with the proper exercise of their functions, to further the conservation and enhancement of SSSIs. The act also strengthens the existing provisions of the Wildlife and Countryside Act 1981 for the enforcement of wildlife legislation, including a new offence of "recklessly" destroying or damaging the habitats of certain protected species.
- 3.5 UK wildlife is also protected under the **Conservation (Natural Habitats &c.) Regulations 1994** (which were issued under the European Communities Act 1972), through inclusion on Schedule 2. In 2010, these Regulations, together with subsequent amendments, were consolidated into the **Conservation of Habitats and Species Regulations 2010**.
- 3.6 The Regulations provide for the designation and protection of 'European sites', the protection of 'European protected species', and the adaptation of planning and other controls for the protection of European Sites. The Regulations make it an offence (subject to exceptions) to deliberately capture, kill, disturb, or trade in the animals listed in Schedule 2, or pick, collect, cut, uproot, destroy, or trade in the plants listed in Schedule 4. However, these actions can be made lawful through the granting of licenses by the appropriate authorities. Licenses may be granted for a number of purposes but only after the appropriate authority is satisfied that

there are no satisfactory alternatives and that such actions will have no detrimental effect on wild population of the species concerned.

- 3.7 The **Protection of Badgers Act 1992** consolidates previous badger legislation by providing comprehensive protection for badgers and their setts, with a requirement that any authorised sett disturbance or destruction be carried out under licence.
- 3.8 The **Hedgerows Regulations 1997** aim to protect important hedgerows in the countryside. They make it illegal to remove most countryside hedges without first notifying the local planning authority, and provide protection for 'important hedgerows'.
- 3.9 **County Wildlife Site or Local Wildlife Site** is a non-statutory designation used to identify high quality wildlife habitats in a county context. Local Authorities have a responsibility as part of their planning function to take account of sites of substantial nature conservation value and to consider them alongside other material planning considerations. The location of County Wildlife Sites will be included in Local Plans and Development Documents.

National Planning Policy - National Planning Framework (NPPF)

- 3.10 Section 9 of the National Planning Policy Framework 2012 (NPPF): Biodiversity and geological conservation states that *'the planning system should contribute to and enhance the natural and local environment by minimising impacts on biodiversity and providing net gains in biodiversity where possible.'*

Office of The Deputy Prime Minister ("ODPM") Government Circular: Biodiversity and Geological Conservation – Statutory Obligations and their impact within the planning system.

- 3.11 Paragraph 98 of Circular 06/2005 states that *'the presence of a protected species is a material consideration when a planning authority is considering a development proposal that, if carried out, would be likely to result in harm to the species or its habitat'.*

Implications of legislation and policies

- 3.12 Without this ecological assessment the potential developer would be unable to demonstrate due diligence in his responsibilities. Furthermore, the local planning authority would not have been provided with sufficient information for a planning decision to be made. This could result in non-determination or refusal of the application.
- 3.13 With legal responsibilities and planning implications, it is essential that any ecological assessment of a potential development site, including the area of this report, must determine the possible presence or absence of any protected species as part of any planning

development consideration.

4 SITE CONTEXT

Location

- 4.1 The general location of the site is shown in Figure 1 below.
- 4.2 The site is located in a rural landscape within a partly derelict farm complex, within the village of Battisford. The closest town is Needham Market, located approximately 3km to the east.
- 4.3 The surrounding landscape is sparsely populated by individual farmsteads and dwellings. The site is bounded by arable fields to the north and east, residential dwellings and gardens to the south and a deciduous woodland to the west. The wider surroundings are predominantly comprised of extensive arable fields lined with mature trees and hedgerows.



Photo 1, access road leading to Battisford Hall.



Figure 1

Satellite image of site surroundings, site outlined in red.

Image © Microsoft, date accessed 07.10.16

5 DESCRIPTION OF THE DEVELOPMENT

- 5.1 The proposed project involves the conversion of the existing cart lodge and barns on site to residential use and the demolition of the pig shed and other buildings.
- 5.2 The access route for construction and occupation of the site will be gained from Church Road to the south of the site, via the existing track. A site layout plan is attached at Appendix I.

6 DESKTOP REVIEW

Protected sites

- 6.1 A data search was supplied by Suffolk Biodiversity Information Service. Please refer to Appendix A for protected site locations.

Statutory protected sites

- 6.2 There are two Sites of Special Scientific Interest (“SSSI”) within 2km of the site, refer to Appendix B for the full citations.

Hascot Hill Pit, located approximately 0.9km southeast

“This site is of geological interest as it is the only site known to expose a beach facies of the Red Crag, comprising beach cobbles and a littoral fauna. The site provides an important sedimentological and faunal contrast with other Red Crag exposures, which show deeper water facies.”

Combs Wood, located approximately 1.9km north

“An ancient woodland with a well developed coppice with standards structure, on boulder clay overlain with variable amounts of sand and loess. The consequent range of soil types has led to the development of a variety of woodland types.”

Non-statutory protected sites

- 6.3 There are seven County Wildlife Site (“CWS”) within 2km, refer to Appendix B for the full citations.

Upper Badley Wood, located approximately 0.5km north

“This small ancient woodland is situated to the south west of Badley Green Farm. A ditch, woodbank and hedge possibly medieval in origin enclose the entire wood.”

St John’s Grove, located approximately 0.6km northwest

“This small wood is listed in the Suffolk Ancient Woodland Inventory compiled by English Nature. A significant feature of the wood is a ditch and woodbank, probably medieval in origin, which encloses it on all sides.”

Roadside Nature Reserve 48, located approximately 0.9km southeast

“Boulder clay flora. This site is also a Roadside Nature Reserve.”

Great Newton Wood, located approximately 1.2km east

“Great Newton Wood lies to the west of Needham Market and is situated close to another small ancient woodland, namely Little Newton Wood. A public footpath runs along the southern boundaries of both woods.”

Little Newton Wood, located approximately 1.5km east

“This small woodland is one of several woodlands listed in English Nature's Inventory of Ancient Woodlands, situated to the west and south of Needham Market. Little Newton Wood, together with Great Newton Wood situated close by, are important both as refuges for wildlife and as features in an intensively-farmed landscape.”

Muckinger Wood, located approximately 1.6km south

“A large ancient woodland situated close to the Barking Woods, a number of which have been scheduled as Sites of Special Scientific Interest. The sinuous outline of Muckinger Wood is a characteristic feature of medieval woods. An internal and external ditch and bank system is another indication of the wood's antiquity.”

Keyfield Groves, located approximately 1.7km northeast

“Keyfield Groves is listed in English Nature's Ancient Woodland Inventory. This small woodland is divided into two sections by a wide, shrubby track, known as the Badley Walk. This footpath is well-used by local people from Stowmarket and Needham Market.”

Protected habitats

- 6.4 There is a small block of Priority Habitat Inventory (Deciduous Woodland) in the northwest corner of the site and NERC Act 2006 Section 41 Habitat of Principal Importance: Hedgerow, on the site boundary.
- 6.5 Priority Habitat Inventory habitats within 2km are Good Quality Semi-Improved Grassland, Traditional Orchards and Woodpasture and Parkland BAP Priority Habitat.

Protected species

- 6.6 The protected species recorded within 2km include 24 flowering plant species, 28 insect species, 58 bird species, grass snakes *Natrix natrix*, adders *Vipera berus*, water voles *Arvicola amphibius*, badgers *Meles meles*, hedgehogs *Erinaceus europaeus*, brown hares *Lepus europaeus*, harvest mice *Micromys minutus* and at least one bat species.

6.7 Records of note within 2km and relevant to the proposed development works include:

- 12 records of barn owls between 1996 and 2014, with the closest located approximately 0.6km northwest of the site.
- There has been one record of a grass snake and one record of an adder from 1999 and 2002 respectively, with the closest record located approximately 0.7km southeast.
- One record of a water vole from 2001, located within 2km of the site.
- One record of a brown long-eared *Plecotus auritus* roost from 2004, located approximately 1.2km southwest.

7 FIELD STUDY

Habitats

- 7.1 The site is located within a partly derelict farm complex and is enclosed by arable fields to the north and east, residential dwellings and gardens to the south and a deciduous woodland to the west. The site vegetation is largely unmanaged, and scrub has encroached into most areas. Access to the site will be gained from Church Road to the south of the site, via the existing track.

Broadleaved woodland (phase 1 habitat classification A1)

- 7.2 A small block of Priority Habitat Inventory Deciduous Woodland is located in the northwest corner of the site and dominated by English Oak *Quercus robur* and Horse Chestnut *Aesculus hippocastanum*.

Scrub (phase 1 habitat classification A2)

- 7.3 A large proportion of the site is comprised of scrub, dominated by bramble *Rubus fruticosus* and common nettle *Urtica dioica*. Other species include creeping thistle *Cirsium arvense*, greater willowherb *Epilobium hirsutum* and Yorkshire fog *Holcus lanatus*.

Semi-improved grassland (phase 1 habitat classification B6)

- 7.4 Small areas of semi-improved grassland, dominated by Yorkshire fog, cock's-foot *Dactylis glomerata* and creeping bent *Agrostis stolonifera*, are situated around buildings and areas of hardstanding. This habitat is being encroached by neighbouring scrub.

