Hopkins Ecology

Site:	**White House Farm, Sprowston: Phase 3**
Work Item:	**Ecology Appraisal and Strategic Assessment**
Client:	**Consortium of Taylor Wimpey, Persimmon Homes and Hopkins Homes**

Author: Dr GW Hopkins CEnv MCIEEM
Reviewer: Dr JI Thacker MCIEEM
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Hopkins Ecology Ltd, St George's Works, 51 Colegate, Norwich NR3 1DD
T. 01603 435598 **M:** 07481 477103 **E:** graham@hopkinsecology.co.uk **W:** www.hopkinsecology.co.uk

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Summary

Hopkins Ecology Ltd was appointed by the Consortium of Taylor Wimpey, Persimmon Homes and Hopkins Homes to prepare an appraisal of the proposed Phase 3 of the White House Farm site in Sprowston. This appraisal is intended to identify the principal ecological features of the site and to identify appropriate mitigation for the proposed scheme.

The site is largely an arable field with a block of woodland and boundary hedgerows. There is also an area of soft fruit. The arable margins are narrow and have a species-poor flora of arable weeds and the fruit areas have grass sward paths and the fruit trees rank grass understoreys. Lines of poplars run through the fruit areas.

Adjacent to the east boundary is a woodland that is designated as a County Wildlife Site. On the Phase 3 site itself is a block of coniferous plantation woodland that was planted on an ancient woodland site, and a few mature deciduous trees remain in an otherwise coniferous stand.

Along the north-west, north and south boundaries are hedgerows including mature trees; the southern hedgerow is intact but the others are gappy.

Two 'bat corridors' cross the site as shown in the Area Action Plan, with the barbastelle bat of particular importance locally. Bat surveys identified six species, including barbastelles along the eastern edge and within the fruit areas. Two factors are relevant to bats:

- Bat corridors. One corridor will need to be created across an arable field, with structural planting. A second corridor runs alongside an existing woodland edge at the east of the site, and this should be retained as a strip of undeveloped land with structural planting to exclude light spill from the development.
- Foraging habitat. The boundary areas will largely be retained as suitable bat foraging habitat, but the fruit areas will be lost. It is proposed that areas of greenspace are provided and that these should be of high quality. First, new public greenspace should have native planting schemes to provide an abundance of the moths required by barbastelle bats. The on-site woodland should be enhanced, through conifer removal and planting of native trees and shrubs; felled timber should be retained.

Great crested newts were not recorded in surveys and the nearest breeding pond is believed to be at Rackheath Hall >300m east. It is thought that the scheme can avoid protected species licensing by erecting an exclusion fence along the eastern boundary to prevent colonisation once farming ceases and the site become more suitable as terrestrial habitat.

To provide a full assessment of the site it is recommended that additional surveys are undertaken for breeding birds and reptiles, as well as bat surveys over the full season.

Public open space and walking routes within the development will be required to provide mitigation for the otherwise potential increase in recreational pressure on The Broads and its international sites.

It is not thought that there are significant ecological constraints to the Phase 3 scheme provided that bat corridors are created / retained and that new high quality foraging habitats are created for the loss of existing foraging areas. The on-site block of coniferous plantation on ancient woodland should be enhanced.

1. Introduction

BACKGROUND

1.1 Hopkins Ecology Ltd was appointed by the Consortium of Taylor Wimpey, Persimmon Homes and Hopkins Homes to prepare an ecology appraisal of the proposed Phase 3 development parcel of the White House Farm site in Sprowston. This appraisal is intended to provide a strategic appraisal of the site and to establish the significant ecological factors that are relevant for the site vision and delivery. This appraisal combines an extensive desk study with fieldwork in the spring and early summer of 2017, covering: phase 1 habitats and botany, bats and great crested newts as European Protected Species and protected species scoping for other animals of conservation concern.

SITE CONTEXT AND STATUS

1.1 The Phase 3 area is proposed for ~1200 houses across ~69ha. The site itself largely comprises an arable field with areas of soft fruit and fruit trees with boundary hedgerows and a block of mixed plantation woodland over ancient woodland.

1.2 The site is located to the east of, but excluding, White House Farm itself and associated buildings including cafes and shops. The site is to the east of the Phase 1 development area and proposed Phase 2 application site. To the north lies the Sprowston Manor Golf Club, to the south is Salhouse Road and to the east is Rackheath Park.

LEGISLATION AND PLANNING POLICY

1.3 The following key pieces of nature conservation legislation are relevant to legally protected species (with a more detailed description in Appendix 5):

- The Conservation of Habitats and Species Regulations 2010 (the Habitats Regulations); and
- The Wildlife and Countryside Act, 1981 (as amended).

1.4 Also, the National Planning Policy Framework (DfCLG, 2012[1]) requires local authorities to avoid and minimise impacts on biodiversity and, where possible, to provide net gains in biodiversity when making planning decisions. A substantial number of species are of conservation concern in the UK. A small number of these species are fully protected under the legislation listed above, but others in England are recognised as Species of Principal Importance under the Natural Environment and Rural Communities Act 2006 and reinforced by the National Planning Policy Framework. For these species local planning authorities are required to promote the "*protection and recovery"* via planning and development control. Examples include the widespread reptiles, house sparrows and barbastelle, soprano pipistrelle, brown long-eared and noctule bats.

1.5 Although the NPPF has an overarching aim of minimise impacts to biodiversity, the majority of species of conservation concern are not specifically recognised by legislation or planning policy. The level of protection afforded to these is undefined and should be considered within the overall aim of minimising impacts on biodiversity.

[1] DCLG (2010) *A National Planning Policy Framework for England*. Department for Communities and Local Government, London.

2. Methods

DATA SEARCH

2.1 A data search for a 2km radius was commissioned from the Norfolk Biodiversity Information Service (NBIS) in summer 2017 (with earlier searches also available for informing field surveys). This search included available data on bats from work undertaken for the Northern Distributor Road ('NDR').

FIELD SURVEY

2.2 Various site visits were undertaken in spring and summer 2017, with the habitat survey and hedgerow survey on 17 May 2017 but supplemented with botanical observations on other dates. The description of habitats was based on the methods of JNCC (2010)[2] and hedgerows following (DEFRA, 2007[3]). Trees were surveyed from ground level for their potential suitability for roosting bats, looking for gaps, cracks and other potential roost features[4]; searches were also made for signs of badgers.

