# Appendix A

Invertebrate Survey Report

# INVERTEBRATE SURVEY OF NORTHSTOWE, CAMBRIDGESHIRE

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# Contents

# 1 Summary


- Selected elm-containing sites were surveyed for white-letter hairstreak butterfly *Satyrium w-album* on 11th and 12th July 2013.
- Five of those sites were revisited to survey for white-spotted pinion moth *Cosmia diffinis* by light-trapping on 21st-22nd and 28th-29th August 2013.
- Other invertebrates were recorded during the course of survey work targeting white-letter hairstreak and white-spotted pinion.
- White-letter hairstreak was found to be present at most of the sites surveyed: 9 sites in total.
- White-spotted pinion was found to be present at all 5 of the sites surveyed.
- As such, the elm-containing woodland and hedges should, as a minimum, be retained within the proposed development.
- Brush-thighed seed-eater beetle *Harpalus froelichii* (a Biodiversity Action Plan (BAP) species) was found at one site: the first Cambridgeshire record of this Breckland speciality.
- Ten other BAP species were found: all moths, and all species for which only research action is required, not site protection.
- 311 species of invertebrate were recorded from the Northstowe site in total.
- 25 species (8.0% of the 311) have Red Data Book, Nationally Scarce, Threatened or Near Threatened conservation status.
- In addition to the important elm-containing woodland and hedges, the Northstowe site supports invertebrates of conservation importance associated with (i) arable margins and weedy disturbed ground, (ii) pasture with herbivore dung, and (iii) wetlands.
- Further survey is strongly recommended to assess the conservation importance of other habitats on site, notably (i) arable margins and weedy disturbed ground, (ii) pasture with herbivore dung, and (iii) wetlands.


# 2 Introduction

## 2.1 BACKGROUND

The Northstowe site covers Oakington Barracks and Airfield, and an equivalent area between the barracks and the A14 to the south of mostly arable farmland with some pasture (Figure 1). A new town is proposed in the northern part of the site, with associated infrastructure proposed between the barracks and the A14. A planning application for Phase 2 in the northern half of the barracks is due to be submitted in late spring 2014, in conjunction with a separate application for associated infrastructure.

A hedgerow survey of the Northstowe site was conducted in 2004 by Lapwings Consultants on behalf of WSP Environmental, working for English Partnerships and Gallagher Longstanton Ltd. The site is noteworthy for elms *Ulmus* sp., including numerous mature trees (presumably individuals resistant to Dutch elm disease) as well as suckering regrowth. There is an area of elm woodland on the site of Bishop's Palace, within Oakington Barracks.

Due to the abundance of elm on the site, invertebrate surveys were carried out in 2013 targeting white-letter hairstreak butterfly *Satyrium w-album* and white-spotted pinion moth *Cosmia diffinis*, which both feed on elm.

## 2.2 ECOLOGY

White-letter hairstreak caterpillars favour wych elm *Ulmus glabra* and its hybrid taxa but probably occur on all species of elm in Britain. Adults are unobtrusive, feeding on honeydew in the canopy of elms and neighbouring trees, and very occasionally descending to nectar from flowers, such as thistles. Before the arrival of Dutch elm disease in Britain, White-letter Hairstreaks were patchily distributed in southern Britain northwards to Yorkshire. The loss of elms, particularly of the mature trees favoured by the butterfly, has caused a substantial decline.

White-spotted Pinion larvae feed on elm foliage with a preference for mature trees. They have been reported to feed on English elm *Ulmus procera* and wych elm (Waring and Townsend, 2003) and it seems likely that they use all species of elm in Britain. Although large stands of elms are of high conservation importance for this moth, single mature trees can also support colonies. The adult moths fly at night from mid-July to the end of September and are attracted to light. Formerly more widely distributed, since Dutch elm disease, the moth has declined and has recently only been recorded from a restricted area of Huntingdonshire, Cambridgeshire, Bedfordshire and Essex[1].

## 2.3 LEGISLATION AND CONSERVATION STATUS

Both white-letter hairstreak and white-spotted pinion are Biodiversity Action Plan (BAP) Priority Species[2] and have been added to Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006[3] which lists species "of principal importance for the purpose of conserving biodiversity"[4].

White-letter hairstreak is also listed as Endangered in Britain by Fox *et al*. (2010), indicating that on the best available evidence it is facing a very high risk of extinction in the wild. Additionally, white-letter hairstreak is protected from sale under Section 9 of the Wildlife and Countryside Act 1981[5] (as amended).

White-spotted pinion was listed as Nationally Scarce (Na) in Britain by Waring (1994) indicating a species thought to occur in between 16 and 100 10-km squares of the National Grid (see Appendix 1.1 for further detail). Waring (1999) made a revised assessment and proposed that white-spotted pinion should be given one of the Red Data Book categories; this proposal has not been formally adopted by the Joint Nature Conservation Committee (JNCC).

[1] Butterfly Conservation, (2005); White-spotted Pinion. *Cosmia diffinis*.' Available at: http://butterfly-conservation.org/files/white-spotted_pinion-psf.pdf.
[2] These species were identified as requiring action under the UK Biodiversity Action Plan (BAP) and continue to be regarded as conservation priorities under the "UK Post-2010 Biodiversity Framework", the successor to the UK BAP from July 2012. In this report, these species will be referred to as "BAP species".
[3] HMSO, (2006). Natural Environment and Rural Communities Act 2006.
[4] Secretary of State, (2010). Section 41 of the Natural Environment and Rural Communities Act 2006 - Habitats and Species of Principal Importance in England.
[5] Her Majesty's Stationery Office (HMSO), (1981). Wildlife and Countryside Act 1981.

### 2.4 OBJECTIVES

The aims of the surveys were:

- To survey for the presence of white-letter hairstreak at each of the hedgerows containing elm and the elm woodland on the Oakington Barracks; and
- To survey for the presence of white-spotted pinion at the hedgerows dominated by elm and in the elm woodland on the Oakington Barracks.

In addition to surveying for the presence of these two BAP species, other readily-identified invertebrates were noted in the field and a limited number of specimens were collected for subsequent identification.

## 3 Methods

### 3.1 WHITE-LETTER HAIRSTREAK

The peak time for surveying for white-letter hairstreak is the last two weeks of June into early July. Two survey visits were made by the author, on 11th and 12th July 2013. Of the hedgerows containing elm, white-letter hairstreak was surveyed at each of the following locations shown on Figure 1:

- The elm woodland on the Oakington Barracks and Airfield;
- Hedgerows 43, 47, 48, 49 and 50 around pasture fields to the west of Oakington Barracks and Airfield; and
- Hedgerows 51, 52, 53, 59, 72, 96 and 45/15/77 around arable fields between Oakington Barracks and Airfield and the A14.

Access was not available to hedges 46, 91 and 92 around pasture and arable fields to the west of Oakington Barracks and Airfield but these hedges were viewed through binoculars from distance where possible.

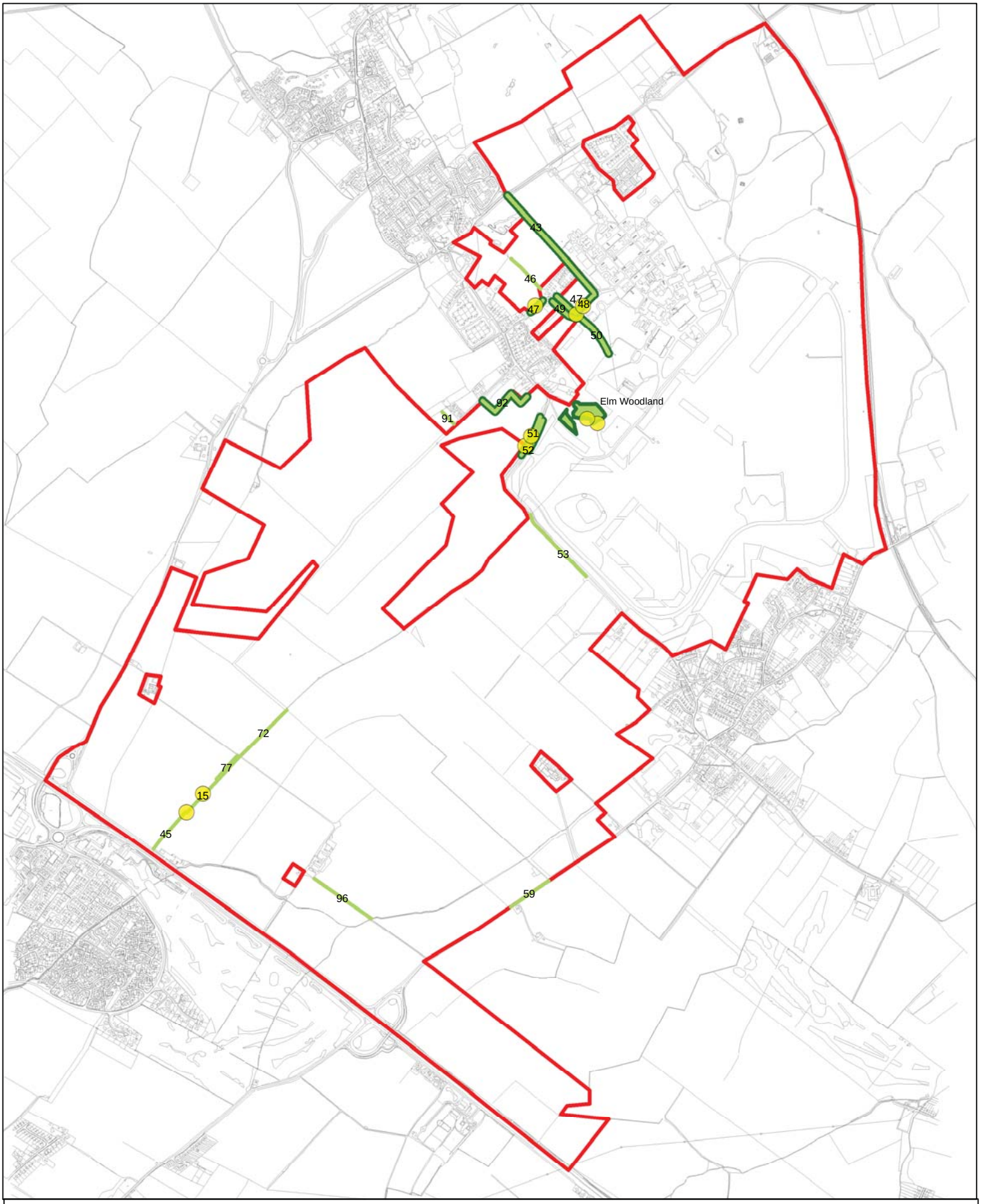
The survey was conducted to ascertain the presence or likely absence of white-letter hairstreak in accordance with advice on the White-letter Hairstreak Recording Project website[6]. The surveyor searched for adult butterflies flying around the tops of elms and other prominent trees in warm, sunny weather with little or no wind. Survey work on 11th was carried out from 09:08 to 13:24, and on 12th from 13:40 to 17:40.

### 3.2 WHITE-SPOTTED PINION

White-spotted pinion flies from late July to late August, exceptionally to as late as mid-September (Waring and Townsend, 2003). Hedges 47, 48, 50, 51, 52 and 45/15/77 were surveyed (refer to Figure 1), as well as the elm woodland on the Oakington Barracks.

Two nocturnal survey visits were made by the author, together with Martin Albertini and Peter Hall (both experienced lepidopterists), on 21st-22nd and 28th-29th August 2013. On each night, three generators were operated, each running two light-traps with 125W mercury-vapour bulbs (or one light-trap in the case of Hedge 51 which was too small a site to run two traps). The traps were positioned adjacent to elm trees. The objective of the survey was to ascertain the presence or likely absence of white-spotted pinion.

[6] http://www.hertsmiddx-butterflies.org.uk/w-album/index.php




**Legend**

- Site Boundary
- Location of light traps
  White-spotted pinion moth recorded in all locations
- Locations surveyed for white-letter hairstreak
- White-letter hairstreak recorded



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# Figure 1: Invertebrate Survey Results

Scale at A3
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### 3.3 CONSTRAINTS

Invertebrate activity is significantly affected by the weather, which can seriously diminish the effectiveness of some sampling techniques, and this is particularly true of the techniques used by this survey.

The weather on 11th July was dry, overcast (8/8), with a moderate northerly breeze (F4), cool (15 °C) at first but becoming warmer and sunnier later (5/8 cloud cover by 11.00). On 12th July, it was cloudless (0/8), hot and still or with a slight wind (F1); temperatures were forecast to reach 30 °C. The weather on the night of 21st-22nd August was warm, dry and still until 01.30, when the weather turned showery and trapping was abandoned. On 28th-29th August, it was another warm, dry and still night, though fractionally cooler. All fieldwork was thus conducted in suitable weather conditions.

## 4 Results

Both white-letter hairstreak and white-spotted pinion were recorded at the site and this section gives further details relating to these two species, and of other species recorded.

### 4.1 WHITE-LETTER HAIRSTREAK

**Plate 1: White-letter Hairstreak Nectaring on Creeping Thistle at Oakington Barracks.**

White-letter hairstreak (Plate 1) was found to be present at most of the locations surveyed (Figure 1). The species was present in the small patch of elm woodland on the barracks site and at several hedges lying close together in an area of pasture fields on the north-east side of Longstanton, between the village and the barracks site (Table 1): in Hedge 43, in both the western and eastern sections of Hedge 47, in Hedge 49 (on the opposite side of the road to Hedge 47 East), Hedge 48 (which is continuous with Hedge 47 East alongside St Michael's

track), and Hedge 50 (divided from Hedges 47, 48 and 49 only by the width of a road). The only other elm-containing hedge in this area was Hedge 46 to which there was no access. However, this hedge could be scanned through binoculars and it was clear that it was a frequently trimmed hedge with only 3 or 4 elms of hedge height, and probably of negligible importance for white-letter hairstreak.