Hedgerows with trees (phase 1 habitat classification J2.3)

- 7.5 Two mature, intact, species-poor hedgerows with trees are located along the northern and eastern boundaries. The hedgerows are approximately 2.5m high and 2.0m wide, and dominated by hawthorn *Crataegus monogyna*, with scattered goat willow *Salix caprea*.

Rank vegetation (phase 1 habitat classification J5)

- 7.6 A large proportion of the site is comprised of rank vegetation. Species include Yorkshire fog, creeping bent, ribwort plantain *Plantago lanceolata*, hoary plantain *Plantago media*, hogweed *Heracleum sphondylium*, creeping buttercup *Ranunculus repens* and silverweed cinquefoil *Argentina anserina*. This habitat is being encroached by neighbouring scrub. A full list of plant species recorded on site is attached at Appendix C.



Figure 2

Phase 1 map.

Image © Microsoft, date accessed 07.10.16



Photo 2, view of scrub in the centre of the site, looking north.



Photo 3, view of scrub and rank vegetation in the east section of the site, looking northeast.



Photo 4, view of species-poor hedgerow with trees along the eastern boundary, looking east.

Bats

Physical inspection

- 7.7 There are several buildings on site, split into the following groups – i) the mill, ii) the grain store, iii) the open barn, iv) the cart lodge, v) the pig shed, vi) western outbuildings and vii) eastern outbuildings (Figure 3). The buildings are in a derelict to fair state of repair, and are used for storage of materials.
- i. The mill is of brick construction, with areas of weatherboarding, timber stud work and polythene sheeting. The roof is comprised of clay pantiles, lined with a mixture of hessian and lath and plaster, with several chipboard roof repairs. An open lean-to pole barn is present on the western aspect, featuring timber supports and corrugated metal sheeting.
 - ii. The grain store features a timber frame situated on a brick/cobbled plinth, with weatherboarding and brick/cobbled walls. The roof is comprised of asbestos lined with sarking on the northern two-thirds, and clay pantiles lined with lath and plaster on the southern third. The eastern extension is of mixed construction, featuring breezeblock, weatherboarding and brick/cobbled walls. The roof is comprised of clay pantiles on batons and corrugated metal on half of the southern aspect.
 - iii. The open barn features a historic timber frame situated on a brick plinth, with weatherboard cladding. The timber frame includes substantial beams measuring up to

30cm x 30cm in thickness. The apex roof was comprised of unlined asbestos and clay pantiles lined with hessian and lath and plaster. Internally, the weatherboard cladding has been rendered with a limewash solution. The eastern extension is of brick construction, with clay pantiles and lined with bitumen felt in areas.

- iv. The cart lodge is of mixed construction. The majority of the building features a timber frame, roofed with clay pantiles and corrugated metal on the western and eastern aspects respectively. A garage is present in the northern third of the building and is of brick construction, clad with weatherboarding and roofed with clay pantiles.
- v. The pig shed is of mixed construction. The northern section features a breezeblock plinth, with wooden and metal vertical cladding, roofed with clay pantiles and lined with hessian. A brick entrance is present on the western aspect. The southern section is of pole barn design, with timber supports, wooden vertical cladding and roofed with corrugated metal.
- vi. The western outbuildings are a timber frame construction, with weatherboard cladding and an open fronted eastern aspect. They are roofed with corrugated metal and unlined.
- vii. The eastern outbuildings are of mixed construction, featuring breezeblock, weatherboarding and brick/cobbled walls. They are roofed with clay pantiles and are unlined. The northern roof aspects were partially collapsed.



Roosting potential

- 7.8 The mill has several roosting opportunities under slipped, missing and/or raised tiles, along the ridge beams in the open voids and within gaps in the brickwork/mortar leading to various cavities. Internally, the voids are heavily cobwebbed in areas and have a significant amount of daylight present from the partially collapsing roof. A small number of scattered moth/butterfly wings and droppings, consistent in size, structure and appearance with brown long-eared *Plecotus auritus* bats were found on the first floor.
- 7.9 The grain store has numerous roosting opportunities under slipped, missing and/or raised tiles, along the ridge beams in the open voids, within crevices in the tie-beam and mortise and tenon joints and under sarking. Internally, the voids are heavily cobwebbed in areas and have a significant amount of daylight present from the open doorways and gaps in the weatherboarding. A number of scattered droppings, consistent in size, structure and appearance with pipistrelles *Pipistrellus sp.* and brown long-eared bats were found on the gantry, on the southern third of the building and underneath an area of timber sarking
- 7.10 The open barn has numerous roosting opportunities under slipped, missing and/or raised tiles and within crevices in the mortise joints at brace members. Internally, a significant amount of daylight is present from the open doorway on the southern aspect. A single barbastelle *Barbastella barbastellus* was observed roosting behind a support pillar in the northern section of the barn (photo 16). Evidence of staining and a large collection of droppings, consistent in size, structure and appearance with *Myotis sp.* bats were found below a brace mortise joint and other beam cavities (photos 14 and 15).
- 7.11 The cart lodge, pig shed, western and eastern outbuildings were considered suboptimal for roosting bats due to the significant amount of daylight, open and draughty environment, and limited roosting opportunities.

Foraging and commuting links

- 7.12 The landscape immediately adjacent to the site is considered of moderate value for foraging and commuting bats, with hedgerows/treelines providing commuting links to blocks of woodland in the local vicinity.
- 7.13 The site itself provides some foraging habitat for bats over the scrub, rank vegetation and amongst the deciduous woodland in the northwest corner of the site. However, bats would predominantly use the adjacent hedgerows, woodland and ponds for foraging.
- 7.14 The trees around the site boundary were assessed for bat roosting potential and were considered unsuitable due to their age and lack of features.



Photo 5, view of the mill, looking northeast.



Photo 6, internal view of the mill, looking south.



Photo 7, view of the pig shed, looking northwest.



Photo 8, internal view of the pigshed, looking northwest.



Photo 9, view of the grain store and eastern extension, looking northwest.



Photo 10, internal view of the grain store eastern extension, looking east.



Photo 11, internal view of the grain store, showing barn owl pellets/straining and scattered bat droppings.



Photo 12, internal view of the grain store, looking north.



Photo 13, view of the open barn, looking northwest.



Photo 14, internal view of the open barn, looking north. Main *Myotis sp.* roost location highlighted by red box.



Photo 15, internal view of the open barn, showing collection of bat droppings.



Photo 16, internal view of the open barn, showing roosting barbastelle, highlighted by the red box.



Photo 17, view of the cart lodge, looking northeast.



Photo 18, internal view of the cart lodge, looking east.

Great crested newts, water voles, otters, white-clawed crayfish

- 7.15 There are no ponds within the survey site, but five ponds within 250m, which for the size of the development and nature of terrestrial habitat on the site, is a sufficient distance to consider for assessment (Figure 2). GCN are most likely to occupy good quality terrestrial habitat within 250m of a breeding pond (English Nature, 2001).
- 7.16 Ponds one and two scored good to excellent suitability for GCN. Pond three was not assessed in detail, as the pond could not be accessed directly. Pond four did not appear to exist, having been filled in or dry for a prolonged period of time. Pond five was dry at the time of the survey and was considered unsuitable for GCN; drying annually, being heavily shaded and surrounded by a regularly managed lawn.

SI No.	Pond 1	
	SI score	Comment
1	1.00	Within UK Zone A
2	1.00	560m ² surface area
3	0.90	Never dries
4	0.67	Moderate invertebrate diversity
5	1.00	40% shoreline shade
6	0.67	Minor wildfowl impacts (small number of mallard ducks present)
7	1.00	Fish absent
8	1.00	15+ ponds within 1km which aren't separated by ecological barriers
9	0.67	Moderate quality, rough grassland and scrub present
10	0.30	1% macrophyte cover
Mean	0.78	Good suitability for GCN

Table 2, HSI score for pond one.

SI No.	Pond 2	
	SI score	Comment
1	1.00	Within UK Zone A
2	0.40	200m ² surface area
3	0.90	Never dries
4	0.67	Moderate invertebrate diversity
5	1.00	50% shoreline shade
6	1.00	Wildfowl absent
7	1.00	Fish absent
8	1.00	15+ ponds within 1km which aren't separated by ecological barriers
9	0.67	Moderate quality, rough grassland and scrub present
10	0.80	50% macrophyte cover
Mean	0.81	Excellent suitability for GCN

Table 3, HSI score for pond two.

- 7.17 The site and area in close vicinity to the ponds contain some moderate quality terrestrial and hibernation habitats for GCN. This includes areas of scrub, rank vegetation and rubble piles located within the site and on its boundaries.
- 7.18 Although the data search revealed a water vole record within 2km of the site, no suitable habitat is present on or near the site. Ponds one and two were inspected for signs of use by water voles and although no signs were found, the banks could provide potential habitat.