2.3 Bat surveys comprised monthly transects and five nights of static recording with five Anabat Express detectors per month (May – July inclusive) (Figure 1; Table 1).

Figure 1. Bat survey transect and static detector stations.

[2] JNCC (2010) *Handbook for Phase 1 Habitat Surveys.* Joint Nature Conservation Committee, Peterborough.

[3] DEFRA (2007) *Hedgerow Survey Manual.* DEFRA, London.

[4] Collins, J. (2016) *Bat Surveys for Professional Ecologists*. Bat Conservation Trust, London.

Table 1. Summary of bat surveys.

Survey type	Dates	Weather
Static	1 – 6 May (5 nights)	Generally mild throughout period
Static	2 – 7 June (5 nights	Generally mild throughout period
Static	1 – 6 July (5 nights	Generally mild throughout period
Transect	8 May	Mild (13°C), light wind
Transect	10 June	Mild (14°C), light wind
Transect	18 July	Mild (14°C) light wind

2.4 The suitability of ponds for great crested newts (within 500m) was assessed using the Habitat Suitability Index (ARG, 2010)[5]. Direct Great crested newt surveys were undertaken of various ponds using a combination of manual and e-DNA methods according to access arrangements. Manual surveys used a combination of methods (torching, egg search and netting) but bottle trapping was not possible due to waterbodies having or potentially having liners or due to shallow depth. For e-DNA methods the testing laboratory was Sure Screen Scientifics in Derby, with samples taken on 27 June 2017. All work was led in the field by Dr Graham Hopkins who holds a full great crested newt survey licence. All methods compliant with current guidance (English Nature, 2001[6]; Natural England, 2015[7]). Survey details are shown below (Figure 2 and Table 2).

Table 2. Summary of great crested newt surveys.

Pond numbers	Dates	Methods	Weather
1, 2, 3, 4 and 5	20 April, 28 April, 7 May and 12 May	Manual	All dates weather >10°C
6, 7 and 8	29 June	e-DNA	Good, light rain in the day preceding
9 and 10	7 May, 12 May, 14 May and 28 May	Manual	All dates weather >10°C

GUIDANCE

2.5 The ecological assessment has been prepared with reference to best practice guidance published by the Chartered Institute for Ecology and Environmental Management (CIEEM) and as detailed in British Standard 42020:2013 Biodiversity - Code of Practice for Biodiversity and Development.

CONSTRAINTS

2.6 It should be noted that whilst every effort has been made to provide a comprehensive description of the site, no investigation can ensure the complete characterisation and

[5] ARG (2010) *Great Crested Newt Habitat Suitability Index. May 2010 Advice Note 5.* Available from: http://www.arguk.org/info-advice/advice-notes/9-great-crested-newt-habitat-suitability-index-arg-advice-note-5/file

[6] English Nature (2001) *Great Crested Newt Mitigation Guidelines*. English Nature, Peterborough.

[7] https://www.gov.uk/guidance/great-crested-newts-surveys-and-mitigation-for-development-projects

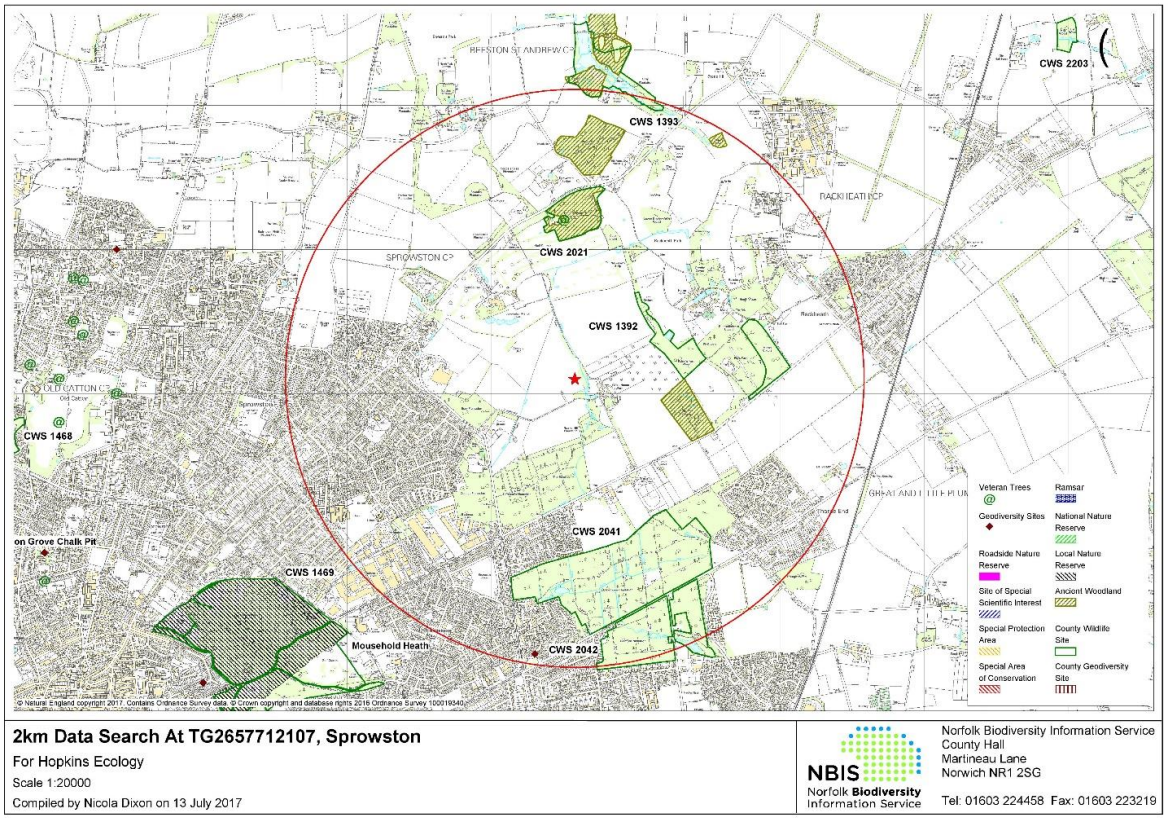
prediction of the natural environment. It is not considered, however, that there were any substantial constraints to the survey work or interpretation of results.

3. Designated Sites

OVERVIEW

3.1 An overview of the site in relation to nearby designated sites is shown in Figure 2. There are no statutory sites within 2km.

Figure 2. Data search results for sites and ancient woodlands.