On the opposite, south-west, side of Longstanton, white-letter hairstreak was found to be present in Hedge 51, as well as in Hedge 52 on the opposite side of the road. There was no access to Hedges 91 and 92 but both could be observed through binoculars from some distance. This was sufficient to establish that white-letter hairstreak was present in Hedge 92. White-letter hairstreak was not observed at Hedge 91 though the habitat looked equally as suitable as at several other hedges where white-letter hairstreak was present.

Towards the southern edge of the survey area, Hedges 59 and 96 were surveyed. Elm was present but white-letter hairstreak was not observed. An avenue of mature elms was found along the bridleway near Hazlewell Court (Hedges 45, 15 and 77) but white-letter hairstreak was not present here either.

Hedges 53 and 72 were noted as containing elm in the 2004 hedgerow survey but no elms were present when these hedges were surveyed for white-letter hairstreak in 2013. It is likely that elms were present in these hedges in 2004 but had died or been cut down prior to the survey.

**Table 1**: Sites where White-letter Hairstreak was Recorded

| **Hedge** | **Site** | **Central Grid Reference** |
|---|---|---|
| - | Oakington Barracks: elm woodland | TL405656 |
| 43 | Long Lane, Longstanton | TL4066 |
| 47W | Mills Lane, Longstanton | TL402661 |
| 47E & 49 | Mills Lane, Longstanton | TL404661 |
| 48 | St Michael's Track, Longstanton | TL405661 |
| 50 | Mills Lane, Longstanton | TL404660 |
| 51 | Longstanton Road, Longstanton | TL402655 |
| 52 | Longstanton Road, Longstanton | TL402655 |
| 92 | Wilson's Road, Longstanton | TL400657 |

## 4.2 WHITE-SPOTTED PINION

**Plate 2: White-spotted Pinion at a Light Trap at the Site.**

White-spotted pinion (Plate 2) was found to be present at all five sites where light-traps were operated (Table 2; Figure 1). Table 2 gives the full GPS grid references to the light-trap positions but moths could be attracted to the lights from upwards of 50 m away, such that these trapping positions indicate the presence of white-spotted pinion in the hedges listed in the first column, as well as in the elm woodland on the barracks site.

**Table 2**: Sites where White-spotted Pinion was Recorded

| Hedge | Site | GPS grid references[7] |
|---|---|---|
| - | Oakington Barracks: elm woodland | TL40561 65625 & TL40516 65646 |
| 47W | Mills Lane, Longstanton | TL40293 66135 |
| 47E, 48, 49 & 50 | junction of Mills Lane, St Michaels Lane and St Michael's Track, Longstanton | TL40469 66098 & TL40498 66133 |
| 51 & 52 | Longstanton Road, Longstanton | TL40249 65527 & TL40274 65569 |
| 45, 15 & 77 | Elm avenue along bridleway near Hazlewell Court, Bar Hill | TL38787 63943 & TL38858 64023 |

[7] GPS grid references are generally accurate to ± 6 m at best.

## 4.3 OTHER INVERTEBRATES

The survey identified 311 species of invertebrate (Appendix 2), including representatives of the following groups: woodlice, dragonflies, earwigs, bush-crickets, crickets, grasshoppers, leafhoppers, planthoppers, bugs, beetles, ants, wasps, bees, lacewings, flies, caddisflies, moths, butterflies and snails.

### 4.3.1 Biodiversity Action Plan Priority Species

Thirteen UK Biodiversity Action Plan (BAP) Priority Species have been found by this survey (Table 3). In addition to white-letter hairstreak and white-spotted pinion discussed above, brush-thighed seed-eater beetle *Harpalus froelichii* is a rare species which needs to be taken into account in proposals to develop this site. In contrast, the remaining ten BAP species (all moths) are still widespread and common though declining. Conservation action for these "research only" BAP species is focused on further research rather than protection of individual sites. Nevertheless, all thirteen BAP species have been added to Section 41 of the NERC Act 2006 which lists species "of principal importance for the purpose of conserving biodiversity".

**Table 3**: BAP Species Recorded

| Order | Family | Species (Scientific Name) | Species (English Name) | BAP Status |
|---|---|---|---|---|
| Coleoptera | Carabidae | *Harpalus froelichii* | Brush-thighed Seed-eater | BAP |
| Lepidoptera | Lycaenidae | *Satyrium w-album* | White-letter Hairstreak | BAP |
| Lepidoptera | Noctuidae | *Cosmia diffinis* | White-spotted Pinion | BAP |
| Lepidoptera | Geometridae | *Timandra comae* | Blood-vein | BAP (research only) |
| Lepidoptera | Geometridae | *Chiasmia clathrata* | Latticed Heath | BAP (research only) |
| Lepidoptera | Arctiidae | *Tyria jacobaeae* | Cinnabar | BAP (research only) |
| Lepidoptera | Noctuidae | *Diarsia rubi* | Small Square-spot | BAP (research only) |
| Lepidoptera | Noctuidae | *Tholera decimalis* | Feathered Gothic | BAP (research only) |
| Lepidoptera | Noctuidae | *Atethmia centrago* | Centre-barred Sallow | BAP (research only) |
| Lepidoptera | Noctuidae | *Acronicta psi* | Grey Dagger | BAP (research only) |
| Lepidoptera | Noctuidae | *Amphipyra tragopoginis* | Mouse Moth | BAP (research only) |
| Lepidoptera | Noctuidae | *Hydraecia micacea* | Rosy Rustic | BAP (research only) |
| Lepidoptera | Noctuidae | *Hoplodrina blanda* | Rustic | BAP (research only) |

Further information about the brush-thighed seed-eater *Harpalus froelichii* is provided in Section 4.3.2 below.

### 4.3.2 Key Species

Amongst the 311 species recorded by this survey, 25 (8.0%) have RDB, Nationally Scarce, Threatened or Near Threatened conservation status (Table 4); for the purposes of this report, these species will be referred to as "Key Species". Table 4 is ordered by conservation status category starting with the rarest/most threatened species.

For an explanation of the conservation status categories of invertebrates, see the box below, in conjunction with Appendix 1. This total of 25 Key Species includes the three BAP species which also have either RDB status (white-letter hairstreak and brush-thighed seed-eater) or Nationally Scarce status (white-spotted pinion).

**Conservation status categories of invertebrates**

A system of conservation statuses has been in use since the British Red Data Book for insects (Shirt, 1987), amended and supplemented by a series of JNCC Nature Conservation reviews. By this system, the rarest and most threatened species are given one of the Red Data Book (RDB) statuses. Species which do not qualify as RDB but are nonetheless uncommon are given one of the Nationally Scarce statuses. The status categories and criteria of this first version are defined in Appendix 1.1.

For butterflies, dragonflies, water beetles and some other groups, the most up-to-date conservation statuses are based on the International Union for Conservation of Nature (IUCN) Red List categories and criteria (IUCN, 2001). This system places less emphasis on rarity and more on factors which suggest a risk of extinction (such as severe declines in range or population). The status categories and criteria of this second version are defined in Appendix 1.2.

The species of conservation significance for a site assessment such as this (the "Key Species") are the RDB and Nationally Scarce species under the earlier criteria and the Threatened and Near Threatened species under the later criteria.

**Table 4**: Key Species Recorded

| Order | Family | Species (Scientific Name) | Species (English Name) | Conservation Status |
|---|---|---|---|---|
| Coleoptera | Carabidae | *Harpalus froelichii* | Brush-thighed Seed-eater | RDB2, BAP |
| Lepidoptera | Lycaenidae | *Satyrium w-album* | White-letter hairstreak | EN, BAP, WCA5 |
| Hemiptera | Miridae | *Lygus pratensis* | a mirid bug, | RDB3 |
| Coleoptera | Staphylinidae | *Oxytelus piceus* | a rove-beetle | RDBK |
| Coleoptera | Cryptophagidae | *Cryptophagus schmidtii* | a beetle | RDBK |
| Coleoptera | Cryptophagidae | *Atomaria scutellaris* | a beetle | RDBK |

| Order | Family | Species (Scientific Name) | Species (English Name) | Conservation Status |
|---|---|---|---|---|
| Coleoptera | Colydiidae | *Aulonium trisulcus* | A beetle | Nationally Scarce (Na) |
| Coleoptera | Chrysomelidae | *Longitarsus parvulus* | A flea-beetle | Nationally Scarce (Na) |
| Hymenoptera: Aculeata | Formicidae | *Lasius brunneus* | Brown tree ant | Nationally Scarce (Na) |
| Lepidoptera | Noctuidae | *Cosmia diffinis* | White-spotted pinion | Nationally Scarce (Na), BAP |
| Hemiptera: Auchenorrhyncha | Delphacidae | *Asiraca clavicornis* | A planthopper | Nationally Scarce (Nb) |
| Coleoptera | Carabidae | *Ophonus ardosiacus* | A ground beetle | Nationally Scarce (Nb) |
| Coleoptera | Cantharidae | *Malthinus balteatus* | A soldier-beetle | Nationally Scarce (Nb) |
| Coleoptera | Salpingidae | *Lissodema denticolle* | A beetle | Nationally Scarce (Nb) |
| Lepidoptera | Sesiidae | *Sesia apiformis* | Hornet moth | Nationally Scarce (Nb) |
| Lepidoptera | Gelechiidae | *Chionodes fumatella* | A micro-moth | Nationally Scarce (Nb) |
| Lepidoptera | Geometridae | *Phibalapteryx virgata* | Oblique striped | Nationally Scarce (Nb) |
| Lepidoptera | Geometridae | *Eupithecia millefoliata* | Yarrow pug | Nationally Scarce (Nb) |
| Lepidoptera | Noctuidae | *Xestia rhomboidea* | Square-spotted clay | Nationally Scarce (Nb) |
| Lepidoptera | Noctuidae | *Archanara sparganii* | Webb's wainscot | Nationally Scarce (Nb) |
| Lepidoptera | Noctuidae | *Earias clorana* | Cream-bordered green pea | Nationally Scarce (Nb) |
| Coleoptera | Hydrophilidae | *Enochrus bicolor* | An aquatic beetle | Nationally Scarce |
| Coleoptera | Hydrophilidae | *Enochrus quadripunctatus* | An aquatic beetle | Nationally Scarce |
| Coleoptera | Hydrophilidae | *Cercyon bifenestratus* | A beetle | Nationally Scarce |
| Coleoptera | Staphylinidae | *Carpelimus obesus* | A rove-beetle | Nationally Scarce |

For each of the Key Species recorded (except for white-letter hairstreak and white-spotted pinion already discussed above), a short account is provided, describing the ecology and distribution of the species in Britain, followed by details of its occurrence during the current survey. These accounts may make reference to “vice-counties”: a fixed set of 112 areas covering the whole of Britain which have been used by biological recorders since 1852. The Northstowe site is within the vice-county of Cambridgeshire (VC 29).

***Harpalus froelichii* (Coleoptera: Carabidae) brush-thighed seed-eater, BAP, RDB2**

This is a seed-feeding ground beetle that requires open vegetation on sandy soil, extensive bare ground, regular and intense soil disturbance, and abundant seeds from a diverse flora of ruderal plants, particularly *Chenopodium album* (Telfer, 2009). It is a speciality of the Breckland of Norfolk and Suffolk though it was also known from a few coastal localities in Norfolk, Suffolk and Essex in the late 1800s and early 1900s. In addition, it was recorded for the first time in Lincolnshire in 2009. The UK Species Action Plan target is to “ensure the maintenance of five viable populations [of *H. froelichii*] across the historic range by 2010”. The review by Telfer (2009) concludes that the species is known from only three viable populations, which falls short of the Species Action Plan target.

On the current survey, a female was found at a light trap at Hedge 45/15/77. This is the first record for Cambridgeshire and a significant extension of the known range of this beetle.

***Lygus pratensis* (Hemiptera: Heteroptera: Miridae) a mirid Bug, RDB3**

This is a large mirid bug (Plate 3). It was formerly known in southern Britain from Kent to Hampshire and north to Berkshire, mostly confined to southern heaths. However, in recent years this bug has undergone a dramatic range expansion. It is now widespread throughout much of southern Britain and undoubtedly no longer merits Red Data Book status. Older records come from rides in ancient woodland, open herb-rich areas and heathland. On the continent it is known to be polyphagous (Kirby, 1992).

**Plate 3: *Lygus pratensis***

On the current survey, two were recorded at light at Hedge 47W.

***Oxytelus piceus* (Coleoptera: Staphylinidae) a rove-beetle, RDBK**

This rove-beetle (Plate 4) is a specialist on herbivore dung. There are records from Wales and southern England northwards to Yorkshire but this is a species which has declined during the 20th century. Peter Hammond (*in litt*., 8th August 2013), who coordinates the national recording scheme for this family of beetles, notes the potential for misidentification of the similar species *O. sculptus* and *O. laqueatus* (both of which were also recorded by this survey). He has confirmed post-1950 records from West Kent in 1951 and West Suffolk in 1973. Likely to be correct are records from West Norfolk in 1985 and Glamorganshire in 1991. Unconfirmed recent records also exist for Yorkshire, Lincolnshire and South Hampshire. Even if all these records are correct, this is a rare species with a very scattered distribution.

**Plate 4: A Male Specimen of *Oxytelus piceus* from the Site**

On the current survey, four individuals were recorded at light at three sites: a male and female at Hedge 47W, a male at Hedge 48 and a female at Hedge 51.

***Cryptophagus schmidtii* (Coleoptera: Cryptophagidae) a beetle, RDBK**

The genus *Cryptophagus* is a large one in Britain and its members are amongst the most difficult beetles to identify. However, *C. schmidtii* is a relatively distinctive *Cryptophagus*. Little is known about the ecological requirements of these deservedly unpopular beetles. Many *Cryptophagus* live in close association with man, and *C. schmidtii* has been found in such situations, including in “stack litter and in a granary” (Hyman and Parsons, 1994) and “in a grain silo” (Drane and Marsh, 2006). However, *C. schmidtii* has also been found in natural fenland: at Wicken Fen in 1870, and some time prior to that at Whittlesea Mere. Drane and Marsh (2006) detail records from six British sites since 1980, from diverse outdoor habitats, including a farmyard, a chalk under-cliff, chalk grassland, saline lagoon margin, limestone woodland and ancient wood-pasture. It is possible that the occurrence of *C. schmidtii* outdoors in Britain is linked to pheasant feed.

