



Greater Cambridge Partnership

CAMBOURNE TO CAMBRIDGE

Environmental Statement

Technical Report 5: Ecology, Appendix 5.14:

Terrestrial Invertebrates Survey Report (Draft)





Greater Cambridge Partnership

Cambourne to Cambridge

Terrestrial Invertebrates Survey Report (Draft)

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WSP

62-64 Hills Road
Cambridge
CB2 1LA

Phone: +44 1223 558 050

Fax: +44 1223 558 051

WSP.com

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1 Introduction

1.1 Project Background

- 1.1.1. The Cambourne to Cambridge project (C2C) is a proposed new 13.6km public transport route linking Cambourne and Cambridge. It will include a dedicated busway serving communities in Cambourne and the proposed Bourn Airfield development, as well as in Hardwick, Coton and the West Cambridge campus. A service road, to be used as a path for active travel, particularly by cyclists and pedestrians, will run alongside the busway. A new travel hub will be provided at Scotland Farm.
- 1.1.2. Scheme details are provided in the main report to the Environmental Statement (ES).

1.2 Ecological Background

- 1.2.1. The requirement for terrestrial invertebrate surveys followed the identification of suitable habitats with the potential to support important assemblages of invertebrates within the Scheme. These habitats were identified within the Ecology Constraints Report (Cambridge Ecology, 2017)
- 1.2.2. Cambridge Ecology undertook invertebrate surveys between April and September 2018 inclusive. The results of these surveys are included within the Invertebrate Survey Report (Cambridge Ecology, 2018). The invertebrate surveys identified a total of 15,014 records comprising 1,866 taxa. One hundred and fifty-eight of the species recorded had national conservation statuses: twenty of these were Red Data Book or equivalent and 134 were Nationally Scarce or equivalent. Four recorded species were Priority Species under Section 41 of the NERC Act 2006 but had no other status. A further two species were listed as Cambridgeshire and Peterborough species of additional interest (CPASI) but had no national conservation status. These surveys were undertaken within a wider survey area to the current Scheme boundary and as such, some records may no longer be relevant to the impact assessment. This will be addressed in Technical Report 5: Ecology of the ES, which will account for those species and areas that are potentially impacted by the Scheme.
- 1.2.3. Invertebrate species of particular interest included:
 - Tree Snail *Balea perversa* (very local);
 - A false blister beetle *Ischnomera caerulea*, (nationally rare);
 - A false darkling beetle *Osphya bipunctata* (nationally scarce);
 - A lacehopper *Reptalus quinquecostatus* (nationally notable);
 - A planthopper *Flastena fumipennis* (new to Britain);
 - A groundbug *Nysius graminicola* (Red Data Book category 3 rare);
 - Green Hairstreak *Callophrys rubi* (Cambridgeshire and Peterborough Additional Species of Interest);
 - White-letter Hairstreak *Satyrrium w-album* (IUCN Endangered);

- Common Green Grasshopper *Omocestus viridulus* (Cambridgeshire and Peterborough Additional Species of Interest); and,
- Stripe-winged Grasshopper *Stenobothrus lineatus* (Nationally Scarce).

- 1.2.4. The survey identified 14 areas considered to be of high importance and 14 separate areas of secondary importance to the invertebrate fauna/assembly (see Figures within the Invertebrate Survey Report (Cambridge Ecology, 2018)). The greatest invertebrate interest was found in habitats dominated by woody vegetation. A high quality saproxylic assembly was recorded. Interest predominantly occurred in isolated trees and mature hedgerows and plantations.
- 1.2.5. Much of the remaining invertebrate conservation interest was found in open mosaic habitats and grasslands. The grassland associated with the Waterworks site at Madingley Mulch was considered to be of most conservation significance and has established as a site of high value for invertebrates.
- 1.2.6. Other habitats present on the Site were of less significance, although some, especially wetland, make a notable contribution to the overall interest of the Site.
- 1.2.7. An invertebrate habitat assessment was undertaken in 2021 (Cambridge Ecology, 2021) to examine the key areas for invertebrates identified in the 2018 survey. No formal sampling of invertebrates was undertaken. The survey report determined all the landscape types and habitats identified in 2018 to be present in the survey corridor of the route and considered that the conclusions of the 2018 survey report remain correct.
- 1.2.8. Due to access constraints, it was not possible to undertake surveys in some sections of the route (namely Coton Orchard) as part of the previous invertebrate surveys. Coton Orchard has, therefore, become the focus of the terrestrial invertebrate survey work undertaken by WSP in 2022.

1.3 Brief and Objectives

- 1.3.1. WSP UK Ltd was commissioned by Greater Cambridge Partnership (GCP) to undertake a terrestrial invertebrates assessment, with the following objectives:
- To undertake a desk study to determine the number and type of invertebrate species records within the Study Area (2km radius of the Scheme boundary);
 - Identify the key habitats / features within the Survey Area that are likely to be of greatest value to terrestrial invertebrates;
 - Sample and identify terrestrial invertebrate species within the Survey Area over spring and summer;
 - Assess the terrestrial invertebrate assembly(s) of the Survey Area and evaluate the likely importance of the invertebrate assembly(s) at a geographic scale; and
 - Present the findings in a baseline report.

1.4 Study and Survey Areas

Study Area

- 1.4.1. An updated ecological desk study was completed in 2022. As part of this study, records of any notable or legally protected species from within the Study Area were requested from Cambridgeshire & Peterborough Environmental Records Centre (CPERC). The Study Area for this was defined as a 2km radius of the Scheme boundary, shown in **Annex 5.14.1** (See Figure 1).

Survey Area

- 1.4.2. The Survey Area covered the Coton Orchard area of the scheme which was within the red line boundary and the route of the Proposed Scheme. This was assessed for its potential to support for an important terrestrial invertebrate assemblage. The Survey Area was investigated for its features that would offer most potential to support valuable invertebrates, and therefore an invertebrate assemblage, and were then subject to targeted survey. The overall Survey Area and sample points are shown in **Annex 5.14.1** (See Figures 1 and 2).

2 Legal and Policy Compliance

- 2.1.1. The Natural Environment and Rural Communities (NERC) Act came into force on 1 October 2006. Section 41 (S41) of the Act require the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England. The list has been drawn up in consultation with Natural England as required by the Act. In accordance with the Act the Secretary of State keeps this list under review and will publish a revised list, if necessary, in consultation with Natural England.
- 2.1.2. The S41 list is used to guide decision-makers such as public bodies, including local authorities and utilities companies, in implementing their duty under Section 40 of the NERC Act 2006, to have regard to the conservation of biodiversity in England, when carrying out their normal functions, including development control and planning. This is commonly referred to as the 'Biodiversity Duty'.
- 2.1.3. Guidance for public authorities on implementing the Biodiversity Duty has been published by Defra. One of the key messages in this document is that 'conserving biodiversity includes restoring and enhancing species populations and habitats, as well as protecting them'. In England the administration of the planning system and licensing schemes are highlighted as having a 'profound influence on biodiversity conservation'. Local authorities are required to take measures to "promote the preservation, restoration and re-creation of priority habitats, ecological networks and the protection and recovery of priority species". The guidance states that 'the duty aims to raise the profile and visibility of biodiversity, clarify existing commitments with regard to biodiversity, and to make it a natural and integral part of policy and decision making.'
- 2.1.4. In 2007, the UK Biodiversity Action Plan (BAP) Partnership published an updated list of priority UK species and habitats covering terrestrial, freshwater and marine biodiversity to focus conservation action for rarer species and habitats in the UK. The UK Post-2010 Biodiversity Framework, which covers the period from 2011 to 2020, now succeeds the UK BAP. The UK priority list contained 1,150 species and 65 habitats requiring special protection and has been used as a reference to draw up the lists of species and habitats of principal importance in England. Of those 1,150 species, there are 349 insects, 31 arachnids, 19 molluscs and 14 other inverts (covering worms, crustaceans, and other species) covered under the UK Post-2010 Biodiversity Framework. For the UK Biodiversity Action Plan (BAP) to be implemented successfully it requires some means of ensuring that the national strategy is translated into effective action at the local level, in this case the Cambridge Biodiversity Action Plan (Cambridge BAP).
- 2.1.5. In England, there are 56 Habitats of Principal Importance and 943 Species of Principal Importance on the S41 list. These are all the habitats and species found in England that were identified as requiring action in the UK BAP and which continue to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework. Of the 943



Species of Principal Importance, 379 of these are terrestrial invertebrates (covering insects, arachnids and molluscs).

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3 Methods

3.1 Desk Study

- 3.1.1. A desk-based review of existing biological information was undertaken across the Study Area which utilised the following information sources:
- Multi Agency Geographic Information for the Countryside (MAGIC);
 - Ordnance Survey mapping and publicly available aerial photography; and
 - A data search report from CPERC that included recent and historic invertebrate records within 2km.

3.2 Field Survey

Invertebrate Habitat Potential (IHP) assessment

- 3.2.1. The Survey Area (shown in **Annex 5.14.1**, Figure 1) was assessed for its potential to support important terrestrial invertebrate assemblages by a suitably experienced entomologist, on 12 April 2022. Survey effort was focussed on habitats and habitat features that were most likely to be directly impacted by the Scheme (e.g., through direct habitat loss).
- 3.2.2. An invertebrate habitat potential assessment survey was undertaken with reference to the (as yet unpublished) Invertebrate Habitat Potential Protocol (Dobson and Fairclough, unpublished). A record was made regarding the habitats present and features considered likely to be of significant value or potentially valuable for notable invertebrate assemblages. Such features can include areas with dense patches of flowering plants (including on roadside verges); south facing banks; patchy mosaic habitat including aggregations of bare ground; margins of scrub/woodland and substrate containing high organic content; mature or veteran trees offering standing and fallen dead wood and temporary areas of standing water (e.g., ephemeral pools and seepages) and associated terrestrial habitat (e.g. marshy grassland).
- 3.2.3. **Table 3-1** and **Table 3-2** show details of the IHP assessment protocol.

Table 3-1 - Summary of eleven habitat elements assessed by IHP survey

Habitat Element	No.	Comments
Decaying Wood	HE1	In all its forms; from decaying wood on/in large trees to woodland floor debris.
Rotational Management	HE2	Planned or serendipitous; and whether for nature conservation of other purposes.
Nectar Resources	HE3	As a proxy for nectar- and pollen resources, as assessment of pollen resources is impracticable on a walk-through survey.

Habitat Element	No.	Comments
Wet Substrates	HE4	Including marginal, marshy, muddy and seasonally inundated habitats, as well as flushes.
Open Water Habitats	HE5	The Open Water element of rivers, lakes, ponds, streams, ditches etc.
Structural Patchwork	HE6	Habitat Mosaics, including, but by no means restricted to open mosaic habitats on previously developed land.
Still Air (S)	HE7	Suntraps and still-air microclimates in open situations. The term 'still air' is used in preference to 'wind breaks' as many rigid wind breaks are likely to produce turbulent air in their lee.
Still Air (H)	HE8	Humid still-air microclimates in sheltered and shaded situations.
Connectivity	HE9	Landscape-scale connectivity between the site and external habitats.
Ecoclines	HE10	A graded transition between two or more broad habitats.
Bare Earth	HE11	Unshaded bare or sparsely vegetated well-drained substrate, regardless of soil type.

Table 3-2 - Grading system applied to habitat elements

Grade	Description
Negligible / Absent (E)	Habitat element is absent or of insignificant (barely perceptible) quantity.
Minor (D)	Habitat element is present but is insufficient quality to qualify as Moderate or above. For example, it may be of extremely limited extent, or very sparsely dispersed. Likely to support common and widespread, generalist species.
Moderate (C)	A clear example of the habitat element is present, but which does not qualify as Major. Likely to be of sufficient quality to support a characteristic invertebrate fauna.
Major (B)	Good quality examples of each habitat element which do not meet the criteria for Exceptional. Likely to be a predominant factor in supporting characteristic and specialised invertebrate assemblages. Considerations might include the extent, maturity and historic- and current connectivity of the element.
Exceptional (A)	Very high-quality examples of the habitat element, including but not restricted to those of potential regional significance. This may be for

Grade	Description
	reasons of intrinsic quality, rarity, vulnerability, or the perceived importance of its position in the wider landscape.

3.2.4. To enable a baseline characterisation of the Survey Area for invertebrates, the habitat assessment included observations of features that might limit invertebrate interest, as well as those which might be of value for invertebrates.

3.2.5. The distribution and extent of features of potential value informed the design of targeted terrestrial invertebrate surveys that were subsequently conducted within the Survey Area.

Targeted survey for terrestrial invertebrates

3.2.6. Coton Orchard supports a variety of habitats and features including, veteran and mature apple *Malus* sp., pear *Pyrus* sp. and plum *Prunus* sp. trees with standing and some (limited) fallen dead and decaying wood, mixed scrub, hedgerows and grassland. These habitats and features were subject to targeted survey in spring (mid-April) and summer (late-July). The targeted survey was designed to target data collection of key indicator groups associated with such habitats and features. This approach relates to the guidance set out in Drake et al. (2007); which lists many of the target taxa of field layer and arboreal assemblages and their value in assessment. *Coleoptera* (beetles), aculeate *Hymenoptera* (bees, ants and wasps), *Lepidoptera* (butterflies and moths), *Hemiptera* (true bugs) and *Orthoptera* (grasshoppers and crickets) are four orders that are strongly represented in such assemblages. Certain families (and suborders) of the order *Diptera* (flies) (e.g., *Syrphidae* (hoverflies) and other families of the larger *Brachycera* were also targeted. Observations of other invertebrate taxa including were also recorded.

3.2.7. The following sampling methods were employed: pan traps, pitfall traps, window traps, light trapping, sweep-netting, beating and grubbing. These methods are described below and shown in **Annex 5.14.1**, Figure 2.

Pan Traps

3.2.8. Pan traps were laid out in flower-rich locations in April 2022 (spring sampling) and July 2022 (summer sampling). The pan traps comprised yellow trays into which a small amount of water was poured (along with a few drops of detergent to break the surface tension). Such traps mimic large flowers and attract flying insects of many groups' especially aculeate *Hymenoptera* and certain *Diptera*, which become trapped in the fluid and can be collected later. During each visit the traps were set at the start of the survey and collected in at the end of the survey, usually the following day. Traps were left to collect invertebrates for a period of at least 24 hours.

Pitfall Traps

- 3.2.9. Pitfall traps were set out in suitable habitats to target ground dwelling invertebrates e.g., carabid beetles. Pitfall trapping involved the use of circular plant pot trays (24 cm diameter x 5 cm depth) sunk into an excavated circular hole with the tray rims flush with the surrounding ground level. Preserving fluid (and a drop of detergent to break the surface tension) was poured into the trays until they were half full. Lastly, a piece of mesh was secured over the tray to prevent capture of small mammals, amphibians, and reptiles. Traps were operational from 12 April 2022 to July 26 July 2022. Photographs 3 and 4 in **Annex 5.14.3** shows a pitfall trap deployed *in situ*.