INTERNATIONAL SITES

3.2 There are no 'international sites' within 2km of the site. At the nearest point The Broads Ramsar Site, The Broads Special Area of Conservation (SPA), and the Broadland Special Protection Area (SAC) are approximately 3.6km north-east of the site. The major parts of these international sites lie downstream of Wroxham, approximately 5km from the site across open farmland.

3.3 All three international designated sites are composed of a large number of individual component SSSI's: 26 for Broadland SPA and 28 for The Broads Ramsar Site and SAC, the furthest of which are more than 30km distant (Table 1).

Table 3. Distances from the development area to individual component SSSI's of The Broads Ramsar Site, The Broads SAC and the Broadland SPA.

Distance from site (km)	Component SSSI
<5	Crostwick Marsh
5-10	Bure Broads and Marshes
10-15	Yare Broads and Marshes; Alderfen Broad; Broad Fen, Dilham; Ant Broads and Marshes; Smallburgh Fen; Upton Broad and Marshes; Ducan's Marsh, Claxton; and Cantley Marshes
15-20	Shallam Dyke Marshes; Thurne Ludham-Potter Heigham Marshes; Decoy Carr; Acle Poplar Farm Meadows, Langley; Burgh Common and Muckfleet Marshes; Limpenhoe Meadows; Calthorpe Broad; and Upper Thurne Broads and Marshes; Damgate Marshes, Acle; and Hardley Flood
20-25	Priory Meadows, Hickling; Halvergate Marshes; Hall Farm Fen, Hemsby; Geldeston Meadows; Stanley and Alder Carrs, Aldeby
20-25	Trinity Broads
30-35	Barnby Broad and Marshes; Sprat's Water and Marshes, Carlton Colville

3.4 The designated features of The Broads' international sites are aquatic and wetland species, including: vegetation types; assemblages of rare or named plant species; assemblages of rare or named invertebrates; named animals other than invertebrates and assemblages of breeding and wintering birds.

NATIONALLY DESIGNATED SITES

3.5 There are no nationally designated sites within 2km of the proposed development site. The nearest site is Crostwick Marsh SSSI (a component of the Broadland SPA and The Broads SAC and Ramsar site) located 3.6km to the north.

NON-STATUTORY SITES

3.6 Five non-statutory County Wildlife Site (CWSs) are located within 2km of the site's centre (Table 4). Of particular note is that Paine's Yard Wood, The Owlery and March Covert CWS lies adjacent to the north-east boundary. Although not designated as a CWS, a block of ancient woodland lies within the site boundary (Bulmer Coppice), albeit this is largely now replanted as coniferous plantation.

Table 4. County Wildlife Sites within 2km of the site's centre.

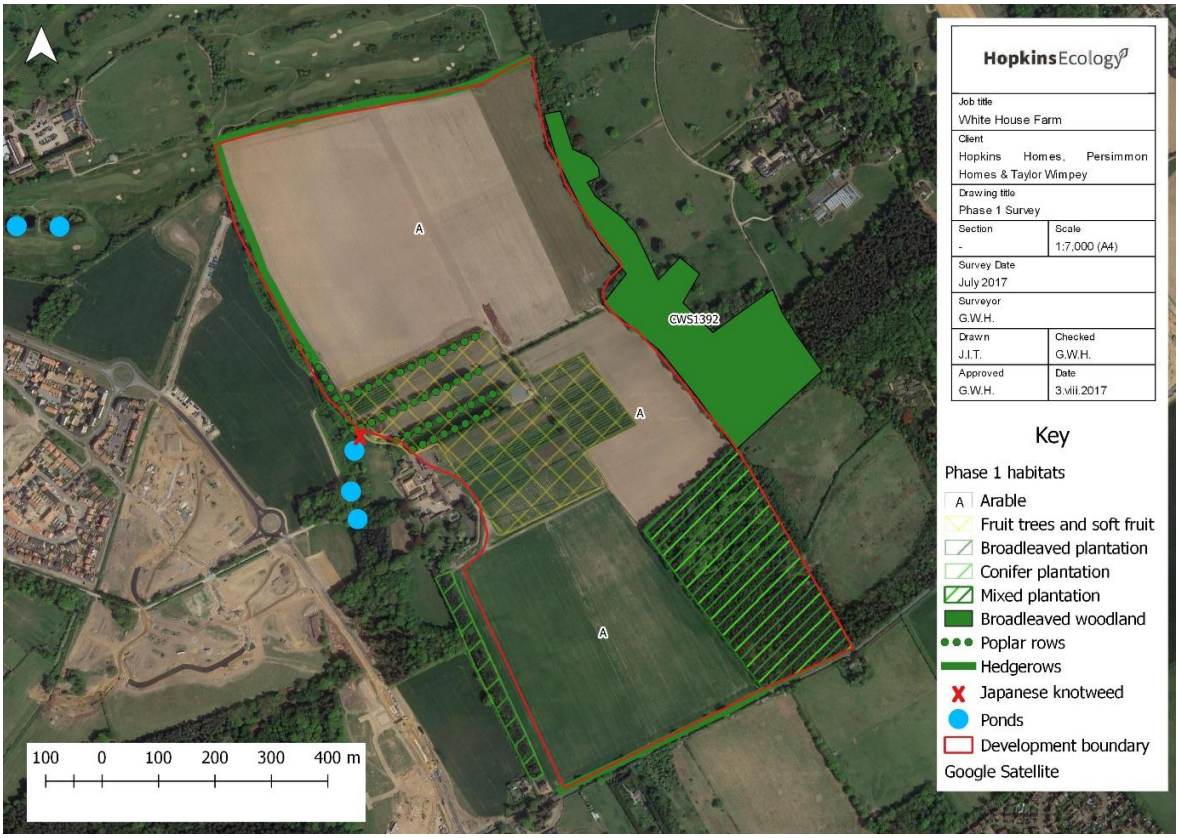
Site Name (number)	Proximity and Location	Description
Tollshill Wood (2021).	390m, north	Ancient, broad-leaved semi-natural woodland.
Ladies Wood, Church Carr and Springs (1393).	1.2km, north.	Woodland (some of which is ancient), grassland and standing water habitats.
Paine's Yard Wood, The Owlery and March Covert (1392).	Adjacent, east.	Woodland, including abundant deadwood and stored coppice.
Belmore and Browne's Plantation (2042).	900m, south.	Semi-natural woodland
Racecourse Plantation (2041).	350m, south-west	Coniferous plantation and broad-leaved semi-natural woodland

4. Habitats and Botany

OVERVIEW

4.1 The site is largely arable cropland with areas of soft fruit and fruit trees, boundary hedgerows and a block of coniferous plantation over ancient woodland. Four main habitats are present within the site and there are others nearby (Figure 3).