On the current survey, one was recorded at light at Hedge 48.

***Atomaria scutellaris* (Coleoptera: Cryptophagidae) a beetle, RDBK**

This small beetle was first recorded in Britain from the Isles of Scilly in the 1960s. Johnson (1993) mapped records from Scilly, Cornwall, Surrey, West Sussex and East Sussex, mostly on or near the coast. It has been found in a wide range of habitats. In more recent years, this species has expanded its range considerably, extending to northern England (Roger Booth, pers. comm.) and undoubtedly no longer merits Red Data Book status.

On the current survey, 11 were recorded at light at Hedge 51.

***Aulonium trisulcus* (Coleoptera: Colydiidae) a beetle, Nationally Scarce (Na)**

This beetle is associated with elm bark under attack by the elm bark beetles *Scolytus scolytus* and *S. multistriatus* and may be predatory upon the bark beetles to some degree. It has a south-eastern distribution in England northwards and westwards to South Lincolnshire and Herefordshire (Hyman and Parsons, 1992). It declined greatly with the demise of elm in the British landscape, with no British records between 1964 and 1971 but has recovered since the 1970s.

On the current survey, one was recorded at light at Hedge 51. This may be the first record for Cambridgeshire, as there are no records listed from the county by Hyman and Parsons (1992).

***Longitarsus parvulus* (Coleoptera: Chrysomelidae) a flea-beetle, Nationally Scarce (Na)**

This flea-beetle is associated with flax. It had declined and Hyman and Parsons (1992) knew of it from only four vice-counties between 1970 and their publication. Subsequently, linked to the increased popularity of flax as a crop, this has become a common and ubiquitous beetle in much of England, now utilising a much wider range of foodplants (Cox, 2007). It no longer deserves to be regarded as Nationally Scarce (Na) but until there is a revision of status categories, this remains its official conservation status.

On the current survey, recorded at Hedges 47W, 51 and 45/15/77.

***Lasius brunneus* (Hymenoptera: Aculeata: Formicidae) brown tree ant, Nationally Scarce (Na)**

Often also referred to as the ‘brown ant’ or ‘tree ant’, *Lasius brunneus* is similar in appearance to the common black pavement ant *Lasius niger* but the head and mid-parts are reddish-brown, contrasting with the blackish hind-body. Nests are usually found within trunks of mature trees, typically oaks, where parts of the wood have been softened by fungal decay. The ants excavate their nests and jettison the resulting frass which often provides a tell-tale sign of ant activity from the outside. The workers are largely nocturnal, forming conspicuous runs up and down trunks after dark. Tree ants are an important component of the saproxylic invertebrate community, creating conditions which are then inhabited by a range of other species. This species has two areas of distribution, one centred on London and another on the Severn valley. In both areas it is expanding its range and becoming more common, and no longer merits its official status as a Nationally Scarce species.

On the current survey, one was seen on the trunk of an old hawthorn at Hedge 72 (running north from Hedge 45/15/77).

***Asiraca clavicornis* (Hemiptera: Auchenorrhyncha: Delphacidae) a planthopper, Nationally Scarce (Nb)**

This is a distinctive planthopper of short grassland swards on drier chalk or sandy soils, often in disturbed situations with an element of bare ground. It was formerly known from a wide area of southern England south of a line joining the Wash to the Bristol Channel. Kirby (1992) reported a substantial decline in range with all recent records being confined to the Thames Estuary, largely from the London area. However, the species does still persist in the Suffolk Breckland and on chalk in Bedfordshire and Buckinghamshire (pers. obs.) and is widespread and occasionally abundant in its London and Thames Estuary core range (Jones, 1999).

On the current survey, one was recorded at light at Hedge 51.

***Ophonus ardosiacus* (Coleoptera: Carabidae) a ground beetle, Nationally Scarce (Nb)**

A ground-beetle that feeds predominantly on seeds and is associated with weedy places, usually in coastal localities on chalk, limestone or clay soils. Within recent decades it has become significantly more common and occurs far more widely inland than it used to (Harvey, 2004), though still restricted to south-eastern England. This shift may be a response to favourable agri-environment schemes or to climate change.

On the current survey, two were recorded at light at Hedge 48.

***Malthinus balteatus* (Coleoptera: Cantharidae) a soldier-beetle, Nationally Scarce (Nb)**

This is a predatory beetle living in trees and shrubs and developing in deadwood. It has a thinly scattered distribution across southern England and Wales, where it is “a speciality of wooded habitats on soils where the water table is regularly high. These include alluvial floodplain woodland, seepage woodland and even the wooded lower fringes to chalk downs” (Alexander, 2003).

On the current survey, one was beaten from elm branches at the Barracks elm woodland.

***Lissodema denticolle* (Coleoptera: Salpingidae) a beetle, Nationally Scarce (Nb)**

Until recently known as *Lissodema quadripustulatum*. This is a predatory insect in both the adult and larval stages. Usually found under bark or in crevices in rotting wood, and associated with a wide range of broad-leaved trees as well as being found on pine. It has been recorded in scattered localities across much of England northwards to the north-east region.

On the current survey, two were beaten from elm branches at the Barracks elm woodland.

***Sesia apiformis* (Lepidoptera: Sesiidae) hornet moth, Nationally Scarce (Nb)**

A spectacular moth with a strong resemblance to a hornet *Vespa crabro*. Larvae feed on the living wood of poplars and develop within the roots and lowest parts of the trunk of their host tree, typically emerging as an adult after two or three years (Waring and Townsend, 2003). The large, circular emergence holes they create are more often seen than the moths themselves. In East Anglia and the East Midlands, this moth is quite frequent but outside of this core range it is very scarce or absent.

On the current survey, exit holes were seen in the bases of mature poplars on the Oakington Barracks site.

***Chionodes fumatella* (Lepidoptera: Gelechiidae) a micro-moth, Nationally Scarce (Nb)**

This moth is thought to feed on mosses in the caterpillar stage. It inhabits sandy coastal habitats but has increasingly been found in similar habitats inland. Its distribution covers much of England and Wales, extending to Scotland on the east coast.

On the current survey, three females were recorded at light at the Barracks elm woodland.

***Phibalapteryx virgata* (Lepidoptera: Geometridae) oblique striped, Nationally Scarce (Nb)**

The caterpillars mainly feed on lady's bedstraw *Galium verum*, and the moth inhabits sandy, calcareous sites on the coasts of southern Britain as well as inland in the Breckland of Norfolk and Suffolk, and on inland chalk and limestone from Wiltshire to Sussex.

On the current survey, one was recorded at light at Hedge 51.

***Eupithecia millefoliata* (Lepidoptera: Geometridae) yarrow pug, Nationally Scarce (Nb)**

As the names suggest, this species feeds on yarrow *Achillea millefolium* in the caterpillar stage. It inhabits open dry grassland and ruderal vegetation, especially on sandy or stony soils. It has been recorded from south-east England westwards to Dorset and northwards to North Lincolnshire (Waring and Townsend, 2003).

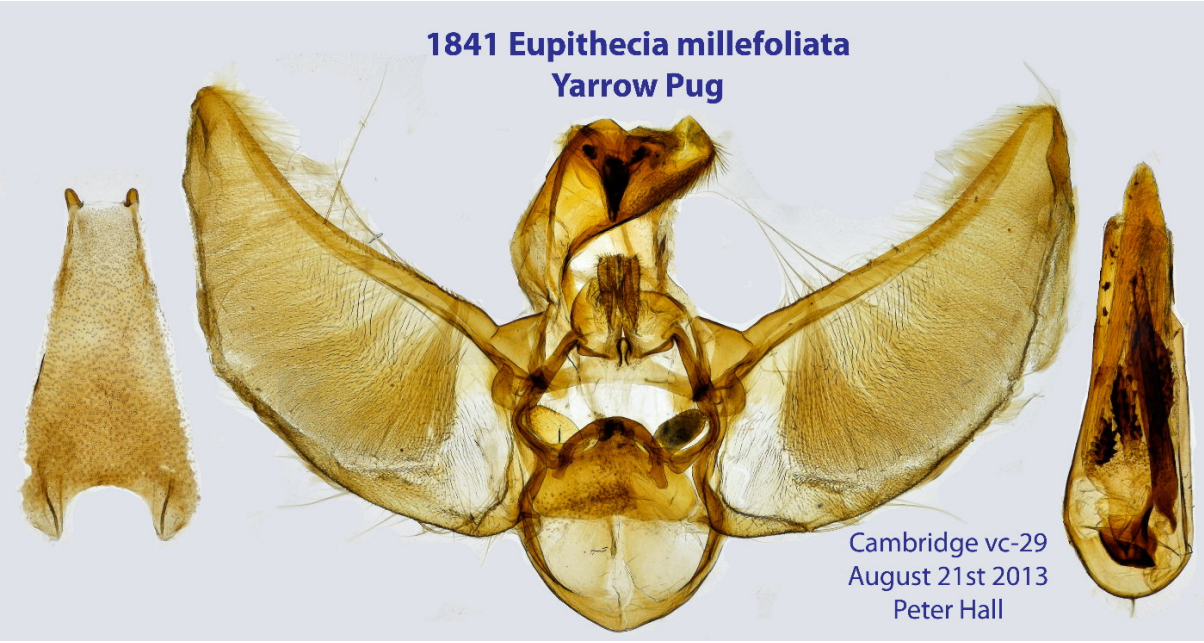


**Plate 5: Genitalia of a Male Yarrow Pug from the Site**

On the current survey, two males were recorded at light at the Barracks elm woodland. Their identity was confirmed by dissection (Plate 5).

***Xestia rhomboidea* (Lepidoptera: Noctuidae) Square-spotted Clay, Nationally Scarce (Nb)**

The foodplants of the caterpillar are not well known but probably include Common Nettle and Dog's-mercury; it may be polyphagous. It inhabits broad-leaved woodland, often on chalk soils, and favouring clearings and woodland edges. It has a very scattered distribution

with some local declines and extinctions but occurs widely in England Wales and parts of Scotland. It is most frequent in the Breckland of Norfolk and Suffolk.

On the current survey, two were recorded at light at Hedge 48 and four at light at the Barracks elm woodland.

***Archanara sparganii* (Lepidoptera: Noctuidae) Webb's Wainscot, Nationally Scarce (Nb)**

A wetland moth with caterpillars feeding on Bulrush *Typha latifolia* primarily, though recorded from a few other tall emergent wetland plants. It has a wide distribution in coastal wetlands from South Wales to the Wash in Lincolnshire with a more restricted distribution inland.

On the current survey, one was recorded at light at Hedge 45/15/77.

***Earias clorana* (Lepidoptera: Noctuidae) Cream-bordered Green Pea, Nationally Scarce (Nb)**

A wetland moth with caterpillars feeding on the terminal shoots of sallows and willows *Salix* species. It occurs in southern England northwards to the Humber Estuary and westwards to Cornwall and the Severn Vale.

On the current survey, one was recorded at light at the Barracks elm woodland.

***Enochrus bicolor* (Coleoptera: Hydrophilidae) an aquatic beetle, Nationally Scarce**

This water beetle is strongly associated with brackish water, in coastal ponds and slow-flowing ditches. Adults feed on algae and decaying plant material whereas the larvae are predatory. It has been noted in ponds which are more than 50% seawater. It occurs around the coasts of southern Britain, especially in East Anglia. Inland records are distinctly unusual (NBN).

On the current survey, singletons were recorded at light at the Barracks elm woodland and the elm avenue (Hedge 45/15/77).

***Enochrus quadripunctatus* (Coleoptera: Hydrophilidae) an aquatic beetle, Nationally Scarce**

This is a scarce species of base-rich lowland fens and in well-vegetated parts of shallow pools on otherwise exposed substrata. It can occur on man-made sites but is mainly recorded from relic fen sites. It is restricted to eastern England.

On the current survey, a male was recorded at light at Hedge 47W.

***Cercyon bifenestratus* (Coleoptera: Hydrophilidae) a beetle, Nationally Scarce**

This is a small aquatic beetle occurring in shallow water and on wet margins. Adults are domed black beetles with a pair of triangular orange spots at the apices of the elytra. This species was first confirmed as British from a capture at Castle Water, Rye Harbour (Allen, 1970). Formerly considered to be Rare (RDB3), this species was downgraded to Nationally Scarce (Na) after its range expanded to include a scatter of recently created sand and gravel pits across south and east England. More recently, Foster (2010) downgraded it further to Nationally Scarce.

On the current survey, one was recorded at light at Hedge 48.

***Carpelimus obesus* (Coleoptera: Staphylinidae) a rove-beetle, Nationally Scarce**

A small wetland rove-beetle occurring on the muddy or sandy margins of standing and running water. It was first recorded in Britain in 1948, probably as an immigrant from the continent and has now colonised most of England (Lott, 2009). It is sometimes attracted to light.

On the current survey, a female was recorded at light at Hedge 51.

# 5 Key Habitats and Habitat Features

This section details the habitats and habitat features within the site that support invertebrate species or assemblages of particular importance.

## 5.1 Elms

The current survey was focused on surveying elms for white-letter hairstreak and white-spotted pinion. Several hedges and one area of woodland were found to support one or both of these BAP species (Table 5) and can thus be assessed as being of national importance for invertebrate conservation.

