Terrestrial Invertebrate Survey Report
Cambridge South East Transport (CSET) Phase 2

October 2020 (re-issue Mar 2021)

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1. Introduction

Background

1.1 Capita Real Estate & Infrastructure's Ecologists were commissioned by the Greater Cambridgeshire Partnership in March 2020 to undertake terrestrial invertebrate surveys. These surveys were undertaken in relation to the development of Phase 2 of the Cambridge South East Transport (CSET) Project, (the 'Scheme'). The results of the survey will be used to inform the design of the Scheme.

1.2 Ecology Link Ltd. was commissioned by Capita, to undertake a terrestrial invertebrate habitat scoping assessment of areas of grassland, which may be affected by the Scheme.

Project Description and Purpose of the Scheme

1.3 The Cambridge South East Transport (CSET) Project aims to create a vital link to ease congestion, offer sustainable travel choices, connect communities and support growth in the in South East of Cambridge. CSET would form part of the Cambridgeshire Autonomous Metro, providing high quality, frequent and affordable public transport.

1.4 CSET Phase 2 comprises a segregated public transport route from the A11 (near Brabham) to the Cambridge Biomedical Campus (CBC). This would include new walking, cycling and equestrian links.

Site Location and Description

1.5 Although the exact route has not been finalised, a broad zone of influence (ZOI) has been determined, which included a range of grassland sites with terrestrial invertebrate potential for rare or scare species.

1.6 The grasslands within the proposed ZOI, formed a mosaic of plant species and structural diversity, allowing a range of grassland types to be sampled. The sites were identified during the initial Phase 1 habitat surveys (undertaken by another Consultancy), with the majority of the sample sites being located south of Babraham (Appendix 1).

Legislation and Planning Policy

1.7 Many invertebrates are listed as UK Biodiversity Action Plan (UK BAP) priority species and as Species of Principal Importance (Section 41) of the Natural Environment and Rural Communities Act 2006 (abbreviated as NERC-S41). Although such species do not receive protection under criminal law their presence is a material planning consideration and consequently (following Natural England, 2010):

- Regional Planning Bodies and Local Planning Authorities will use the Section 41 list to identify the species and habitats that should be afforded priority when applying the requirements of the National Planning Policy Framework (NPPF) (DfCLG, 2012) to promote the "protection and recovery of priority species populations".
- Local Planning Authorities (LPA) will use it to identify the species and habitats that require specific consideration in dealing with planning and development control, recognising that under NPPF the aim of planning decisions should be to avoid minimise impacts to biodiversity.
- The LPA's now have to ensure all developments try to achieve 'biodiversity net gain'. This requires an understanding of species and habitats present, Suitable enhancements should be incorporated into the design to attain an overall positive gain in ecological value and species diversity.

2. Scope of Works and Survey Methodology

2.1 A biological records search was completed by Mott McDonald. Relevant records have been summarised in the results section.

2.2 An Invertebrate Habitat Scoping Survey was undertaken on 21st August 2020. The methodology followed guidelines as set out in Drake, *et al* (2007). Searches were made, ranging across a number of grassland habitats defined by species and structural variation.

2.3 A total of 40 minutes was spent sampling the vegetation (for each habitat type), using sweep nets, beating trays and hand searches. Specimens were collected using pooters or forceps and immediately placed into tubes containing propanol.

2.4 The survey was undertaken by Jon Panter (MCIEEM), an experienced invertebrate surveyor. A risk assessment was completed, and appropriate PPE worn. The client granted access to the site. Species identification was undertaken by Dr. J Thacker.

ISIS Analysis

2.5 The species inventory data was analysed using the ISIS package (Drake, *et al*. 2007). This is a computer application that Natural England has been developing to help identify the broad and specific assemblage types present, which habitats or microhabitats support specialist invertebrate species.

Evaluation

2.6 Evaluation of the terrestrial fauna followed the criteria proposed by Colin Plant Associates (2006) to define the significance of invertebrate habitats (Table 2.1). In applying these criteria, a level of professional judgment is applied, with authority given to particular assemblages of species and greater importance given to sites with assemblages associated with specific habitats.