Figure 3. Habitat survey map.



ARABLE FIELD

4.2 The field was under sugar beet, cereal and maize, roughly comprising a third each of the arable area. The crop was largely intensively managed with few weeds within the crop.

4.3 The arable margins were narrow and cultivated to the adjacent permanent grass sward of the boundaries. The arable flora was species-poor with only a few weeds of arable verges noted: henbit dead nettle *Lamium aplexicaule* is the species most typically associated with arable verges and other annuals or short lived perennials noted were: scarlet pimpernel, pineapple weed *Matricaria discoidea*, scentless mayweed *Tripleurospermum inodorum*, yellow pimpernel *Lysimachia nemorum*, common cudweed *Filago vulgaris*, chickweed *Stellaria media*, sterile brome *Anisantha sterilis*, plantains *Plantago major* and *P. lanceolata*, weld *Reseda luteola*, ground ivy *Glechoma hederacea*, parsley-piert *Aphanes arvensis*, field pansy *Viola arvensis*, and silverweed *Potentilla anserina*.

FRUIT AREAS

4.4 The fruit areas comprised parallel rows of trees or soft fruits with well managed paths in between of short grass sward. Under the fruit trees the grass swards were longer but with evidence of herbicide affecting the herb flora. The fruit trees were modern varieties of short stature and girth. Included in these areas were rows of polar *Populus x canadensis* as windbreaks.

4.5 The paths had grass swards of mainly rye grass *Lolium* species, couch *Elymus repens*, bents *Agrostis capillaris* and *A. stolonifera* and Yorkshire fog *Holcus lanatus* and meadow grass *Poa annua*. Also present were low herbs such as groundsel *Senecio vulgaris*, American willowherb *Epilobium ciliatum*, scarlet pimpernel Anagallis arvensis and Canadian fleabane *Erigeron canadensis*.

4.6 Under the fruit trees the longer grass swards were mainly false oat *grass Arrhenatherum elatius* and cock's foot *Dactylus glomerata*. The herb flora comprised tall competitive species, such as hogweed *Heracleum sphondylium,* nettle *Urtica dioica*, broad leaved dock *Rumex obtusifolius* and occasional brambles *Rubus fruticosus*.

4.7 Along part of the north-west boundary, west of the track is a small area of old, abandoned plum *Prunus domestica* trees, with an understorey of false oat grass, broad leaved dock, creeping thistle *Cirsium arvense*, nettle, cleavers *Galium aparine* and hogweed, as the most frequent species. The trees are unmanaged but narrow in girth and do not appear to be traditional varieties.

BOUNDARY HEDGEROWS

4.8 Boundary hedgerows run along the north-west, north and south boundaries:

- The north-west boundary hedgerow runs to the east of an old trackway. This hedgerow is defunct with tall unmanaged bushes of hawthorn *Crataegus monogyna* and blackthorn *Prunus spinosa*. Mature oak *Quercus robur* trees are present along much of its lengths with occasional ash *Fraxinus excelsior*; other scrub species include bramble, field rose *Rosa arvensis*, and hazel *Corylus avellana*. The ground flora was largely rank grass and herbs, dominated by false oat grass and cock's foot with nettle and other tall competitive herbs.
- The north boundary hedgerow was gappy and unmanaged, with lengths of hawthorn and blackthorn as the main structural species with hazel, elder *Sambucus nigra*, bramble, and ash as the other woody species. To the north of the hedgerow along the golf course edge were lengths of planted screening trees, such as silver birch *Betula pendula*, Norway maple *Acer platanoides*, Italian alder *Alnus italica* and rowan *Sorbus aucuparia*. The ground flora was rank with competitive species such as hogweed and cleavers, and a few shorter herbs such as red campion *Silene dioica*, garlic mustard *Alliaria petiolata* and nightshade *Solanum dulcamara*.
- The south boundary was a hedgerow running alongside Salhouse Road. This was on a low bank and was tall (~3m), mainly hawthorn with some sycamore *Acer pseudoplatanus*, oak, blackthorn and other wild plum *Prunus* species, and field rose. Also present was honeysuckle *Lonicera periclymenum* and ivy *Helix hedera* as climbers and over the ground. The ground flora included rank sward species such as false oat grass and cock's foot but also taller grassland species such as knapweed *Centaurea nigra*, and more typical hedgerow flora such as red campion, Alexanders *Smyrnium olusatrum*, and wood sage *Teucrium scorodonia*.

The east field boundary ran alongside the woodland edge of Paine's Yard Wood, The Owlery and March Covert CWS and the on-site Bulmer Coppice. The south-west boundary ran alongside a pine plantation.

Coniferous Plantation Woodland

4.9 The Bulmer Coppice is a rectangular block of coniferous plantation woodland planted on an ancient woodland. It is shown as the same size and shape on the 1880 OS map. The main part of the woodland is pine *Pinus* species with a small number of mature oak remaining as well as sweet chestnut *Castanea sativa* as apparently older trees or from coppice. The ground flora of the woodland is sparse, albeit with some occasional patches of bluebell *Hyacinthoides non-scripta*, and bracken *Pteridium aquilinum* and bramble as the only summer components. Along the north and west boundary is a row of deciduous trees on a low bank presumably retained from the original woodland, with trees being sycamore, hazel forming large stools, ash, sweet chestnut and elder.

5. Bats

BACKGROUND

5.1 The site is included within the 'growth triangle' Area Action Plan[8], with bats identified as a key species group. The principal policy relating to ecology and bats is:

- GT2: Green Infrastructure.

5.2 Within the Area Action Plan the key mechanism for protecting these bats at the landscape scale is via green infrastructure to create corridors of connected habitat free of intrusive lighting across the landscape, allowing the bats to easily fly between roosting and foraging areas. Within the project area there are three such corridors (Figure 4).

Figure 4. Bat corridors within Area Action Plan.