**Table 5**: Key Sites for Elm-associated Species

| Hedge | Site | Key Elm-associated Species |
|---|---|---|
| - | Oakington Barracks: elm woodland (Plate 6) | White-letter hairstreak and White-spotted pinion |
| 43 | Long Lane, Longstanton | White-letter hairstreak |
| 47W | Mills Lane, Longstanton | White-letter hairstreak and White-spotted pinion |
| 47E, 48, 49 & 50 | Mills Lane, St Michaels Lane and St Michael's Track, Longstanton | White-letter hairstreak and White-spotted pinion |
| 51 & 52 | Longstanton Road, Longstanton | White-letter hairstreak, White-spotted pinion and *Aulonium trisulcus* |
| 91 | Wilson's Road, Longstanton | None recorded as not surveyed but appears suitable for White-letter hairstreak at least |
| 92 | Wilson's Road, Longstanton | White-letter hairstreak |
| 45, 15 & 77 | Elm avenue along bridleway near Hazlewell Court, Bar Hill | White-spotted pinion |

Other Key Species found by this survey and dependent on broad-leaved trees include the beetles *Malthinus balteatus* and *Lissodema denticolle* (both found at the Barracks elm woodland (Plate 6)), and square-spotted clay moth (found at the Barracks elm woodland and Hedge 48).

**Plate 6: The Elm Woodland at the Barracks**

## 5.2 Arable Margins and Weedy Disturbed Ground

Such habitats were not directly surveyed but light-trapping along the elm avenue near to Hazlewell Court, Bar Hill produced a record of the brush-thighed seed-eater beetle *Harpalus froelichii*, a BAP species which inhabits arable margins and other disturbed ground with abundant weedy plants. This is an important discovery: the first for Cambridgeshire and some distance from its Breckland stronghold. Without further research, it is difficult to know whether the single individual had flown a few metres to the trap or a few hundred metres but the likelihood is that a population exists in the vicinity of the elm avenue.

To the north, on and around the Barracks site, four Nationally Scarce insects were found which share a similar affinity for weedy disturbed ground: the moths *Chionodes fumatella* and yarrow pug (both found at the Barracks elm woodland) and the oblique striped moth and the planthopper *Asiraca clavicornis* (both found immediately adjacent to the Barracks perimeter at Hedge 51). These finds suggest that the open grassy and disturbed habitats on the Oakington Barracks site could support invertebrate assemblages of conservation importance.

## 5.3 Pasture

Pasture habitats were not directly surveyed but the rare and declining rove-beetle *Oxytelus piceus* was recorded at three of the light-trapping sites amongst pastures grazed by cattle and horses between the village of Longstanton and the Oakington Barracks site. This species depends on herbivore dung in pasture. It should be noted that beetles were not sampled at

the light traps by the elm woodland on the Barracks site, so it is not known whether *O. piceus* occurs on the Barracks (though it is considered to be highly likely).

### 5.4 WETLAND

Wetland is another habitat that was not directly surveyed but a number of wetland species were recorded at light, including two Nationally Scarce moths (Webb's wainscot and cream-bordered green pea) and four Nationally Scarce beetles (*Enochrus bicolor*, *Enochrus quadripunctatus*, *Cercyon bifenestratus* and *Carpelimus obesus*). One can only speculate as to how far these individuals had flown from their breeding habitat but it strongly suggests that wetland habitats on the survey area including the lake on the Oakington Barracks site could support invertebrate assemblages of conservation importance.

## 6 Recommendations

In view of their national importance for invertebrate conservation, the hedges and elm woodland listed in Table 5 should, as a minimum, be retained within the proposed development.

It is strongly recommended that other elm-containing hedges present within the survey area should also be retained in view of the likelihood that they may contribute to the persistence of populations of white-letter hairstreak, white-spotted pinion and other elm-associated invertebrates.

It will be important that landscaping plans seek to link areas of similar habitats through the planting of habitat corridors that reflect the habitat types to be linked.

Incidental to the surveys of white-letter hairstreak, white-spotted pinion and other elm-associated invertebrates, an unexpectedly wide variety of Key Species associated with other habitats was discovered. It is strongly recommended that further invertebrate survey work should be carried out aiming to assess the conservation importance of other habitats on site, notably (i) arable margins and weedy disturbed ground, (ii) pasture with herbivore dung, and (iii) wetlands.

Without further survey data from these other habitats, it is very difficult to make practical recommendations for mitigation. For example, it would be necessary to have regard for the presence of brush-thighed Seed-eater *Harpalus froelichii* in any development proposals. On current knowledge, this could be achieved by retaining, and appropriately managing, all areas of arable margin and disturbed weedy ground within 500 metres of the point of capture (Hedge 45/15/77). Further survey would aim to identify the precise area occupied by the beetles and to define their habitat requirements on site, and thus to be able to make practical recommendations for mitigation by retention, translocation or creation of compensatory habitat.

## 7 Acknowledgements

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# Appendix 1: British Conservation Status Categories – Definitions.

## 1.1 Status Categories and Criteria Version 1 (Shirt, 1987)

These status categories and criteria were introduced for British insects by Shirt (1987) and received some modifications by later authors (e.g. Hyman and Parsons (1992)).

**Red Data Book Category EXTINCT**

Definition Species which were formerly native to Britain but have not been recorded since 1900.

**Red Data Book Category 1, Endangered**

Definition Species in danger of extinction and whose survival is unlikely if causal factors continue to operate. Endangered species either (a) occur as only a single population within one 10-km square, or (b) only occur in especially vulnerable habitats, or (c) have been declining rapidly or continuously for twenty years or more to the point where they occur in five or fewer 10-km squares, or (d) may already have become extinct.

**Red Data Book Category 2, Vulnerable**

Definition Species which are likely to move into the Endangered category in the near future if causal factors continue to operate. Vulnerable species are declining throughout their range or occupy vulnerable habitats.

**Red Data Book Category 3, Rare**

Definition Species which occur in small populations and although not currently either Endangered or Vulnerable are at risk. Rare species exist in 15 or fewer 10-km squares, or are more widespread than this but dependent on small areas of especially vulnerable habitat.

**Red Data Book Category I, Indeterminate**

Note: Best written as 'RDBi' rather than 'RDBI' as the latter is easily confused with 'RDB1' (Endangered).

Definition Species considered to be either Endangered, Vulnerable or Rare but with insufficient information to say which.

**Red Data Book Category K, Insufficiently Known**

Definition Species suspected to merit either Endangered, Vulnerable, Rare or Indeterminate status but lacking sufficient information. Species included in this category may have only recently been discovered in Britain, or may be very poorly recorded for a variety of reasons.

**Nationally Scarce Category A, Na.**

Definition Species which do not fall within Red Data Book categories but which are nonetheless uncommon in Great Britain and thought to occur in 30 or fewer (typically between 16 and 30) 10-km squares of the National Grid, or for less well-recorded groups, in seven or fewer vice-counties.

**Nationally Scarce Category B, Nb.**

Definition Species which do not fall within Red Data Book categories but which are nonetheless uncommon in Great Britain and thought to occur in between 31 and 100 10-km squares of the National Grid, or for less well-recorded groups, between eight and twenty vice-counties.

**Nationally Scarce, N.**

Definition Species which do not fall within Red Data Book categories but which are nonetheless uncommon in Great Britain. This status category has been used where information has not been sufficient to allocate a species to either Na or Nb. These species are thought to occur in between 16 and 100 10-km squares of the National Grid.

## 1.2 STATUS CATEGORIES AND CRITERIA VERSION 2 (IUCN, 2001)

These later status categories and criteria are based on IUCN Red List Categories and Criteria version 3.1 (IUCN, 2001) and have been applied to British butterflies, dragonflies and a few other invertebrate groups.

**Critically Endangered (CR)**

A taxon is Critically Endangered when the best available evidence indicates that it is facing an **extremely high** risk of extinction in the wild.

**Endangered (EN)**

A taxon is Endangered when the best available evidence indicates that it is facing a **very high** risk of extinction in the wild.

**Vulnerable (VU)**

A taxon is Vulnerable when the best available evidence indicates that it is facing a **high** risk of extinction in the wild.

**N.B.:** Species belonging to the above three categories may be collectively referred to as **Threatened**.

**Data Deficient (DD)**

A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate.

The DD category effectively replaces the Indeterminate (RDBi) and Insufficiently Known (RDBK) categories of the earlier version.

**Near Threatened (NT)**

A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.

**Least Concern (LC)**

A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.

# Appendix 2: List of invertebrates recorded at the Northstowe site in 2013 by Mark G. Telfer, Martin V. Albertini and Peter R. Hall

Key Species and all BAP species are listed in red text. The table is in taxonomic sequence.

Full details of all records generated by this project are held in a computer database by the author that may be consulted if required to provide further information such as precise localities, grid references, quantity, sex and life-stage.

| Class | Order | Family | Species (Scientific Name) | Species (English Name) | Conservation Status |
|---|---|---|---|---|---|
| Malacostraca | Isopoda | Armadillidiidae | *Armadillidium vulgare* | Common pill-woodlouse | None |
| Insecta | Odonata | Aeshnidae | *Aeshna grandis* | Brown hawker | LC |
| Insecta | Odonata | Aeshnidae | *Aeshna cyanea* | Southern hawker | LC |
| Insecta | Odonata | Aeshnidae | *Anax imperator* | Emperor dragonfly | LC |
| Insecta | Odonata | Libellulidae | *Orthetrum cancellatum* | Black-tailed skimmer | LC |
| Insecta | Dermaptera | Forficulidae | *Forficula auricularia* | Common earwig | None |
| Insecta | Orthoptera | Meconematidae | *Meconema thalassinum* | Oak bush-cricket | None |
| Insecta | Orthoptera | Phaneropteridae | *Leptophyes punctatissima* | Speckled bush-cricket | None |
| Insecta | Orthoptera | Gryllidae | *Acheta domesticus* | House cricket | None |
| Insecta | Orthoptera | Acrididae | *Chorthippus brunneus* | Field grasshopper | None |
| Insecta | Orthoptera | Acrididae | *Chorthippus parallelus* | Meadow grasshopper | None |
| Insecta | Hemiptera: Auchenorrhyncha | Cicadellidae | *Ledra aurita* | A leafhopper | None |
| Insecta | Hemiptera: Auchenorrhyncha | Cicadellidae | *Ribautiana ulmi* | A leafhopper | None |

| Class | Order | Family | Species (Scientific Name) | Species (English Name) | Conservation Status |
|---|---|---|---|---|---|
| Insecta | Hemiptera: Auchenorrhyncha | Cicadellidae | *Edwardsiana ulmiphagus* | A leafhopper | None |
| Insecta | Hemiptera: Auchenorrhyncha | Delphacidae | *Asiraca clavicornis* | A planthopper | Nationally Scarce (Nb) |
| Insecta | Hemiptera: Heteroptera | Microphysidae | *Loricula elegantula* | A bug | None |
| Insecta | Hemiptera: Heteroptera | Miridae | *Deraeocoris flavilinea* | A mirid bug | None |
| Insecta | Hemiptera: Heteroptera | Miridae | *Lygus pratensis* | A mirid bug | RDB3 |
| Insecta | Hemiptera: Heteroptera | Miridae | *Lygus rugulipennis* | A mirid bug | None |
| Insecta | Hemiptera: Heteroptera | Miridae | *Phytocoris varipes* | A mirid bug | None |
| Insecta | Hemiptera: Heteroptera | Miridae | *Heterotoma planicornis* | A mirid bug | None |
| Insecta | Hemiptera: Heteroptera | Miridae | *Orthotylus viridinervis* | A mirid bug | None |
| Insecta | Hemiptera: Heteroptera | Anthocoridae | *Anthocoris nemorum* | A flower bug | None |
| Insecta | Hemiptera: Heteroptera | Anthocoridae | *Cardiastethus fasciiventris* | A flower bug | None |
| Insecta | Hemiptera: Heteroptera | Pentatomidae | *Palomena prasina* | Green shieldbug | None |

| Class | Order | Family | Species (Scientific Name) | Species (English Name) | Conservation Status |
|---|---|---|---|---|---|
| Insecta | Hemiptera: Heteroptera | Pentatomidae | *Pentatoma rufipes* | Red-legged shieldbug | None |
| Insecta | Hemiptera: Heteroptera | Acanthosomatidae | *Elasmostethus interstinctus* | Green birch shieldbug | None |
| Insecta | Coleoptera | Gyrinidae | *Gyrinus substriatus* | A whirligig beetle | LC |
| Insecta | Coleoptera | Haliplidae | *Haliplus immaculatus* | A crawling water beetle | LC |
| Insecta | Coleoptera | Dytiscidae | *Hydroglyphus geminus* | A diving beetle | LC |
| Insecta | Coleoptera | Dytiscidae | *Hygrotus impressopunctatus* | A diving beetle | LC |
| Insecta | Coleoptera | Dytiscidae | *Ilybius fuliginosus* | A diving beetle | LC |
| Insecta | Coleoptera | Dytiscidae | *Rhantus suturalis* | The supertramp | LC |
| Insecta | Coleoptera | Carabidae | *Carabus violaceus* | Violet ground beetle | None |
| Insecta | Coleoptera | Carabidae | *Trechus quadristriatus* | A ground beetle | None |
| Insecta | Coleoptera | Carabidae | *Amara apricaria* | A ground beetle | None |
| Insecta | Coleoptera | Carabidae | *Curtonotus aulicus* | A ground beetle | None |
| Insecta | Coleoptera | Carabidae | *Harpalus froelichii* | Brush-thighed seed-eater | RDB2, BAP |
| Insecta | Coleoptera | Carabidae | *Harpalus rufipes* | A ground beetle | None |
| Insecta | Coleoptera | Carabidae | *Ophonus ardosiacus* | A ground beetle | Nationally Scarce (Nb) |
| Insecta | Coleoptera | Carabidae | *Ophonus rufibarbis* | A ground beetle | None |
| Insecta | Coleoptera | Carabidae | *Bradycellus verbasci* | A ground beetle | None |
| Insecta | Coleoptera | Carabidae | *Demetrias atricapillus* | A ground beetle | None |