Window or Flight Interception Traps

- 3.2.10. Two window (or flight interception) traps were used to target the dead and decaying wood invertebrate fauna of veteran and over mature orchard trees (predominantly apple and pear). Each trap was composed of two card sheets which slotted into each other, securely locked in place with a circular plant pot tray (24 cm diameter x 5 cm depth) at the base, and a reservoir (receptacle) at the other end, to store the catch. The constructed trap was inverted and therefore suspended from its base by hanging it from a suitable tree branch. Approximately 50 millilitres (ml) of preserving fluid, comprising 1-part ethylene glycol (antifreeze) to 2-parts water was poured into each window trap reservoir. Photographs 1 and 2 in **Annex 5.14.3** shows a window trap deployed *in situ*.

Light trapping

- 3.2.11. Nocturnal moth surveying was undertaken on the nights of the 26 and 27 July (two nights in total) on Site. Two generator-powered 125W Robinson moth trap were used, fitted with a mercury vapour bulb to attract moths from within the vicinity of each trap. The light was switched on at dusk and was checked throughout the night, into the early hours of the morning in order to record all visiting moths. In addition, two portable 6W actinic heath traps were used in the field at adjacent locations to the Robinson moth trap to supplement the survey effort. Locations of light trapping are shown in **Annex 5.14.1**, Figure 2.

Sweep Netting

- 3.2.12. Sweep netting involved walking at a steady pace through the vegetation and passing an entomologist's sweep net back and forth through vegetation in a figure of eight motion. Sweep netting was accompanied by 'spot-sweeping' where individual invertebrates (e.g., bees, butterflies and day flying moths) were targeted and collected via a single sweep. Sweep netting was conducted across Coton Orchard, during both surveys (April and July 2022) and again in August 2022 when some of the passive traps i.e., window traps, were retrieved from Site.

Beating

- 3.2.13. Beating is a useful technique for extracting arboreal invertebrates from overhanging branches. This method involves placing a beating tray beneath a branch before delivering several sharp blows to the branch, sending any dislodged invertebrates into the beating tray

for inspection. This method was generally combined with sweep netting in most locations, where possible. Beating was also conducted during both surveys (April and July), targeting scrub edge habitat, hedgerows and woodland canopies, where appropriate.

Grubbing

- 3.2.14. Grubbing is the name generally applied to the extraction of invertebrates by hand from a variety of media such as: dead wood or fungi and under bark; from moist cracked ground in seasonally inundated habitats; in dung, or from dense aggregations of leaf matter and detritus (e.g., base of grass tussocks, fern shuttlecocks and leafy / woody deposits). If appropriate, to assist in the detection of small beetles, material was sieved or placed in a bucket of water to capture invertebrates moving to the surface. Grubbing from such media took place during both survey visits (April and July 2022), in suitable locations of Coton Orchard.

Sample Sorting and Identification

- 3.2.15. For all surveys, whilst some species could be identified in the field, the majority of specimens were stored in 70% Industrial Methylated Spirit (IMS) for later identification, using a stereoscopic microscope with the aid of identification literature. For all target groups identification was taken down to species level, where possible.

3.3 Dates of Survey and Personnel

- 3.3.1. The team for this survey and reporting involved the following personnel:

- The lead surveyor was a principal consultant ecologist (BSc, MSc) with over 9 years' experience undertaking invertebrate surveys and assessment on a variety of development sites.
- The invertebrate identification specialist (MSc, FRES) is a fellow of the Royal Entomological Society and Curator of Natural Science at Bolton Museum. He specialises in invertebrate identification, particularly *Coleoptera*, and has carried out work for a wide range of clients across the UK over the last 10 years.

- 3.3.2. **Table 3-3** shows the weather conditions on the days of survey and gives details of the weather in the week preceding surveys.

Table 3-3 – Weather conditions during terrestrial invertebrate surveys

Survey dates and season	Survey type	Survey Effort (Hours)	Weather conditions
12 – 13 April 2022 (Spring)	Habitat potential assessment Targeted survey (sweep, beat, grubbing, pan trap, pitfall trap setting, window trap setting)	15	Preceding week: Cool conditions, with some scattered rainfall, cloud, and sunny spells.

Survey dates and season	Survey type	Survey Effort (Hours)	Weather conditions
			Dates of Survey: Unseasonably warm, sunny with scattered clouds. Gentle breeze. Cloud cover – 2-3 Oktas. Max temp. 18°C.
26 – 27 July 2022 (Summer)	Targeted survey (sweep, beat, pan trap, pitfall and window trap setting / resetting and moth trapping)	20	<p>Preceding week: Very warm, humid, and sunny, with a prolonged period of dry / drought conditions.</p> <p>Dates of Survey: Much cooler conditions than week before, partly sunny with scattered clouds. Gentle breeze. Cloud cover 1-2 Oktas. Max temp. 22°C.</p>
8 August 2022 (Summer)	Targeted survey (spot sweep, beat, pitfall trap and window trap retrieval)	4	<p>Preceding week: Warm conditions, with cloud and sunshine, no rain, very dry.</p> <p>Dates of Survey: Warm conditions, passing clouds with some sunshine. Still air. Cloud cover 3-4 Oktas. Max temp. 28°C.</p>

Data Analysis

- 3.3.3. The results and discussion section places a value on the rare and notable invertebrates found at the Site dependent on their current national status. Further information on status definitions and criteria of invertebrate groups can be found in **Annex 5.14.4**.

Pantheon Assemblage Analysis

- 3.3.4. The list of species derived from the invertebrate surveys was analysed using the “Pantheon” database tool developed by Natural England and the Centre for Ecology and Hydrology (Webb et al., 2018). For each species recognised by Pantheon, various attributes relating to associated habitats and resources, assemblage types and habitat fidelity scores are placed against them. Reports can then be generated including those that provide:
- information on each individual species entered into the database;
 - a list of species belonging to different feeding guilds (e.g. xylophagous, saprophagous, nectivorous);
 - a list of species with different associations (e.g. to certain groups of plant, fungi or animal);

- a summary of the number of species within the sample that have a particular score or fidelity and, if relevant an overall score that provides insight into the quality of the site that the sample has come from; and
 - summary tables that assess where species live and what assemblages they are associated with.
- 3.3.5. In the context of this assessment, it is the report that Pantheon provides relating to where species live and with which assemblages they are associated, that is considered most useful in evaluating the relative importance of a site for its invertebrates. This considers the habitats and resources used by an invertebrate species at various hierarchical levels, from broad biotopes (e.g. tree associated, wetland, coastal) at the highest level, down to specific habitats (e.g. tall sward and scrub, decaying wood, arboreal, marshland) at a mid-level, and resources (e.g. sapwood & bark decay, heart-rot and fungal fruiting bodies all associated with the decaying wood habitat) at the finest level. The assessment also considers the “ISIS” (Invertebrate Species-habitat Information System) assemblage types that had previously been developed by Natural England (Drake et al., 2007). The original Specific Assemblage Types (SATs) are therefore carried forward in their original form, although ‘Habitats’ have replaced the ISIS Broad Assemblage Types (BATs).
- 3.3.6. SATs include only habitat specific species, which are normally faithful to a single habitat or resource, which are often closely associated with sites of higher conservation value. Analysis of SATs is helpful to inform the determination of the nature conservation value of a site for invertebrates; sites with high-scoring SATs are considered to have good quality invertebrate assemblages.
- 3.3.7. The original role of ISIS was to guide Natural England on assessing the conservation value of Sites of Special Scientific Interest (SSSIs) for their invertebrate assemblages (especially for the purposes of Common Standards Monitoring) (Drake et al., 2007). This was done by identifying whether an assemblage associated with a site was in a “favourable condition” (i.e. where it was considered to be of sufficient condition to meet the threshold criteria for an assemblage of SSSI-level value). However, whilst the condition assessment function is still retained within Pantheon, it is not the sole use. Accordingly, the analysis may be used in other situations (e.g. by nature reserve managers or those assessing the effects of a development) to help understand which assemblages (SATs) within a site are considered likely to be of value.
- 3.3.8. A useful measure of the quality of a site for its invertebrate assemblage is to count and assign scores that are more heavily weighted towards the rarer species. The Species Quality Index (SQI) is a numerical scoring system contained within Pantheon that does exactly this. Each species recorded from a sample is given a Species Quality Score (SQS) based on their conservation status. The SQI is the sum of all SQSs divided by the number of species in that sample. This score is multiplied by 100 to give a 3 figure value without decimal places (e.g.100 rather than a 1.00). This SQI score is preferred to the SQS since it eliminates, to a greater extent the effect of recorder effort. Notwithstanding this, sites where

little effort has been made to record the common species could result in overly amplified SQI scores. There is presently no published guidance on what SQI score might be classed as 'good' or 'average' as this might vary between habitats and regions (e.g. northern vs. southern England). However, as a general rule of thumb, based on the experience of the author, a habitat with an SQI score exceeding 125 is likely to be of some value and merit further consideration.

3.4 Notes and Limitations

- 3.4.1. Surveys conducted between April and August covers the optimal survey period for invertebrates. However, during May and June access had been rescinded by the landowner and no surveys took place over these months. This represents a minor constraint to the data collection but is not considered to have significantly altered the results.
- 3.4.2. The survey approach has been designed with reference to guidance set out in Drake et al. (2007). It should be noted that the confidence in the ISIS / Pantheon analysis of SATs is reduced where survey work does not follow the precise ISIS sampling protocols. The objective of the survey was to identify a broad a range of invertebrates across target groups in predicted key areas of habitat, hence, the methods employed do vary slightly from the ISIS protocol. In such instances Webb et al. (2018) advises that caution is applied when using the SAT assessments, and that confidence in a favourable condition should be considered as 'Medium' for semi-ISIS compliant samples. In the present context, the analysis is considered to be broadly indicative; and may therefore give further steer to help understand which assemblages within the Survey Area are likely to be of value.

4 Results

4.1 Desk Study

- 4.1.1. CPERC returned multiple records of invertebrate species for groups including, but not limited to; *Coleoptera* (beetles), *Diptera* (true flies), *Hemiptera* (true bugs), *Hymenoptera* (ants, bees, wasps and sawflies) and *Lepidoptera* (butterflies and moths). Many of these include species that are assigned conservation statuses, i.e. red list species that are Nationally Rare or Scarce, or are considered Section 41 Priority Species. A complete list of invertebrate desk study records provided by CPERC is included in **Annex 5.14.1**.

4.2 Field Survey

Invertebrate Habitat Potential (IHP) Assessment

Coton Orchard habitat description

- 4.2.1. The Survey Area for the terrestrial invertebrate's assessment included the entire Coton Orchard complex, situated approximately 1km to the east of Cambridge city (See **Annex 5.14.1**, Figure 1). Broad habitat types at Coton Orchard include traditional orchard, scattered trees and scrub, mixed scrub, hedgerows, broad-leaved woodland, and neutral grassland. The habitat description below summarised in terms of IHP categories in **Table 4-1** and is accompanied by photographs of features / habitats of note (**Annex 5.14.3**).

Area 1

- 4.2.2. Area 1 covers the south-eastern section of Coton Orchard, where the habitat is generally heavily covered in scrub and less so in woodland. The dominant woody species that occur throughout this area tend to be Apple, Hawthorn *Crataegus monogyna* and Blackthorn *Prunus spinosa*. The woodland has developed on existing orchard land, where it has been left unmanaged and become dense and more or less impenetrable in some places. There are a few open areas within the scrub, but much of it is dense Bramble *Rubus fruticosus* agg. that has grown unchecked over a number of years and now dominates much of this side of the Site.
- 4.2.3. Bare ground exists throughout the wooded areas with few plants present in the ground flora, the soils here are largely clay-based, and completely shaded by the dense cover of Hawthorn and Blackthorn shrubs. There are paths / walkways, particularly around the perimeter of this area that do display warm suntraps and sheltered, still air features. A wet ditch features along the eastern boundary of Coton orchard which follows a line of hybrid Poplar *Populus deltoids x Populus nigra* trees, forming an 'L-shape'. There was noticeably high-levels of pollinator-insect activity in this area in April, when much of the Hawthorn was beginning to come into flower, as well as the last remaining flowers of Blackthorn, which were being investigated by many bees, wasps and hoverflies.

Area 2

- 4.2.4. Area 2 covers the central section of Coton Orchard, which features predominantly semi-mature to mature apple trees, planted in lines, with gaps present (where presumably trees had either been removed or did not establish) and neutral grassland extending from the scrub on the eastern side to the hedgerow on the western side. During the April survey visit, the apple trees were in flower resulting in an abundant nectar and pollen resource across Area 2. There were many farmed Honeybees *Apis mellifera* recorded here foraging, which are kept on Site in hives and managed by the landowner. The neutral grassland is well-maintained, with a short-mown sward and dominated by Perennial Rye *Lolium perenne* with species also present including; Creeping Buttercup *Ranunculus repens*, False Oat Grass *Arrhenatherum elatius*, Cock's-foot *Dactylis glomerata*, Dandelion *Taraxacum officinale* agg. Hawk's-beard *Crepis* sp. and Ribwort Plantain *Plantago lanceolata*.
- 4.2.5. There are signs of Rabbit activity along the grassland boundary where it sits adjacent to the scrub in the east. A mature hedgerow dividing Area 2 with Area 3 was present dividing up the Orchard and supported a range of broad-leaf species including Alder *Alnus glutinosa*, Ash *Fraxinus excelsior*, Oak *Quercus* sp., Elm *Ulmus* sp. and Goat Willow *Salix caprea*. The hedgerow creates a 'shelter-belt' with still conditions on its lee-ward side (depending on wind-direction) and provides additional shelter and forage opportunities for a range of invertebrates.

Area 3

- 4.2.6. Area 3 is similar in character to Area 2 and contains many similar Apple tree specimens, with the addition of Pear and Plum trees, as well as a line of veteran apple trees, considered to be over 100 years old. The veteran apple trees support some dead and decaying wood niches, that other parts of the orchard do not. Some of the trees are over 5m tall, with large cavities through the woody stem, such as old woodpecker holes, and branches with holes supporting cavities reaching into the heartwood of some trees. Other veteran features include rotten stems, flaking bark and historic exit-holes from wood-boring insects. Two window traps were sited within two examples of these veteran apple trees, hung from suitable features upon them, and left for two months to collect emerging saproxylic invertebrates.
- 4.2.7. The lines of Pear trees in Area 3 were in flower during the April site visit, which created a large area of forage for Spring-emerging insects, and many species of bee and hoverfly were witnessed feeding during the first day of survey. Another hedgerow with a good range of species is present straddling the centre of Area 3, other species here include Ash, Elder *Sambucus nigra* and Dog-rose *Rosa canina*.