5.3 An extensive body of data on the local occurrences of bats is available from work on the NDR, albeit with much of these data being from the eastern part of the site (nearer the NDR corridor) and less being available from the west. These data show that to the east of Norwich is an important population of barbastelle bats, a species listed on Annex II of the Habitats Directive although there are no sites designated as Special Area of Conservation for this species locally; barbastelle bats are Species of Principal Importance under the NERC Act 2006. The site is known to be within the foraging range for barbastelles locally and also the site is crossed by commuting bats, as shown by the AAP corridors.

[8] Broadland District Council (2016) *Old Catton, Sprowston, Rackheath and Thorpe St Andrew. Growth Triangle Area Action Plan. July 2016.* Broadland District Council, Norwich.

5.4 The data search returned records for barbastelle, serotine, Daubenton's, noctule, Nathusius' pipistrelle, common pipistrelle, soprano pipistrelle and brown long-eared. It is not thought that roosts are known from the site or its boundaries.

TREE ASSESSMENTS

5.5 Within the main part of the site are three oak trees that are of moderate potential suitability for roosting bats, and others along the site boundaries (Figure 5). The trees within the woodland edges to Rackheath Park (Paine's Yard Wood, The Owlery and March Covert CWS) are relatively small in the northern part and are larger towards the south. The majority of trees within Bulmer Coppice are of negligible potential suitability for roosting bats, the others are of high potential suitability.

FIELD SURVEYS

5.6 The field surveys recorded a total of six species: barbastelle, noctule, common pipistrelle, soprano pipistrelle, brown long-eared and *Myotis* species (Table 5).

Figure 5. Trees with moderate and high potential suitability for roosting bats.

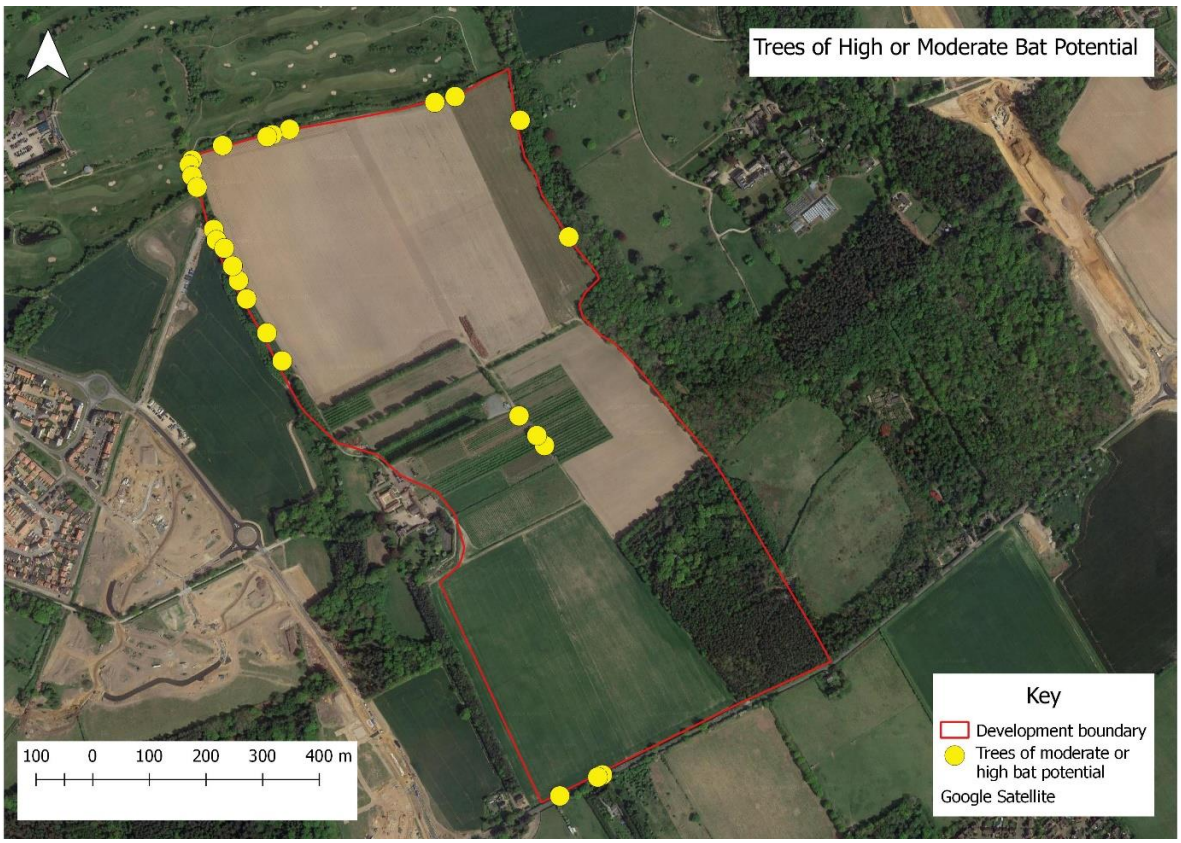


Table 5. Occurrences of bats from surveys in 2017.

Species	Static detector station	Transect location	Comment
Barbastelle	1, 2 and 3 Sporadic registrations in June and July at stations 1 and 2, with station 3 recording only a single registration in July	Recorded in July along east boundary alongside woodland edge	The east boundary alongside the woodland edges appears to be the main area of activity, presumably for commuting and also feeding. Activity within the fruit growing areas (static station 3) is suggestive of occasional feeding
Noctule	1, 2, and 5 Brief registrations in June and July only	Recorded as brief registrations along east edge only	Activity suggestive of feeding and possibly commuting along woodland edge areas, but in low numbers
Common pipistrelle	1, 2, 3, 4 and 5 Registrations in all months, with periods of extended activity in stations 1, 2 and 5 and more sporadic occurrences at 3 and 4	Recorded along much of the transect routes	Activity consistent with the site being used for feeding and commuting but with most activity along the boundaries
Soprano pipistrelle	1, 2, 3, 4 and 5	Recorded along much of the transect routes	Activity consistent with the site being used for feeding and commuting but with most activity along the boundaries
Brown long-eared	1 Brief registration in June	Not recorded	Likely to be along much of the wooded boundary areas, in low numbers
Myotis species	1 and 5 Registrations at both stations in June and July, but sporadic registrations only	Not recorded	Activity suggestive of feeding by low numbers of bats in boundary areas