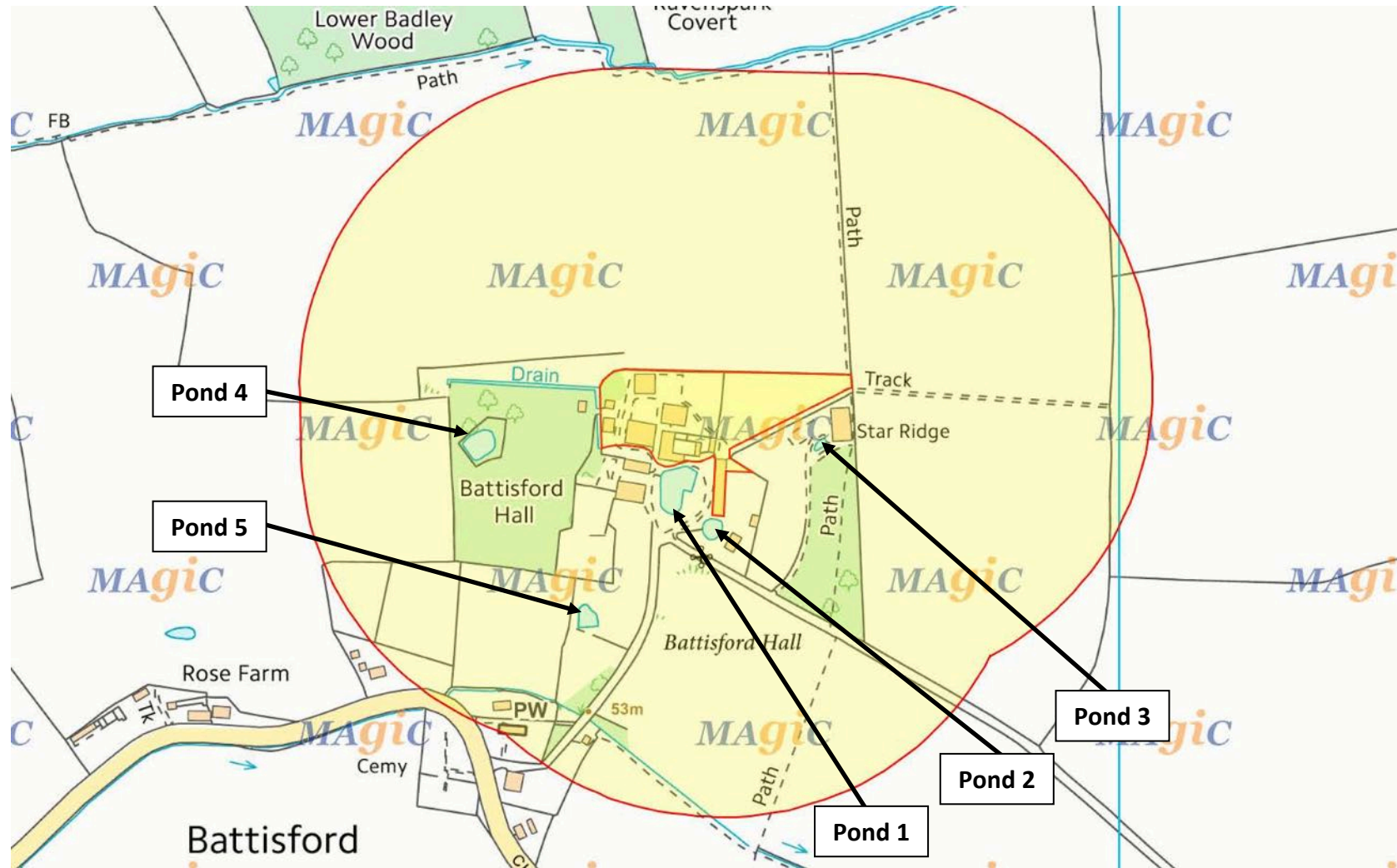


Figure 2

Ponds within 250m of the proposed site.

Image © MAGIC, date accessed 07.10.16



Photo 19, view of pond one, looking north.



Photo 20, view of pond two, looking southeast.



Photo 21, view of pond four, looking west.



Photo 22, view of pond five, looking east.

Birds

- 7.19 Birds in the UK are classified into three categories of conservation importance - red, amber and green. Factors such as global threat level, population decline, breeding population decline, and contraction of breeding range are taken into account to determine classification.
- 7.20 The nesting habitat on site was considered suitable for Amber listed species dunnock *Prunella modularis*, with no Red listed species recorded during the site visit. The following bird species were observed during the site visit:

Amber listed:

Mallard	<i>Anas platyrhynchos</i>
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Green listed:

Barn owl	<i>Tyto alba</i>
Blackbird	<i>Turdus merula</i>
Blue tit	<i>Cyanistes caeruleus</i>
Green woodpecker	<i>Picus viridis</i>
Jackdaw	<i>Corvus monedula</i>
Robin	<i>Erithacus rubecula</i>
Swallow	<i>Hirundo rustica</i>
Woodpigeon	<i>Columba palumbus</i>

- 7.21 Jackdaw and swallow nests were present within the mill.
- 7.22 The site was considered suitable as a daytime roost for barn owls, with pellets present throughout the grain store and open barn. No evidence of breeding barn owls was present.

Badgers

- 7.23 No badger setts or signs were recorded on site or within the immediate vicinity, and no records were present within the data search.

Reptiles

- 7.24 The site provides good quality habitats for reptiles, with semi-improved grassland, scrub, rank vegetation and hedgerow margins. Furthermore, the site offers potential hibernacula within rubble piles and deciduous woodland.
- 7.25 The desktop study revealed one record of a grass snake and one record of an adder, with the closest record located approximately 0.7km southeast of the site.

8 DISCUSSION AND CONCLUSIONS

Protected sites

- 8.1 Within 2km is located two SSSI and seven CWS.
- 8.2 The proposed development will have no effect on statutory and non-statutory protected sites, owing to its relatively small scale, distance to protected sites, and limited impacts beyond the area of works.

Habitats

- 8.3 The vegetation habitats on the site are of **low** to **moderate** ecological value, being predominantly scrub and rank vegetation. A small block of Priority Habitat Inventory (Deciduous Woodland) is located in the northwest corner of the site, although proposed plans will not affect this habitat.
- 8.4 The development offers opportunities to enhance habitats, for example tree and shrub planting within the gardens of the converted barns. Refer to Appendix G for suggested native species.

Bats

- 8.5 The mill is assessed as of **moderate** probability of interest to bats, with several roosting opportunities. Evidence of a brown long-eared bat feeding perch is present on the first floor. Although the mill is considered generally unsuitable as a maternity roost, non-breeding bats may roost here on occasion.
- 8.6 The grain store is assessed as of **high** probability of interest to bats, with numerous roosting opportunities. Evidence of an occasional pipistrelle and brown long-eared roost was present, probably from a small number of non-breeding individuals.
- 8.7 The open barn is assessed as of **high** probability of interest to bats, with numerous roosting opportunities. Evidence of a probable *Myotis sp.* maternity roost was present, based on the number of droppings and in a number of locations. A single barbastelle bat was observed roosting within the northern section of the barn. Barbastelles are a highly mobile species that switch roosts frequently (Russo *et al.*, 2005). We considered that the open barn is used as an occasional barbastelle non-breeding roost.
- 8.8 The proposed conversion of the above buildings is likely to materially modify or destroy potential bat roosting locations.
- 8.9 To determine the species present, roosting locations, access points and the nature of their use of the buildings, three bat activity surveys should be conducted on the mill, grain store and open barn between May and September (two dusk emergences and one dawn return-to-roost survey). At least two surveys should be conducted between May and August to assess the site for potential

presence of a maternity roost. A European Protected Species Mitigation Licence will probably be required to allow the development to proceed.

8.10 The outcomes of further activity surveys will inform the detailed recommended mitigation for bats. We consider that the conversion of the buildings will be able to accommodate this in the form of a potential bat loft and/or alternative crevice roosting opportunities, as required.

8.11 The cart lodge, pig shed, western and eastern outbuildings are assessed as of **low** probability of interest to bats, with limited roosting opportunities. The proposed conversion of the buildings is not considered to materially modify or destroy potential bat roosting locations.

8.12 The following mitigation is recommended to avoid impacts on bats from the proposed works:

- Works should be undertaken outside the main bat maternity season, ideally during October to March.
- Workers to be given a toolbox talk prior to works commencing detailing bat signs, potential roosts/access points, what to do if bats are found and to avoid activities that might cause high vibrations or noise.
- All works which include the removal or the demolition of certain parts of the buildings, such as stripping the roof or affecting potential roosting locations in the walls should be undertaken with special care and under watching brief of a licenced bat worker.
- If any bats are found, work should cease immediately and any bats removed to safety. The licenced bat worker will then advice appropriate mitigation.
- For buildings with bat roosts, the roofs are to be lined with traditional bituminous felt, and not a breathable membrane; these are proven to entangle bats through regular contact, which also compromises the integrity of the membrane.
- Alternative roosting locations are to be provided, depending on the outcome of the activity surveys. This would probably include a bat loft and other crevice roosting opportunities such as bat boxes (Appendix E).
- A low light level regime around the development should be installed, without the use of high powered security lighting, to minimise impacts on bats that may forage and commute in the vicinity and other nocturnal animals.

Great crested newts, water voles, otters, white-clawed crayfish

8.13 No suitable habitat for water voles, otters or white-clawed crayfish is present on or near the site and no mitigation is required.

- 8.14 The site contains moderate quality terrestrial and hibernation habitats for GCN, with areas of scrub, rank vegetation and rubble piles. Aquatic habitats near the site were considered suitable for GCN, with ponds one and two having a HSI score of good and excellent respectively.
- 8.15 GCN are most likely to use suitable terrestrial habitat within only 250m of a breeding pond (English Nature, 2001). Further GCN surveys are recommended to assess GCN presence/likely absence, their population size if present, and to decide on the most suitable mitigation measures. If GCN are found to be present and may be affected by proposed works, a European Protected Species Mitigation Licence may be required to allow the development to proceed. Mitigation measures may include the trapping of animals from the proposed areas of works, and their translocation to a suitable receptor area.
- 8.16 We recommended mitigation to include the retention and creation of suitable habitat(s) on site to accommodate GCN within the development. We recommended that two amphibian and reptile hibernaculum are created on site as a compensation measure for GCN (see Appendix H).