Table 2.1: Criteria used to define significance of invertebrate habitats

Significance	Description	Minimum qualifying criteria
National	UK important site	Achieving SSSI invertebrate criteria **or** containing RDB2 (Vulnerable) **or** containing viable populations of RDB 3 (Rare) species **or** containing viable populations of any species protected under UK legislation **or** containing habitats that are threatened or rare nationally (Great Britain).
Regional	Site with populations of invertebrates or invertebrate habitats considered scarce or rare or threatened in south-east England	Habitat that is scarce or threatened in the region **or** which has, or is reasonably expected to have, the presence of an assemblage of invertebrates including at least ten Nationally Scarce species **or** at least ten species listed as Regionally Scarce for the *English Nature* region in question in the Recorder database or elsewhere or a combination of these categories amounting to ten species in total.
County	Site with populations of invertebrates or invertebrate habitats considered scarce or rare or threatened in the county in question	Habitat that is scarce or threatened in the county and which contains, or is reasonably expected to contain, an assemblage of invertebrates that includes viable populations of at least five Nationally Scarce species or viable populations of at least five species regarded as Regionally Scarce by the county records centres and/or field club.

Significance	Description	Minimum qualifying criteria
District	Site with populations of invertebrates or invertebrate habitats considered scarce or rare or threatened in the administrative District	A rather vague definition of habitats falling below county significance level, but which may be of greater significance than merely Local. They include sites for which Nationally Scarce species in the range from 1 to 4 examples are reasonably expected but not yet necessarily recorded and where this omission is considered likely to be partly due to under-recording.
Local	Site with populations of invertebrates or invertebrate habitats considered scarce or rare or threatened in the affected and neighbouring Parishes	Habitats or species unique or of some other significance within the local area.
Low Significance	–	Although almost no area is completely without significance these are the areas with nothing more than expected "background" populations of common species and the occasional Nationally Local species.

Survey Constraints

2.7 The surveys were initially constrained by the Covid-19 pandemic, which delayed access permissions from landowners (as it had to be reobtained during lockdown). Further delays resulted from internal processes. These issues combined resulting in the first survey not being completed until late summer. It was too late in the season to complete a second and third sampling, which should have been completed in spring and early summer. However, the habitats on site were all considered to be of low value in terms of their species diversity and rareness within the locality (i.e. all common and widely present habitats) and missing all of the sampling is not thought to be a significant constraint.

3. Results

Biological Records

3.1 A total of 2,458 invertebrate records were provided as part of the biological records search. Of these, the vast majority were for moths with 2,134 records and 59 species being represented. The remaining records were dominated by true-flies, butterflies and beetles. Very few records were from within the last 10 years, most being historic in nature. The scarcity and levels of protection afforded to each species was not provided with the data.

Habitat Description

3.2 The grassland survey was divided into three distinct community types (Table 3.1) based on plant species composition and structure. These communities were the main focus of the invertebrate sampling to assess the range of invertebrate species which could be present.