6. Great Crested Newts

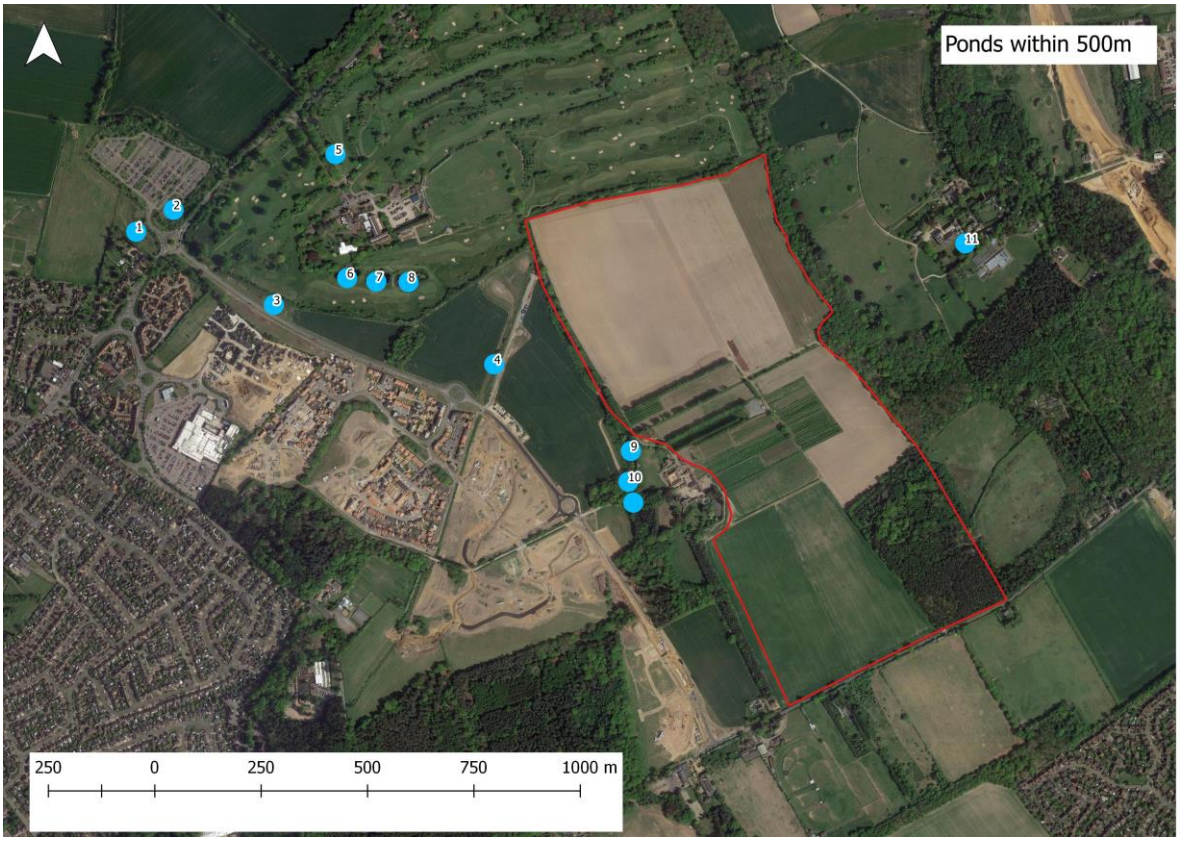
OVERVIEW

6.1 As part of the survey work for the NDR and other schemes locally (including Phase 1 of White House Farm) ponds within the vicinity have been surveyed for great crested newts on a number of occasions. Ponds within 500m are shown on Figure 6. As reported, the distribution of great crested newts is:

- Pond 6 and 7. Reported from eggs in pond 6 only in 2012 and as eggs in pond 7 only in 2013[9]. These ponds were surveyed in 2010[10] but without great crested newts being recorded.

6.2 Ponds 9 and 10 were surveyed in 2012 and 2013, without great crested newts being recorded, and ponds 1 and 2 were also recorded in 2010 without great crested newts being recorded.

Figure 6. Ponds within 500m. The numbering does not cross-reference to other survey work.



[9] JBA (2014) *Great Crested Newt Survey of The Land at Blue Boar Lane. Sprowston, Norfolk*. Unpublished report to the Consortium of Hopkins Homes Ltd, Taylor Wimpey East Anglia and Persimmon Homes Anglia.

[10] 2012/1516 | Land to the North of Sprowston and Old Catton, Between Wroxham Road and St Faiths Road | The Development of Land North of Sprowston and Old Catton to Provide Up To 3,520 Dwellings etc.

RESULTS

6.3 The survey work did not record any great crested newts (Table 6). The population identified at Rackheath Hall is presumed to still be present and is the subject of licensed mitigation measures as part of the NDR. This pond is located >310m from the eastern boundary of the site.

6.4 It is assumed that the eggs recorded in the golf course ponds in 2012 (pond 6) and 2013 (pond 7) are from a transient occurrence.

Table 6. Summary of survey results 2017.

Pond number	Description	Habitat Suitability Index rating	Survey results	Great crested newts (present / absent)
1	Attenuation pond associated with the park and ride	Average	No amphibians recorded	Absent
2	Attenuation pond associated with the park and ride	Average	No amphibians recorded	Absent
3	Attenuation ponds associated with Phase 1	Average	No amphibians recorded	Absent
4	Attenuation ponds associated with Phase 1	Average	Smooth newts recorded	Absent
5	Golf course pond	Below Average	Not surveyed due to isolation and distance (~500m)	Absent
6	Golf course pond	Average	Negative by e-DNA	Absent
7	Golf course pond	Average	Negative by e-DNA	Absent
8	Golf course pond	Average	Negative by e-DNA	Absent
9	Woodland pond	Average	Smooth newts recorded	Absent
10	Wet ditch	Poor	No amphibians recorded	Absent
11	Ornamental pond within Rackheath Park	-	Not surveyed	Assumed present

7. Evaluation

HABITATS OF PRINCIPAL IMPORTANCE

7.1 The only habitats that are considered to qualify as Habitats of Principal Importance (Maddock, 2011[11]) are:

- The hedgerow along the south boundary alongside Salhouse Road.
- The hedgerow alongside the north-west boundary, which has a great than 80% overall cover of native woody species. The hedgerow along the north boundary is not thought to have greater than 80% native woody species due to the numerous gaps and does not therefore qualify.