Birds

- 8.17 The buildings provide suitable nesting/roosting habitat for a variety of species including barn owls, jackdaws and swallows, with several pellets/nests being present.
- 8.18 Any works affecting bird nesting habitat such as works to the buildings, would need to be conducted outside the main nesting season, which lasts from March to August. If work is planned during the bird nesting season, then a precautionary check should be undertaken a week before the start of works, and all active bird nests protected until the young have fledged.
- 8.19 As mitigation for the loss of barn owl roosting habitat, the installation of one barn owl box should be incorporated within the scheme design (see Appendix E for examples).
- 8.20 As enhancements, we recommend the installation of four small bird nesting boxes, two swallow nests and one further barn owl box to be placed on buildings/trees, in the vicinity of the site (see Appendix E for examples).

Badgers

- 8.21 No badger setts or signs were present on site or within the vicinity, and we predict no impacts on badgers. No further surveys are considered necessary.

Reptiles

- 8.22 Due to the suitable reptile habitat on site and the presence of a grass snake and adder within the data search, there is a risk of harm to reptiles during the construction of the development. Further reptile surveys are recommended to assess the species present, their population sizes, and to decide on the most suitable mitigation measures. Mitigation measures may include the trapping of animals from the proposed areas of works and their translocation to a suitable receptor area.
- 8.23 We recommended mitigation to include the retention and creation of suitable habitat(s) on site to accommodate reptiles within the development. It is recommended that two amphibian and reptile hibernaculum are created on site as a compensation measure for reptiles (see Appendix H).

Other animals

- 8.24 General mitigation to protect wildlife during the construction period are as follows:
- Any excavations on the construction site should be covered during the night to prevent animals from falling in.
 - Lighting of the construction site at night should be minimised as far as practicable, to reduce the risk of possible disruption to nocturnal animals such as bats and badgers.
 - Construction materials should be stored off the ground on pallets, to prevent providing shelter for animals and subsequent harm when materials are moved.

Conclusion

- 8.25 In overall conclusion, no significant ecological constraints were identified that would adversely affect the overall development of the site, after the recommended further surveys and mitigation, which could be accommodated within the proposed development.
- 8.26 With some or all of the recommended mitigation and suggested enhancements incorporated into the layout, there may be an opportunity to enhance the value of the site for local wildlife, resulting in a net gain for biodiversity, as is encouraged by the National Planning Policy Framework.

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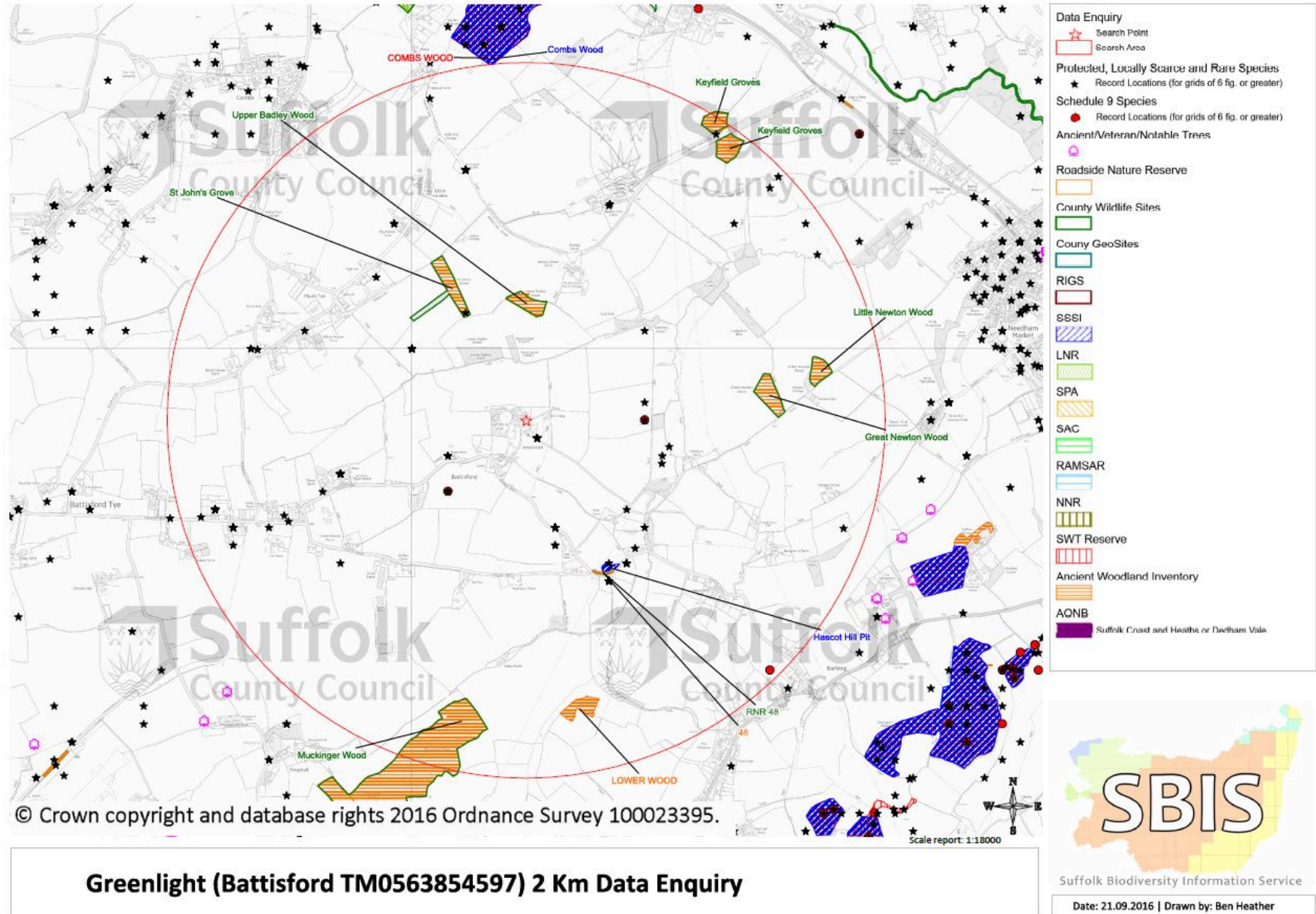
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Appendix A

Map of protected sites within 2km



Greenlight (Battisford TM0563854597) 2 Km Data Enquiry

Appendix B

Protected sites citations

Sites of Special Scientific Interest

COUNTY: SUFFOLK SITE NAME: HASCOT HILL PIT

DISTRICT: MID SUFFOLK

Status: Site of Special Scientific Interest (SSSI) notified under Section 28 of the Wildlife and Countryside Act 1981

Local Planning Authority: MID SUFFOLK DISTRICT COUNCIL

National Grid Reference: TM 061538 Area: 0.4 (ha.) 0.9 (ac.)

Ordnance Survey Sheet 1:50,000: 155 1:10,000: TM 05 SE

Date Notified (Under 1949 Act): 1955 Date of Last Revision: 1972

Date Notified (Under 1981 Act): 1987 Date of Last Revision: –

Other Information:

The site is managed by the Suffolk Trust for Nature Conservation.

Description and Reasons for Notification:

This site is of geological interest as it is the only site known to expose a beach facies of the Red Crag, comprising beach cobbles and a littoral fauna. The site provides an important sedimentological and faunal contrast with other Red Crag exposures, which show deeper water facies.

COUNTY: SUFFOLK

SITE NAME: COMBS WOOD

DISTRICT: MID SUFFOLK

Status: Site of Special Scientific Interest (SSSI) notified under Section 28 of the Wildlife and Countryside Act 1981.

Local Planning Authority: Mid Suffolk District Council

National Grid Reference: TM 055568

Area: 14.33 (ha.) 35.41 (ac.)

Ordnance Survey Sheet 1:50,000: 155

1:10,000: TM 05

Date Notified (Under 1949 Act): 1954

Date of Last Revision: 1972

Date Notified (Under 1981 Act): 1982

Date of Last Revision: 1987

Other Information:

This site is owned and managed by the Suffolk Trust for Nature Conservation.

Description and Reasons for Notification:

Situated just to the south of Stowmarket, Combs Wood is an ancient woodland with a well developed coppice with standards structure, on boulder clay overlain with variable amounts of sand and loess. The consequent range of soil types has led to the development of a variety of woodland types. Pedunculate oak-hornbeam woodland is predominant, with areas of typical ash-maple woodland, this grading into the heavy soil form of pedunculate oak-hazel-ash woodland where the soils are more acid.