Area 4

- 4.2.8. Area 4 is outside of the scheme boundary, but does contain analogous habitat to the rest of Coton Orchard. A section of hedgerow that runs along the eastern boundary of Coton Orchard garden centre, supports a wide range of species and was subject to a sweep/beat

exercise, which also sampled part of the orchard trees in the north. The eastern edge of Area 4 contains a good number of mature trees and is more reminiscent of woodland or woodland edge, with a mix of species and also some scattered scrub present. The apple trees here range from young (planted within the last 30 years) to more mature, with a similar grassland component to the rest of the orchard site. The northern-most end of Area 4 has been to grow, with a long grass and herb sward present, with patches of scattered scrub.

Table 4-1 – Coton Orchard IHP assessment results

Habitat Element	HE1	HE2	HE3	HE4	HE5	HE6	HE7	HE8	HE9	HE10	HE11
IHP Grading	B	C	A	D	D	C	C	C	C	C	B

Invertebrate species assemblage

- 4.2.9. The results of the targeted terrestrial invertebrate surveys provide an indication of the relative species diversity within the targeted groups of invertebrates. Over 600 specimens were collected or recorded over the course of the surveys, allowing 239 species to be identified from the Survey Area.
- 4.2.10. Of the target groups, *Lepidoptera* was the dominant order, with 119 species recorded largely moths caught using light trapping. *Coleoptera* was the second most recorded order with 38 species recorded; *Hymenoptera* was represented by 25 species; *Hemiptera* was represented by 13 species and *Diptera* by 12 species. Other orders, with two or fewer species included (but was not limited to) *Odonata* (dragonflies and damselflies), *Orthoptera* (grasshoppers and crickets), *Polydesmida* (flat-backed millipedes), *Julida* (millipedes) and *Isopoda* (woodlice).
- 4.2.11. Of the species recorded, 170 (c. 71 %) are without any recognised conservation status, being widely distributed and common, and exhibiting little habitat specificity; and 11 species (c. 5 %) are regarded as locally common or locally scarce. There are 54 moths that are currently listed as ‘Least Concern’ (Global), which is of low conservation value, as these species are relatively common, but have had the status of their populations evaluated. A total of 14 of the species recorded (c. 6 %) are currently regarded as Nationally Scarce. Three species are also Section 41 Species of Principal Importance (NERC Act, 2006), two for ‘research only’. Further information on status definitions and criteria of invertebrate groups can be found in **Annex 5.14.4**. The full list of invertebrates recorded within the Survey Area is displayed in tabular format in **Annex 5.14.5**.
- 4.2.12. Further information relating to species which were recorded with an assessed status, is provided below.

Coleoptera (beetles)

***Cleridae* (chequered beetles) *Tillus elongatus* – UK Status: Nationally Scarce**

4.2.13. A widespread species in south and central England with a few records as far as north Yorkshire and usually recorded from ancient broad-leaved and pasture-woodland. It has been found in Oak, Hazel *Corylus avellana*, Black Poplar *Populus nigra*, Holly *Ilex aquifolium* and Ivy *Hedera helix* and predates *Anobium* species. Listed as a saproxylic species with Continuity Grade 3 in Alexander (2004). The status of this species has recently been reviewed by Alexander (2014).

4.2.14. Two specimens were caught from a window trap in Area 3, in July 2022. See photograph 15 in **Annex 5.14.3**.

***Curculionidae* (weevils) Large Fruit Bark Beetle *Scotylus mali* – UK Status: Nationally Scarce**

4.2.15. Duff (2016) says this is found under the bark of rosaceous trees and shrubs or Elms *Ulmus* sp. and the larvae live in the living wood. It has been recorded between March and November and is local in England and very local in Wales on various plants near ponds, ditches and slow-flowing water. It has been mainly recorded between March and October, is local in England and Wales and generally scarce. Listed as a saproxylic species in Alexander (2004) but without a Continuity Grade. The other two *Scolytus* species identified are also saproxylics but without a status.

4.2.16. Three specimens were caught from a window trap in Area 3, in July 2022. See photograph 16 in **Annex 5.14.3**.

***Elateridae* (click beetles) *Athous campyloides* – UK Status: Nationally Scarce (Notable B)**

4.2.17. The distribution of this species seems to be mainly restricted to southeast England where it is local, and south Wales (Duff, 2020). It can be found typically in dry, especially calcareous grassland and the larvae develop in soil, feeding on the roots of various grass species and emerge in May. The males are more conspicuous as they tend to fly about, with females staying closer to the ground.

4.2.18. One specimen was caught from a window trap in Area 3, in July 2022. See photograph 17 in **Annex 5.14.3**.

***Eucnemidae* (false click beetles) *Melasis buprestoides* – UK Status: Nationally Scarce**

4.2.19. This distinctive species is found in rotten wood of broad-leaved trees and has been recorded in every month of the year. It has a widespread distribution in central and southern England and is local in northeast and southwest England and Wales and although generally scarce can sometimes be frequent (Duff, 2020). Listed as a saproxylic species with Continuity Grade 3 in Alexander (2004).

4.2.20. One specimen was caught from a window trap in Area 3, in July 2022. See photograph 18 in **Annex 5.14.3**.

***Histeridae* (hister beetles) *Aeletes atomarius* – UK Status: Nationally Scarce**

- 4.2.21. This minute (0.8-1.0mm) beetle lives in rotten wood of broad-leaved trees, especially Beech *Fagus* sp., sometimes in the larval burrows of Lesser Stag-beetle *Dorcus parallelipipedus* or Rhinoceros Beetle *Sinodendron cylindricum*. It has been recorded in most months of the year and is very local and rare in England and SE Wales (Duff, 2012). It is a saproxylic species with Continuity Grade 3 in Alexander (2004). The status has recently been reviewed in Lane (2017).
- 4.2.22. One specimen was caught from a window trap in Area 3, in July 2022. See photograph 19 in **Annex 5.14.3**.

***Histeridae* (hister beetles) *Gnathoncus buyssoni* – UK Status: Nationally Scarce**

- 4.2.23. This small beetle (2.2-3.4mm) is typically found in the nests of birds and mammals and on fungi in woodland. It has been recorded in December / January and June-August and is very local and rare in south England and Wales (Duff, 2012). It is listed as a saproxylic species in Alexander (2004) but without a Continuity Grade. The status has recently been reviewed in Lane (2017).
- 4.2.24. One specimen was caught from a window trap in Area 3, in July 2022. See photograph 20 in **Annex 5.14.3**.

***Mordellidae* (tumbling flower beetles) *Variimorda villosa* – UK Status: Nationally Scarce**

- 4.2.25. This is one of the larger (5-8mm) members of a distinctive family. The larvae develop in the rotten wood of poplars and willows, often in flood plains (Ermisch, 1969) and the adults feed on various flowers in the families *Asteraceae* (daisies) and *Apiaceae* (umbellifers). The status of this species has recently been reviewed by Alexander, et al (2014).
- 4.2.26. One specimen was caught from a pan trap in Area 1, in July 2022. See photograph 21 in **Annex 5.14.3**.

***Tenebrionidae* (darkling beetles) *Mycetochara humeralis* – UK Status: Nationally Scarce**

- 4.2.27. This distinctive beetle is found in rotten wood and under the bark, of broad-leaved trees, usually *Fagus* beech, in ancient woodlands. It has been recorded between April and September, and is locally scarce in central and southeast England. Listed as a saproxylic species with Continuity Grade 2 in Alexander (2004).
- 4.2.28. One specimen was caught from a window trap in Area 3, in July 2022. See photograph 22 in **Annex 5.14.3**.

Hymenoptera (bees, wasps, ants and sawflies)

***Megachilidae* (leafcutting bees) Two-coloured Mason Bee *Osmia bicolor* – UK Status: Nationally Scarce**

4.2.29. A robust, medium sized bee with a black head and thorax, and bright gingery hairs covering the abdomen. It is found mainly on chalk grasslands or woodland on chalk, where females conceal the nest in a snail's shell beneath a mound of twigs or leaves, which are carried to the nest site. Recorded from March to early July. (Brock, 2019).

4.2.30. One specimen was caught from spot sweeping in Area 1, in April 2022. See photograph 23 in **Annex 5.14.3**.

***Mellitidae* (Mellitid bees) Pantaloon Bee *Dasypoda hirtipes* – UK Status: Nationally Scarce**

4.2.31. A distinctive, hairy bee with two submarginal cells and oversized, pantaloon-like pollen brushes on the female hind legs, it is the only member of its genus which occurs in Britain. Nesting occurs in sandy ground, especially south-facing slopes. This species is strongly associated with yellow composite (*Asteraceae*) flowers and flies in mid-June to late August (Falk, 2017).

4.2.32. One specimen was caught from spot sweeping in Area 1, in July 2022. See photograph 24 in **Annex 5.14.3**.

***Crambidae* (Crambid snout moths) Waste Grass-veneer *Pediasia contaminella* – UK Status: Nationally Scarce**

4.2.33. A small, rather dull looking crambid micro-moth which prefers dry, grassy habitats, flying in July and August and attracted to light. The larvae feed in a silken tube amongst grasses such as Sheep's-fescue *Festuca ovina* (UK Moths, 2022).

4.2.34. One specimen was caught from light trapping in Area 2, in July 2022. See photograph 25 in **Annex 5.14.3**.

***Gelechiidae* (*Gelechiid* or twirler moths) Brindled Groundling *Recurvaria nanella* – UK Status: Nationally Scarce**

4.2.35. A speckled-greyish micro-moth. It occurs in orchards, where it can be a pest, feeding on Apple, Pear and also *Prunus* sp. The larva mines a leaf when young, later feeding inside a bud after hibernating. The adult moths fly in July and August, and are attracted to light, but can also be found resting on tree trunks (UK Moths, 2022).

4.2.36. One specimen was caught from light trapping in Area 1, in July 2022. See photograph 26 in **Annex 5.14.3**.

***Pyralidae* (Pyralid moths) Rosy-striped Knot-horn *Oncocera semirubella* – UK Status: Nationally Scarce**

4.2.37. A distinctive micro-moth, popularly named the Rhubarb and Custard moth. The preferred habitats are chalk downland and limestone cliffs, and the species occurs in the southernmost counties of England (UK Moths, 2022). The larval foodplants are Bird's-foot-trefoil *Lotus corniculatu* and Clover *Trifolium* sp.

4.2.38. One specimen was caught from light trapping in Area 2, in July 2022. See photograph 27 in **Annex 5.14.3**.

Stathmopodidae (Stathmopodid moths) Alder Signal *Stathmopoda pedella* – UK Status: Nationally Scarce

4.2.39. A small but distinctive micro-moth with a very characteristic resting position. The larvae feed on the seeds of ripening fruits of Alder (*Alnus*) but show little sign of their presence. It is widespread but extremely local in southern and south-eastern England. A few scattered populations occur further north. Adults fly in July (UK Moths, 2022).

4.2.40. One specimen was beaten from Alder in Area 3, in July 2022. See photograph 28 in **Annex 5.14.3**.

Pantheon Assemblage Analysis

4.2.41. As explained in **Section 3**, the Pantheon database has been used principally to help understand which assemblages within the site are likely to be important. The species list derived from the targeted surveys across the Survey Area was entered into Pantheon. The data output from the analysis is shown in **Table 4-2**, **Table 4-3** and **Table 4-4** below which considers invertebrate assemblages at three different levels.

Broad Biotopes

4.2.42. These are the top-level division into broad ecological groups. The Pantheon tool uses four broad categories for this: tree-associated, open habitats, wetland and coastal.

Table 4-2 – Summary of Pantheon output for broad biotopes

Broad biotope	No. of species	No. of species with a conservation status recognised by Pantheon	Conservation Status
Open habitats	104	29	26 LC (Global); 1 VU; 1 S41 PS; 3 Nb; 1 S41 PS (research only)
Tree-associated	68	26	3 Nb; 18 LC (Global); 4 NS; 1 EN
Wetland	7	1	1 LC (Global)

4.2.43. **Table 4-2** shows that there are three broad assemblage types which are recognised by Pantheon based on the invertebrate species recorded from the Site. The best represented is that belonging to open habitats at 104 species, which is unsurprising given that most of the survey effort targeted this broad biotope that includes grassland and scrub habitats.

Habitats

4.2.44. These are the second level of the Pantheon Hierarchy, under Broad biotope and above resources.

Table 4-3 – Summary of Pantheon output for habitats

Broad biotopes	Habitat	No. of species	SQL	No. of species with a conservation status recognised by Pantheon	Conservation Status
Open habitats	Tall sward and scrub	76	105	25	25 LC (Global); 1 S41 PS (research only)
Tree-associated	Arboreal	42	110	20	18 LC (Global); 1 EN; 1Nb
Open habitats	Short sward and bare ground	23	100	5	2 Nb; 2 LC (Global); 1 S41 PS; 1 VU
Tree-associated	Decaying wood	21	222	6	4 NS; 2Nb
Tree-associated	Shaded woodland floor	5	n/a	-	-
Wetland	Acid and sedge peats	4	n/a	1	1 LC (Global)
Wetland	Marshland	3	n/a	-	-

4.2.45. **Table 4-3** adds a finer level of detail to **Table 4-2**, sub-dividing broad biotopes into habitats. The most prominent habitat that features is that of ‘tall sward and scrub’ that lies within the broad biotope of ‘open habitats’. However, it was the habitat ‘Decaying wood’ which returned 6 species with a conservation status, and as a result has a higher SQL score associated with it of 222.

4.2.46. Habitats with less than 15 species are not considered to be able to generate a reliable SQL score. The ‘tall scrub and sward’ and ‘arboreal’ habitats generated a SQL score of 105 and 110 respectively, but most of the species with a conservation status here are moths which have been evaluated as being of ‘Least Concern’ in a global context, and so are not a focus of conservation efforts.

Specific Assemblage Types

4.2.47. SATs are characterised by ecologically restricted species and were generally only expressed in lists from sites with conservation value (Pantheon, 2022).