FEATURES WITHIN THE NPPF

7.2 The Bulmer Coppice is an ancient woodland site re-planted with conifers. On this basis it does not therefore qualify as a Habitat of Principal Importance despite its ancient history, and it also is not listed as a County Wildlife Site. However, the National Planning Policy Framework (DCLG, loc. cit., paragraph 118) recognises the value of ancient woodland (without distinguishing between the past and present tree cover):

> *"planning permission should be refused for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the need for, and benefits of, the development in that location clearly outweigh the loss"*

7.3 This recognition also applies to many of the hedgerow trees that are mature and potentially 'aged' if not 'veteran'.

BATS

7.4 As shown by the work for the NDR and incorporated into the AAP the site is important for its location along the commuting routes for barbastelle bats. The east boundary in particular offers a long and near continuous woodland edge for them to fly along. This area in particular is important for commuting per se.

7.5 The importance of the site as foraging habitat is difficult to quantify, being a function of habitat area and quality. Table 7 attempts to quantify this, and the total extent of low quality and moderate quality foraging habitat is 17.84ha, and as foraging habitat in the local context if it is likely to be of lower but not negligible value.

Table 7. Semi-quantitative assessment of foraging areas for bats.

Location	Extent (ha)	habitat	Quality as foraging
East boundary	0.28ha (1.4km by width of 2m)	A mix of grass verge and woodland edge	Moderate
North and north-west boundary	0.22ha (1.1km by 2m)	Grass verge with tall hedgerow including trees	Moderate
Other boundaries	0.17ha (828m by 2m)	Grass verge and hedgerow	Low
Bulmer Coppice	7.18ha	Mainly coniferous woodland with sparse understorey	Low
Fruit areas	10ha	Rank grassland with fruit trees	Low

[11] Maddock, A. (2011) *UK BAP Priority Habitat Descritpions*. Available from: http://jncc.defra.gov.uk/PDF/UKBAP_PriorityHabitatDesc-Rev2010.pdf

GREAT CRESTED NEWTS

7.6 Great crested newts are considered to be absent from the site (but see mitigation).

PROTECTED SPECIES SCOPING

7.7 No evidence of badgers was seen during the surveys and they are assumed to be absent. The protected species scoping is shown below (Table 8), with species present likely to be present in low numbers and as part(s) of larger local population(s).

Table 8. Summary of ecology assessment.

Feature	Description	Assessment and impacts
Birds	Good hedgerow and verge habitat for a range of species, skylarks not noted but yellowhammer recorded incidentally	Almost certainly present in site hedgerows and other areas of tall vegetation. Skylarks potentially present in the main field, but not noted incidentally during 2017
Reptiles	Limited verge habitat, with associated cover	Potentially present
Brown hare	Hares reported from within 2km but none noted during surveys. The site is probably too disturbed and isolated from wider farmland to be occupied	Scoped-out
Hedgehogs	Known to be present locally and good habitat is present on the boundaries for individuals to be resident and also for foraging	Potentially present
Invertebrates	Specialist microhabitats generally absent, although the trees support dead wood that may be relevant to dead wood species but a rich dead wood fauna is not known locally	Most likely only widespread species present

RECOMMENDATIONS FOR ADDITIONAL SURVEYS

7.8 The work reported here provides a strategic overview of the site and the main ecological features. For a full assessment it is recommended that surveys are undertaken for breeding birds and reptiles as well as additional bat surveys over the full season. The site is likely to support nesting birds and possibly reptiles as part of larger local population(s), but with the ecological importance of any such species being low.

8. Mitigation of Impacts

MASTERPLANNING

8.1 At this strategic level site masterplanning is seen as the key mechanism for maintaining the ecological interest of the site as far as possible and to mitigate ecological impacts. Barbastelle bats are the key species group to be targeted by this, with other species benefiting from these measures.

8.2 Bats, including barbastelles, have been shown to be negatively associated with housing and urban developments through both loss of habitat and indirect effects such as lighting (Border et al., 2017[12]). Barbastelles are typically considered to be light intolerant (Stone et al., 2015[13]) and sensitive to other urbanising impacts. Although there is generic guidance on minimising such pathways on bats (Gunnell and Grant, 2012[14]

Area Action Plan Bat Corridors

8.3 Two AAP bat corridors cross the site, one east-west across the south and north-south along the east boundary. It is recommended that these are kept as dark as possible with minimal light spill and the use of new structural planting to provide screening:

- The east–west corridor will need to be designed into the masterplan as a new feature across a currently arable field. Breaks in this corridor will be inevitable due to road crossings, but these should be minimised as far as possible.
- The north-south corridor is already present along the woodland edge, and this should be retained as a linear band of non-developed land, at least 15m wide and with structural planting to provide screening between the corridor and developed areas along its length. Non-lit development would be acceptable within this corridor, such as children's playgrounds and paths.

8.4 Other linear bands of habitat are present within the site (lines of poplars) and the site boundaries (hedgerows), and these should be retained as far possible.

8.5 The design of site lighting especially in the vicinity of bat corridors and at crossing points will need to be designed with consideration of bats to avoid deterrence and the creation of lit zones through which bats will not fly. Design options include low lighting columns, taller orientated columns, baffles and shrouds and also potentially motion activated lighting.

Foraging Habitat

8.6 Existing areas of high quality foraging habitat will be retained within the masterplan and kept suitable for foraging with minimal lighting and screening as appropriate. These include:

- The east boundary (which is also an AAP bat corridor)
- The north-west and north hedgerows, which have tall woody vegetation and associated rank grass swards offering shelter from winds and also moderate quality

[12] Border, J.A., Newson, S.E. White, D.C., and Gillings, S. (2017). Predicting the likely impact of urbanisation on bat populations using citizen science data, a case study for Norfolk, UK. *Landscape and Urban Planning*, *162*, 44-55.

[13] Stone, E.L., Harris, S. and Jones, G. (2015). Impacts of artificial lighting on bats: a review of challenges and solutions. *Mammalian Biology-Zeitschrift für Säugetierkunde*, *80*(3), 213-219.

[14] Gunnell, K. and Grant, G. (2012) *Landscape and Urban Design for Biodiversity and Bats*. Bat Conservation Trust, London.

habitat for foraging. Trees in these locations have moderate or high potential suitability for roosting bats.

8.7 Following the estimates for the extent and quality of foraging habitat on the site, the areas of soft fruit and fruit trees represents the greatest area of loss:

- The loss of soft fruit is estimated to represent 10ha of low quality habitat.