The pedunculate oak-hornbeam woodland consists mainly of tall coppice of hornbeam *Carpinus betulus*, with some ash *Fraxinus excelsior* and field maple *Acer campestre* and scattered standards of pedunculate oak *Quercus robur*. The shrub layer is poorly developed, with occasional hazel *Corylus avellana*, midland hawthorn *Crataegus oxyacanthoides* and elder *Sambucus nigra*. The ground flora is sparse, and consists mainly of dog's mercury *Mercurialis perennis* and bramble *Rubus sp.*, with early dog violet *Viola reichenbachiana*. The ash-maple woodland is dominated by coppice of ash, with frequent hazel and occasional field maple. There are occasional standards of pedunculate oak. The shrub layer is well developed, and includes hawthorn *Crataegus monogyna*, midland hawthorn, spindle *Euonymus europaeus*, dogwood *Cornus sanguinea* and guelder rose *Viburnum opulus*. The ground flora beneath this woodland type is rich and varied, and has shown a good response to the recent reintroduction of a coppice rotation over the wood. Dog's mercury and tufted hair-grass *Deschampsia cespitosa* are locally abundant, with frequent wood anemone *Anemone nemorosa*, wood sedge *Carex sylvatica* and remote sedge *Carex remota*. Other species of interest include woodruff *Asperula odorata*, greater butterfly orchid *Platanthera chlorantha*, pale sedge *Carex pallescens*, grey sedge *C. divulsa* and oxlip *Primula elatior* which is at the northern limit of its range here.

There are a number of rides within the woodland which are wet in places, and support a flora including creeping bent *Agrostis stolonifera*, soft rush *Juncus effusus*, water mint *Mentha aquatica*, greater bird's-foot trefoil *Lotus uliginosus*, bugle *Ajuga reptans* and nettle-leaved bellflower *Campanula trachelium*. The unimproved grassland of these rides and a small pond provide valuable additional habitat for invertebrates.

County Wildlife Sites

CWS Number	Mid Suffolk 7
Site Name	UPPER BADLEY WOOD
Parish	BADLEY
District	Mid Suffolk
NGR	TM057553
Description	<p>This small woodland is situated to the south west of Badley Green Farm. It is listed in English Nature's Inventory of Ancient Woodland. A ditch, woodbank and hedge possibly medieval in origin enclose the entire wood. A large proportion of Upper Badley Wood is dominated by ash standards with abundant hornbeam coppice. The understorey is composed of Midland hawthorn, field maple and hazel. The ground flora is rather impoverished due to the dense shade cast by the hornbeam coppice. In areas where there is sufficient light dog's mercury, nettle, bramble and ivy carpet the woodland floor. Dead wood, in the form of fallen branches and standing timber is a significant feature of Badley Wood and provides a valuable habitat for dead wood invertebrates and hole-nesting birds.</p>
Area	1.49

CWS Number	Mid Suffolk 6
Site Name	ST JOHNS GROVE
Parish	BADLEY
District	Mid Suffolk
NGR	TM052553
Description	<p>This small wood is listed in the Suffolk Ancient Woodland Inventory compiled by English Nature. A significant feature of the wood is a ditch and woodbank, probably medieval in origin, which encloses it on all sides. A species-rich hedge mainly hawthorn, with blackthorn, hazel, spindle, dogwood and willow borders the eastern and western edges. Part of the secondary woodland, which lies adjacent to the medieval wood, has been grubbed out and converted to arable land. St John's Grove consists predominantly of hornbeam coppice with pedunculate and Turkey oak standards. Small areas of ash, field maple and hazel coppice are confined mainly to the edges of the wood. In addition there is an area of sycamore on the western margin. In areas where the hornbeam coppice is less dense, hawthorn and elder are abundant in the shrub layer. The field layer composed largely of dog's mercury, bramble and nettle also supports small quantities of ancient woodland indicator species, for example nettle-leaved bellflower, wood millet, oxlip and hairy wood-rush. A large pond situated in the southern corner of the wood provides valuable additional habitat, particularly for dragonflies.</p>
Area	2.83

CWS Number	Mid Suffolk 165
Site Name	48
Parish	Battisford
District	Mid Suffolk
NGR	TM06025375 - TM06145377
Description	Boulder clay flora. This site is also a Roadside Nature Reserve.
Area	0.12

CWS Number	Mid Suffolk 18
Site Name	GREAT NEWTON WOOD
Parish	BARKING
District	Mid Suffolk
NGR	TM069546
Description	<p>Great Newton Wood lies to the west of Needham Market and is situated close to another small ancient woodland, namely Little Newton Wood. A public footpath runs along the southern boundaries of both woods. The dominant species in the dense tree canopy are ash with some oak with smaller amounts of field maple coppice and hornbeam. Hazel coppice and occasional elder forms the shrub layer. The ground flora, although dominated by dog's mercury also contains patches of bluebell and primrose and a number of uncommon ancient woodland indicator species for example wood spurge and wood anemone. A ditch and a dense hedge composed of hawthorn, bramble, blackthorn, hornbeam and field maple enclose the wood. Great Newton Wood which is listed in English Nature's Ancient Woodland Inventory appears to have been neglected for some time.</p>
Area	2.02

CWS Number	Mid Suffolk 19
Site Name	LITTLE NEWTON WOOD
Parish	BARKING
District	Mid Suffolk
NGR	TM073549
Description	<p>This small woodland is one of several woodlands listed in English Nature's Inventory of Ancient Woodlands, situated to the west and south of Needham Market. Little Newton Wood, together with Great Newton Wood situated close by, are important both as refuges for wildlife and as features in an intensively-farmed landscape. The entire wood is enclosed by a barbed-wire fence and a dense hedge consisting of hawthorn, dogwood and blackthorn. The tree canopy is dominated by oak and ash with small amounts of hornbeam. Beneath the tree layers, hazel coppice and elder form a dense understorey in places. The woodland floor is carpeted with dog's mercury, bluebell and wood anemone, the latter species being strongly associated with ancient woodland. It appears that Little Newton Wood has been neglected for some time.</p>
Area	1.25

CWS Number	Mid Suffolk 111
Site Name	MUCKINGER WOOD
Parish	RINGSHALL
District	Mid Suffolk
NGR	TM050527
Description	<p>Muckinger Wood, a large ancient woodland is situated close to the Barking Woods, a number of which have been scheduled as Sites of Special Scientific Interest. It is listed in English Nature's Inventory of Ancient Woodland. The sinuous outline of Muckinger Wood is a characteristic feature of medieval woods. An internal and external ditch and bank system is another indication of the wood's antiquity. The semi-natural structure of the wood has been considerably altered by the extensive planting of conifers, mainly Scots pine and Norway spruce. Native woodland is largely restricted to the southern corner. Despite the widespread planting of non-native trees, Muckinger Wood supports a diverse woodland flora. Bramble, dog's mercury, bluebell and nettle are frequent in the field layer as are a number of rare ancient woodland indicator plants. Oxlip, a nationally rare species, occurs in small quantities in Muckinger Wood. Other uncommon medieval plants are nettle-leaved bellflower, herb-Paris, pale sedge, stinking iris and yellow pimpernel. Some recent management work has included the removal of conifers and the clearing of overshadowed rides. A woodland pond colonised by yellow flag provides additional valuable habitat for woodland invertebrates.</p>
Area	22.45

CWS Number	Mid Suffolk 9
Site Name	KEYFIELD GROVES
Parish	BADLEY
District	Mid Suffolk
NGR	TM067562
Description	<p>Keyfield Groves is listed in English Nature's Ancient Woodland Inventory. This small woodland is divided into two sections by a wide, shrubby track, known as the Badley Walk. This footpath is well-used by local people from Stowmarket and Needham Market. The northern woodland is composed of hazel and hornbeam coppice. Some old coppiced ash stools which are also present are evidence of the wood's antiquity. Midland hawthorn, a species strongly associated with medieval woodlands, and elder are abundant in the understorey. On the woodland floor, bramble and dog's mercury form a dense layer. The southern woodland consists of field maple, elder, rose, elm and hazel. Large ash standards dominate the tree canopy. The impenetrable shrub layer provides valuable habitat for breeding birds. A significant feature of Keyfield Groves is the abundance of dead and dying wood. This provides a source of food for invertebrates, fungi and birds.</p>
Area	2.87

Appendix C

Legislation

European Protected Species

Bats

All bat species in Britain are protected under the Wildlife and Countryside Act 1981 through inclusion on Schedule 5. They are also protected under the Conservation (Natural Habitats &c.) Regulations 1994 (which were issued under the European Communities Act 1972), through inclusion on Schedule 2. On 1st April 2010, these Regulations, together with subsequent amendments, were consolidated into the Conservation of Habitats and Species Regulations 2010.

European protected animal species ("EPS) and their breeding sites or resting places are protected under Regulation 39. It is an offence for anyone to deliberately capture, injure or kill any such animal or to deliberately take or destroy their eggs. It is an offence to damage or destroy a breeding or resting place of such an animal. It is also an offence to have in one's possession or control, any live or dead European protected species.

The threshold above which a person will commit the offence of deliberately disturbing a wild animal of a European protected species has been raised. A person will commit an offence only if he deliberately disturbs such animals in a way as to be likely significantly to affect (a) the ability of any significant groups of animals of that species to survive, breed, or rear or nurture their young, or (b) the local distribution of abundance of that species. The existing offences under the Wildlife and Countryside Act (1981) as amended which cover obstruction of places used for shelter or protection (for example, a bat roost), disturbance and sale still apply to European protected species.

This legislation provides defences so that necessary operations may be carried out in places used by bats, provided the appropriate Statutory Nature Conservation Organisation (in England this is Natural England) is notified and allowed a reasonable time to advise on whether the proposed operation should be carried out and, if so, the approach to be used. The UK is a signatory to the Agreement on the Conservation of Bats in Europe, set up under the Bonn Convention. The Fundamental Obligations of Article III of this Agreement require the protection of all bats and their habitats, including the identification and protection from damage or disturbance of important feeding areas for bats.