Table 4-4 - Summary of Pantheon output for specific assemblage types

Broad biotope	Habitat	SAT	No. of species	Reported condition
Open habitats	-	Rich flower resource	18	Favourable (18 species, 15 required)
Open habitats	-	Scrub edge	9	Unfavourable (9 species, 11 required)
-	-	Epiphyte fauna	1	Unfavourable (1 species, 3 required)
Open habitats	Short sward and bare ground	Bare sand and chalk	2	Unfavourable (2 species, 19 required)
Open habitats	Short sward and bare ground	Open short sward	1	Unfavourable (1 species, 13 required)
Tree-associated	Decaying wood	Bark & sapwood decay	11	Unfavourable (11 species, 19 required)
Tree-associated	Decaying wood	Heartwood decay	4	Unfavourable (4 species, 6 required)
Tree-associated	Decaying wood	Fungal fruiting bodies	1	Unfavourable (1 species, 7 required)
Wetland	Acid and sedge peats	Reed-fen & pools	1	Unfavourable (1 species, 11 required)

4.2.48. **Table 4-4** shows that there is one specific assemblage types (SATs) which is recognised by Pantheon with 15 or more species. The presence of SATs with high numbers of representative species, especially those in favourable condition provides an insight into the rarest and often most unique invertebrate assemblages associated with a Survey Area. Such assemblages within the Survey Area are considered likely to be the most valuable.

4.2.49. The favourable condition returned for 'rich flower resource' suggests that the open habitats within the Survey Area have an important resource of large flower patches capable of supporting a range of associated species (especially aculeate *Hymenoptera*). The flower patches were evident throughout the surveys, with Blackthorn, Pear and Dandelions providing sources of nectar and pollen early in the season, followed by Hawthorn and then

an array of umbellifers, composites and legumes in mid-summer, Bramble and a different range of composites in late summer and finally flowering Ivy and a few tall herbs in late September / October. Flower-rich resources include those associated with woody species as well as those associated with more typical herbaceous flowering plants. As explained in Pantheon (Webb et al., 2018), the detection of this assemblage is considered to be relevant in that it flags up the importance of the floral resource.

- 4.2.50. The Survey Area is predominantly a traditional orchard habitat with abundant flower-rich resources in the form of Apple, Pear and Plum trees, which flower in Spring and early summer, along with Blackthorn and Hawthorn scrub, but also has dense patches of Bramble which flower in late summer. This diversity of flowering vegetation is likely to be of importance for this invertebrate assemblage.

4.3 Evaluation of Invertebrate Assemblage

- 4.3.1. There is no widely accepted published guidance presently available that provides a clear description of how to evaluate an invertebrate assemblage of a site. Various authors (e.g. Plant, undated) have previously proposed that threshold levels of species with a recognised conservation status could be used to distinguish sites of varying levels of importance across a geographical scale (e.g. a site with more than ten Nationally Scarce species might merit Regional value). However, this relies on relatively comprehensive surveys being undertaken covering a broad range of groups, and the constant state of flux of status applied to species compounds the difficulty in applying such an approach. Former English Nature guidance (English Nature, 2005) advised that an appropriate approach is to compare with other sites of similar nature and habitat. So, for example, a site in Cambridgeshire is of County importance if it compares well with other similar sites in the area. This however introduces doubt, especially where useful data are unavailable (e.g., poorly recorded areas or where data have not been shared with Local Record Centres).
- 4.3.2. For the purposes of the present evaluation, it is considered to be more useful to rely on a combination of factors in making a qualitative assessment of the invertebrate value of the Survey Area. This considers the Pantheon output, including the number of species with a recognised conservation status found within the Survey Area during surveys, the SQI scores and number and condition of SATs. It also takes into account desk study information; and professional judgement of the author, based on a knowledge and understanding of the invertebrate importance of sites across the particular geographic region (in this case East Anglia).
- 4.3.3. Overall, the Survey Area supports a diverse invertebrate fauna, which includes 14 species currently regarded as Nationally Scarce. However, closer examination of this number reveals that certain areas supported more rarities than others. Area 3 supported eight such rarities, followed by Area 1, with four rarities, and Area 2 with two rarities. Area 4 had no rarities associated with it. Pantheon analysis reveals that the majority of these species are those associated with decaying wood habitats. The best examples of such habitats within the Survey Area are found within Area 3, from window trapping of the veteran apple trees,

which are likely to support the greatest diversity of invertebrates and the highest numbers of rarities.

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5 Conclusion

- 5.1.1. The terrestrial invertebrates survey and assessment at Coton Orchard (The Survey Area) in 2022, had identified the Site to likely have an important invertebrate assemblage based on the survey data and invertebrate specimens collected across the months of April, July and August. The main findings of the survey include:
- The IHP assessment concluded that the Habitat Elements best represented across the Survey Area were HE3 - Nectar Resources (Grade A), followed by HE1 - Decaying Wood (Grade B) and HE11 – Bare Earth (Grade B);
 - The collection or recording of over 600 specimens allowing 239 species to be identified, of which;
 - 119 species recorded were *Lepidoptera* (butterflies and moths, with the majority being moths);
 - 38 species recorded were *Coleoptera* (beetles);
 - 25 species recorded were *Hymenoptera* (bees, wasps, ants and sawflies);
 - 13 species recorded were *Hemiptera* (true bugs);
 - 12 species recorded were *Diptera* (true flies); and
 - A small number of other invertebrate orders, no more than two represented in each group.
 - The most well represented habitat is that of ‘tall sward and scrub’ within the ‘open habitats’ biotope, with 76 species.
 - The habitat with the best SQI score is ‘decaying wood’ which has a score of 222. It is likely this score would be further increased with additional sampling in May and June.
 - Pantheon has also recognised the ‘rich flower resource’ SAT component to the Survey Area as being ‘favourable’ and therefore likely one of the more important habitat features of the Survey Area. It is likely that the ‘decaying wood’ SATs, e.g. ‘bark & sapwood decay’ and ‘heartwood decay’, would also achieve favourable condition with additional sampling efforts of the deadwood habitats, i.e. the veteran orchard trees.
- 5.1.2. As described in the ‘notes and limitations’ section, and as is evident from the ‘evaluation’ paragraphs (above), the survey undertaken in 2022 subject to a minor limitation by the fact that no visits to the Survey Area were undertaken in May or June due to access issues. Extending the surveys across the spring, summer and even including an early autumn visit (end of August or into September) would provide a more complete set of survey information that can be used to more definitively evaluate the importance of the invertebrate fauna upon which the impact of development can be assessed.

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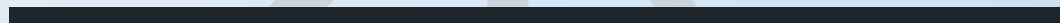
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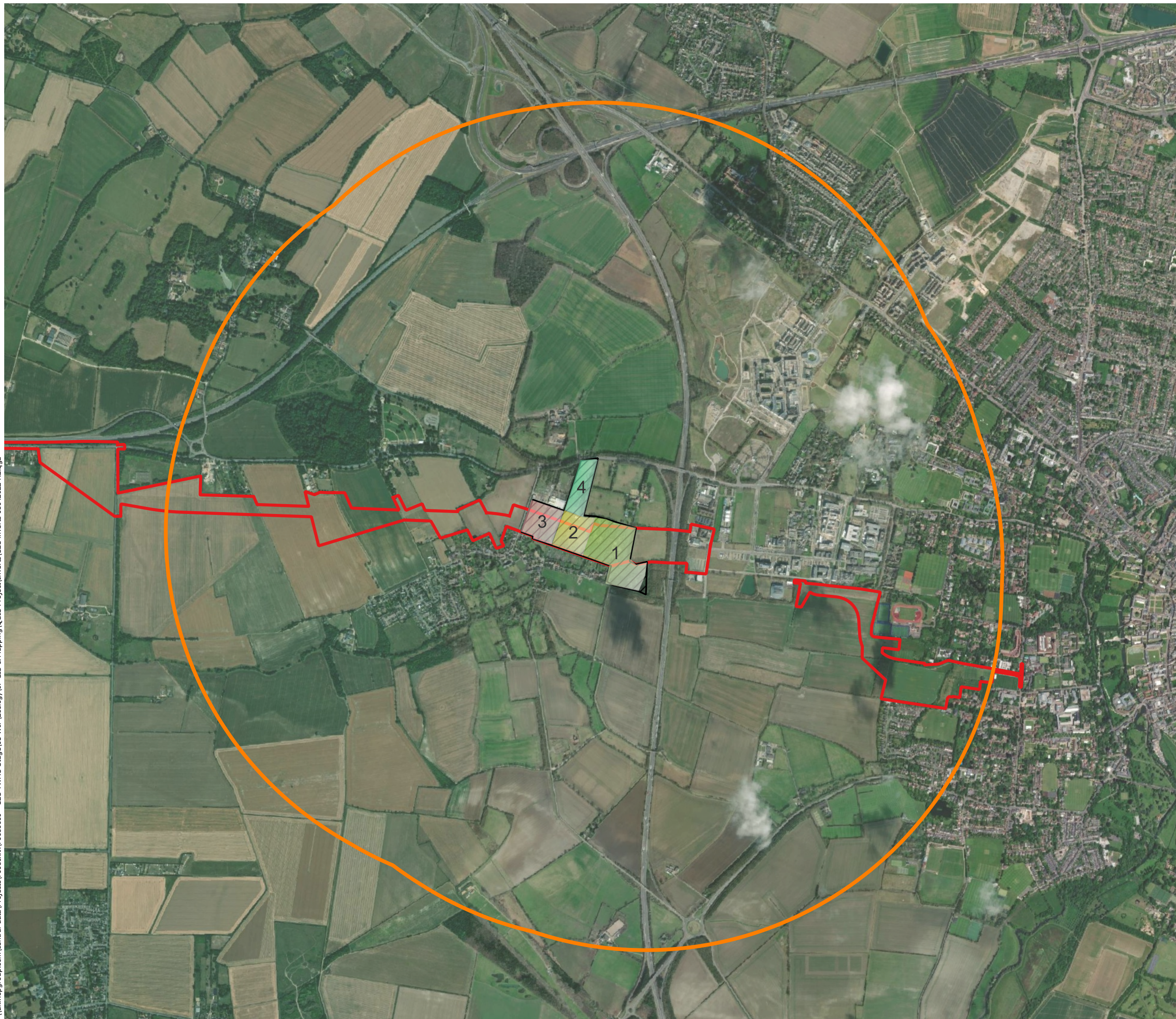
Annex 5.14.1

Study and Survey Areas






WSP





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LEGEND:

-  C2C Scheme Boundary
-  Study Area
-  Survey Area

Cotton Orchard Sampling Areas

-  1
-  2
-  3
-  4

STATUS:
FOR INFORMATION ONLY



WSP, 6 Devonshire Square
London, EC2M 4YE
Tel: +44 (0) 20 7337 1700
www.wsp.com

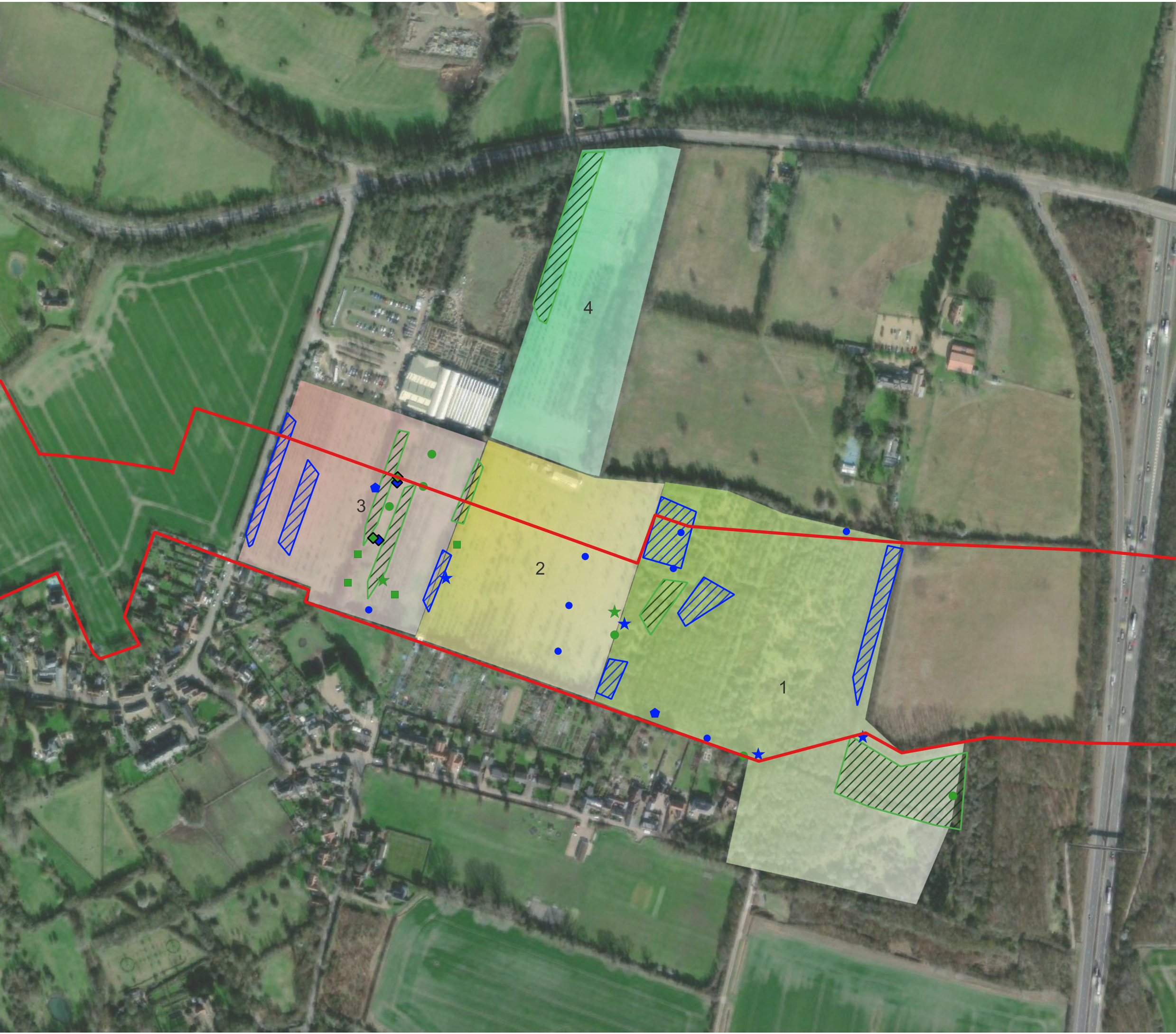
CLIENT:
Greater Cambridge Partnership

PROJECT:
Cambourne to Cambridge

TITLE:
**Terrestrial Invertebrates
Study and Survey Areas**

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LEGEND:

C2C Scheme Boundary
 C2C Scheme Boundary

Sampling Methods Spring 2022

- Light trap
- Pan trap
- Pitfall trap
- Window trap

Sampling Methods Summer 2022

- Grubbing
- Light trap
- Pan trap
- Window trap
- Sweep/beat

STATUS:
FOR INFORMATION ONLY



WSP, 6 Devonshire Square
 London, EC2M 4YE
 Tel: +44 (0) 20 7337 1700
 www.wsp.com