Table 3.1: Habitats Surveyed and Descriptions

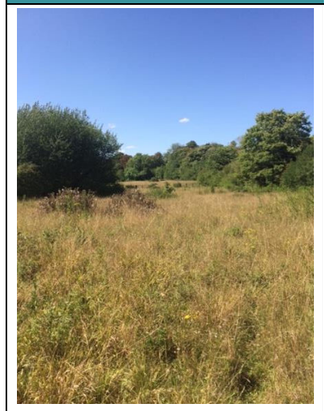
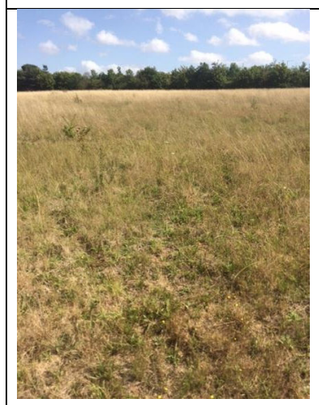
Photo Reference	Description
	Sample 1 (TL 47335 53151) An area of semi-improved grassland, being part of a wider complex of open grassland, scrub and secondary woodland. The sample area formed part of an open species rich plant community, with small developing areas of scrub. Dominant grass species included false oat-grass (*Arrhenatherum elatius*), cock's-foot (*Dactylis glomerata*), common bent (*Agrostis canina*) and red fescue (*Festuca rubra*). Forbs included common knapweed (*Centaurea nigra*), salad burnet (*Sanguisorba minor*), ribwort plantain (*Plantago lanceolata*), yarrow (*Achillea millefolium*), hedge parsley (*Torilis arvensis*) and germander speedwell (*Veronica chamaedrys*).
	**Sample 2** (TL 51690 48858) An area of poor semi-improved grassland, dominated by rank grass species such as false oat-grass, cock's-foot, tufted hair-grass (*Deschampsia cespitosa*) and red fescue. A range of common forbs were recorded including yarrow, ribwort plantain, spear thistle (*Cirsium vulgare*), cleavers (*Galium aparine)* and white campion (*Silene latifolia*).

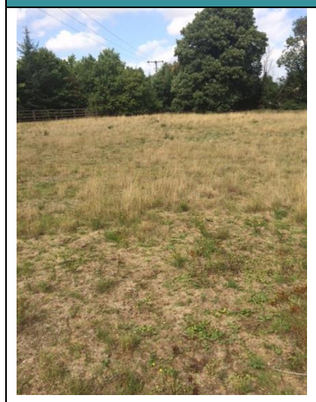
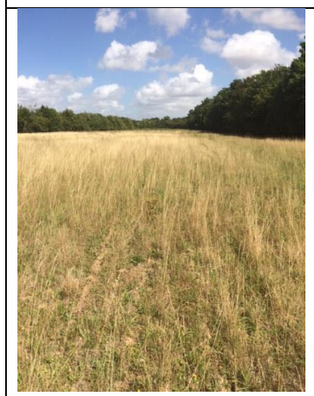
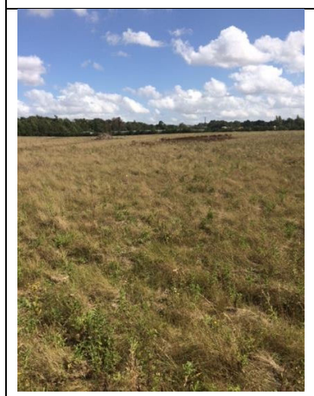
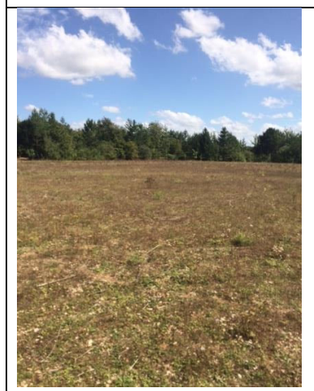
Photo Reference	Description
	**Sample 3** (TL 51886 48970) A small area of poor semi-improved grassland, which may have been used for grazing horses (stable area adjacent to the site). Dominant species included false oat-grass, St John's-wort (*Hypericum perforatum*), ground ivy (*Glechoma hederacea*), ragwort (*Jacobaea vulgaris*) and evening primrose (*Oenothera biennis*).
	**Sample 4** (TL 52097 49747) A linear grassland running between the A11 and Bourn Bridge road. The site looked previously ploughed with the grassland developing over the last few years. A rank grass plant community dominated by false oat-grass and cock's-foot. Species included creeping thistle, ribwort plantain, creeping cinquefoil (*Potentilla reptans*), broadleaved dock (*Rumex obtusifolius*) and ground ivy.
	**Sample 5** (TL 52216 49642) An area of former arable land, which has now developed into poor semi-improved grassland. The plant community was pretty homogeneous across the site. The plant community was dominated by cock's-foot, red fescue, creeping thistle, common fleabane (*Pulicaria dysenterica*), ragwort, with hairy willowherb (*Epilobium hirsutum*) and St John's-wort.