Water Vole

The water vole received limited legal protection in April 1998 through its inclusion in Schedule 5 of the Wildlife & Countryside Act 1981 (as amended) for some offences. This protection has recently been extended (6th April 2008), so the water vole is now fully protected under Section 9 and is also protected under the Countryside & Rights of Way Act 2000. Legal protection makes it an offence to:

- intentionally kill, injure or take (capture) a water vole;
- possess or control a dead or live water vole, or any part of a water vole;
- intentionally or recklessly damage or destroy access to any structure or place which water voles use for shelter or protection or disturb Water Voles while they are using such a place;
- sell, offer for sale or advertise for sale live or dead Water Voles

Unlike works affecting other protected species such as badgers, bats or great crested newts, there is no provision under the Wildlife & Countryside Act 1981 for licensing what would otherwise be offences for the purpose of development, maintenance or land management. At present in England and Wales, if it can be demonstrated that any action which otherwise would have been an offence was the 'incidental result of a lawful operation and could not reasonably have been avoided', this constitutes a defence against prosecution under the Act. The defence does, however, require that all reasonable steps must be taken to avoid any unnecessary damage.

Water voles are also a UK Biodiversity Action Plan Priority Species for which a Species Action Plan has been developed.

Badger

The Wildlife and Countryside Act (1981) and its subsequent amendment in 1985 made it an offence to take, kill, injure or ill-treat a badger. The badger gained further protection under the auspices of The Protection of Badgers Act (1992) which consolidates all former protective legislation in relation to badgers, except their inclusion on Schedule 6 of the Wildlife and Countryside Act 1981.

Under the 1992 Act, the badger sett is protected against obstruction, destruction, and damage; furthermore, the animal's access to and from the sett must not be impeded. It should be noted that the concept/definition of the sett extends beyond the main sett to include annexe, subsidiary and outlying setts. However, although the badger and its sett are protected (including access to the sett), the wider habitat and foraging ground is not.

Otters

Otters are protected under Section 9 of the Wildlife and Countryside Act 1981 (as amended) and revised by the Countryside and Rights of Way Act 2004, making it an offence to:

- intentionally kill, injure or take an otter;
- possess or control any (live or dead) otter, or any part of or anything derived from an otter;
- intentionally or recklessly damage or destroy or obstruct access to any structure or place used for shelter or protection by an otter;
- intentionally or recklessly disturb an otter while it is occupying a structure or place for that purpose;
- to sell, offer for sale, possess or transport for the purpose of sale any (live or dead) otter or part or derivative of an otter;
- to advertise for buying and selling such things.

Furthermore, otters are included on Schedule 2 of the Conservation (Habitats &c.) Regulations (1994), making it an offence to:

- deliberately to capture or kill a wild animal of a European protected species;
- deliberately to disturb any such animal;
- deliberately to take or destroy the eggs of such an animal; or
- damage or destroy a breeding site or resting place of such an animal.

Otters are also listed as a priority species on the UK and Biodiversity Action Plans.

Reptiles

Reptiles such as common lizard, slowworm, grass snake or adder are protected under Section 9 of the Wildlife & Countryside Act (1981) as amended. The legislation makes it illegal to deliberately or recklessly kill or injure any native reptile. This protection therefore requires that reasonable effort be made to avoid harm to reptiles during developments on land occupied by reptiles.

Barn Owls

The Habitats Regulations (1994), as amended, states that a person commits an offence in the case of Barn Owl only if this species is disturbed in the breeding season. This applies equally to all those bird species listed under Schedule 1.

Breeding Birds

It is an offence to kill, injure or take any wild bird; take, damage or destroy the nest of any wild bird while that nest is in use or being built (even of "pest" species); take or destroy the eggs of any wild bird.

Dormice

Dormice are protected from being killed, injured, captured or disturbed and their resting and breeding places should not be damaged or destroyed.

White-Clawed Crayfish

This crayfish is listed under Annex II of the habitats directive and areas are designated as Special Areas of Conservation to protect this species. Outside of this a licence is required to capture this species. It is listed as a priority species under the Biodiversity Action Plan and is a Species of Principal Importance under section 41 of the NERC Act 2006.

Great Crested Newts

Great crested newts are protected under both English and European law. It is an offence to kill, injure, disturb or take great crested newts or to damage or destroy their places of shelter, whether the animals are present or not.

Natural England Licensing - EPS Mitigation Licensing

Since September 2000, building development that affects bats or their roosts needs a Development Licence under the Habitats Regulations (1994), administered in England by the Department for Environment, Food and Rural Affairs (DEFRA). Since October 2006, licences have been granted by Natural England.

Licences can be obtained from the Wildlife Management and Licensing Service at Natural England to allow certain activities that would otherwise constitute an offence, for the purposes of development.

Appendix D

Plant species recorded on site

English name	Scientific name
Ash	<i>Fraxinus excelsior</i>
Blackthorn	<i>Prunus spinosa</i>
Bramble	<i>Rubus fruticosus</i>
Broadleaf Dock	<i>Rumex obtusifolius</i>
Cock's-foot Grass	<i>Dactylis glomerata</i>
Common Ragwort	<i>Senecio jacobaea</i>
Cow Parsley	<i>Anthriscus sylvestris</i>
Creeping bent	<i>Agrostis stolonifera</i>
Creeping Buttercup	<i>Ranunculus repens</i>
Creeping Thistle	<i>Cirsium arvense</i>
Elder	<i>Sambucus nigra</i>
English Elm	<i>Ulmus minor 'Atinia'</i>
English Oak	<i>Quercus robur</i>
Goat Willow	<i>Salix caprea</i>
Greater Willowherb	<i>Epilobium hirsutum</i>
Hawthorn	<i>Crataegus monogyna</i>
Hoary Plantain	<i>Plantago media</i>
Hogweed	<i>Heracleum sphondylium</i>
Horse Chestnut	<i>Aesculus hippocastanum</i>
Ivy	<i>Hedera helix</i>
Lesser Burdock	<i>Arctium minus</i>
Mugwort	<i>Artemisia vulgaris</i>
Nettle	<i>Urtica dioica</i>
Ribwort Plantain	<i>Plantago lanceolata</i>
Silverweed Cinquefoil	<i>Argentina anserina</i>
White Dead-Nettle	<i>Lamium album</i>
Yorkshire Fog	<i>Holcus lanatus</i>

Appendix E

Examples of bat and bird boxes

(images sourced from www.nhbs.com)

<p>2F Schwegler Bat Box (General purpose)</p> 	<p>1FF Schwegler Bat Box with built-in wooded rear panel</p> 	
<p>1B Schwegler Nest Box</p> 	<p>2H Schwegler Robin Box</p> 	<p>No. 10 Schwegler Swallow Nest</p> 
<p>Triangular Barn Owl Nest Box</p> 	<p>Eco Barn Owl Nest Box</p> 	

Appendix F

Great Crested Newt Habitat Suitability Index

Background

The Habitat Suitability Index (HSI) for the great crested newt was developed by Oldham *et al.* (2000). HSI scoring systems were originally developed by the US Fish and Wildlife Service as a means of evaluating habitat quality and quantity. An HSI is a numerical index, between 0 and 1. 0 indicates unsuitable habitat, 1 represents optimal habitat. The HSI for the great crested newt incorporates ten suitability indices, all of which are factors thought to affect great crested newts. These ten suitability indices are retained in this current Guidance Note.

The HSI system proposed by Oldham *et al.* (2000) is fairly easy to use. However, one suitability index (SI₉, terrestrial) involves a more lengthy measurement and calculation than the other factors. In using the HSI system with volunteer surveyors in Kent, Lee Brady substituted a simpler evaluation of terrestrial habitat quality, a four-point scale. Volunteers have found this modified HSI relatively easy to use.

Several other, local, surveys have utilised the HSI, but utilised their own variations on the original system. In 2007, a workshop was held at the Herpetofauna Workers' Meeting to evaluate the use of the HSI for the great crested newt, with the aims of:

- identifying components of the system that may need clarification or refinement
- agreeing on a standard that can be easily used by volunteers and professionals alike.

A conservative approach has been adopted in modifying the use of the original HSI suitability indices.

Use and limitations of HSI

The HSI for great crested newts is a measure of habitat suitability. It is not a substitute for newt surveys. In general, ponds with high HSI scores are more likely to support great crested newts than those with low scores. However, the system is not sufficiently precise to allow the conclusion that any particular pond with a high score will support newts, or that any pond with a low score will not do so.

There is also a positive correlation between HSI scores and the numbers of great crested newts observed in ponds. So, in general, high HSI scores are likely to be associated with greater numbers of great crested newts. However, the relationship is not sufficiently strong to allow predictions to be made about the numbers of newts in any particular pond.

HSI scoring can be useful in:

- Evaluating the general suitability of a sample of ponds for great crested newts
- Comparing general suitability of ponds across different areas
- Evaluating the suitability of receptor ponds in a proposed mitigation scheme.