CLIENT:
Greater Cambridge Partnership

PROJECT:
Cambourne to Cambridge

TITLE:
**Terrestrial Invertebrates
 Sampling Methods and Areas**

SCALE @A3: 1:3,500	DRAWN: CH	APPROVED: AH
VERSION: 001	DATE: IE	DATE: 19/10/22
PROJECT No: 70086660	DRAWING No: Figure 2	

Annex 5.14.2

Desk Study Records within 2km

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Table 5.14.2-1 – Terrestrial Invertebrate Desk Study Records within 2km

Species	Taxon Group	No. of Records	Designation
<i>Euglenes oculatus</i>	Insect – beetle (Coleoptera)	1	NS
<i>Anobium inexpectatum</i>	Insect – beetle (Coleoptera)	1	-
<i>Platyrhinus resinosus</i>	Insect – beetle (Coleoptera)	1	Nb
<i>Aphodius zenkeri</i>	Insect – beetle (Coleoptera)	1	-
<i>Demetrias imperialis</i>	Insect – beetle (Coleoptera)	1	-
<i>Platyderus depressus</i>	Insect – beetle (Coleoptera)	1	-
<i>Anaglyptus mysticus</i>	Insect – beetle (Coleoptera)	1	-
<i>Aromia moschata</i>	Insect – beetle (Coleoptera)	1	-
<i>Phytoecia cylindrica</i>	Insect – beetle (Coleoptera)	1	-
<i>Chrysolina oricalcia</i>	Insect – beetle (Coleoptera)	1	-
<i>Donacia clavipes</i>	Insect – beetle (Coleoptera)	1	-

Species	Taxon Group	No. of Records	Designation
<i>Epitrix atropae</i>	Insect – beetle (Coleoptera)	1	NS
<i>Hippodamia variegata</i>	Insect – beetle (Coleoptera)	2	Nb
<i>Cossonus linearis</i>	Insect – beetle (Coleoptera)	2	NA
<i>Dorytomus ictor</i>	Insect – beetle (Coleoptera)	1	Nb
<i>Kissophagus hederæ</i>	Insect – beetle (Coleoptera)	1	Nb
<i>Polydrusus formosus</i>	Insect – beetle (Coleoptera)	1	Na
<i>Rhinocyllus conicus</i>	Insect – beetle (Coleoptera)	1	Nb
<i>Ctesias serra</i>	Insect – beetle (Coleoptera)	1	-
<i>Athous campyloides</i>	Insect – beetle (Coleoptera)	4	Nb
<i>Notaris scirpi</i>	Insect – beetle (Coleoptera)	1	Nb
<i>Orchesia micans</i>	Insect – beetle (Coleoptera)	1	NS
<i>Ischnomera cyanea</i>	Insect – beetle	1	-

Species	Taxon Group	No. of Records	Designation
	(Coleoptera)		
<i>Nicrophorus interruptus</i>	Insect – beetle (Coleoptera)	1	Nb
<i>Sphindus dubius</i>	Insect – beetle (Coleoptera)	1	Nb
<i>Medon apicalis</i>	Insect – beetle (Coleoptera)	1	N
<i>Philonthus fumarius</i>	Insect – beetle (Coleoptera)	1	Nb
<i>Platystethus nodifrons</i>	Insect – beetle (Coleoptera)	1	N
<i>Scaphisoma boleti</i>	Insect – beetle (Coleoptera)	1	Nb
<i>Sepedophilus testaceus</i>	Insect – beetle (Coleoptera)	2	-
<i>Stenus pusillus</i>	Insect – beetle (Coleoptera)	1	-
<i>Sunius melanocephalus</i>	Insect – beetle (Coleoptera)	1	N
<i>Eledona agricola</i>	Insect – beetle (Coleoptera)	1	-
<i>Hallomenus binotatus</i>	Insect – beetle (Coleoptera)	1	NS

Species	Taxon Group	No. of Records	Designation
<i>Hilara lugubris</i>	Insect – fly (Diptera)	1	LR; NS
<i>Atypophthalmus inustus</i>	Insect – fly (Diptera)	1	N
<i>Gnophomyia viridipennis</i>	Insect – fly (Diptera)	1	N
<i>Scenopinus niger</i>	Insect – fly (Diptera)	1	NS; NT
<i>Colobaea bifasciella</i>	Insect – fly (Diptera)	1	N
<i>Pherbellia annulipes</i>	Insect – fly (Diptera)	1	N
<i>Beris clavipes</i>	Insect – fly (Diptera)	1	-
<i>Chorisops nagatomii</i>	Insect – fly (Diptera)	1	-
<i>Odontomyia tigrina</i>	Insect – fly (Diptera)	1	-
<i>Oxycera analis</i>	Insect – fly (Diptera)	1	NR; VU
<i>Stratiomys potamida</i>	Insect – fly (Diptera)	1	-
<i>Vanoyia tenuicornis</i>	Insect – fly	1	-





Species	Taxon Group	No. of Records	Designation
	(<i>Diptera</i>)		
<i>Mintho rufiventris</i>	Insect – fly (<i>Diptera</i>)	1	N
<i>Asiraca clavicornis</i>	Insect – bug (<i>Hemiptera</i>)	7	Nb
<i>Chloriona vasconica</i>	Insect – bug (<i>Hemiptera</i>)	1	Nb
<i>Raglius alboacuminatus</i>	Insect – bug (<i>Hemiptera</i>)	2	Nb
<i>Agnocoris reclairei</i>	Insect – bug (<i>Hemiptera</i>)	3	Nb
<i>Anthophora quadrimaculata</i>	Insect – ants, bees, wasps and sawflies (<i>Hymenoptera</i>)	4	Nb
<i>Bombus rupestris</i>	Insect – ants, bees, wasps and sawflies (<i>Hymenoptera</i>)	2	Nb
<i>Hylaeus signatus</i>	Insect – ants, bees, wasps and sawflies (<i>Hymenoptera</i>)	2	Nb
<i>Cerceris quinquefasciata</i>	Insect – ants, bees, wasps and sawflies (<i>Hymenoptera</i>)	2	RDB3; S41 PS
<i>Nysson trimaculatus</i>	Insect – ants, bees, wasps and sawflies (<i>Hymenoptera</i>)	1	Nb
<i>Oxybelus mandibularis</i>	Insect – ants, bees, wasps and sawflies (<i>Hymenoptera</i>)	1	Na
<i>Lasioglossum malachurum</i>	Insect – ants, bees, wasps and sawflies (<i>Hymenoptera</i>)	1	Nb
<i>Chiasmia clathrata</i>	Insect – moths and butterflies (<i>Lepidoptera</i>)	4	NT; S41 PS; VU
<i>Coenonympha pamphilus</i>	Insect – moths and butterflies (<i>Lepidoptera</i>)	7	S41 PS; VU

Annex 5.14.3

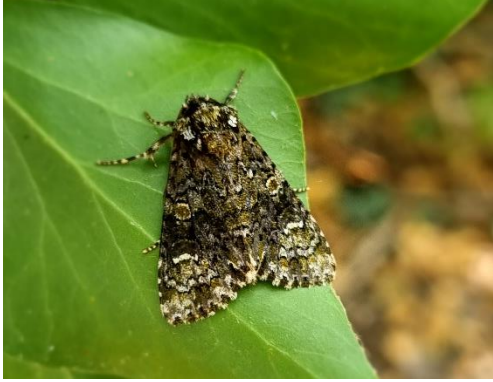



Survey and Assessment Photographs







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Table 5.14.3-1 – Survey and Assessment Photographs

 <p style="text-align: right;">© Chris Horley</p>	 <p style="text-align: right;">© Chris Horley</p>
<p>1. A window trap in-situ (fixed to veteran Apple tree)</p>	<p>2. Window trap fixed near to deadwood features of the Apple tree</p>
 <p style="text-align: right;">© Chris Horley</p>	 <p style="text-align: right;">© Chris Horley</p>
<p>3. Pitfall trap in-situ by a mature Apple tree</p>	<p>4. Pitfall traps were fitted with mesh coverings and filled with diluted ethylene glycol solution</p>

 <p data-bbox="676 707 836 734">© Chris Horley</p>	 <p data-bbox="1326 707 1485 734">© Chris Horley</p>
<p data-bbox="204 770 807 831">5. Surveyor sorting through contents of sweep net</p>	<p data-bbox="863 770 1482 831">6. Mining bee <i>Andrena</i> sp. nest entrance in grassland habitat</p>
 <p data-bbox="676 1299 836 1326">© Chris Horley</p>	 <p data-bbox="1326 1299 1485 1326">© Chris Horley</p>
<p data-bbox="204 1364 836 1424">7. Mining bee <i>Andrena</i> sp. nest entrance in bare ground habitat</p>	<p data-bbox="863 1364 1482 1424">8. Dark-edged bee-fly <i>Bombylius major</i>, a nest parasite of mining bees</p>
 <p data-bbox="676 1877 836 1904">© Chris Horley</p>	 <p data-bbox="1326 1877 1485 1904">© Chris Horley</p>

<p>9. Storage yard area with pallets and wood piles in foreground and orchard habitat in the background (facing west)</p>	<p>10. Many Honeybees were present here (hives in background). A single female Pantaloon Bee <i>Dasypoda hirtipes</i> was caught here during a spot-sweep.</p>
 <p>© Chris Horley</p>	 <p>© Chris Horley</p>
<p>11. The Coronet <i>Craniophora ligustri</i> Caught using light trap on 26 July 2022</p>	<p>12. Burnished Brass <i>Diachrysia chrysitis</i> Caught using light trap on 26 July 2022</p>
 <p>© Chris Horley</p>	 <p>© Chris Horley</p>
<p>13. Yellow-striped Darwin Wasp <i>Ichneumon xanthorius</i> Day time observation on 26 July 2022</p>	<p>14. Parent Shieldbug <i>Elasmucha grisea</i> Day time observation on 8 August 2022</p>

 <p>www.ukbeetles.org.uk</p>	 <p>www.ukbeetles.org.uk</p>
<p>15. <i>Tillus elongatus</i> UK Status: Nationally Scarce</p>	<p>16. <i>Scolytus mali</i> UK Status: Nationally Scarce</p>
 <p>www.ukbeetles.org.uk</p>	 <p>www.ukbeetles.org.uk</p>
<p>17. <i>Athous campyloides</i> UK Status: Nationally Scarce (Notable B)</p>	<p>18. <i>Melasis buprestoides</i> UK Status: Nationally Scarce</p>
 <p>www.ukbeetles.org.uk</p>	 <p>www.ukbeetles.org.uk</p>
<p>19. <i>Aeletes atomarius</i> UK Status: Nationally Scarce</p>	<p>20. <i>Gnathoncus buyssoni</i> UK Status: Nationally Scarce</p>

 <p data-bbox="598 728 837 757">www.ukbeetles.org.uk</p>	 <p data-bbox="1244 728 1484 757">www.ukbeetles.org.uk</p>
<p data-bbox="199 788 486 824">21. <i>Variimorda villosa</i></p> <p data-bbox="199 837 582 869">UK Status: Nationally Scarce</p>	<p data-bbox="861 788 1220 824">22. <i>Mycetochara humeralis</i></p> <p data-bbox="861 837 1244 869">UK Status: Nationally Scarce</p>
 <p data-bbox="646 1254 837 1283">© Malcolm Storey</p>	 <p data-bbox="1300 1254 1492 1283">© Janet Graham</p>
<p data-bbox="199 1319 438 1355">23. <i>Osmia bicolor</i></p> <p data-bbox="199 1368 582 1400">UK Status: Nationally Scarce</p>	<p data-bbox="861 1319 1157 1355">24. <i>Dasypoda hirtipes</i></p> <p data-bbox="861 1368 1244 1400">UK Status: Nationally Scarce</p>
 <p data-bbox="670 1758 837 1787">© Jim Swalwell</p>	 <p data-bbox="1324 1758 1492 1787">© P. Kitchener</p>
<p data-bbox="199 1823 542 1859">25. <i>Pediasia contaminella</i></p> <p data-bbox="199 1872 582 1904">UK Status: Nationally Scarce</p>	<p data-bbox="861 1823 1165 1859">26. <i>Recurvaria nanella</i></p> <p data-bbox="861 1872 1244 1904">UK Status: Nationally Scarce</p>



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27. *Oncocera semirubella*
UK Status: Nationally Scarce

28. *Stathmopoda pedella*
UK Status: Nationally Scarce

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Annex 5.14.4

Status Definitions

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Much invertebrate conservation evaluation hinges on nationally threatened and scarce species. For many invertebrate groups, species rarity has often been gauged by the number of national 10 km grid squares in which they occur. The fewer “spots on a map”, the rarer it is. This, however, does not exactly equate with how threatened a species is, since some species may be naturally confined to very few localities but are very abundant where they do occur and under no immediate threat of extinction. The matter of how threatened the “rarest” species are, has been addressed in a series of Red Data Books (RDB), such as for insects¹. Here, the listing as RDB1 (Endangered), RDB2 (Vulnerable) and RDB3 (Rare) is an assessment of how threatened or endangered the species is in Britain, rather than how scarce it is in terms of map spot counting.

Over the last decade the RDB categories are slowly being replaced by IUCN red-list categories (Critically Endangered, Endangered and Vulnerable), which use different criteria to those developed for the RDBs. The process of replacing RDB categories with IUCN ones is however slow, and IUCN categories are not available for all groups. Accordingly, wherever IUCN categories have been allocated in the report, these are also shown in preference, ahead of RDB categories.

IUCN also recognised the value of a Near Threatened category to identify species that need to be kept under review to ensure that they have not become vulnerable to extinction. This category is used for species which have been evaluated against the criteria but do not qualify for a threatened category, although they may be close to qualifying or likely to qualify in the near future.

At the national level, countries are permitted to refine the definitions for the non-threatened categories and to define additional ones of their own, which essentially sit below RDB / IUCN status (i.e., Near Threatened). Thus, less rare but still significant species can be defined as Nationally Scarce (formerly called Nationally Notable), which is often sub-divided into Na (scarce), Nb (less scarce). These sub-categories are based on 10 km square spot counting for the Great Britain grid system². The Na sub-category represents scarce taxa that are thought to occur in 30 or fewer 10 km squares of the Great Britain grid system. The Nb sub-category represents less scarce taxa that occur in 31 to 100 10 km squares. Taxa in the N- sub-category are those listed as ‘Notable’, but not always distinguished into sub-category Na or Nb. These species are thought to occur in 16 to 100 10 km squares of the National Grid but are too poorly known for their status to be more precisely estimated.