Photo Reference	Description
	**Sample 6** (TL 52304 49848) An area of grassland adjacent to a Premier Inn and associated parking. The grassland displayed some recreational pressure with paths and some formal seating. The grassland was uncut, leading to tree and scrub colonisation. Some trees had been planted as part of the wider landscaping. The grassland was dominated by false oat-grass, creeping thistle, ground ivy, common fleabane (*Pulicaria dysenterica*), with foxglove (*Digitalis purpurea*) and St John's-wort.
	**Sample 7** (TL 52363 49958) A sparse, open ruderal mosaic, which has probably colonised a former area of bare ground. The soil was predominantly nutrient poor clay loam, possibly a subsoil material with has restricted any intensive plant colonisation. Plant species were limited and dominated by common toadflax (*Linaria vulgaris*), ragwort, ground ivy, wild mignonette (*Reseda lutea*) and common fleabane (*Pulicaria dysenterica*).

Invertebrate Results and ISIS Analysis

3.3 The numbers and diversity of invertebrate species were high, with one nationally scarce (Sample Site 4) and five notable species distributed across the samples (Sites 1, 2, 4, 5 & 7) (Table 3.2 & Appendix 2). This is quite surprising considering the relatively poor quality of the grassland in terms of structural and plant species diversity.

Table 3.2: Notable invertebrate species

Group	Species Name	Sample Site	Status
Arachnida	*Cheiracanthium virescens*	4	Nationally Scarce
Coleoptera	*Squamapion cineraceum*	4	Notable A
Coleoptera	*Aulacobaris picicornis*	7	Notable B
Coleoptera	*Glocianus punctiger*	5	Notable B
Coleoptera	*Neliocarus faber*	2	Notable B
Coleoptera	*Pseudorchestes pratensis*	1	Notable B

3.4 Due to the low plant species diversity across the sample sites, the nationally scarce and notable species recorded were associated with common plants. There were four species of beetle (not notable or scarce) from ribwort plantain and two species (one nationally scarce (*Aulacobaris picicornis))* from wild mignonette. Many species were generalists or favoured grassland.

3.5 A number of specialist species were recorded for F112 Open short sward and F112 Bare sand and chalk, seven in total (Appendix 3). The broad habitat of almost all the collected species refers to grassland. This is usually indicative of an open site, with no significant scrub colonisation providing shade. The ISIS analysis is a prediction of habitat types, identified by the species groups recorded within the survey samples. It is not a site-specific assessment, but it is a good indicator of habitat requirements in terms of retention and replacement for any proposed development scheme. It can be used to determine the important range of specific key habitats of relevance to the species found.

3.6 It is possible that the sample sites were more diverse (plant species) in May than August, which may reflect the relatively low number of invertebrate communities found.

3.7 These sites look good when compared to more nutrient-rich rank grassland, with quite a few of the beetles from ruderal species, including a number of the scarce invertebrates.

3.8 A number of incidental field observations for common species were provided by other surveyors (Table 3.3), but none were noteworthy for the habitats or in terms of protected status. These have focused on macro-invertebrate groups, such as butterflies and beetles. Exact locations of these records were not provided, but site names have been listed within the table below.

Table 3.3: Incidental invertebrate species

Group	Common name	Specific name	Site
Apoidea	Hornet	*Vespa* sp.	Deal Farm
Apoidea	Solitary bee	*Andrena* sp.	Uplands
Arachnida	Orb-web spider	*Argiope bruennichi*	Grassland - Travelodge
Coleoptera	Cardinal beetle	*Pyrochroa serraticornis*	Cheveley
Coleoptera	Long-horn beetle	*Strictoleptura variicornis*	Cheveley
Hemiptera	Green shield bug	*Palomena prasina*	Uplands
Hemiptera	Sloe bug	*Dolycoris baccarum*	Uplands
Lepidoptera	Common skipper	*Ochlodes sylvanus*	Cheveley
Lepidoptera	Common blue	*Polyommatus icarus*	Uplands
Lepidoptera	Marble white	*Melanargia galathea*	Cheveley
Lepidoptera	six-spot burnet	*Zygaena filipendulae*	Uplands
Lepidoptera	Meadow brown	*Maniola jurtina*	Uplands
Lepidoptera	Comma	*Polygonia c-album*	Uplands
Orthoptera	Common green grasshopper	*Omocestus viridulus*	Uplands

4. Conclusion

4.1 One nationally scarce spider (*Cheiracanthium virescens*) was recorded at Site 4. One Notable A (Site 4) and four Notable B (Sites 1, 2, 5 & 7) beetle species were recorded (Appendix 2), which all rely on common and often abundant plant species.