How to collect data and calculate HSI

The HSI is a geometric mean of ten suitability indices:

$$HSI = (SI_1 \times SI_2 \times SI_3 \times SI_4 \times SI_5 \times SI_6 \times SI_7 \times SI_8 \times SI_9 \times SI_{10})^{1/10}$$

- The ten Suitability Indices are scored for a pond, in the field and from map work.
- The ten field scores are then converted to SI scores, on a scale from 0.01 to 1 (0.01 is used as the bottom end of the range in stead of 0, because multiplying by 0 reduces all other SI scores to 0).
- The ten SI scores are then multiplied together.
- The tenth root of this number is then calculated $(X)^{1/10}$

The calculated HSI for a pond should score between 0 and 1.

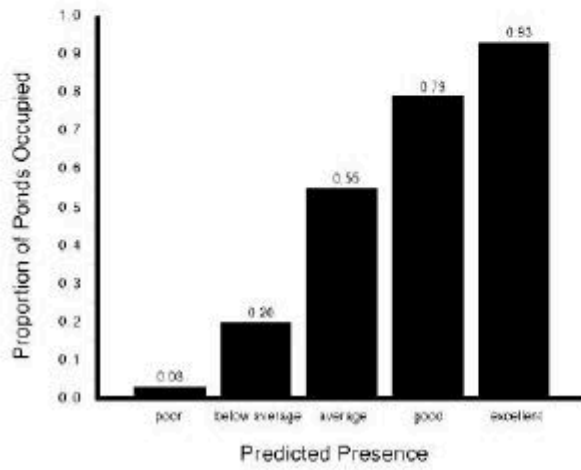
Some of the field scores are categorical, some are numerical. The numerical field scores are converted to SI scores by reading off the values from graphs produced by Oldham *et al.* (2000) reproduced in this Guidance Note.

The field scores are the data that should be collected by a surveyor. A summary of data to collect is given in *Summary of scoring system* below. More full details of the scoring system, including descriptions of the criteria used in the categorical scores are given in *Details of Suitability Indices and Definitions of Categories*. Two of the SI scores (SI₁ and SI₂) can be carried out as desktop/map exercises and so do not have to be completed in the field. The remaining SI scores should be recorded as field scores, and later converted to suitability indices, in some cases reading SI scores from the graphs provided in *Details of Suitability Indices and Definitions of Categories*.

Categorisation of HSI scores

Lee Brady has developed a system for using HSI scores to define pond suitability for great crested newts on a categorical scale:

HSI		Pond suitability
<0.5	=	poor
0.5 – 0.59	=	below average
0.6 – 0.69	=	average
0.7 – 0.79	=	good
> 0.8	=	excellent



Summary of scoring system

SI₁ Location

Field score	SI
A (optimal)	1
B (marginal)	0.5
C (unsuitable)	0.01

SI₂ Pond area

Field score	SI
Measure pond surface area (m ²) and round to nearest 50 m ²	Read off graph.

SI₃ Pond drying

Field score	SI	Criteria
Never	0.9	Never dries
Rarely	1.0	Dries no more than two years in ten or only in drought.
Sometimes	0.5	Dries between three years in ten to most years
Annually	0.1	Dries annually

SI₄ Water quality

Field score	SI	Criteria
Good	1.0	Abundant and diverse invertebrate community.
Moderate	0.67	Moderate invertebrate diversity
Poor	0.33	Low invertebrate diversity, few submerged plants
Bad	0.01	Clearly polluted, only pollution-tolerant invertebrates, no submerged plants.

SI₅ Shade

Field score	SI
Estimate percentage perimeter shaded to a least 1 m from shore.	Read off graph.

SI₆ Fowl

Field score	SI	Criteria
Absent	1	No evidence of water fowl (although moorhen may be present)
Minor	0.67	Waterfowl present, but little sign of impacts
Major	0.01	Severe impact of waterfowl

SI₇ Fish

Category	SI	Criteria
Absent	1	No records of fish stocking and no fish revealed during survey.
Possible	0.67	No evidence of fish, but local conditions suggest that they may be present.
Minor	0.33	Small numbers of crucian carp, goldfish or stickleback known to be present.
Major	0.01	Dense populations of fish known to be present.

SI₈ Ponds

Field score	SI
Count the number of ponds within 1 km of survey pond, not separated by major barriers, and divide by 3.14. This can be done from maps rather than in the field.	Read off graph.

SI₉ Terrestrial habitat

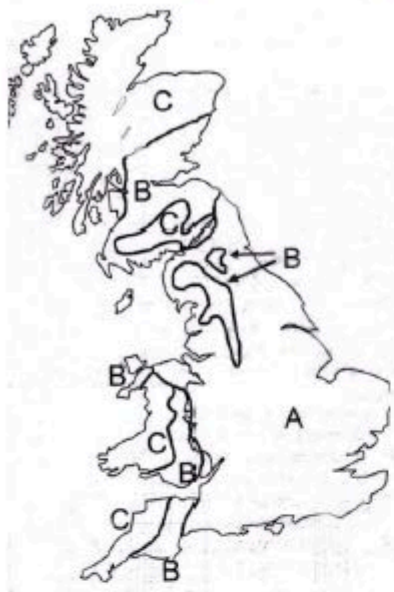
Field score	SI
Good	1
Moderate	0.67
Poor	0.33
None	0.01

SI₁₀ Macrophytes

Field score	SI
Estimate the percentage of the pond surface area occupied by macrophyte cover (between May and the end of September)	Read off graph.

Details of Suitability Indices and Definitions of Categories

Factor 1. Geographic location (SI₁)

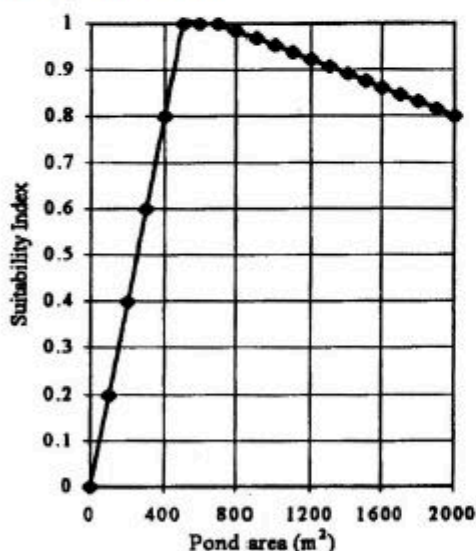


Sites should be scored according to the zone in which they occur. This scoring can be carried out either in the field, or as part of a desktop exercise.

- Zone A, location is optimal, SI = 1
- Zone B, location is marginal, SI = 0.5
- Zone C, location is unsuitable, SI = 0.01.

Some sites will fall on boundary lines between zones. In such cases, select medium-value scores i.e. Zone B.

Factor 2. Pond area



Pond area is the surface area of the pond when water is at its highest level (excluding flooding events). This is usually in the spring. If the pond is being measured at another time of year, the springtime area should still be evident from vegetation types and evidence of a draw down zone around the pond.

Pond area should be measured as accurately as possible. There are several ways of doing this, for example by measuring axes of regularly shaped ponds, either by pacing out in the field, or using a map. Irregularly shaped ponds may have to be treated as a series of geometrical shapes, calculating the area for each and adding together.

Since it can be difficult reading off SI scores from graph, pond area should be rounded to nearest 50 m.

It can be particularly difficult to read off SI scores for very small ponds. For ponds smaller than 50 m² a score of 0.05 should be used.

Factor 3. Permanence

Pond permanence should be deduced from local knowledge and on personal judgement. A landowner may know how often a pond dries. However, if not, the surveyor should make a judgement based on water level at the time of the survey, and taking seasonality into consideration. For example, a pond that is already dry by late spring is likely to dry out every year, etc.

Category	SI	Criteria
Never dries	0.9	Never dries.
Rarely dries	1.0	Dries no more than two years in ten or only in drought.
Sometimes dries	0.5	Dries between three years in ten to most years.
Dries annually	0.1	Dries annually.

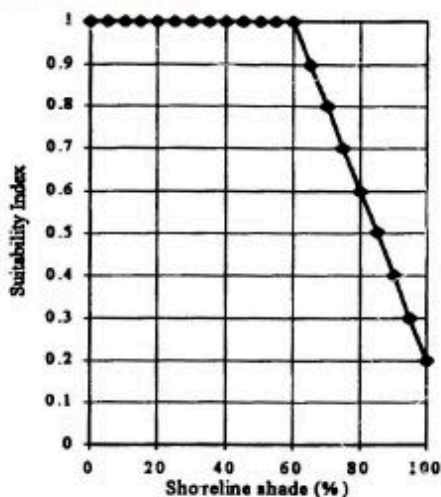
Factor 4. Water quality.

The assessment of water quality is subjective and should be based primarily on invertebrate diversity. Hence, water quality should not be confused with water clarity. Sometimes clear water can be devoid of invertebrates, and turbid ponds can support a wealth of invertebrates. There is no quick and simple invertebrate index of water quality. However, some species are indicators of water quality.

Category	SI	Criteria
Good	1.0	Water supports an abundant and diverse invertebrate community. Netting reveals handfuls of diverse invertebrates, including groups such as mayfly larvae and water shrimps.
Moderate	0.67	Moderate invertebrate diversity
Poor	0.33	Low invertebrate diversity (e.g. species such as midge and mosquito larvae. Few submerged plants.
Bad	0.01	Clearly polluted, only pollution-tolerant invertebrates (such as rat-tailed maggots), no submerged plants.

Other cues may also provide information about water quality. For example, ponds subject to agricultural inputs are likely to have poor water quality.