IUCN (pre 1994) categories remain relevant to certain taxa if an update has not been forthcoming. These categories are as follows:

¹ Shirt, D. B (ed) (1987) British Red Data Books: Insects. JNCC

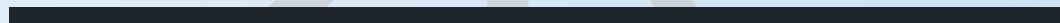
² Ball, S.G. (1986) Terrestrial and freshwater invertebrates with Red Data Book, Notable or habitat indicator status. Invertebrate Site Register internal report number 66. NCC

- IUCN (pre 1994) Rare - taxa with small populations that are not at present Endangered or Vulnerable, but are at risk. In the UK, this was interpreted as species which exist in fifteen or fewer 10km squares. Superseded by new IUCN categories in 1994, but still applicable to lists that have not been reviewed since 1994.
- IUCN (pre 1994) Vulnerable - taxa believed likely to move into the Endangered category in the near future if the causal factors continue operating. Superseded by new IUCN categories in 1994, but still applicable to lists that have not been reviewed since 1994.

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Annex 5.14.5

Survey data 2022



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Table 5.14.5-1 – Coton Orchard Survey Data 2022

Order	Family	Common name	Scientific name	Conservation status	Season	Date	Method	Count	Area
<i>Coleoptera</i>	<i>Curculionidae</i>	A bark beetle	<i>Scolytus laevis</i>	-	Summer (July)	26/07/2022	Window trap	1	Area 3
<i>Coleoptera</i>	<i>Curculionidae</i>	Large Fruit Bark Beetle	<i>Scolytus mali</i>	Nb	Summer (July)	26/07/2022	Window trap	3	Area 3
<i>Coleoptera</i>	<i>Curculionidae</i>	Shothole Borer	<i>Scolytus rugulosus</i>	Local	Summer (July)	26/07/2022	Window trap	10	Area 3
<i>Coleoptera</i>	<i>Chrysomelidae</i>	Cabbage-stem Flea Beetle	<i>Psylliodes chrysocephala</i>	-	Spring (April)	13/04/2022	Sweep/beat	4	Area 3
<i>Coleoptera</i>	<i>Coccinellidae</i>	Cream Spot Ladybird	<i>Calvia quattuordecimguttata</i>	-	Spring (April)	12/04/2022	Sweep/beat	1	Area 2
<i>Coleoptera</i>	<i>Coccinellidae</i>	7-spot Ladybird	<i>Coccinella septempunctata</i>	-	Spring (April)	12/04/2022	Sweep/beat	5	Area 4
<i>Coleoptera</i>	<i>Coccinellidae</i>	Pine Ladybird	<i>Exochomus quadripustulatus</i>	-	Spring (April)	12/04/2022	Sweep/beat	1	Area 3
<i>Coleoptera</i>	<i>Coccinellidae</i>	Orange Ladybird	<i>Halysia sedecimguttata</i>	-	Spring (April)	12/04/2022	Sweep/beat	1	Area 4
<i>Coleoptera</i>	<i>Coccinellidae</i>	14-spot Ladybird	<i>Propylea quattuordecimpunctata</i>	-	Spring (April)	12/04/2022	Sweep/beat	2	Area 4
<i>Coleoptera</i>	<i>Cleridae</i>	A checkered beetle	<i>Tillus elongatus</i>	NS	Summer (July)	26/07/2022	Window trap	2	Area 3
<i>Coleoptera</i>	<i>Elateridae</i>	A click beetle	<i>Athous campyloides</i>	Nb	Summer (July)	26/07/2022	Window trap	1	Area 3



Order	Family	Common name	Scientific name	Conservation status	Season	Date	Method	Count	Area
<i>Coleoptera</i>	<i>Elateridae</i>	A click beetle	<i>Denticollis linearis</i>	-	Summer (July)	26/07/2022	Sweep/beat	1	Area 3
<i>Coleoptera</i>	<i>Elateridae</i>	A click beetle	<i>Stenagostus rhombeus</i>	Local	Summer (July)	26/07/2022	Window trap	2	Area 3
<i>Coleoptera</i>	<i>Elateridae</i>	Wireworm Click Beetle	<i>Agriotes obscurus</i>	-	Spring (April)	12/04/2022	Sweep/beat	2	Area 4
<i>Coleoptera</i>	<i>Histeridae</i>	A clown beetle	<i>Aeletes atomarius</i>	NS	Summer (July)	26/07/2022	Window trap	1	Area 3
<i>Coleoptera</i>	<i>Histeridae</i>	A clown beetle	<i>Gnathoncus buyssoni</i>	NS	Summer (July)	26/07/2022	Window trap	1	Area 3
<i>Coleoptera</i>	<i>Tenebrionidae</i>	A darkling beetle	<i>Mycetochara humeralis</i>	NS	Summer (July)	26/07/2022	Window trap	1	Area 3
<i>Coleoptera</i>	<i>Geotrupidae</i>	Dor Beetle	<i>Geotrupes stercorarius</i>	-	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Coleoptera</i>	<i>Eucnemidae</i>	A false click beetle	<i>Melasis buprestoides</i>	Nb	Summer (July)	26/07/2022	Window trap	1	Area 3
<i>Coleoptera</i>	<i>Carabidae</i>	Black Clock Beetle	<i>Pterostichus madidus</i>	-	Summer (July)	26/07/2022	Pitfall trap	3	Area 1
<i>Coleoptera</i>	<i>Trogidae</i>	A hide beetle	<i>Trox scaber</i>	Local	Summer (July)	26/07/2022	Window trap	1	Area 3
<i>Coleoptera</i>	<i>Coccinellidae</i>	Pine Ladybird	<i>Exochomus quadripustulatus</i>	-	Summer (July)	26/07/2022	Window trap	1	Area 3
<i>Coleoptera</i>	<i>Chrysomelidae</i>	Broad Bean Beetle	<i>Bruchus rufimanus</i>	Local	Summer (July)	26/07/2022	Window trap	1	Area 3
<i>Coleoptera</i>	<i>Chrysomelidae</i>	A flea beetle	<i>indet Altica species</i>	-	Summer (July)	26/07/2022	Pan trap	1	Area 2

Order	Family	Common name	Scientific name	Conservation status	Season	Date	Method	Count	Area
<i>Coleoptera</i>	<i>Erotylidae</i>	A pleasing fungus beetle	<i>Triplax russica</i>	Local	Summer (July)	26/07/2022	Window trap	1	Area 3
<i>Coleoptera</i>	<i>Nitidulidae</i>	A pollen beetle	<i>Meligethes aeneus</i>	-	Summer (July)	26/07/2022	Window trap	1	Area 3
<i>Coleoptera</i>	<i>Nitidulidae</i>	A pollen beetle	<i>Meligethes nigrescens</i>	-	Summer (July)	26/07/2022	Pan trap	1	Area 3
<i>Coleoptera</i>	<i>Staphylinidae</i>	A rove beetle	<i>Anotylus rugosus</i>	-	Summer (July)	26/07/2022	Window trap	1	Area 3
<i>Coleoptera</i>	<i>Staphylinidae</i>	Devil's Coach Horse Beetle	<i>Ocypus olens</i>	-	Spring (April)	13/04/2022	Grubbing	7	Area 3
<i>Coleoptera</i>	<i>Staphylinidae</i>	A rove beetle	<i>Othius punctulatus</i>	-	Summer (July)	26/07/2022	Pitfall trap	1	Area 3
<i>Coleoptera</i>	<i>Staphylinidae</i>	A rove beetle	<i>Plataraea brunnea</i>	Local	Summer (July)	26/07/2022	Window trap	1	Area 3
<i>Coleoptera</i>	<i>Staphylinidae</i>	A rove beetle	<i>Tasgius globulifer</i>	-	Summer (July)	26/07/2022	Window trap	1	Area 3
<i>Coleoptera</i>	<i>Cantharidae</i>	Common Red Soldier Beetle	<i>Rhagonycha fulva</i>	-	Summer (July)	26/07/2022	Window trap	7	Area 3
<i>Coleoptera</i>	<i>Mordellidae</i>	A tumbling flower beetle	<i>Variimorda villosa</i>	NS	Summer (July)	26/07/2022	Sweep/beat	1	Area 2
<i>Coleoptera</i>	<i>Apionidae</i>	A seed weevil	<i>Apion frumentarium</i>	-	Summer (July)	26/07/2022	Pan trap	2	Area 3
<i>Coleoptera</i>	<i>Curculionidae</i>	Cabbage Seed Pod Weevil	<i>Ceutorhynchus obstrictus</i>	-	Spring (April)	13/04/2022	Sweep/beat	1	Area 2
<i>Coleoptera</i>	<i>Curculionidae</i>	A wood-boring weevil	<i>Euophryum confine</i>	-	Summer (July)	26/07/2022	Pan trap	1	Area 1



Order	Family	Common name	Scientific name	Conservation status	Season	Date	Method	Count	Area
<i>Coleoptera</i>	<i>Curculionidae</i>	Small Nettle Weevil	<i>Nedyus quadrimaculatus</i>	-	Summer (July)	26/07/2022	Window trap	6	Area 3
<i>Coleoptera</i>	<i>Curculionidae</i>	Armadillo Weevil	<i>Otiorhynchus armadillo</i>	-	Spring (April)	12/04/2022	Sweep/beat	2	Area 2
<i>Coleoptera</i>	<i>Curculionidae</i>	A true weevil	<i>Otiorhynchus aurifer</i>	-	Summer (July)	26/07/2022	Window trap	1	Area 3
<i>Coleoptera</i>	<i>Curculionidae</i>	A true weevil	<i>Parathelcus pollinarius</i>	-	Summer (July)	26/07/2022	Window trap	1	Area 3
<i>Coleoptera</i>	<i>Curculionidae</i>	Pea Leaf Weevil	<i>Sitona lineatus</i>	-	Summer (July)	26/07/2022	Sweep/beat	2	Area 2
<i>Coleoptera</i>	<i>Rhynchitidae</i>	Apple Fruit Weevil	<i>Neocoenorrhinus aequatus</i>	-	Spring (April)	12/04/2022	Pan trap	2	Area 3
<i>Coleoptera</i>	<i>Cerambycidae</i>	Lesser Thorn-tipped Longhorn Beetle	<i>Pogonocherus hispidus</i>	-	Summer (July)	26/07/2022	Window trap	1	Area 3
<i>Diptera</i>	<i>Bombyliidae</i>	Dark-edged Beefly	<i>Bombylius major</i>	-	Spring (April)	13/04/2022	Sweep/beat	10+	Area 1
<i>Diptera</i>	<i>Calliphoridae</i>	Bluebottle Fly	<i>Calliphora vomitoria</i>	-	Summer (July)	27/07/2022	Sweep/beat	10+	Area 1
<i>Diptera</i>	<i>Syrphidae</i>	Greater Spring Blacklet	<i>Cheilosia grossa</i>	-	Spring (April)	12/04/2022	Spot sweep	1	Area 1
<i>Diptera</i>	<i>Syrphidae</i>	Spring Epistrophe	<i>Epistrophe eligans</i>	-	Spring (April)	12/04/2022	Spot sweep	2	Area 1
<i>Diptera</i>	<i>Syrphidae</i>	Small Spotty-eyed Dronefly	<i>Eristalinus sepulchralis</i>	Local	Spring (April)	12/04/2022	Spot sweep	1	Area 2
<i>Diptera</i>	<i>Syrphidae</i>	Tapered Drone Fly	<i>Eristalis pertinax</i>	-	Spring (April)	12/04/2022	Spot sweep	2	Area 1



Order	Family	Common name	Scientific name	Conservation status	Season	Date	Method	Count	Area
<i>Diptera</i>	<i>Syrphidae</i>	Migrant Hoverfly	<i>Eupeodes corollae</i>	-	Summer (July)	26/07/2022	Pan trap	1	Area 3
<i>Diptera</i>	<i>Syrphidae</i>	Tiger Hoverfly	<i>Helophilus pendulus</i>	-	Spring (April)	12/04/2022	Spot sweep	1	Area 2
<i>Diptera</i>	<i>Syrphidae</i>	Short Melanostoma	<i>Melanostoma mellinum</i>	-	Spring (April)	12/04/2022	Spot sweep	2	Area 3
<i>Diptera</i>	<i>Syrphidae</i>	Chequered Hoverfly	<i>Melanostoma scalare</i>	-	Summer (July)	26/07/2022	Pan trap	1	Area 2
<i>Diptera</i>	<i>Syrphidae</i>	Batman Hoverfly	<i>Myathropa florea</i>	-	Spring (April)	12/04/2022	Spot sweep	1	Area 2
<i>Diptera</i>	<i>Asilidae</i>	Kite-tailed Robberfly	<i>Machimus atricapillus</i>	-	Summer (July)	26/07/2022	Window trap	3	Area 3
<i>Diptera</i>	<i>Tachinidae</i>	A tachinid fly	<i>Gymnocheta viridis</i>	-	Summer (July)	26/07/2022	Pan trap	10+	Area 1
<i>Diptera</i>	<i>Conopidae</i>	Small Beegrabber	<i>Thecophora atra</i>	Local	Summer (July)	26/07/2022	Pan trap	4	Area 2
<i>Hemiptera</i>	<i>Nabidae</i>	Tree Damsel Bug	<i>Himacerus apterus</i>	-	Spring (April)	12/04/2022	Spot sweep	1	Area 1
<i>Hemiptera</i>	<i>Aradidae</i>	A flatbug	<i>Aradus depressus</i>	Local	Summer (July)	26/07/2022	Pan trap	1	Area 1
<i>Hemiptera</i>	<i>Aphrophoridae</i>	Common Froghopper	<i>Philaenus spumarius</i>	-	Summer (July)	26/07/2022	Sweep/beat	10+	Area 3
<i>Hemiptera</i>	<i>Cicadellidae</i>	A leaf hopper	<i>Aphrodes makarovi</i>	-	Summer (July)	26/07/2022	Window trap	1	Area 3
<i>Hemiptera</i>	<i>Coreidae</i>	Dock Bug	<i>Coreus marginatus</i>	-	Summer (July)	26/07/2022	Sweep/beat	4	Area 2