8.8 Two types of habitat are proposed as new or improved foraging habitat: new greenspace and Bulmer Coppice.

8.9 Within areas of new greenspace, in locations connected to dark corridors accessible for bats, it is proposed that this 10ha of low quality habitat can be mitigated with a smaller area of higher quality habitat. Such higher quality habitat would require:

- A mix of habitats to provide a continuity of insect prey over the season, including linear features to provide features for bats to navigate along.
- A high proportion of native species likely to produce an abundance of insect prey. Barbastelles are typically considered to be moth-feeders (Sierro and Arlettaz 1997[15] Rydell et al., 1996[16]). Important species to include within such planting schemes include: oak, silver birch, ivy, low growing shrubs and herb rich grassland.

8.10 Bulmer Coppice (7ha) is currently considered to be of low qualify as foraging habitat, with a sparse understorey and mainly conifer trees. This woodland could be substantially enhanced by: retaining existing deciduous trees; thinning the conifers to create clearings; and understorey planting of native shrubs around the edges of clearings. As part of woodland works cut timbers, including brash, branches and logs should be retained on-site as these offer high quality habitat for many insects, including those relevant as bat prey. Stumps should be retained rather than removed or 'ground'.

8.11 Areas of wetland including SUDS features will offer new foraging habitat for smaller bats, such as the pipistrelles that feed on flies.

8.12 Overall, there is scope to provide a substantial area of new, higher quality foraging habitat able to offer mitigation for the loss of foraging habitat.

GREAT CRESTED NEWTS

8.13 The only population of great crested newts relevant to the scheme is located at Rackheath hall, more than 300m from the east boundary. It is thought appropriate that a non-licensable approach is taken to mitigation with barrier (exclusion) fencing erected along the east boundary to prevent colonisation of currently unsuitable habitat (that will become suitable once arable farming ceases).

RECREATIONAL DISTURBANCE (OFF-SITE)

8.14 To mitigate for increased local numbers of residents and the potenial for receational disturbance on The Broads and its international sites, on-site mitigation will be required as an integral component of the scheme. This can be achieved via the provision of on-site

[15] Sierro, A., and Arlettaz, R. (1997). Barbastelle bats (*Barbastella* spp.) specialize in the predation of moths: implications for foraging tactics and conservation. *Acta Oecologica*, *18*(2), 91-106.

[16] Rydell, J., Natuschke, G., Theiler, A. and Zingg, P. E. (1996). Food habits of the barbastelle bat *Barbastella barbastellus*. *Ecography*, *19*(1), 62-66.

greenspace including Bulmer Coppice, with walking routes creating paths attractive to local residents, especially dog walkers (see guidance from Hampshire County Council, undated[17]).

AVOIDANCE OF HARM

8.15 Depending on the results of future survey work for reptiles and the expectation that nesting birds will be present, mitigation of harm will require measures to avoid destruction of nesting birds and possibly reptiles. These are non-licensable operations and are not considered to pose significant constraints to any development.

[17] Hampshire County Council (undated) *Planning for Dog Ownership in New Developments: Reducing Conflict – Adding Value.* Available from: http://documents.hants.gov.uk/ccbs/countryside/planningfordogownership.pdf

9. Conclusion

The principal constraint on the development of the site is considered to be the barbastelle and other bats, with impacts on commuting corridors (the AAP bat corridors) and the loss of foraging habitat. It is thought that careful design at the masterplan stage including measures such as lighting design and the creation of high quality foraging habitat will offer appropriate mitigation and maintain the value of the site for bats.

10. Appendix 1: Photographs

Figure 7. Fruit trees.

Figure 8. Hedgerow tree with high potential suitability for bats.

Figure 9.
Verge alongside north hedgerow.

Figure 10.
Verge alongside east boundary, adjacent to Paine's Yard Wood, The Owlery and March Covert.

Figure 11.
Bulmer Coppice.

11. Appendix 2: Legislation

Non-technical account of relevant legislation and policies.

Species	Legislation	Offence	Licensing
Bats: European protected species	Conservation of Habitats and Species Regulations 2010 (as amended) Reg 41	Deliberately capture, injure or kill a bat; deliberate disturbance of bats; or damage or destroy a breeding site or resting place used by a bat. [The protection of bat roosts is considered to apply regardless of whether bats are present.]	A Natural England (NE) licence in respect of development is required.
Bats: National protection	Wildlife and Countryside Act 1981 (as amended) S.9	Intentionally or recklessly obstruct access to any structure or place used for shelter or protection or disturb a bat in such a place.	Licence from NE is required for surveys (scientific purposes) that would involve disturbance of bats or entering a known or suspected roost site.
Birds	Wildlife and Countryside Act 1981 (as amended) S.1	Intentionally kill, injure or take any wild bird; intentionally take, damage or destroy the nest of any wild bird while that nest is in use or being built. Intentionally or recklessly disturb a Schedule 1 species while it is building a nest or is in, on or near a nest containing eggs or young; intentionally or recklessly disturb dependent young of such a species [e.g. kingfisher].	No licences are available to disturb any birds in regard to development.
Great crested newt: European protected species	Conservation of Habitats and Species Regulations 2010 (as amended) Reg 41	Deliberately capture, injure or kill a great crested newt; deliberate disturbance of a great crested newt; deliberately take or destroy its eggs; or damage or destroy a breeding site or resting place used by a great crested newt.	Licences issued for development by Natural England.
Great crested newt: National protection	Wildlife and Countryside Act 1981 (as amended) S.9	Intentionally or recklessly obstruct access to any structure or place used for shelter or protection or disturb it in such a place.	A licence is required from Natural England for surveying and handling.
Adder, common lizard, grass snake slow worm	Wildlife and Countryside Act 1981 S.9(1) and S.9(5)	Intentionally kill or injure any common reptile species.	No licence is required. However an assessment for the potential of a site to support reptiles should be undertaken.
Scientific Interest (SSSI) It is an offence	Wildlife and Countryside Act 1981 (as amended)	To carry out or permit to be carried out any potentially damaging operation. SSSIs are given protection through policies in the Local Development Plan.	Owners, occupiers, public bodies and statutory undertakers must give notice and obtain the appropriate consent under S.28 before undertaking operations likely to damage a SSSI. All public bodies to further the conservation and enhancement of SSSIs.

Species	Legislation	Offence	Licensing
County Wildlife Sites	There is no statutory designation for local sites.	Local sites are given protection through policies in the Local Development Plan.	Development proposals that would potentially affect a local site would need to provide a detailed justification for the work, an assessment of likely impacts, together with proposals for mitigation and restoration of habitats lost or damaged.