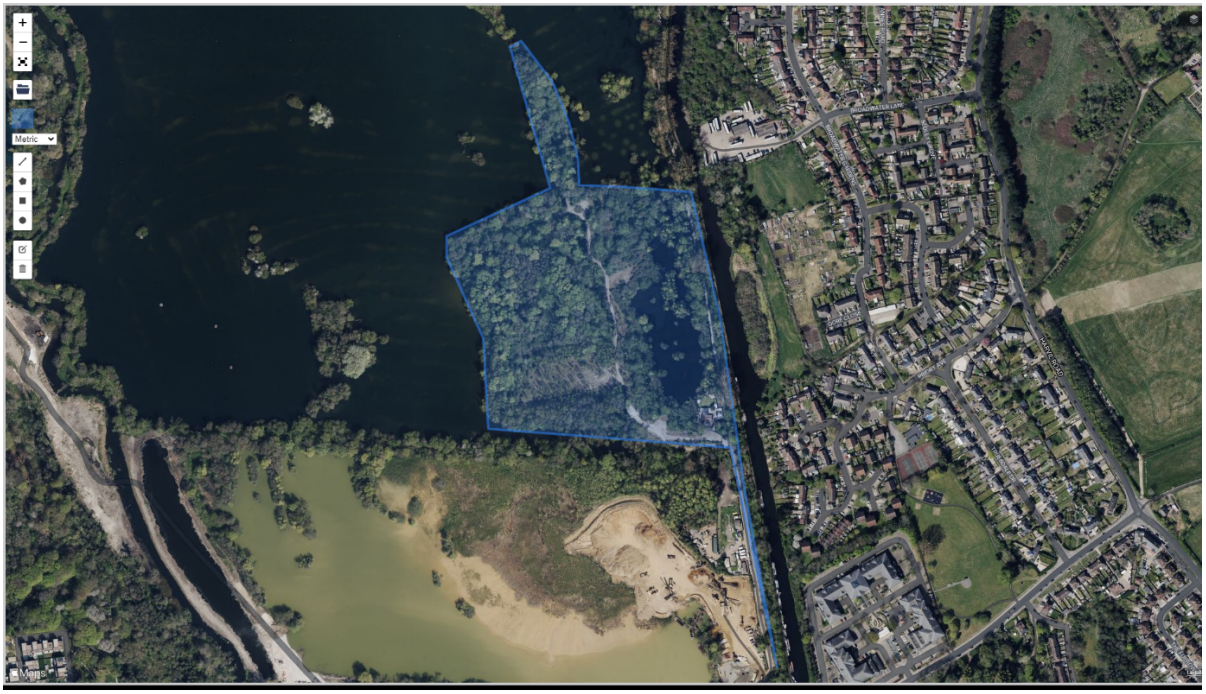

2.3 Aims and objectives

2.3.1 Aim

The main aim of this project was to survey the site to gain an understanding of the terrestrial invertebrate assemblage it supports, including the presence of any species of conservation concern.

2.3.2 Objectives

- To conduct a desk study of designated sites and invertebrate species recorded within proximity of the site;
- To conduct an invertebrate survey of the site;
- To produce a report including findings, an evaluation of key habitat and species assemblages and an appraisal of the potential conservation value of the site's habitats for invertebrates.

3 Methodology

3.1 Desk study

Prior to conducting fieldwork, existing information pertaining to the invertebrate fauna of the site was reviewed. Much of this was sourced from a Scoping Survey report (Mellings 2022) and, to a lesser extent, a preliminary Ecological Appraisal (PEA) carried out by CGO Ecology (Gleed-Owen 2021). Mellings 2022 includes a review of historic invertebrate records from within a 2.5km radius of the survey area supplied by the local biological records office.

3.2 Field survey

3.2.1 Timing

The survey the invertebrate diversity of the site, three visits were conducted:

- 9th June 2022
- 7th July 2022
- 19th July 2022 (moth trapping only)
- 11th August 2022
- 7th September 2022

3.2.2 Sampling

Sampling areas were identified from Mellings 2022 and from the initial visit to the site in June 2022. During this initial visit the whole site was walked and the most promising areas noted. During each visit, the following sampling protocol was employed in each of the sampling areas (Figure 2).