Order	Family	Common name	Scientific name	Conservation status	Season	Date	Method	Count	Area
Hemiptera	Miridae	Common Nettle Bug	<i>Liocoris tripustulatus</i>	-	Summer (July)	26/07/2022	Pan trap	50+	Area 1
Hemiptera	Cicadellidae	A planthopper bug	<i>Anoscopus serratulae</i>	Local	Summer (July)	26/07/2022	Sweep/beat	1	Area 3
Hemiptera	Issidae	A planthopper bug	<i>Issus coleoptratus</i>	-	Spring (April)	12/04/2022	Sweep/beat	1	Area 1
Hemiptera	Rhopalidae	Cinnamon Bug	<i>Corizus hyoscyami</i>	-	Summer (July)	26/07/2022	Window trap	1	Area 3
Hemiptera	Pentatomidae	Common Green Shieldbug	<i>Palomena prasina</i>	-	Summer (July)	26/07/2022	Window trap	4	Area 3
Hemiptera	Acanthosomatidae	Parent Shieldbug	<i>Elasmucha grisea</i>	-	Summer (July)	26/07/2022	Window trap	1	Area 3
Hemiptera	Pentatomidae	Red-legged Shieldbug	<i>Pentatoma rufipes</i>	-	Summer (July)	26/07/2022	Sweep/beat	3	Area 2
Hemiptera	Coreidae	Box Bug	<i>Gonocerus acuteangulatus</i>	-	Spring (April)	12/04/2022	Sweep/beat	4	Area 3
Hymenoptera	Formicidae	A wood ant	<i>Formica lemni</i>	-	Summer (July)	27/07/2022	Day time observation	1	Area 1
Hymenoptera	Formicidae	A red ant	<i>Myrmica ruginodis</i>	-	Summer (July)	26/07/2022	Sweep/beat	2	Area 1
Hymenoptera	Apidae	Hairy-footed Flower Bee	<i>Anthophora plumipes</i>	-	Spring (April)	13/04/2022	Sweep/beat	1	Area 1
Hymenoptera	Apidae	Red-tailed Bumblebee	<i>Bombus lapidarius</i>	-	Summer (July)	26/07/2022	Window trap	7	Area 3
Hymenoptera	Apidae	White-tailed bumblebee	<i>Bombus lucorum</i>	-	Summer (July)	26/07/2022	Pan trap	2	Area 2

Order	Family	Common name	Scientific name	Conservation status	Season	Date	Method	Count	Area
Hymenoptera	Apidae	Common Carder Bumblee	<i>Bombus pascuorum</i>	-	Summer (July)	26/07/2022	Day time observation	22	Area 3
Hymenoptera	Apidae	Buff-tailed Bumblebee	<i>Bombus terrestris</i>	-	Spring (April)	13/04/2022	Spot sweep	6+	Area 3
Hymenoptera	Crabronidae	Golden-moustached Fly Fox	<i>Ectemnius cavifrons</i>	-	Summer (July)	26/07/2022	Pan trap	1	Area 2
Hymenoptera	Crabronidae	Hogweed Fly Fox	<i>Ectemnius lituratus</i>	-	Summer (July)	27/07/2022	Pan trap	1	Area 2
Hymenoptera	Crabronidae	Little Black Wasp	<i>Pemphredon lethifer</i>	-	Spring (April)	26/07/2022	Day time observation	1	Area 2
Hymenoptera	Apidae	Honeybee	<i>Apis Mellifera</i>	-	Summer (July)"	12/04/2022	Day time observation	100+	Area 1
Hymenoptera	Ichneumonidae	Yellow-striped Darwin Wasp	<i>Ichneumon xanthorius</i>	-	Spring (April)	27/07/2022	Window trap	1	Area 3
Hymenoptera	Megachilidae	Wood-carving Leafcutter Bee	<i>Megachile ligniseca</i>	Local	Summer (July)	27/07/2022	Pan trap	1	Area 1
Hymenoptera	Megachilidae	Two-coloured Mason Bee	<i>Osmia bicolor</i>	Nb	Summer (July)	12/04/2022	Pan trap	1	Area 1
Hymenoptera	Andrenidae	Short-fringed Mining Bee	<i>Andrena dorsata</i>	-	Summer (July)	26/07/2022	Day time observation	1	Area 2
Hymenoptera	Andrenidae	Buffish Mining Bee	<i>Andrena nigroaenea</i>	-	Spring (April)	13/04/2022	Pan trap	2	Area 3
Hymenoptera	Andrenidae	Impunctate Mini-miner	<i>Andrena subopaca</i>	-	Summer (July)	26/07/2022	Spot sweep	1	Area 2
Hymenoptera	Apidae	Fabricius' Nomad Bee	<i>Nomada fabriciana</i>	-	Summer (July)	27/07/2022	Pan trap	2	Area 2



Order	Family	Common name	Scientific name	Conservation status	Season	Date	Method	Count	Area
<i>Hymenoptera</i>	<i>Apidae</i>	Gooden's Nomad Bee	<i>Nomada goodeniana</i>	-	Summer (July)	26/07/2022	Spot sweep	1	Area 3
<i>Hymenoptera</i>	<i>Melittidae</i>	Pantaloony Bee	<i>Dasygoda hirtipes</i>	Nb	Spring (April)	26/07/2022	Spot sweep	1	Area 1
<i>Hymenoptera</i>	<i>Colletidae</i>	Common Yellow-face Bee	<i>Hylaeus communis</i>	-	Summer (July)	27/07/2022	Pan trap	1	Area 1
<i>Hymenoptera</i>	<i>Tenthredinidae</i>	A sawfly	<i>Hoplocampa chrysorrhoea</i>	-	Spring (April)	13/04/2022	Pan trap	2	Area 1
<i>Hymenoptera</i>	<i>Halictidae</i>	Bronze Furrow Bee	<i>Halictus tumulorum</i>	-	Summer (July)	26/07/2022	Pan trap	1	Area 2
<i>Hymenoptera</i>	<i>Halictidae</i>	White-footed Green Furrow Bee	<i>Lasioglossum leucopus</i>	-	Spring (April)	12/04/2022	Pan trap	1	Area 2
<i>Hymenoptera</i>	<i>Halictidae</i>	Common Green Furrow Bee	<i>Lasioglossum morio</i>	-	Spring (April)	26/07/2022	Pan trap	7	Area 2
<i>Hymenoptera</i>	<i>Halictidae</i>	Bare-saddled Blood Bee	<i>Sphecodes ephippius</i>	-	Summer (July)	13/04/2022	Spot sweep	2	Area 1
<i>Hymenoptera</i>	<i>Vespidae</i>	Common Wasp	<i>Vespula vulgaris</i>	-	Summer (July)	13/04/2022	Pan trap	24+	Area 2
<i>Isopoda</i>	<i>Armadillidiidae</i>	Common Pill Woodlouse	<i>Armadillidium vulgare</i>	-	Spring (April)	27/07/2022	Sweep/beat	4	Area 1
<i>Isopoda</i>	<i>Philosciidae</i>	Common Striped Woodlouse	<i>Philoscia muscorum</i>	-	Summer (July)	26/07/2022	Pan trap	1	Area 3
<i>Julida</i>	<i>Julidae</i>	A millipede	<i>Ophiulus pilosus</i>	-	Summer (July)	12/04/2022	Pan trap	1	Area 3
<i>Lepidoptera</i>	<i>Lycaenidae</i>	Common Blue	<i>Polyommatus icarus</i>	-	Summer (July)	26/07/2022	Pan trap	1	Area 2



Order	Family	Common name	Scientific name	Conservation status	Season	Date	Method	Count	Area
<i>Lepidoptera</i>	<i>Nymphalidae</i>	Peacock	<i>Aglais io</i>	-	Summer (July)	26/07/2022	Pan trap	6	Area 3
<i>Lepidoptera</i>	<i>Nymphalidae</i>	Ringlet	<i>Aphantopus hyperantus</i>	-	Summer (July)	26/07/2022	Pan trap	4	Area 1
<i>Lepidoptera</i>	<i>Nymphalidae</i>	Small Heath	<i>Coenonympha pamphilus</i>	S41 PS; VU	Summer (July)	26/07/2022	Pitfall trap	6	Area 2
<i>Lepidoptera</i>	<i>Nymphalidae</i>	Meadow Brown	<i>Maniola jurtina</i>	-	Summer (July)	26/07/2022	Window trap	8	Area 3
<i>Lepidoptera</i>	<i>Nymphalidae</i>	Speckled Wood	<i>Pararge aegeria</i>	-	Summer (July)	27/07/2022	Window trap	7	Area 3
<i>Lepidoptera</i>	<i>Nymphalidae</i>	Comma	<i>Polygonia c-album</i>	-	Summer (July)	26/07/2022	Day time observation	4	Area 1
<i>Lepidoptera</i>	<i>Nymphalidae</i>	Gatekeeper	<i>Pyronia tithonus</i>	-	Spring (April)	26/07/2022	Day time observation	12	Area 3
<i>Lepidoptera</i>	<i>Pieridae</i>	Brimstone	<i>Gonepteryx rhamni</i>	-	Summer (July)	26/07/2022	Day time observation	2	Area 1
<i>Lepidoptera</i>	<i>Pieridae</i>	Large White	<i>Pieris brassicae</i>	-	Summer (July)	26/07/2022	Day time observation	1	Area 1
<i>Lepidoptera</i>	<i>Pieridae</i>	Green-veined White	<i>Pieris napi</i>	-	Summer (July)	12/04/2022	Day time observation	6	Area 1
<i>Lepidoptera</i>	<i>Pieridae</i>	Small White	<i>Pieris rapae</i>	-	Spring (April)	26/07/2022	Day time observation	1	Area 2
<i>Lepidoptera</i>	<i>Drepanidae</i>	Chinese Character	<i>Cilix glaucata</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Erebidae</i>	Scarce Footman	<i>Eilema complana</i>	LC (Global)	Spring (April)	26/07/2022	Light trapping	4	Area 1



Order	Family	Common name	Scientific name	Conservation status	Season	Date	Method	Count	Area
<i>Lepidoptera</i>	<i>Erebidae</i>	Dingy Footman	<i>Eilema griseola</i>	LC (Global)	Summer (July)	12/04/2022	Light trapping	5	Area 1
<i>Lepidoptera</i>	<i>Erebidae</i>	White Satin Moth	<i>Leucoma salicis</i>	LC (Global)	Summer (July)	27/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Erebidae</i>	Black Arches	<i>Lymantria monacha</i>	LC (Global)	Spring (April)	12/04/2022	Light trapping	5	Area 1
<i>Lepidoptera</i>	<i>Erebidae</i>	Ruby Tiger	<i>Phragmatobia fuliginosa</i>	LC (Global)	Summer (July)	27/07/2022	Light trapping	2	Area 1
<i>Lepidoptera</i>	<i>Erebidae</i>	Straw Dot	<i>Rivula sericealis</i>	LC (Global)	Spring (April)	26/07/2022	Light trapping	2	Area 1
<i>Lepidoptera</i>	<i>Erebidae</i>	The Cinnabar	<i>Tyria jacobaeae</i>	LC (Global); S41 PS (research only)	Summer (July)	12/04/2022	Light trapping	2	Area 1
<i>Lepidoptera</i>	<i>Geometridae</i>	Mottled Beauty	<i>Alcis repandata</i>	LC (Global)	Summer (July)	27/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Geometridae</i>	Peppered Moth	<i>Biston betularia</i>	LC (Global)	Summer (July)	12/04/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Geometridae</i>	Common White Wave	<i>Cabera pusaria</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Geometridae</i>	Yellow Shell	<i>Camptogramma bilineata</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	3	Area 1
<i>Lepidoptera</i>	<i>Geometridae</i>	Purple Bar	<i>Cosmorhoe ocellata</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Geometridae</i>	Scalloped Oak	<i>Crocallis elinguaris</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Geometridae</i>	Common Carpet	<i>Epirrhoe alternata</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	1	Area 1



Order	Family	Common name	Scientific name	Conservation status	Season	Date	Method	Count	Area
<i>Lepidoptera</i>	<i>Geometridae</i>	Wormwood Pug	<i>Eupithecia absinthiata</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	2	Area 1
<i>Lepidoptera</i>	<i>Geometridae</i>	Currant Pug	<i>Eupithecia assimilata</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Geometridae</i>	Lime-speck Pug	<i>Eupithecia centaureata</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	5	Area 1
<i>Lepidoptera</i>	<i>Geometridae</i>	Maple Pug	<i>Eupithecia inturbata</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	3	Area 1
<i>Lepidoptera</i>	<i>Geometridae</i>	Riband Wave	<i>Idea aversata</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	5	Area 1
<i>Lepidoptera</i>	<i>Geometridae</i>	Small Scallop	<i>Idea emarginata</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Geometridae</i>	Least Carpet	<i>Idea rusticata</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	6	Area 1
<i>Lepidoptera</i>	<i>Geometridae</i>	Scorched Carpet	<i>Ligdia adustata</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Geometridae</i>	Brimstone Moth	<i>Opisthograptis luteolata</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Geometridae</i>	Willow Beauty	<i>Peribatodes rhomboidaria</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	2	Area 1
<i>Lepidoptera</i>	<i>Geometridae</i>	Dark Umber	<i>Philereme transversata</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Geometridae</i>	Early Thorn	<i>Selenia dentaria</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Geometridae</i>	Red Twin-spot Carpet	<i>Xanthorhoe spadicearia</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	2	Area 1

Order	Family	Common name	Scientific name	Conservation status	Season	Date	Method	Count	Area
<i>Lepidoptera</i>	<i>Noctuidae</i>	The Spectacle	<i>Abrostola tripartita</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	2	Area 1
<i>Lepidoptera</i>	<i>Noctuidae</i>	Grey / Dark Dagger	<i>Acronicta psi / tridens</i>	-	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Noctuidae</i>	Knot Grass	<i>Acronicta rumicis</i>	LC (Global); S41 PS (research only)	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Noctuidae</i>	Shuttle-shaped Dart	<i>Agrotis puta</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	8	Area 1
<i>Lepidoptera</i>	<i>Noctuidae</i>	Turnip Moth	<i>Agrotis segetum</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	2	Area 1
<i>Lepidoptera</i>	<i>Noctuidae</i>	Copper Underwing	<i>Amphipyra pyramidea</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Noctuidae</i>	The Nutmeg	<i>Anarta trifolii</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Noctuidae</i>	Lunar-spotted Pinion	<i>Cosmia pyralina</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Noctuidae</i>	The Dun-bar	<i>Cosmia trapezina</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	8	Area 1
<i>Lepidoptera</i>	<i>Noctuidae</i>	The Coronet	<i>Craniophora ligustri</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Noctuidae</i>	Tree-lichen Beauty	<i>Cryphia algae</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	10	Area 1
<i>Lepidoptera</i>	<i>Noctuidae</i>	Burnished Brass	<i>Diachrysa chrysitis</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Noctuidae</i>	The Uncertain	<i>Hoplodrina alsines</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	8	Area 1