| Class | Order | Family | Species (Scientific Name) | Species (English Name) | Conservation Status |
|---|---|---|---|---|---|
| Insecta | Coleoptera | Hydrophilidae | *Berosus affinis* | An aquatic beetle | LC |
| Insecta | Coleoptera | Hydrophilidae | *Hydrobius fuscipes* | An aquatic beetle | LC |
| Insecta | Coleoptera | Hydrophilidae | *Enochrus bicolor* | An aquatic beetle | Nationally Scarce |
| Insecta | Coleoptera | Hydrophilidae | *Enochrus quadripunctatus* | An aquatic beetle | Nationally Scarce |
| Insecta | Coleoptera | Hydrophilidae | *Cymbiodyta marginellus* | An aquatic beetle | LC |
| Insecta | Coleoptera | Hydrophilidae | *Cercyon bifenestratus* | A beetle | Nationally Scarce |
| Insecta | Coleoptera | Hydrophilidae | *Cercyon laminatus* | A beetle | None |
| Insecta | Coleoptera | Hydrophilidae | *Cercyon lateralis* | A beetle | None |
| Insecta | Coleoptera | Hydrophilidae | *Cercyon marinus* | A beetle | None |
| Insecta | Coleoptera | Hydrophilidae | *Cercyon quisquilius* | A beetle | None |
| Insecta | Coleoptera | Hydrophilidae | *Cercyon analis* | A beetle | None |
| Insecta | Coleoptera | Silphidae | *Necrodes littoralis* | A sexton beetle | None |
| Insecta | Coleoptera | Staphylinidae | *Hapalaraea pygmaea* | A rove-beetle | None |
| Insecta | Coleoptera | Staphylinidae | *Tachyporus hypnorum* | A rove-beetle | None |
| Insecta | Coleoptera | Staphylinidae | *Atheta graminicola* | A rove-beetle | None |
| Insecta | Coleoptera | Staphylinidae | *Bledius gallicus* | A rove-beetle | None |
| Insecta | Coleoptera | Staphylinidae | *Carpelimus obesus* | A rove-beetle | Nationally Scarce |
| Insecta | Coleoptera | Staphylinidae | *Carpelimus pusillus* | A rove-beetle | None |
| Insecta | Coleoptera | Staphylinidae | *Oxytelus laqueatus* | A rove-beetle | None |
| Insecta | Coleoptera | Staphylinidae | *Oxytelus piceus* | A rove-beetle | RDBK |

| Class | Order | Family | Species (Scientific Name) | Species (English Name) | Conservation Status |
|---|---|---|---|---|---|
| Insecta | Coleoptera | Staphylinidae | *Oxytelus sculptus* | A rove-beetle | None |
| Insecta | Coleoptera | Staphylinidae | *Anotylus inustus* | A rove-beetle | None |
| Insecta | Coleoptera | Staphylinidae | *Anotylus nitidulus* | A rove-beetle | None |
| Insecta | Coleoptera | Staphylinidae | *Anotylus rugosus* | A rove-beetle | None |
| Insecta | Coleoptera | Staphylinidae | *Lithocharis nigriceps* | A rove-beetle | None |
| Insecta | Coleoptera | Staphylinidae | *Lithocharis ochracea* | A rove-beetle | None |
| Insecta | Coleoptera | Staphylinidae | *Ocypus olens* | Devil's coach-horse | None |
| Insecta | Coleoptera | Lucanidae | *Dorcus parallelipipedus* | Lesser stag beetle | None |
| Insecta | Coleoptera | Geotrupidae | *Geotrupes spiniger* | A dor-beetle | None |
| Insecta | Coleoptera | Scarabaeidae | *Aphodius rufipes* | A dung beetle | None |
| Insecta | Coleoptera | Scarabaeidae | *Aphodius rufus* | A dung beetle | None |
| Insecta | Coleoptera | Throscidae | *Trixagus carinifrons* | A beetle | None |
| Insecta | Coleoptera | Elateridae | *Hemicrepidius hirtus* | A click-beetle | None |
| Insecta | Coleoptera | Elateridae | *Adrastus pallens* | A click-beetle | None |
| Insecta | Coleoptera | Cantharidae | *Rhagonycha fulva* | A soldier-beetle | None |
| Insecta | Coleoptera | Cantharidae | *Malthinus balteatus* | A soldier-beetle | Nationally Scarce (Nb) |
| Insecta | Coleoptera | Cantharidae | *Malthinus seriepunctatus* | A soldier-beetle | None |
| Insecta | Coleoptera | Anobiidae | *Ochina ptinoides* | A woodworm | None |
| Insecta | Coleoptera | Anobiidae | *Ptilinus pectinicornis* | Fan-bearing wood-borer | None |

| Class | Order | Family | Species (Scientific Name) | Species (English Name) | Conservation Status |
|---|---|---|---|---|---|
| Insecta | Coleoptera | Kateretidae | *Brachypterus glaber* | A nettle pollen beetle | None |
| Insecta | Coleoptera | Monotomidae | *Monotoma picipes* | A beetle | None |
| Insecta | Coleoptera | Phalacridae | *Stilbus testaceus* | A beetle | None |
| Insecta | Coleoptera | Cryptophagidae | *Cryptophagus schmidtii* | A beetle | RDBK |
| Insecta | Coleoptera | Cryptophagidae | *Atomaria linearis* | A beetle | None |
| Insecta | Coleoptera | Cryptophagidae | *Atomaria lewisi* | A beetle | None |
| Insecta | Coleoptera | Cryptophagidae | *Atomaria scutellaris* | A beetle | RDBK |
| Insecta | Coleoptera | Coccinellidae | *Harmonia axyridis* | Harlequin ladybird | None |
| Insecta | Coleoptera | Coccinellidae | *Coccinella septempunctata* | 7-spot ladybird | None |
| Insecta | Coleoptera | Coccinellidae | *Subcoccinella vigintiquattuorpunctata* | 24-spot ladybird | None |
| Insecta | Coleoptera | Latridiidae | *Cartodere bifasciata* | A beetle | None |
| Insecta | Coleoptera | Latridiidae | *Cortinicara gibbosa* | A beetle | None |
| Insecta | Coleoptera | Mordellidae | *Mordellistena variegata* | A tumbling flower-beetle | None |
| Insecta | Coleoptera | Ripiphoridae | *Metoecus paradoxus* | Wasp nest beetle | None |
| Insecta | Coleoptera | Colydiidae | *Aulonium trisulcus* | A beetle | Nationally Scarce (Na) |
| Insecta | Coleoptera | Tenebrionidae | *Lagria hirta* | A darkling beetle | None |
| Insecta | Coleoptera | Oedemeridae | *Oedemera nobilis* | Swollen-thighed beetle | None |
| Insecta | Coleoptera | Salpingidae | *Lissodema denticolle* | A beetle | Nationally Scarce (Nb) |

| Class | Order | Family | Species (Scientific Name) | Species (English Name) | Conservation Status |
|---|---|---|---|---|---|
| Insecta | Coleoptera | Salpingidae | *Salpingus planirostris* | A beetle | None |
| Insecta | Coleoptera | Scraptiidae | *Anaspis maculata* | A beetle | None |
| Insecta | Coleoptera | Chrysomelidae | *Phyllotreta vittula* | A flea-beetle | None |
| Insecta | Coleoptera | Chrysomelidae | *Aphthona euphorbiae* | A flea-beetle | None |
| Insecta | Coleoptera | Chrysomelidae | *Longitarsus parvulus* | A flea-beetle | Nationally Scarce (Na) |
| Insecta | Coleoptera | Chrysomelidae | *Longitarsus succineus* | A flea-beetle | None |
| Insecta | Coleoptera | Apionidae | *Protapion trifolii* | A weevil | None |
| Insecta | Coleoptera | Curculionidae | *Curculio glandium* | Acorn weevil | None |
| Insecta | Hymenoptera: Parasitica | Cynipidae | *Diplolepis rosae* | Rose bedeguar gall-causer | None |
| Insecta | Hymenoptera: Aculeata | Formicidae | *Lasius brunneus* | Brown tree ant | Nationally Scarce (Na) |
| Insecta | Hymenoptera: Aculeata | Vespidae | *Vespula germanica* | German wasp | None |
| Insecta | Hymenoptera: Aculeata | Apidae | *Apis mellifera* | Honey bee | None |
| Insecta | Hymenoptera: Aculeata | Apidae | *Bombus hortorum* | Small garden bumblebee | None |
| Insecta | Hymenoptera: Aculeata | Apidae | *Bombus hypnorum* | A bumblebee | None |

| Class | Order | Family | Species (Scientific Name) | Species (English Name) | Conservation Status |
|---|---|---|---|---|---|
| Insecta | Hymenoptera: Aculeata | Apidae | *Bombus lapidarius* | Large red-tailed bumblebee | None |
| Insecta | Hymenoptera: Aculeata | Apidae | *Bombus pascuorum* | Common carder-bee | None |
| Insecta | Neuroptera | Hemerobiidae | *Micromus variegatus* | A brown lacewing | None |
| Insecta | Neuroptera | Chrysopidae | *Chrysopa commata* | A green lacewing | None |
| Insecta | Neuroptera | Chrysopidae | *Chrysopa perla* | A green lacewing | None |
| Insecta | Neuroptera | Chrysopidae | *Chrysoperla carnea agg.* | A green lacewing | None |
| Insecta | Neuroptera | Chrysopidae | *Dichochrysa ventralis* | A green lacewing | None |
| Insecta | Diptera | Tipulidae | *Tipula maxima* | A long-palped cranefly | None |
| Insecta | Diptera | Stratiomyidae | *Chloromyia formosa* | Broad centurion | None |
| Insecta | Diptera | Stratiomyidae | *Sargus flavipes* | Yellow-legged centurion | None |
| Insecta | Diptera | Syrphidae | *Chrysotoxum bicinctum* | A hoverfly | None |
| Insecta | Diptera | Syrphidae | *Episyrphus balteatus* | A hoverfly | None |
| Insecta | Trichoptera | Leptoceridae | *Mystacides longicornis* | A caddisfly | None |
| Insecta | Lepidoptera | Hepialidae | *Hepialus sylvina* | Orange swift | None |
| Insecta | Lepidoptera | Nepticulidae | *Stigmella aurella* | A micro-moth | None |
| Insecta | Lepidoptera | Tischeriidae | *Tischeria ekebladella* | A micro-moth | None |
| Insecta | Lepidoptera | Tischeriidae | *Emmetia marginea* | A micro-moth | None |
| Insecta | Lepidoptera | Tineidae | *Morophaga choragella* | A micro-moth | None |

| Class | Order | Family | Species (Scientific Name) | Species (English Name) | Conservation Status |
|---|---|---|---|---|---|
| Insecta | Lepidoptera | Tineidae | *Monopis weaverella* | A micro-moth | None |
| Insecta | Lepidoptera | Bucculatricidae | *Bucculatrix albedinella* | A micro-moth | None |
| Insecta | Lepidoptera | Gracillariidae | *Caloptilia semifascia* | A micro-moth | None |
| Insecta | Lepidoptera | Gracillariidae | *Calybites phasianipennella* | A micro-moth | None |
| Insecta | Lepidoptera | Gracillariidae | *Parornix anglicella* | A micro-moth | None |
| Insecta | Lepidoptera | Gracillariidae | *Deltaornix torquillella* | A micro-moth | None |
| Insecta | Lepidoptera | Gracillariidae | *Phyllonorycter sorbi* | A micro-moth | None |
| Insecta | Lepidoptera | Gracillariidae | *Phyllonorycter platanoidella* | A micro-moth | None |
| Insecta | Lepidoptera | Gracillariidae | *Cameraria ohridella* | Horse chestnut leaf-miner | None |
| Insecta | Lepidoptera | Gracillariidae | *Phyllocnistis saligna* | A micro-moth | None |
| Insecta | Lepidoptera | Sesiidae | *Sesia apiformis* | Hornet moth | Nationally Scarce (Nb) |
| Insecta | Lepidoptera | Yponomeutidae | *Argyresthia semifusca* | A micro-moth | None |
| Insecta | Lepidoptera | Yponomeutidae | *Yponomeuta evonymella* | Bird-cherry ermine | None |
| Insecta | Lepidoptera | Yponomeutidae | *Paraswammerdamia albicapitella* | A micro-moth | None |
| Insecta | Lepidoptera | Yponomeutidae | *Paraswammerdamia nebulella* | A micro-moth | None |
| Insecta | Lepidoptera | Yponomeutidae | *Prays ruficeps* | A micro-moth | None |
| Insecta | Lepidoptera | Yponomeutidae | *Ypsolopha sequella* | A micro-moth | None |
| Insecta | Lepidoptera | Yponomeutidae | *Ypsolopha vittella* | A micro-moth | None |

| Class | Order | Family | Species (Scientific Name) | Species (English Name) | Conservation Status |
|---|---|---|---|---|---|
| Insecta | Lepidoptera | Yponomeutidae | *Plutella xylostella* | Diamond-back moth | None |
| Insecta | Lepidoptera | Coleophoridae | *Coleophora alcyonipennella* | A micro-moth | None |
| Insecta | Lepidoptera | Elachistidae | *Cosmiotes freyerella* | A micro-moth | None |
| Insecta | Lepidoptera | Oecophoridae | *Hofmannophila pseudospretella* | Brown house moth | None |
| Insecta | Lepidoptera | Oecophoridae | *Carcina quercana* | A micro-moth | None |
| Insecta | Lepidoptera | Oecophoridae | *Agonopterix arenella* | A micro-moth | None |
| Insecta | Lepidoptera | Gelechiidae | *Teleiodes vulgella* | A micro-moth | None |
| Insecta | Lepidoptera | Gelechiidae | *Carpatolechia fugitivella* | A micro-moth | None |
| Insecta | Lepidoptera | Gelechiidae | *Bryotropha terrella* | A micro-moth | None |
| Insecta | Lepidoptera | Gelechiidae | *Chionodes fumatella* | A micro-moth | Nationally Scarce (Nb) |
| Insecta | Lepidoptera | Gelechiidae | *Scrobipalpa acuminatella* | A micro-moth | None |
| Insecta | Lepidoptera | Autostichidae | *Oegoconia quadripuncta* | A micro-moth | None |
| Insecta | Lepidoptera | Blastobasidae | *Blastobasis adustella* | A micro-moth | None |
| Insecta | Lepidoptera | Cosmopterigidae | *Limnaecia phragmitella* | A micro-moth | None |
| Insecta | Lepidoptera | Tortricidae | *Cochylimorpha straminea* | A tortrix moth | None |
| Insecta | Lepidoptera | Tortricidae | *Agapeta hamana* | A tortrix moth | None |
| Insecta | Lepidoptera | Tortricidae | *Aethes smeathmanniana* | A tortrix moth | None |
| Insecta | Lepidoptera | Tortricidae | *Cochylis dubitana* | A tortrix moth | None |