- 1 x 10 minutes transects with a sweep net where vegetation is vigorously swept;
- 1 x 2 min suction samples with vacuum sampler;

- 20 mins of beating trees, hedgerows, scrub and taller vegetation with a beating tray;
- 10 yellow pan traps (part filled with water and detergent) placed in transects and left out for the duration of each visit. This was restricted to the warm, sunny areas (Areas, 1, 3, 4 and 5);
- Moth trapping. Five Robinson traps fitted with 125W Mercury-vapour bulbs were run overnight between 21:30 and 05:30. Moths were recorded at several intervals during the night and then the following morning between 05:30 and 07:30. Traps were positioned at: TQ04738911, TQ04758916, TQ04738921, TQ04718931 and TQ04608929.
- Direct searching and spot sampling.

Sweep sampling allows the capture of terrestrial invertebrates in the sward and dense vegetation, including very mobile species. The vacuum sampler allows the capture of ground-dwelling species, including leaf-litter and tussock dwelling invertebrates.

Figure 2: Sampling areas

4 Limitations

Local record centre species data provides positive records of species recorded; however, the species records within a given area are dependent on the recording effort of individuals and are often biased towards certain well-recorded groups e.g. butterflies and moths, dragonflies and damselflies etc. and the paucity of recording of less easily recognised species cannot be proof of a lack or absence of such species.

Every effort was made to record habitat features of potential conservation value for invertebrates at a suitable resolution to inform a robust scoping study. However, the recognition of key habitat features with potential to support important invertebrate species or species assemblages is based on knowledge and experience. It cannot be guaranteed that habitats considered to have high conservation potential would be confirmed as such if surveyed in detail, or conversely, some habitat features supporting uncommon species or species assemblages may have been overlooked during the survey.

The Summer of 2022 was exceptionally hot and dry. Such conditions are not ideal for surveying terrestrial invertebrates as the diversity and abundance of many taxa was lower than expected, especially in the latter part of the Summer. Very few insects were found during the August and September visits.

5 Results

5.1 Desk study

5.1.1 Statutory and Non-statutory Sites

The following information was sourced from an independent desk study and data-search conducted for the purpose of the current project by GiGL/eCountability (Ritchie, 2022). There are eight sites subject to statutory designation within a 2.5km radius of the Mid Colne Valley SSSI survey area. A further 16 sites with non-statutory designations (SNCIs) were recorded within a 2.5km radius of the survey area. No proposed SNCIs or RIGS or LIGS are within the search area. These sites are summarised in the tables below which have been reproduced from the scoping survey report of Jon Mellings (Mellings 2022).

Table 1. Statutory sites within 2.5km of the survey area.

Site name	Designation(s)	Distance from redline area	Habitat (from citation)	Key species (from citation)
Mid-Colne Valley	SSSI (includes Unit 3 which forms part of the survey area, as well as other Units comprising the SSSI)	Unit 3 comprises part of the survey area;	132 ha site representing a cross-section of the River Colne flood-plain and the adjoining valley slopes which rise abruptly to the east and west and lie on Upper Chalk, with Pebbly Clay capping the higher western slopes. An extensive series of flooded pits occupy much of the floodplain resulting from the gradual and continuing extraction of underlying river gravels. The northerly pit, Broadwater, is one of the largest expanses of open water in the Colne Valley and is unusual with its scattering of small wooded islands. Around the pits on the dividing	Site designated primarily for the diversity of breeding woodland and wetland birds and for the numbers of wintering wildfowl. On the eastern valley slope is one of the last remaining examples of unimproved chalk grassland in Greater London