4.2 Additional data from further surveys, to compensate for the lateness in the season and single samples obtained would be informative. Samples taken in spring and summer would consolidate this baseline data and potentially identify other notable species which may have been absent during the late season sampling. Three sample visits spread throughout the year is the standard minimum practice for initial invertebrate surveys. This additional data would provide a more comprehensive evaluation of invertebrate assemblages across the sample sites and Scheme. However, as stated in the constraints section, the single survey completed in 2020 provides sufficient baseline data for the site.

5. References

Bruce-White, C. & Shardlow, M. (2011) *A Review of the Impact of Artificial Light on Invertebrates*. Buglife, Peterborough.

Colin Plant Associates (2006) *Invertebrates and Ecological Assessment*. Available from: www.cieem.net

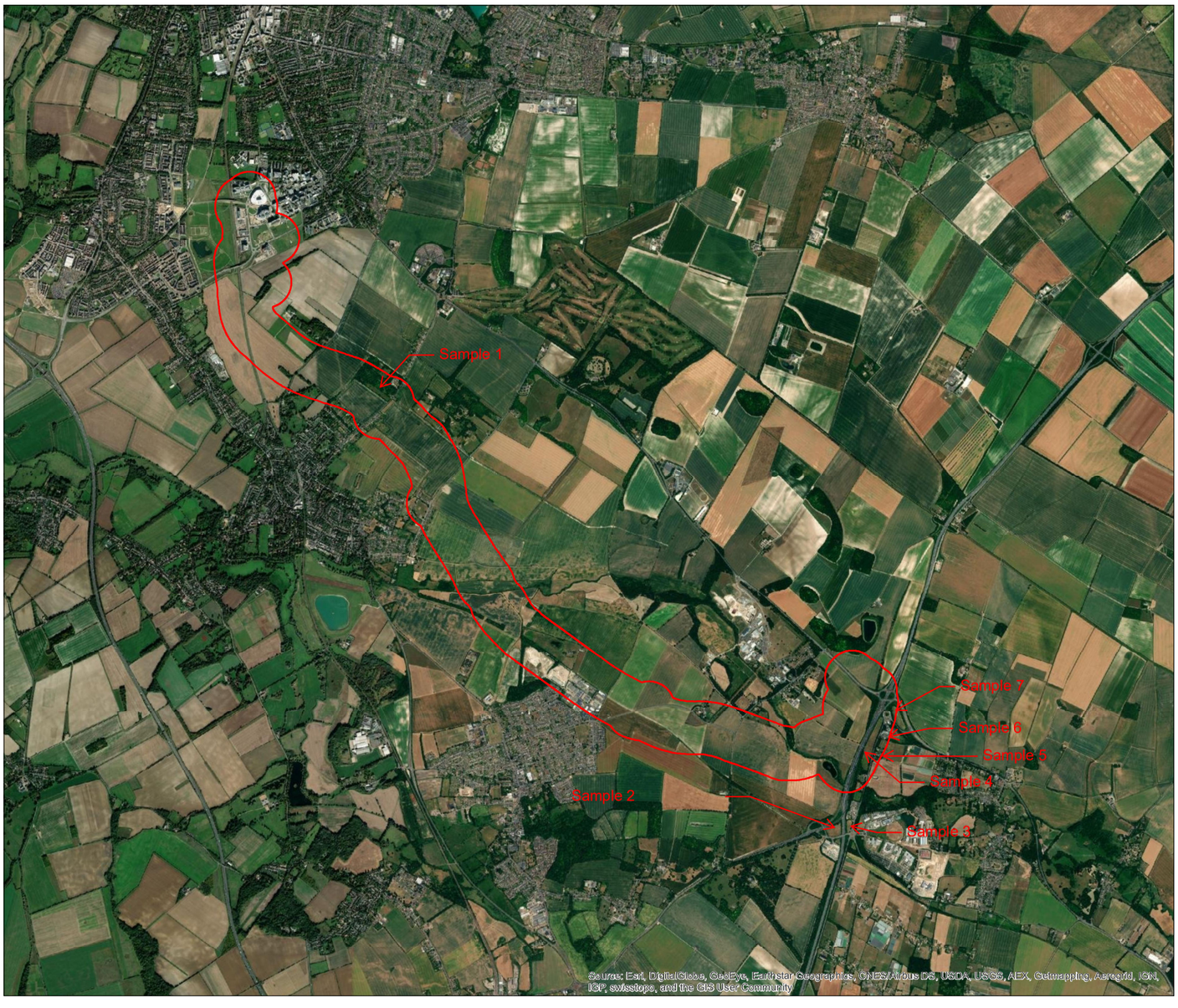
DfCLG (2012) *National Planning Policy Framework*. Department for Communities and Local Government, London.