| Class | Order | Family | Species (Scientific Name) | Species (English Name) | Conservation Status |
|---|---|---|---|---|---|
| Insecta | Lepidoptera | Tortricidae | *Cochylis hybridella* | A tortrix moth | None |
| Insecta | Lepidoptera | Tortricidae | *Pandemis corylana* | Chequered fruit-tree tortrix | None |
| Insecta | Lepidoptera | Tortricidae | *Pandemis heparana* | Dark fruit-tree tortrix | None |
| Insecta | Lepidoptera | Tortricidae | *Archips podana* | Large fruit-tree tortrix | None |
| Insecta | Lepidoptera | Tortricidae | *Cnephasia genitalana* | A tortrix moth | None |
| Insecta | Lepidoptera | Tortricidae | *Acleris forsskaleana* | A tortrix moth | None |
| Insecta | Lepidoptera | Tortricidae | *Acleris holmiana* | A tortrix moth | None |
| Insecta | Lepidoptera | Tortricidae | *Acleris variegana* | Garden rose tortrix | None |
| Insecta | Lepidoptera | Tortricidae | *Acleris kochiella* | A tortrix moth | None |
| Insecta | Lepidoptera | Tortricidae | *Celypha lacunana* | A tortrix moth | None |
| Insecta | Lepidoptera | Tortricidae | *Bactra furfurana* | A tortrix moth | None |
| Insecta | Lepidoptera | Tortricidae | *Eudemis profundana* | A tortrix moth | None |
| Insecta | Lepidoptera | Tortricidae | *Epiblema uddmanniana* | Bramble shoot moth | None |
| Insecta | Lepidoptera | Tortricidae | *Eucosma cana* | A tortrix moth | None |
| Insecta | Lepidoptera | Tortricidae | *Spilonota ocellana* | Bud moth | None |
| Insecta | Lepidoptera | Tortricidae | *Cydia pomonella* | Codling moth | None |
| Insecta | Lepidoptera | Tortricidae | *Dichrorampha simpliciana* | A tortrix moth | None |
| Insecta | Lepidoptera | Pyralidae | *Chilo phragmitella* | A pyralid moth | None |
| Insecta | Lepidoptera | Pyralidae | *Calamotropha paludella* | A pyralid moth | None |
| Insecta | Lepidoptera | Pyralidae | *Chrysoteuchia culmella* | Garden grass-veneer | None |

| Class | Order | Family | Species (Scientific Name) | Species (English Name) | Conservation Status |
|---|---|---|---|---|---|
| Insecta | Lepidoptera | Pyralidae | *Crambus perlella* | A pyralid moth | None |
| Insecta | Lepidoptera | Pyralidae | *Agriphila straminella* | A pyralid moth | None |
| Insecta | Lepidoptera | Pyralidae | *Agriphila tristella* | A pyralid moth | None |
| Insecta | Lepidoptera | Pyralidae | *Agriphila geniculea* | A pyralid moth | None |
| Insecta | Lepidoptera | Pyralidae | *Catoptria falsella* | A pyralid moth | None |
| Insecta | Lepidoptera | Pyralidae | *Acentria ephemerella* | Water veneer | None |
| Insecta | Lepidoptera | Pyralidae | *Eudonia truncicolella* | A pyralid moth | None |
| Insecta | Lepidoptera | Pyralidae | *Eudonia mercurella* | A pyralid moth | None |
| Insecta | Lepidoptera | Pyralidae | *Elophila nymphaeata* | Brown China-mark | None |
| Insecta | Lepidoptera | Pyralidae | *Parapoynx stratiotata* | Ringed China-mark | None |
| Insecta | Lepidoptera | Pyralidae | *Nymphula stagnata* | Beautiful China-mark | None |
| Insecta | Lepidoptera | Pyralidae | *Cataclysta lemnata* | Small China-mark | None |
| Insecta | Lepidoptera | Pyralidae | *Evergestis forficalis* | Garden pebble | None |
| Insecta | Lepidoptera | Pyralidae | *Pyrausta aurata* | A pyralid moth | None |
| Insecta | Lepidoptera | Pyralidae | *Udea lutealis* | A pyralid moth | None |
| Insecta | Lepidoptera | Pyralidae | *Nomophila noctuella* | Rush veneer | None |
| Insecta | Lepidoptera | Pyralidae | *Pleuroptya ruralis* | Mother of pearl | None |
| Insecta | Lepidoptera | Pyralidae | *Endotricha flammealis* | A pyralid moth | None |
| Insecta | Lepidoptera | Pyralidae | *Galleria mellonella* | Wax moth | None |
| Insecta | Lepidoptera | Pyralidae | *Trachycera advenella* | A pyralid moth | None |

| Class | Order | Family | Species (Scientific Name) | Species (English Name) | Conservation Status |
|---|---|---|---|---|---|
| Insecta | Lepidoptera | Pyralidae | *Euzophera pinguis* | A pyralid moth | None |
| Insecta | Lepidoptera | Pterophoridae | *Pterophorus pentadactyla* | White plume moth | None |
| Insecta | Lepidoptera | Pterophoridae | *Emmelina monodactyla* | Common plume | None |
| Insecta | Lepidoptera | Pieridae | *Pieris brassicae* | Large white | LC |
| Insecta | Lepidoptera | Pieridae | *Pieris rapae* | Small white | LC |
| Insecta | Lepidoptera | Pieridae | *Pieris napi* | Green-veined white | LC |
| Insecta | Lepidoptera | Lycaenidae | *Satyrium w-album* | White-letter hairstreak | EN, BAP |
| Insecta | Lepidoptera | Nymphalidae | *Aglais urticae* | Small tortoiseshell | LC |
| Insecta | Lepidoptera | Nymphalidae | *Polygonia c-album* | Comma | LC |
| Insecta | Lepidoptera | Satyridae | *Pararge aegeria* | Speckled wood | LC |
| Insecta | Lepidoptera | Satyridae | *Maniola jurtina* | Meadow brown | LC |
| Insecta | Lepidoptera | Satyridae | *Aphantopus hyperantus* | Ringlet | LC |
| Insecta | Lepidoptera | Drepanidae | *Drepana falcataria* | Pebble hook-tip | None |
| Insecta | Lepidoptera | Geometridae | *Cyclophora punctaria* | Maiden's blush | None |
| Insecta | Lepidoptera | Geometridae | *Timandra comae* | Blood-vein | BAP (research only) |
| Insecta | Lepidoptera | Geometridae | *Idaea rusticata* | Least carpet | None |
| Insecta | Lepidoptera | Geometridae | *Idaea dimidiata* | Single-dotted wave | None |
| Insecta | Lepidoptera | Geometridae | *Idaea aversata* | Riband wave | None |
| Insecta | Lepidoptera | Geometridae | *Phibalapteryx virgata* | Oblique striped | Nationally Scarce (Nb) |

| Class | Order | Family | Species (Scientific Name) | Species (English Name) | Conservation Status |
|---|---|---|---|---|---|
| Insecta | Lepidoptera | Geometridae | *Xanthorhoe spadicearia* | Red Twin-spot carpet | None |
| Insecta | Lepidoptera | Geometridae | *Xanthorhoe fluctuata* | Garden carpet | None |
| Insecta | Lepidoptera | Geometridae | *Epirrhoe alternata* | Common carpet | None |
| Insecta | Lepidoptera | Geometridae | *Camptogramma bilineata* | Yellow shell | None |
| Insecta | Lepidoptera | Geometridae | *Cosmorhoe ocellata* | Purple bar | None |
| Insecta | Lepidoptera | Geometridae | *Colostygia pectinataria* | Green carpet | None |
| Insecta | Lepidoptera | Geometridae | *Eupithecia inturbata* | Maple pug | None |
| Insecta | Lepidoptera | Geometridae | *Eupithecia haworthiata* | Haworth's pug | None |
| Insecta | Lepidoptera | Geometridae | *Eupithecia centaureata* | Lime-speck pug | None |
| Insecta | Lepidoptera | Geometridae | *Eupithecia icterata* | Tawny Speckled pug | None |
| Insecta | Lepidoptera | Geometridae | *Eupithecia succenturiata* | Bordered pug | None |
| Insecta | Lepidoptera | Geometridae | *Eupithecia millefoliata* | Yarrow pug | Nationally Scarce (Nb) |
| Insecta | Lepidoptera | Geometridae | *Gymnoscelis rufifasciata* | Double-striped pug | None |
| Insecta | Lepidoptera | Geometridae | *Aplocera plagiata* | Treble-bar | None |
| Insecta | Lepidoptera | Geometridae | *Acasis viretata* | Yellow-barred brindle | None |
| Insecta | Lepidoptera | Geometridae | *Abraxas grossulariata* | Magpie moth | None |
| Insecta | Lepidoptera | Geometridae | *Macaria liturata* | Tawny-barred angle | None |
| Insecta | Lepidoptera | Geometridae | *Chiasmia clathrata* | Latticed heath | BAP (research only) |
| Insecta | Lepidoptera | Geometridae | *Opisthograptis luteolata* | Brimstone moth | None |

| Class | Order | Family | Species (Scientific Name) | Species (English Name) | Conservation Status |
|---|---|---|---|---|---|
| Insecta | Lepidoptera | Geometridae | *Ennomos alniaria* | Canary-shouldered thorn | None |
| Insecta | Lepidoptera | Geometridae | *Crocallis elinguaria* | Scalloped oak | None |
| Insecta | Lepidoptera | Geometridae | *Peribatodes rhomboidaria* | Willow beauty | None |
| Insecta | Lepidoptera | Geometridae | *Ectropis bistortata* | Engrailed | None |
| Insecta | Lepidoptera | Geometridae | *Campaea margaritata* | Light emerald | None |
| Insecta | Lepidoptera | Geometridae | *Semiaspilates ochrearia* | Yellow belle | None |
| Insecta | Lepidoptera | Sphingidae | *Mimas tiliae* | Lime hawk-moth | None |
| Insecta | Lepidoptera | Sphingidae | *Laothoe populi* | Poplar hawk-moth | None |
| Insecta | Lepidoptera | Notodontidae | *Phalera bucephala* | Buff-tip | None |
| Insecta | Lepidoptera | Notodontidae | *Notodonta ziczac* | Pebble prominent | None |
| Insecta | Lepidoptera | Notodontidae | *Pheosia tremula* | Swallow prominent | None |
| Insecta | Lepidoptera | Notodontidae | *Pterostoma palpina* | Pale prominent | None |
| Insecta | Lepidoptera | Lymantriidae | *Orgyia antiqua* | Vapourer | None |
| Insecta | Lepidoptera | Lymantriidae | *Euproctis similis* | Yellow-tail | None |
| Insecta | Lepidoptera | Arctiidae | *Eilema griseola* | Dingy footman | None |
| Insecta | Lepidoptera | Arctiidae | *Eilema depressa* | Buff footman | None |
| Insecta | Lepidoptera | Arctiidae | *Tyria jacobaeae* | Cinnabar | BAP (research only) |
| Insecta | Lepidoptera | Noctuidae | *Agrotis segetum* | Turnip moth | None |
| Insecta | Lepidoptera | Noctuidae | *Agrotis ipsilon* | Dark sword-grass | None |
| Insecta | Lepidoptera | Noctuidae | *Agrotis puta* | Shuttle-shaped dart | None |

| Class | Order | Family | Species (Scientific Name) | Species (English Name) | Conservation Status |
|---|---|---|---|---|---|
| Insecta | Lepidoptera | Noctuidae | *Axylia putris* | Flame | None |
| Insecta | Lepidoptera | Noctuidae | *Ochropleura plecta* | Flame shoulder | None |
| Insecta | Lepidoptera | Noctuidae | *Noctua pronuba* | Large yellow underwing | None |
| Insecta | Lepidoptera | Noctuidae | *Noctua comes* | Lesser yellow underwing | None |
| Insecta | Lepidoptera | Noctuidae | *Noctua fimbriata* | Broad-bordered yellow underwing | None |
| Insecta | Lepidoptera | Noctuidae | *Noctua janthe* | Lesser broad-bordered yellow underwing | None |
| Insecta | Lepidoptera | Noctuidae | *Diarsia rubi* | Small square-spot | BAP (research only) |
| Insecta | Lepidoptera | Noctuidae | *Xestia c-nigrum* | Setaceous hebrew character | None |
| Insecta | Lepidoptera | Noctuidae | *Xestia rhomboidea* | Square-spotted clay | Nationally Scarce (Nb) |
| Insecta | Lepidoptera | Noctuidae | *Xestia xanthographa* | Square-spot rustic | None |
| Insecta | Lepidoptera | Noctuidae | *Discestra trifolii* | Nutmeg | None |
| Insecta | Lepidoptera | Noctuidae | *Mamestra brassicae* | Cabbage moth | None |
| Insecta | Lepidoptera | Noctuidae | *Tholera decimalis* | Feathered gothic | BAP (research only) |
| Insecta | Lepidoptera | Noctuidae | *Mythimna albipuncta* | White-point | None |
| Insecta | Lepidoptera | Noctuidae | *Mythimna pallens* | Common wainscot | None |
| Insecta | Lepidoptera | Noctuidae | *Atethmia centrago* | Centre-barred sallow | BAP (research only) |
| Insecta | Lepidoptera | Noctuidae | *Acronicta psi* | Grey dagger | BAP (research only) |
| Insecta | Lepidoptera | Noctuidae | *Amphipyra pyramidea* | Copper underwing | None |