Site name	Designation(s)	Distance from redline area	Habitat (from citation)	Key species (from citation)
			causeways are remnants of the original grasslands and valley alderwoods. These grade into various types of beech and hornbeam woodland and mixed scrub on the western slopes.	
Harefield Pit	SSSI	c0.55km (northeast)	Mainly designated for Geological interest, but with remnant calcareous flora in the Reading Beds.	No reference to invertebrates in citation, but site with
Northmoor Hill Wood	LNR	c0.65km (west)	Ancient woodland	No reference to invertebrates in citation, but site with invertebrate potential
Ruislip Woods	NNR, LNR, SSSI	c1.5km (east)	Extensive, 305 ha ancient, semi-natural woodland site, including some of the largest, unbroken blocks in Greater London. Site also occurs in mosaic with other semi-natural habitats including acid grass-heath mosaic and areas of wetland.	SSSI citation refers to important insect fauna including 'Lepidoptera and Diptera'. Recorded species include rot hole specialist wood soldierfly species *Xylomyia maculata* (classed Nationally Rare with a threat status of 'Vulnerable' under post-2001 IUCN guidelines; also moths including Light Orange Underwing *Archiearis notha*; Lead-coloured Drab *Orthosia populeti* and Great Oak Beauty *Hypomecis roboraria*.
Old Park Wood	SSSI	c1.7km (north)	A 16.7 ha ancient woodland SSSI, supporting some of the most floristically rich ancient woodlands in Greater London. Contains contains a complex transition through widely differing woodland types.	Wet woodland present on site. No mention of invertebrate value on site, but likely to support a significant fauna.
Denham Country Park	LNR	c2.2km south	19.82 ha. Site supports meadows, rivers and woodlands	Potential to support wetland, woodland and grassland invertebrate assemblages, but no details in datasearch documents
Denham Quarry Park	LNR	c2.5km south	22.22 ha. Meadowland and flooded quarry land	Potential to support wetland, woodland and grassland invertebrate assemblages, but no details in datasearch documents. Citation refers to dragonflies and damselflies, but is not specific.
Frays Valley	LNR	c2.5km south	71.84 ha. The whole of the LNR contains a wide diversity of habitats. The flooded gravel pits provide valuable habitat for wildfowl, and Fray's Farm Meadows represent some of the last remaining examples of wet alluvial grassland in Greater	Desmoulin's Whorl Snail Vertigo moulinsiana, a UK protected species occurs in Denham Lock Woods

Site name	Designation(s)	Distance from redline area	Habitat (from citation)	Key species (from citation)
			London and are important for a variety of plant	

Table 2. Non-statutory sites within 2.5km of the survey area

Site name	Designation(s)	Distance from redline area	Habitat (from citation)	Key species (from citation)
London's Canals	SNCI	Uncertain	A composite SNCI comprising canals within the London area. Amenity grassland, Bare ground, Canal, Planted shrubbery, Ruderal, Scattered trees, Scrub, Secondary woodland, Semi-improved neutral grassland, Tall herbs, Vegetated wall/tombstones, Wet marginal vegetation, Wet woodland/carr	Not specified other than generic reference to dragonflies and damselflies. Habitat likely to support diverse aquatic invertebrate fauna
Ruislip Woods and Poor's Field	SNCI (also NNR, LNR, SSSI)	c1.5km (east)	See also under statutory sites (above)	There is also an important invertebrate fauna including several nationally rare and scarce species (see under statutory sites (above)
Old Park Wood	SNCI	c1.5km (north)	See also under Old Park Wood SSSI. A sizeable woodland, mostly ancient, with a good variety of woodland stand-types due to variations in geology and topography. The site supports a particularly rich flora, including nationally scarce species	Wet woodland present on site. No mention of invertebrate value on site, but likely to support a significant fauna
Mid Colne Valley	SNCI (also SSSI)	Partly overlaps with survey area	See also under statutory sites (above). This section of the Colne Valley includes a diverse range of high quality habitats. Several waterways include the Frays River, from which 53 species of aquatic and wetland plants have been recorded. The unimproved wet pastures of Frays Farm Meadows (a Site of Special Scientific Interest and Local Nature Reserve managed by the London Wildlife Trust and Hillingdon Natural History Society) support a very rich flora	Citation mentions Desmoulin's Whorl Snail Vertigo moulinsiana, a UK protected species; also Balsam Carpet Moth Xanthorhoe biriviata and Glow-worm Lampyris noctiluca. Likely to support a range of wet woodland and wetland species
Coppermill Down	SNCI	c1km (north)	This site comprises the only natural chalk grassland in London north of the Thames. It supports a diverse flora, with typical downland species such as Upright Brome Bromopsis erecta, Dwarf Thistle Cirsium acaule, Salad Burnet Sanguisorba minor, Fairy Flax Linum catharticum and Cowslip Primula veris	The site has an important invertebrate fauna. Part of the Mid Colne Valley Site of Special Scientific Interest.