Drake, C.M., Lott, D.A., Alexander, K.N.A. & Webb, J. (2007) *Surveying Terrestrial and Freshwater Invertebrates for Conservation Evaluation*. Natural England, Sheffield.

Edwards, M. & Jenner, M. (2009) *Field Guide to the Bumblebees of Great Britain and Ireland*. Ocelli Ltd, East Sussex.

Natural England (2010) *Habitats and Species of Principal Importance in England*. Available from: http://www.naturalengland.org.uk/ourwork/conservation/biodiversity/protectandmanage/habsandspeciesimportance.aspx

6. Appendices



Plot date: 23/02/2021

Appendix 2: Invertebrate Species List

			Sample Number								
			S1	**S2**	**S3**	**S4**	**S5**	**S6**	**S7**	**Notes**	**Status**
Araneae	Araneidae	Agalenatea redii	X			X	X		X		
Araneae	Araneidae	Araneus quadratus		X							
Araneae	Araneidae	Hypsosinga pygmaea	X	X	X	X	X	X			
Araneae	**Clubionidae**	**Cheiracanthium virescens**				**X**					**Nationally scarce**
Araneae	Dictynidae	Dictyna uncinata							X		
Araneae	Philodromidae	Philodromus aureolus							X		
Araneae	Philodromidae	Tibellus oblongus	X	X							
Araneae	Pisauridae	Pisaura mirabilis	X	X							
Araneae	Salticidae	Heliophanus flavipes	X		X		X		X		
Araneae	Theridiidae	Anelosimus vittatus					X		X		
Araneae	Theridiidae	Enoplognatha ovata				X			X		
Araneae	Xysticidae	Xysticus cristatus	X	X			X	X	X		
Coleoptera	Anthribidae	Bruchela rufipes							X	Reseda lutea	
Coleoptera	Apionidae	Holotrichapion pisi					X			Medicago	
Coleoptera	**Apionidae**	**Squamapion cineraceum**				**X**				**Prunella vulgaris**	**Notable A**
Coleoptera	Carabidae	Paradromius linearis		X		X					
Coleoptera	Chrysomelidae	Bruchus loti	X							Lathyrus, Vicia, Lotus	
Coleoptera	Chrysomelidae	Longitarsus jacobaeae	X	X	X	X		X		Senecio	
Coleoptera	Chrysomelidae	Longitarsus pratensis	X		X		X	X		Plantago	
Coleoptera	Chrysomelidae	Psylliodes chrysocephala		X	X		X	X	X	Brassicaceae	
Coleoptera	Chrysomelidae	Sphaeroderma rubidum	X							Asteraceae	
Coleoptera	Coccinellidae	Coccinella septempunctata			X				X		
Coleoptera	Coccinellidae	Subcoccinella vigintiquattuorpunctata		X		X					
Coleoptera	Coccinellidae	Tytthaspis sedecimpunctata		X	X						
Coleoptera	**Curculionidae**	**Aulacobaris picicornis**							**X**	**Reseda lutea**	**Notable B**
Coleoptera	**Curculionidae**	**Glocianus punctiger**					**X**			**Taraxacum**	**Notable B**
Coleoptera	Curculionidae	Mecinus labilis	X							Plantago lanceolata	
Coleoptera	Curculionidae	Mecinus pascuorum				X				Plantago lanceolata	
Coleoptera	**Curculionidae**	**Neliocarus faber**		**X**						**Generalist**	**Notable B**
Coleoptera	**Curculionidae**	**Pseudorchestes pratensis**	**X**							**Centaurea nigra**	**Notable B**
Coleoptera	Curculionidae	Sitona lineatus	X	X		X		X		Fabaceae	
Coleoptera	Curculionidae	Trichosirocalus troglodytes		X						Plantago lanceolata	
Coleoptera	Oedemeridae	Oedemera lurida							X		
Diptera	Asilidae	Machimus atricapillus			X						
Diptera	Syrphidae	Melanostoma mellinum				X					