| Class | Order | Family | Species (Scientific Name) | Species (English Name) | Conservation Status |
|---|---|---|---|---|---|
| Insecta | Lepidoptera | Noctuidae | *Amphipyra tragopoginis* | Mouse moth | BAP (research only) |
| Insecta | Lepidoptera | Noctuidae | *Thalpophila matura* | Straw underwing | None |
| Insecta | Lepidoptera | Noctuidae | *Phlogophora meticulosa* | Angle shades | None |
| Insecta | Lepidoptera | Noctuidae | *Cosmia affinis* | Lesser-spotted pinion | None |
| Insecta | Lepidoptera | Noctuidae | *Cosmia diffinis* | White-spotted pinion | Nationally Scarce (Na), BAP |
| Insecta | Lepidoptera | Noctuidae | *Cosmia trapezina* | Dun-bar | None |
| Insecta | Lepidoptera | Noctuidae | *Apamea monoglypha* | Dark arches | None |
| Insecta | Lepidoptera | Noctuidae | *Mesoligia furuncula* | Cloaked minor | None |
| Insecta | Lepidoptera | Noctuidae | *Mesapamea secalis* | Common rustic | None |
| Insecta | Lepidoptera | Noctuidae | *Eremobia ochroleuca* | Dusky sallow | None |
| Insecta | Lepidoptera | Noctuidae | *Luperina testacea* | Flounced rustic | None |
| Insecta | Lepidoptera | Noctuidae | *Hydraecia micacea* | Rosy rustic | BAP (research only) |
| Insecta | Lepidoptera | Noctuidae | *Archanara geminipuncta* | Twin-spotted wainscot | None |
| Insecta | Lepidoptera | Noctuidae | *Archanara sparganii* | Webb's wainscot | Nationally Scarce (Nb) |
| Insecta | Lepidoptera | Noctuidae | *Hoplodrina blanda* | Rustic | BAP (research only) |
| Insecta | Lepidoptera | Noctuidae | *Hoplodrina ambigua* | Vine's rustic | None |
| Insecta | Lepidoptera | Noctuidae | *Paradrina clavipalpis* | Pale mottled willow | None |
| Insecta | Lepidoptera | Noctuidae | *Earias clorana* | Cream-bordered green pea | Nationally Scarce (Nb) |

| Class | Order | Family | Species (Scientific Name) | Species (English Name) | Conservation Status |
|---|---|---|---|---|---|
| Insecta | Lepidoptera | Noctuidae | *Diachrysia chrysitis* | Burnished brass | None |
| Insecta | Lepidoptera | Noctuidae | *Plusia festucae* | Gold spot | None |
| Insecta | Lepidoptera | Noctuidae | *Autographa gamma* | Silver Y | None |
| Insecta | Lepidoptera | Noctuidae | *Abrostola tripartita* | Spectacle | None |
| Insecta | Lepidoptera | Noctuidae | *Catocala nupta* | Red underwing | None |
| Insecta | Lepidoptera | Noctuidae | *Rivula sericealis* | Straw dot | None |
| Insecta | Lepidoptera | Noctuidae | *Hypena proboscidalis* | Snout | None |
| Gastropoda | Pulmonata | Helicidae | *Cernuella virgata* | Striped snail | None |
| Gastropoda | Pulmonata | Helicidae | *Monacha cantiana* | Kentish snail | None |

# Appendix B

Raw Automated Bat Survey Data

# B1 SD1

| Survey Period | Date | Number of Bat Passes | | | |
|---|---|---|---|---|---|
| | | Common pipistrelle | Soprano Pipistrelle | Pipistrelle | *Nyctalus* sp. |
| 29/05 – 03/06 | 29/05 - 30/05 | 12 | | 3 | 1 |
| | 30/05 – 31/05 | 2 | | | |
| | 31/05 – 01/06 | 5 | 1 | | |
| | 01/06 – 02/06 | 6 | | | |
| | 02/06 – 03/06 | | | 1 | |
| **Bat activity indices** | | **5** | **0.2** | **0.8** | **0.2** |

# B2 SD2

| Survey Period | Date | Number of Calls | | | | |
|---|---|---|---|---|---|---|
| | | **Common Pipistrelle** | **Soprano Pipistrelle** | **Nathusius' Pipistrelle** | **Pipistrelle** | **Barbastelle** |
| 29/05 – 03/06 | 29/05 - 30/05 | 19 | | | | |
| | 30/05 – 31/05 | | | | | |
| | 31/05 – 01/06 | 31 | | 1 | 2 | |
| | 01/06 – 02/06 | 29 | 3 | | 1 | 3 |
| | 02/06 – 03/06 | 3 | | | | |
| **Bat activity indices** | | **16.4** | **0.6** | **0.2** | **0.6** | **0.6** |

# B3 SD3

| Survey Period | Date | Number of Calls |
|---|---|---|
| | | Common Pipistrelle |
| 29/05 – 03/06 | 29/05 - 30/05 | |
| | 30/05 – 31/05 | |
| | 31/05 – 01/06 | 4 |
| | 01/06 – 02/06 | 2 |
| | 02/06 – 03/06 | 1 |
| **Bat activity indices** | | **1.4** |

# B4 SD5

| Survey Period | Date | Number of Calls | | | | |
|---|---|---|---|---|---|---|
| | | **Common Pipistrelle** | **Soprano Pipistrelle** | **Pipistrelle** | **Noctule** | ***Nyctalus* sp.** |
| 29/05 – 03/06 | 29/05 - 30/05 | 95 | 11 | 22 | 3 | |
| | 30/05 – 31/05 | 64 | 4 | 6 | | |
| | 31/05 – 01/06 | 195[1] | 12 | 33 | | 1 |
| | 01/06 – 02/06 | 151 | 15 | 26 | 1 | |
| | 02/06 – 03/06 | 85 | 15 | 4 | | |
| **Bat activity indices** | | **118** | **11.4** | **18.2** | **0.8** | **0.2** |

[1]Includes a social call

# B5 SD6

| Survey Period | Date | Number of Calls | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | **Common Pipistrelle[1]** | **Soprano Pipistrelle[1]** | **Pipistrelle** | **Noctule** | **Leisler's Bat** | ***Nyctalus* sp.** | **Probable Daubenton's Bat** | ***Myotis* sp.** |
| 29/05 – 03/06 | 29/05 - 30/05 | 446 | 79 | 5 | 2 | | | 2 | |
| | 30/05 – 31/05 | 684 | 270 | 5 | | | | 4 | 10 |
| | 31/05 – 01/06 | 29 | 11 | 4 | 7 | 2 | 3 | 12 | 24 |
| | 01/06 – 02/06 | 43 | 4 | 6 | 11 | 7 | | 45 | 11 |
| | 02/06 – 03/06 | 29 | 8 | 4 | 37 | | 1 | 4 | 9 |
| **Bat activity indices** | | **246.2** | **74.4** | **4.8** | **11.4** | **1.8** | **0.8** | **13.4** | **10.8** |

[1] Includes social calls

# B6 SD7

| Survey Period | Date | Number of Calls | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | **Common Pipistrelle[1]** | **Soprano Pipistrelle** | **Pipistrelle[1]** | **Noctule** | ***Nyctalus* sp.** | **Probable Daubenton's Bat** | ***Myotis* sp.** |
| 29/05 – 03/06 | 29/05 - 30/05 | 44 | 2 | 71 | | | | |
| | 30/05 – 31/05 | 19 | | 45 | | | | 3 |
| | 31/05 – 01/06 | 41 | 9 | 81 | 2 | | 2 | 1 |
| | 01/06 – 02/06 | 36 | 7 | 79 | 1 | 2 | 2 | |
| | 02/06 – 03/06 | 38 | 3 | 38 | | | 13 | 5 |
| **Bat activity indices** | | **35.6** | **4.2** | **62.8** | **0.6** | **0.3** | **3.4** | **1.8** |

[1] Includes social calls

# B7 SD8

| Survey Period | Date | Number of Calls | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Common Pipistrelle** | **Soprano Pipistrelle** | **Pipistrelle** | **Noctule** | ***Nyctalus* sp.** | ***Myotis* sp.** |
| 29/05 – 03/06 | 29/05 - 30/05 | 293 | 1 | 17 | | | |
| | 30/05 – 31/05 | 299 | | 14 | | | |
| | 31/05 – 01/06 | 269 | 5 | 12 | 5 | | |
| | 01/06 – 02/06 | 188 | 7 | 32 | 1 | 1 | |
| | 02/06 – 03/06 | 36 | 2 | 43 | 2 | 1 | 1 |
| **Bat activity indices** | | **217** | **3** | **23.6** | **1.6** | **0.4** | **0.2** |

# B8 SD9

| Survey Period | Date | Number of Calls | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | **Common Pipistrelle[2]** | **Soprano Pipistrelle** | **Nathusius' Pipistrelle** | **Pipistrelle[2]** | **Noctule** | **Leisler's Bat** | **Probable *Myotis* sp.** | **Brown Long-eared Bat** |
| 18/06 – 21/06 | 18/06 - 19/06 | 15 | | | 1 | 1 | | | |
| | 19/06 – 20/06 | 23 | 1 | | | | | | |
| | 20/06 – 21/06[1] | 67 | 1 | | | 2 | | | |
| **Bat activity indices** | | **19** | **0.5** | **0** | **0.5** | **0.5** | **0** | **0** | **0** |
| 30/07 – 31/07 | 30/07 - 31/07[2] | 153 | 15 | 1 | 2 | 2 | 1 | | |
| **Bat activity indices** | | **153** | **15** | **1** | **2** | **2** | **1** | **0** | **0** |
| 23/08 – 01/09 | 23/08 - 24/08 | 342 | 9 | | 42 | | | | |
| | 24/08 – 25/08 | 102 | 2 | | 7 | | | | |
| | 25/08 – 26/08 | 202 | 10 | | 10 | | | | |
| | 29/08 – 30/08 | 294 | 28 | 1 | 9 | | | | 4 |
| | 31/08 – 01/09 | 68 | 20 | | 3 | 1 | | | |
| **Bat activity indices** | | **201.8** | **13.8** | **0.2** | **14.2** | **0.2** | **0** | **0** | **0.8** |
| 01/09 – 19/09 | 01/09 – 02/09 | 163 | 73 | | 14 | 2 | | 1 | 3 |
| | 02/09 – 03/09 | 136 | 18 | | 9 | | | 1 | |
| | 04/09 – 05/09 | 128 | 3 | | 1 | | | 1 | |
| | 15/09 – 16/09 | 424 | 36 | | 32 | | | | 2 |
| | 18/09 – 19/09 | 231 | 25 | | 6 | | | | |
| **Bat activity indices** | | **216.4** | **31** | **0** | **12.4** | **0.4** | **0** | **0.6** | **1** |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Average bat activity indices** | **147.6** | **15.1** | **0.3** | **7.3** | **0.8** | **0.3** | **0.2** | **0.5** |

[1] Excluded from bat activity indices calculations (part of survey period)

[2] Includes social calls

# B9 SD10

| Survey Period | Date | Number of Calls | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Common Pipistrelle[1] | Soprano Pipistrelle[1] | Pipistrelle | Noctule | *Myotis* sp. | Brown Long-eared Bat | Probable Brown Long-eared Bat |
| 18/06 – 23/06 | 18/06 - 19/06 | 79 | 28 | 12 | 1 | 2 | | |
| | 19/06 – 20/06 | 54 | 13 | 4 | | 3 | | |
| | 20/06 – 21/06 | 156 | 17 | 32 | | | | |
| | 21/06 – 22/06 | 163 | 28 | 20 | | 1 | | |
| | 22/06 – 23/06 | 20 | 9 | 11 | | 1 | | |
| **Bat activity indices** | | **94.4** | **19** | **15.8** | **0.2** | **1.4** | **0** | **0** |
| 8/07 – 11/07 | 8/07 - 9/07 | 288 | 66 | 5 | | | | |
| | 9/07 – 10/07 | 571 | 77 | 2 | | | 4 | 5 |
| | 10/07 – 11/07 | 230 | 53 | 2 | 1 | | | |
| **Bat activity indices** | | **363** | **65.3** | **3** | **0.3** | **0** | **1.3** | **1.7** |
| 23/08 – 30/08 | 23/08 - 24/08 | 72 | 27 | 40 | | 1 | | |
| | 25/08 – 26/08 | 225 | 37 | 6 | | 1 | | |
| | 26/08 – 27/08 | 61 | 36 | 4 | 1 | | | |
| | 28/08 – 29/08 | 31 | 25 | | | | | |
| | 29/08 – 30/08 | 36 | 24 | | | | | |
| **Bat activity indices** | | **91** | **29.8** | **10** | **0.2** | **0.4** | **0** | **0** |
| 01/09 – 08/09 | 01/09 – 02/09 | 35 | 17 | 6 | | 3 | | |
| | 03/09 – 04/09 | 35 | 51 | 6 | | 1 | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 04/09 – 05/09 | 27 | 38 | 2 | | | | |
| | 05/09 – 06/09 | 40 | 37 | 4 | 2 | 2 | | |
| | 07/09 – 08/09 | 27 | 64 | 2 | | 1 | | |
| **Bat activity indices** | | **32.8** | **41.4** | **4** | **0.4** | **1.4** | **0** | **0** |
| **Average bat activity indices** | | **145.3** | **38.9** | **8.2** | **0.3** | **0.8** | **0.3** | **0.4** |