Factor 5. Shade



Estimate percentage pond perimeter shaded, to at least 1m from the shore. Shading is usually from trees, but can include buildings but should not include emergent pond vegetation. Estimate should be made during the period from May to the end of September.

Factor 6. Fowl

This factor is concerned with the impact of waterfowl upon a pond. At high densities, as created when waterfowl are encouraged to use a pond, by provision of food, the birds can remove all aquatic vegetation, pollute water and persistently stir sediments. Score as one of three categories.

Category	SI	Criteria
Absent	1	No evidence of waterfowl impact (moorhens may be present).
Minor	0.67	Waterfowl present, but little indication of impact on pond vegetation. Pond still supports submerged plants and banks are not denuded of vegetation.
Major	0.01	Severe impact of waterfowl. Little or no evidence of submerged plants, water turbid, pond banks showing patches where vegetation removed, evidence of provisioning waterfowl.

'Waterfowl' includes most water birds, such as ducks, geese and swans. Moorhens should be ignored because almost every pond has at least one or two.

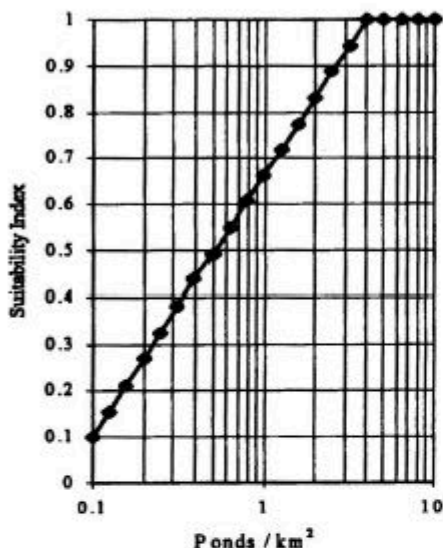
Factor 7. Fish

Information on fish should be gleaned from local knowledge and the surveyor's own observations. Pond owners will usually be aware of stocking with fish for commercial or aesthetic reasons. However, stickleback (which can be significant predators of great crested newt larvae, when present in large numbers) are unlikely to be

deliberately introduced to a pond, but may arrive through other means. Netting is useful in detecting smaller fish, such as sticklebacks, or the fry of larger species.

Category	SI	Criteria
Absent	1	No records of fish stocking and no fish revealed by netting or observed with torchlight.
Possible	0.67	No evidence of fish, but local conditions suggest that they may be present.
Minor	0.33	Small numbers of crucian carp, goldfish or stickleback known to be present.
Major	0.01	Dense populations of fish known to be present.

Factor 8. Pond count



This is the number of ponds occurring within 1 km of survey pond. Do not count the survey pond itself. Ponds on the far side of major barriers, such as main roads, should not be counted. Use 1:25,000 scale O.S. data, such as Explorer maps, GIS or web-based mapping sources. Pond counts can be carried out a by a survey coordinator and so do not necessarily have to be performed by surveyors.

- Getamap www.ordnancesurvey.co.uk/oswebsite/getamap/
- Magic www.magic.gov.uk/site_map.html
- Digimap edina.ac.uk/digimap/

Divide the number of ponds by Pi (3.14) to calculate the density of ponds per km², and read off graph.

Factor 9. Terrestrial

Scoring terrestrial habitat depends on the surveyor’s understanding of newt habitat quality. Good terrestrial habitat offers cover and foraging opportunities and includes meadow, rough grassland, hedges, scrub and woodland. Terrestrial habitat should be considered only on the near side of any major barriers to dispersal (e.g. main roads or large expanses of bare habitat).

Category	SI	Criteria
Good	1	Extensive area of habitat that offers good opportunities for foraging and shelter completely surrounds pond (e.g. rough grassland, scrub or woodland).
Moderate	0.67	Habitat that offers opportunities for foraging and shelter, but may not be extensive in area and does not completely surround pond.
Poor	0.33	Habitat with poor structure that offers limited opportunities for foraging and shelter (e.g. amenity grassland).
None	0.01	Clearly no suitable habitat around pond (e.g. centre of large expanse of bare habitat).

Great crested newts do not have specific habitat requirements. However, good quality terrestrial habitat has structure. The presence of rabbit borrows, small mammal holes, proximity to old farm buildings, stone walls, piles of loose stone/rock all contribute towards 'good' terrestrial habitat. Note that it is rare to encounter a pond with a terrestrial habitat category of 'none'.

Appendix G

Native Species Suitable for Planting and Sowing

The plants should be obtained from specialist nurseries and preferably be of local genetic stock.

1. Native Shrub and Tree Species

Shrubs	
Blackthorn	<i>Prunus spinosa</i>
Buckthorn	<i>Rhamnus catharticus</i>
Crab apple	<i>Malus sylvestris</i>
Dog rose	<i>Rosa canina</i>
Dog wood	<i>Cornus sanguinea</i>
Field maple	<i>Acer campestre</i>
Hawthorn	<i>Crataegus monogyna</i>
Hazel	<i>Corylus avellana</i>
Holly	<i>Ilex aquifolium</i>
Spindle	<i>Euonymus europaeus</i>
Wild privet	<i>Ligustrum vulgare</i>
Trees	
Ash	<i>Fraxinus excelsior</i>
Pedunculate oak	<i>Quercus robur</i>
Silver birch	<i>Betula pendula</i>
Wild cherry	<i>Prunus avium</i>

2. Native Wildflower Species

Grasses	
Common bent	<i>Agrostis capillaris</i>
Crested dog's-tail	<i>Cynosurus cristatus</i>
Meadow fescue	<i>Festuca pratensis</i>
Red fescue	<i>Festuca rubra</i>
Rough meadow-grass	<i>Poa trivialis</i>
Small timothy	<i>Phleum bertolonii</i>
Smooth meadow-grass	<i>Poa pratensis</i>
Sweet vernal-grass	<i>Anthoxanthum odoratum</i>
Yellow oat-grass	<i>Trisetum flavescens</i>
Herbs	
Bird's-foot trefoil	<i>Lotus corniculatus</i>
Black knapweed	<i>Centaurea nigra</i>
Common cat's-ear	<i>Hypochaeris radicata</i>
Common sorrel	<i>Rumex acetosa</i>
Common vetch	<i>Vicia sativa</i>
Cowslip	<i>Primula veris</i>

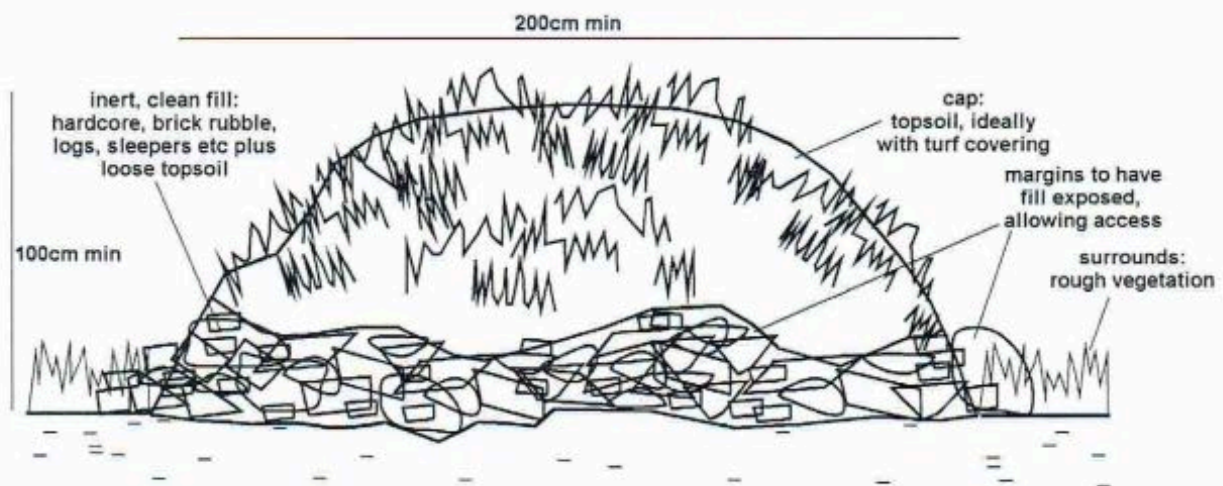
Field scabious	<i>Knautia arvensis</i>
Lady's bedstraw	<i>Galium verum</i>
Meadow buttercup	<i>Ranunculus acris</i>
Meadow vetchling	<i>Lathyrus pratensis</i>
Oxeye daisy	<i>Leucanthemum vulgare</i>
Red clover	<i>Trifolium pratense</i>
Selfheal	<i>Prunella vulgaris</i>
Yarrow	<i>Achillea millefolium</i>

Appendix H

Newt and reptile artificial hibernaculum design

Figure 3: Suggested hibernaculum design

This design mimics artificial and natural conditions in which great crested newts have frequently been found overwintering. Dimensions should not be below 2m length x 1m width x 1m height. The illustrated design would be suitable for locating on an impermeable substrate. On free-draining substrates, the design is largely similar but the bulk of the fill is sited in an excavated depression in the ground. Hibernacula should ideally be positioned across a site, both close to and distant from breeding ponds, always in suitable terrestrial habitat and above the flood-line.



Source: English Nature (2001) *Great Crested Newt Mitigation Guidelines*, Peterborough

Appendix I

Site layout plan