Gastropoda	Hygromiidae	Trochulus hispidus						X	
Heteroptera	Lygaeidae	Nysius senecionis				X	X	X	Asteraceae
Heteroptera	Miridae	Adelphocoris lineolatus			X				Fabaceae
Heteroptera	Miridae	Closterotomus norwegicus	X				X		Generalist
Heteroptera	Miridae	Liocoris tripustulatus	X						Nettles
Heteroptera	Miridae	Lygus rugulipennis	X						Generalist
Heteroptera	Miridae	Phytocoris varipes	X						Generalist
Heteroptera	Nabidae	Nabis ferus	X						
Heteroptera	Pentatomidae	Aelia acuminata		X					Grasses
Heteroptera	Pentatomidae	Dolycoris baccarum	X						Generalist
Heteroptera	Rhopalidae	Myrmus miriformis	X						Generalist
Heteroptera	Rhopalidae	Stictopleurus punctatonervosus				X			
Heteroptera	Scutellaridae	Eurygaster testudinaria		X					Grasses
Heteroptera	Tingidae	Kalama tricornis		X					
Homoptera	Aphrophoridae	Neophilaenus lineatus		X		X	X		Grasses
Homoptera	Cicadellidae	Agallia cf. ribauti					X		Grasses
Homoptera	Cicadellidae	Athysanus argentarius			X				
Hymenoptera	Formicidae	Lasius niger			X	X			
Hymenoptera	Halictidae	Lasioglossum smeathmanellum						X	

Appendix 3: ISIS Analysis

Results

The specific assemblage types represented in this list are as follows:

SAT code	SAT name	No. spp.	Condition	Percentage of national species pool	Related BAT rarity score
F112	open short sward	4		2	
F111	bare sand & chalk	3		1	

All SATs scoring more than zero are listed

The broad assemblage types represented in this list are as follows:

BAT code	BAT name	Representation (1-100)	Rarity score	Condition	BAT species richness	IEC
F2	grassland & scrub matrix	59	138		32	
F1	unshaded early successional mosaic	24			13	
A1	arboreal canopy	6			3	

Rarity scores are shown only for BATS represented by more than 15 species in the assemblage / fauna being analysed

Technical statistics:

Number of species	2000
Number of errors in species list	1946

Specialist species

Species	Specialist habitat	Habitat code
Aulacobaris picicornis	Bare sand and chalk	F111
Cheiracanthium virescens		
Stictopleurus punctatonervosus		
Kalama tricornis	Open short sward	F112
Neliocarus faber		
Pseudorchestes pratensis		
Squamapion cineraceum		

Rare and scarce species

Species	Status	Notes
Aulacobaris picicornis	Notable B	Host Reseda lutea
Cheiracanthium virescens	Nationally scarce	
Glocianus punctiger	Notable B	Host Taraxacum
Neliocarus faber	Notable B	Generalist
Pseudorchestes pratensis	Notable B	Host Centaurea nigrum
Squamapion cineraceum	Notable A	Host Prunella vulgaris

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