[1] Includes social calls

# B10 SD11

| Survey Period | Date | Number of Calls | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Common Pipistrelle** | **Soprano Pipistrelle** | **Pipistrelle** | **Noctule** | ***Nyctalus* sp.** | **Probable Daubenton's Bat** |
| 30/05 – 04/06 | 30/05 - 31/05 | | | 1 | | | |
| | 31/05 – 01/06 | 12 | | | 1 | 1 | |
| | 01/06 – 02/06 | 4 | | | 1 | | |
| | 02/06 – 03/06 | 2 | | | | | |
| | 03/06 – 04/06 | 2 | | | | | |
| **Bat activity indices** | | **4** | **0** | **0.2** | **0.4** | **0.2** | **0** |
| 18/06 – 23/06 | 18/06 – 19/06 | 47 | 2 | 1 | 1 | | 1 |
| | 19/06 – 20/06 | 8 | | | | | |
| | 20/06 – 21/06 | 6 | | | 1 | | |
| | 21/06 – 22/06 | 1 | | | | | |
| | 22/06 – 23/06 | 1 | 1 | | 1 | | |
| **Bat activity indices** | | **12.6** | **0.6** | **0.2** | **0.6** | **0** | **0.2** |
| **Average bat activity indices** | | **8.3** | **0.3** | **0.2** | **0.5** | **0.1** | **0.1** |

# B11 SD12

| Survey Period | Date | Number of Calls | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | **Common Pipistrelle** | **Soprano Pipistrelle** | **Pipistrelle** | **Noctule** | **Leisler's Bat** | **Probable Leisler's Bat** | ***Myotis* sp.** |
| 29/05 – 04/06 | 29/05 - 30/05 | 1 | | | | | | |
| | 31/05 – 01/06 | 6 | | | | | | |
| | 01/06 – 02/06 | 6 | 1 | 3 | 1 | | | |
| | 02/06 – 03/06 | 5 | | 2 | | | | |
| | 03/06 – 04/06 | 18 | 1 | 6 | | | | |
| **Bat activity indices** | | **7.2** | **0.4** | **2.2** | **0.2** | **0** | **0** | **0** |
| 18/06 – 23/06 | 18/06 – 19/06 | 63 | 3 | 12 | 1 | | | 1 |
| | 19/06 – 20/06 | 75 | 2 | 14 | 5 | 1 | 1 | |
| | 20/06 – 21/06 | 73 | 2 | 5 | 1 | | | |
| | 21/06 – 22/06 | 12 | 1 | | | | | |
| | 22/06 – 23/06 | 1 | | | | 1 | | |
| **Bat activity indices** | | **44.8** | **1.6** | **6.2** | **1.4** | **0.4** | **0.2** | **0.2** |
| **Average bat activity indices** | | **26** | **1** | **4.2** | **0.8** | **0.2** | **0.1** | **0.1** |

# B12 SD13

| Survey Period | Date | Number of Calls | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | **Common Pipistrelle** | **Soprano Pipistrelle**[1] | **Pipistrelle** | **Probable Serotine** | **Big Bat** | ***Nyctalus sp.*** | ***Myotis* sp.** | **Probable Natterer's Bat** |
| 29/05 – 0/06 | 30/05 – 31/05 | 347 | 695 | 2 | 3 | | | | |
| | 31/05 – 01/06 | 47 | 1022 | 1 | 2 | | 1 | 1 | 2 |
| | 01/06 – 02/06 | 80 | 928 | | 1 | 1 | | | |
| | 02/06 – 03/06 | 31 | 533 | | | | | | |
| | 03/06 – 04/06 | 32 | 570 | | 2 | | | | |
| **Bat activity indices** | | **107.4** | **749.6** | **0.6** | **1.6** | **0.2** | **0.2** | **0.2** | **0.4** |

[1] Includes many social calls

# B13 SD14

| Survey Period | Date | Number of Calls | | | | | |
|---|---|---|---|---|---|---|---|
| | | Common Pipistrelle | Soprano Pipistrelle | Nathusius' Pipistrelle | Pipistrelle | Noctule | Probable Daubenton's Bat |
| 29/05 – 04/06 | 29/05 - 30/05 | 2 | | | | | |
| | 30/05 – 31/05 | 17 | 1 | | | | |
| | 31/05 – 01/06 | 37 | 1 | | | | |
| | 01/06 – 02/06 | 49 | 1 | | | | 4 |
| | 02/06 – 03/06 | 16 | | 1 | 3 | | 7 |
| | 03/06 – 04/06 | 33 | | | 2 | | |
| **Bat activity indices** | | **30.8** | **0.6** | **0.2** | **1** | **0** | **2.2** |
| 18/06 – 23/06 | 18/06 – 19/06 | 29 | 8 | | 4 | 5 | |
| | 19/06 – 20/06 | 31 | 4 | | 2 | | |
| | 20/06 – 21/06 | 27 | 5 | | 4 | | |
| | 21/06 – 22/06 | 21 | | | 2 | | |
| | 22/06 – 23/06 | | | | | 1 | |
| **Bat activity indices** | | **21.6** | **3.4** | **0** | **2.4** | **1.2** | **0** |
| **Average bat activity indices** | | **26.2** | **2** | **0.1** | **1.7** | **0.6** | **0.9** |

# B14 SD15

| Survey Period | Date | Number of Calls | | | |
|---|---|---|---|---|---|
| | | Common Pipistrelle | Soprano Pipistrelle | Nathusius' Pipistrelle | Pipistrelle |
| 29/05 – 03/06 | 30/05 – 31/05 | 39 | 1 | | |
| | 31/05 – 01/06 | 6 | | | |
| | 01/06 – 02/06 | 17 | | | |
| | 02/06 – 03/06 | 2 | | | 1 |
| | 03/06 – 04/06 | 15 | | | |
| **Bat activity indices** | | **15.8** | **0.2** | **0** | **0.2** |
| 18/06 – 23/06 | 18/06 – 19/06 | 27 | 1 | 1 | 3 |
| | 19/06 – 20/06 | 168 | 4 | 6 | 34 |
| | 20/06 – 21/06 | 22 | 2 | | 3 |
| | 21/06 – 22/06 | 4 | | | |
| | 22/06 – 23/06 | | | | 1 |
| **Bat activity indices** | | **44.2** | **1.4** | **1.4** | **8.2** |
| **Average bat activity indices** | | **30** | **0.8** | **0.7** | **4.1** |

# B15 SD16

| Survey Period | Date | Number of Calls | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | **Common Pipistrelle** | **Soprano Pipistrelle** | **Nathusius' Pipistrelle** | **Pipistrelle** | **Noctule** | **Leisler's Bat** | **Nyctalus *sp.*** | ***Myotis* sp.** | **Probable Brown Long-eared Bat** |
| 29/05 – 0/06 | 29/05 - 30/05 | 1 | 1 | | 1 | | | | | |
| | 30/05 – 31/05 | 3 | 2 | | | 1 | | | | |
| | 31/05 – 01/06 | 52 | | | | 1 | | | | |
| | 01/06 – 02/06 | 76 | | 4 | 1 | 1 | | | 1 | 1 |
| | 02/06 – 03/06 | 6 | | | | | | | | 2 |
| **Bat activity indices** | | **27.9** | **0.6** | **0.8** | **0.4** | **0.6** | **0** | **0** | **0.2** | **0.6** |
| 18/06 – 23/06 | 18/06 – 19/06 | 72 | 3 | 5 | 2 | 1 | 2 | | | |
| | 19/06 – 20/06 | 49 | 4 | | 2 | 5 | 1 | | | 1 |
| | 20/06 – 21/06 | 12 | 1 | 1 | 1 | 2 | | | 1 | 1 |
| | 21/06 – 22/06 | | | | 1 | | | 2 | | |
| | 22/06 – 23/06 | | | | | 1 | | | | |
| **Bat activity indices** | | **26.6** | **1.6** | **1.2** | **1.2** | **1.8** | **0.6** | **0.4** | **0.2** | **0.4** |
| **Average bat activity indices** | | **27.3** | **1.1** | **1** | **0.8** | **1.2** | **0.3** | **0.2** | **0.2** | **0.5** |

# Appendix C

European Bird Census Council Breeding Categories

# C1 Possible Breeding

1. Species heard or observed within safe dates, but not in suitable breeding habitat
2. Species heard or observed within safe dates, and in suitable breeding habitat
3. Territorial behaviour, including counter singing males, territorial singing (repeatedly singing from same locations within an area), drumming in woodpeckers, or aggressive interactions between same-sex individuals of same species

# C2 Probable Breeding

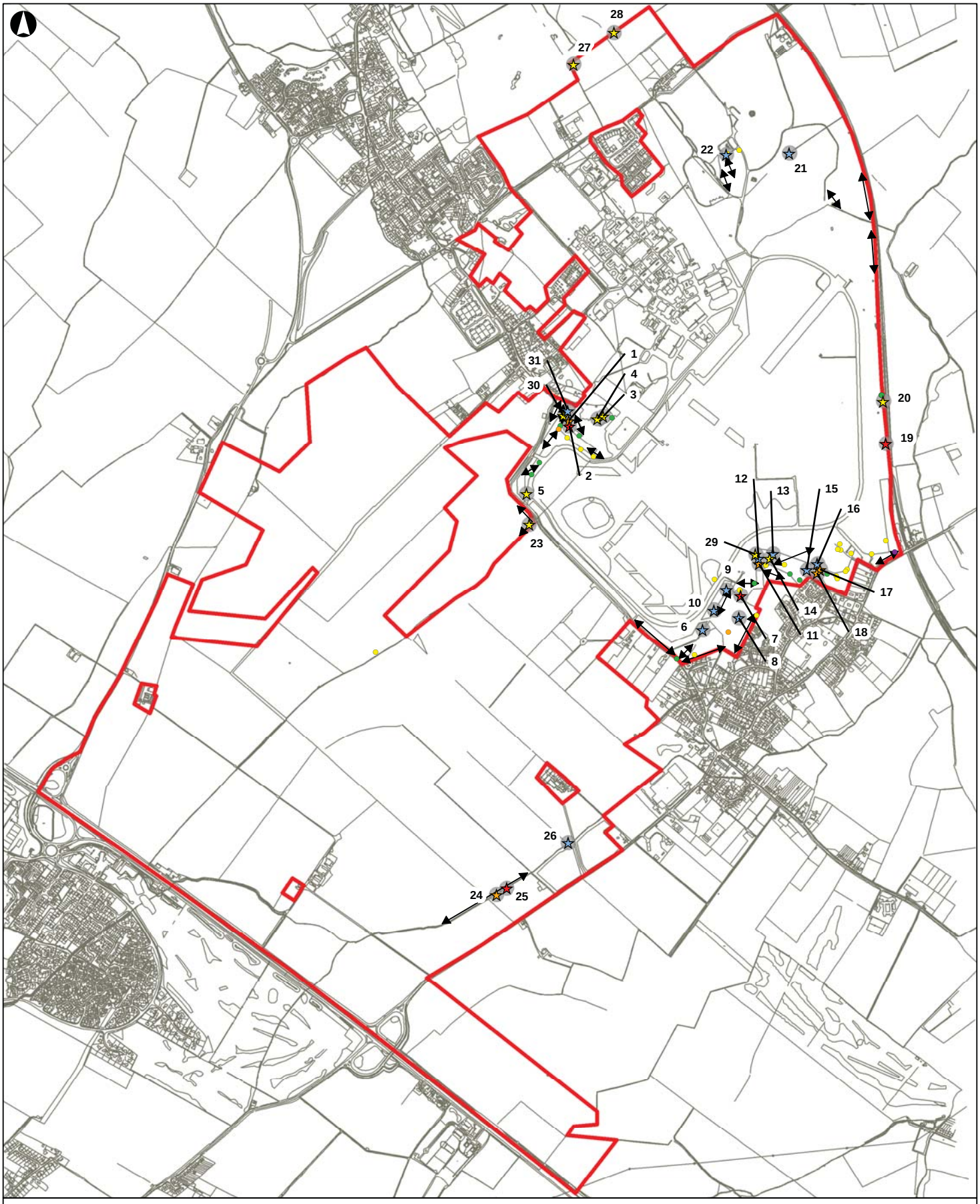
4. Pair (male and female) within safe dates, and in suitable breeding habitat
5. Pair (male and female) present at the same location 7 or more days apart
6. Courtship behaviour (aerial displays, courtship feeding) or copulation
7. Visiting probable nest site
8. Agitated behaviour and/or anxiety calls from an adult, suggesting presence of nearby nest or young
9. Brood patch (Note: code only applies to birds observed in hand and is reserved for experienced birder only)
10. Nest building observed at nest site (Note: for nest building by wrens, woodpeckers, kingfisher...)

# C3 Confirmed Breeding

11. Distraction display (especially injury feigning, such as broken wing display) or attacking/dive-bombing humans in defence of unobserved nest or young
12. Used nest; includes inactive nests
13. Recently fledged young that are incapable of sustained flight
14. Occupied nest, but contents not observed; adults entering and remaining for a period of time, then leaving or exchanging duties
15. Adult carrying a faecal sac
16. Adult carrying food for young
17. Eggshells found below nest
18. Nest with adult incubating
19. Nest with nestlings or eggs

# Figures

A3




**Legend**

- Site Boundary
- Main sett
- Annexe sett
- Subsidiary sett
- Outlier sett
- Badger Prints,
- Latrine,
- Scratches,
- Snuffle Holes,
- Likely badger path
- 30m sett buffer zone



| Issue | Date | By | Chkd | Appd |
|---|---|---|---|---|
| P1 | 01-02-08 | MM | RM | EP |

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Client
**Homes and Communities Agency**

Job Title
**Northstowe**

Metres
0 180 360 720

Figure 6:
Badger Survey Results

Scale at A3
**1:15,000**

| Job No | Drawing Status |
|---|---|
| **230781-05** | **Issue** |

| Drawing No | Issue |
|---|---|
| **001** | **P1** |

MXD Location

# F7 (not included II) Arup Confidential Badger Appendix 2013/14