Order	Family	Common name	Scientific name	Conservation status	Season	Date	Method	Count	Area
<i>Lepidoptera</i>	<i>Noctuidae</i>	Common Rustic agg.	<i>Mesapamea spp.</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	10	Area 1
<i>Lepidoptera</i>	<i>Noctuidae</i>	Cloaked Minor	<i>Mesoligia furuncula</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	8	Area 1
<i>Lepidoptera</i>	<i>Noctuidae</i>	Brown-line Bright-eye	<i>Mythimna conigera</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	5	Area 1
<i>Lepidoptera</i>	<i>Noctuidae</i>	Common Wainscot	<i>Mythimna pallens</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Noctuidae</i>	Southern Wainscot	<i>Mythimna straminea</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Noctuidae</i>	Lesser Yellow Underwing	<i>Noctua comes</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	3	Area 1
<i>Lepidoptera</i>	<i>Noctuidae</i>	Broad-bordered Yellow Underwing	<i>Noctua fimbriata</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	2	Area 1
<i>Lepidoptera</i>	<i>Noctuidae</i>	Lesser Broad-bordered Yellow Underwing	<i>Noctua janthe</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	5	Area 1
<i>Lepidoptera</i>	<i>Noctuidae</i>	Large Yellow Underwing	<i>Noctua pronuba</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	6	Area 1
<i>Lepidoptera</i>	<i>Noctuidae</i>	Flame Shoulder	<i>Ochropleura plecta</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	4	Area 1
<i>Lepidoptera</i>	<i>Noctuidae</i>	Setaceous Hebrew Character	<i>Xestia c-nigrum</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	2	Area 1
<i>Lepidoptera</i>	<i>Notodontidae</i>	Chocolate-tip	<i>Clostera curtula</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Notodontidae</i>	Swallow Prominent	<i>Pheosia tremula</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	1	Area 1

Order	Family	Common name	Scientific name	Conservation status	Season	Date	Method	Count	Area
<i>Lepidoptera</i>	<i>Sphingidae</i>	Poplar Hawk-moth	<i>Laothoe populi</i>	LC (Global)	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Argyresthiidae</i>	Cherry Fruit Moth	<i>Argyresthia pruniella</i>	-	Summer (July)	26/07/2022	Light trapping	2	Area 1
<i>Lepidoptera</i>	<i>Autostichidae</i>	Four-spotted Obscure	<i>Oegoconia deauratella</i>	-	Summer (July)	26/07/2022	Light trapping	2	Area 1
<i>Lepidoptera</i>	<i>Blastobasidae</i>	Dingy Dowd	<i>Blastobasis adustella</i>	-	Summer (July)	26/07/2022	Light trapping	50	Area 1
<i>Lepidoptera</i>	<i>Blastobasidae</i>	London Dowd	<i>Blastobasis decolorella</i>	-	Summer (July)	26/07/2022	Light trapping	2	Area 1
<i>Lepidoptera</i>	<i>Coleophoridae</i>	Clover Case-bearer	<i>Coleophora alcyonipennella</i>	-	Summer (July)	26/07/2022	Light trapping	2	Area 1
<i>Lepidoptera</i>	<i>Crambidae</i>	Water Veneer	<i>Acentria ephemerella</i>	-	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Crambidae</i>	Straw Grass-veneer	<i>Agriphila straminella</i>	-	Summer (July)	26/07/2022	Light trapping	4	Area 1
<i>Lepidoptera</i>	<i>Crambidae</i>	Common Grass-veneer	<i>Agriphila tristella</i>	-	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Crambidae</i>	Pearl Grass-veneer	<i>Catoptria pinella</i>	-	Summer (July)	26/07/2022	Light trapping	2	Area 1
<i>Lepidoptera</i>	<i>Crambidae</i>	Garden Grass-veneer	<i>Chrysoteuchia culmella</i>	-	Summer (July)	26/07/2022	Light trapping	15	Area 1
<i>Lepidoptera</i>	<i>Crambidae</i>	Satin Grass-veneer	<i>Crambus perlella</i>	-	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Crambidae</i>	Box Tree Moth	<i>Cydalima perspectalis</i>	-	Summer (July)	26/07/2022	Light trapping	6	Area 1



Order	Family	Common name	Scientific name	Conservation status	Season	Date	Method	Count	Area
<i>Lepidoptera</i>	<i>Crambidae</i>	Little Grey	<i>Eudonia lacustrata</i>	-	Summer (July)	26/07/2022	Light trapping	2	Area 1
<i>Lepidoptera</i>	<i>Crambidae</i>	Small Grey	<i>Eudonia mercurella</i>	-	Summer (July)	26/07/2022	Light trapping	10	Area 1
<i>Lepidoptera</i>	<i>Crambidae</i>	Small Magpie	<i>Eurrhpara hortulata</i>	-	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Crambidae</i>	Ringed China-mark	<i>Parapoynx stratiotata</i>	-	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Crambidae</i>	Waste Grass-veneer	<i>Pediasia contaminella</i>	Nb	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Crambidae</i>	Mother of Pearl	<i>Pleuroptya ruralis</i>	-	Summer (July)	26/07/2022	Light trapping	4	Area 1
<i>Lepidoptera</i>	<i>Crambidae</i>	Small Purple & Gold	<i>Pyrausta aurata</i>	-	Summer (July)	26/07/2022	Light trapping	2	Area 1
<i>Lepidoptera</i>	<i>Depressariidae</i>	Brown-spot Flat-body	<i>Agonopterix alstromeriana</i>	-	Summer (July)	26/07/2022	Light trapping	6	Area 1
<i>Lepidoptera</i>	<i>Gelechiidae</i>	Gorse Crest	<i>Brachmia blandella</i>	-	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Gelechiidae</i>	Dark Neb	<i>Bryotropha affinis</i>	-	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Gelechiidae</i>	Cinerous Neb	<i>Bryotropha terrella</i>	-	Summer (July)	26/07/2022	Light trapping	5	Area 1
<i>Lepidoptera</i>	<i>Gelechiidae</i>	White-barred Groundling	<i>Recurvaria leucatella</i>	-	Summer (July)	26/07/2022	Light trapping	5	Area 1
<i>Lepidoptera</i>	<i>Gelechiidae</i>	Brindled Groundling	<i>Recurvaria nanella</i>	Nb	Summer (July)	26/07/2022	Light trapping	12	Area 1



Order	Family	Common name	Scientific name	Conservation status	Season	Date	Method	Count	Area
<i>Lepidoptera</i>	<i>Gracillariidae</i>	Poplar Bent-wing	<i>Phyllocnistis unipunctella</i>	-	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Gracillariidae</i>	Hawthorn Midget	<i>Phyllonorycter corylifoliella</i>	-	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Lyonetiidae</i>	Apple Leaf Miner	<i>Lyonetia clerkella</i>	-	Spring (April)	26/07/2022	Light trapping	2	Area 1
<i>Lepidoptera</i>	<i>Oecophoridae</i>	Golden Brown-tubic	<i>Crassa unitella</i>	-	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Oecophoridae</i>	White-shouldered House-moth	<i>Endrosis sarcitrella</i>	-	Summer (July)	26/07/2022	Light trapping	2	Area 1
<i>Lepidoptera</i>	<i>Parametriotidae</i>	Hawthorn Cosmet	<i>Blastodacna hellerella</i>	-	Summer (July)	13/04/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Peleopodidae</i>	Long-horned Flat-body	<i>Carcina quercana</i>	-	Summer (July)	26/07/2022	Light trapping	8	Area 1
<i>Lepidoptera</i>	<i>Plutellidae</i>	Diamond-back Moth	<i>Plutella xylostella</i>	-	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Pterophoridae</i>	Common Plume	<i>Emmelina monodactyla</i>	-	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Pterophoridae</i>	Breckland Plume	<i>Oxyptilus distans</i>	-	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Pyralidae</i>	Grey Knot-horn	<i>Acrobasis advenella</i>	-	Summer (July)	26/07/2022	Light trapping	6	Area 1
<i>Lepidoptera</i>	<i>Pyralidae</i>	Thicket Knot-horn	<i>Acrobasis suavella</i>	-	Summer (July)	26/07/2022	Light trapping	2	Area 1
<i>Lepidoptera</i>	<i>Pyralidae</i>	Rosy Tabby	<i>Endotricha flammealis</i>	-	Summer (July)	26/07/2022	Light trapping	3	Area 1



Order	Family	Common name	Scientific name	Conservation status	Season	Date	Method	Count	Area
Lepidoptera	Pyralidae	Ash-bark Knot-horn	<i>Euzophera pinguis</i>	-	Summer (July)	26/07/2022	Light trapping	3	Area 1
Lepidoptera	Pyralidae	Wax Moth	<i>Galleria mellonella</i>	-	Summer (July)	26/07/2022	Light trapping	1	Area 1
Lepidoptera	Pyralidae	Rosy-striped Knot-horn	<i>Oncocera semirubella</i>	Nb	Summer (July)	26/07/2022	Light trapping	1	Area 1
Lepidoptera	Pyralidae	Dotted Oak Knot-horn	<i>Phycita roborella</i>	-	Summer (July)	26/07/2022	Light trapping	1	Area 1
Lepidoptera	Stathmopodidae	Alder Signal	<i>Stathmopoda pedella</i>	Nb	Summer (July)	26/07/2022	Light trapping	1	Area 1
Lepidoptera	Tineidae	Carrion Moth	<i>Monopis weaverella</i>	-	Summer (July)	26/07/2022	Light trapping	2	Area 1
Lepidoptera	Tischeriidae	Bordered Carl	<i>Emmetia marginea</i>	-	Summer (July)	26/07/2022	Light trapping	1	Area 1
Lepidoptera	Tortricidae	Maple Button	<i>Acleris forsskaleana</i>	-	Summer (July)	26/07/2022	Light trapping	4	Area 1
Lepidoptera	Tortricidae	Common Yellow Conch	<i>Agapeta hamana</i>	-	Summer (July)	26/07/2022	Light trapping	5	Area 1
Lepidoptera	Tortricidae	Kanpweed Conch	<i>Agapeta zoegana</i>	-	Summer (July)	26/07/2022	Light trapping	2	Area 1
Lepidoptera	Tortricidae	Dark Strawberry Tortrix	<i>Celypha lacunana</i>	-	Summer (July)	26/07/2022	Light trapping	1	Area 1
Lepidoptera	Tortricidae	White-bodied Conch	<i>Cochylis hybridella</i>	-	Summer (July)	26/07/2022	Light trapping	1	Area 1
Lepidoptera	Tortricidae	Ox-tongue Conch	<i>Cochylis molliculana</i>	-	Summer (July)	26/07/2022	Light trapping	1	Area 1

Order	Family	Common name	Scientific name	Conservation status	Season	Date	Method	Count	Area
<i>Lepidoptera</i>	<i>Tortricidae</i>	Codling Moth	<i>Cydia pomonella</i>	-	Summer (July)	26/07/2022	Light trapping	3	Area 1
<i>Lepidoptera</i>	<i>Tortricidae</i>	Marbled Piercer	<i>Cydia splendana</i>	-	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Tortricidae</i>	Summer Rose Bell	<i>Epiblema roborana</i>	-	Summer (July)	26/07/2022	Light trapping	1	Area 1
<i>Lepidoptera</i>	<i>Tortricidae</i>	Marbled Bell	<i>Eucosma campoliliana</i>	-	Summer (July)	26/07/2022	Light trapping	3	Area 1
<i>Lepidoptera</i>	<i>Tortricidae</i>	Hoary Bell	<i>Eucosma cana</i>	-	Summer (July)	26/07/2022	Light trapping	4	Area 1
<i>Lepidoptera</i>	<i>Tortricidae</i>	Red Piercer	<i>Lathronympha strigana</i>	-	Summer (July)	26/07/2022	Light trapping	15	Area 1
<i>Lepidoptera</i>	<i>Tortricidae</i>	Barred Fruit-tree Tortrix	<i>Pandemis cerasana</i>	-	Summer (July)	26/07/2022	Light trapping	2	Area 1
<i>Lepidoptera</i>	<i>Tortricidae</i>	Chequered Fruit-tree Tortrix	<i>Pandemis corylana</i>	-	Summer (July)	26/07/2022	Light trapping	2	Area 1
<i>Lepidoptera</i>	<i>Tortricidae</i>	Dark Fruit-tree Tortrix	<i>Pandemis heparana</i>	-	Summer (July)	26/07/2022	Light trapping	3	Area 1
<i>Lepidoptera</i>	<i>Tortricidae</i>	Holly Tortrix	<i>Rhopobota naevana</i>	-	Summer (July)	26/07/2022	Light trapping	10	Area 1
<i>Lepidoptera</i>	<i>Tortricidae</i>	Bud Moth	<i>Spilonota ocellana</i>	-	Summer (July)	26/07/2022	Light trapping	6	Area 1
<i>Lepidoptera</i>	<i>Yponomeutidae</i>	Apple Ermine	<i>Yponomeuta malinellus</i>	-	Summer (July)	26/07/2022	Light trapping	40	Area 1
<i>Lepidoptera</i>	<i>Ypsolophidae</i>	Wainscot Smudge	<i>Ypsolopha scabrella</i>	-	Summer (July)	26/07/2022	Light trapping	4	Area 1

Order	Family	Common name	Scientific name	Conservation status	Season	Date	Method	Count	Area
<i>Lithobiomorpha</i>	<i>Lithobiidae</i>	Brown Centipede	<i>Lithobius forficatus</i>	-	Summer (July)	26/07/2022	Grubbing	2	Area 1
<i>Neuroptera</i>	<i>Chrysopidae</i>	Common Green Lacewing	<i>Chrysoperla carnea</i>	-	Summer (July)	26/07/2022	Grubbing	1	Area 1
<i>Odonata</i>	<i>Aeshnidae</i>	Southern Hawker	<i>Aeshna cyanea</i>	-	Summer (July)	27/07/2022	Day time observation	2	Area 2
<i>Odonata</i>	<i>Libellulidae</i>	Common Darter	<i>Sympetrum striolatum</i>	-	Summer (July)	27/07/2022	Day time observation	6	Area 1
<i>Orthoptera</i>	<i>Tettigoniidae</i>	Speckled Bush-cricket	<i>Leptophyes punctatissima</i>	-	Summer (July)	27/07/2022	Sweep/beat	4	Area 1
<i>Orthoptera</i>	<i>Tetrigidae</i>	Common Ground Hopper	<i>Tetrix undulata</i>	-	Summer (July)	26/07/2022	Pan trap	1	Area 1
<i>Polydesmida</i>	<i>Polydesmidae</i>	Flat-Backed Millipede	<i>Polydesmus angustus</i>	-	Summer (July)	26/07/2022	window trap	1	Area 3

NS – Nationally Scarce, Nb – Nationally Scarce B Category, S41 PS – Section 41 Priority Species, LC (Global) – Least Concern (Global), VU – Vulnerable



62-64 Hills Road
Cambridge
CB2 1LA

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