Site name	Designation(s)	Distance from redline area	Habitat (from citation)	Key species (from citation)
Harefield Chalk Pit	SNCI	c0.25km (northeast)	See also under statutory sites (above). One of four old chalk pits in the east Colne Valley, Harefield Pit comprises a strip of dense woodland on steeply undulating raised ground to the south, and a wooded seasonally damp basin to the north. Part of the southern wood is a Site of Special Scientific Interest	No reference to invertebrates in citation, but site with invertebrate potential
Harefield Churchyard and Wood	SNCI	c0.5km (northeast)	Ancient woodland, Bare ground, Marsh/swamp, Pond/lake, Secondary woodland	No reference to invertebrates in citation, but site with invertebrate potential
Shepherd's Hill Woods and Fields	SNCI	c2.4km (east)	Ancient woodland, Bare ground, Bracken, Coniferous woodland, Hedge, Improved agricultural grassland, Pond/lake, Running water, Scrub, Secondary woodland, Semi- improved neutral grassland, Tall herbs, Unimproved neutral grassland	No reference to invertebrates in citation, but site with invertebrate potential
Dew's Dell	SNCI	c1.2km (southeast)	Bare ground, Pond/lake, Ruderal, Secondary woodland, Semi-improved neutral grassland, Tall herbs, Unimproved neutral grassland, Wet grassland	No reference to invertebrates in citation, but site with invertebrate potential
Newyears Green	SNCI	c2km (southeast)	A woodland believed to have been planted in the late 19th century, surrounded by fields and hedges. Hedge, Scrub, Secondary woodland, Semi-improved neutral grassland, Tall herbs, Wet ditches	No reference to invertebrates in citation, but site with invertebrate potential
Medipark Site	SNCI	c1.5km (northeast)	An interesting mosaic of habitats has developed within the former grounds of a demolished hospital building, including species-rich neutral to chalk grassland, scrub and some marginal secondary woodland. This site adjoins the eastern edge of Old Park Wood	Reference to Marbled White and Common Blue Butterflies. Roesel's Bush-cricket also mentioned as being Nationally Scarce; however, the species has long been downgraded from this status and is widespread and common throughout the southern half of the UK
The Dairy Farm, Harefield	SNCI	c1km (northeast)	Hedge, Semi-improved neutral grassland, Unimproved neutral grassland, Wet ditches, Wet grassland	No reference to invertebrates in citation, but site with invertebrate potential
Knightscote Farm Ponds	SNCI	c1.3km (northeast)	Two ponds separated by an area of woodland, one used for fishing. Bracken, marsh/swamp, pond/lake, ruderal, wet woodland/carr	No reference to invertebrates in citation, but site with invertebrate potential
Harefield Green Pond	SNCI	c1.2km (northeast)	A small pond on the edge of the historic village green of Harefield. Marsh/swamp, pond/lake, scattered trees	Citation mentions that the pond is likely to support aquatic invertebrate populations

Site name	Designation(s)	Distance from redline area	Habitat (from citation)	Key species (from citation)
Breakspear House Wood	SNCI	c1.2km (east)	A small ancient woodland with a footpath running through it. This small woodland is dominated by Ash Fraxinus excelsior, with frequent Pedunculate Oak Quercus robur and Sycamore Acer pseudoplatanus. Stands of Beech Fagus sylvatica, with occasional Hornbeam Carpinus betulus and Horse Chestnut Aesculus hippocastanum make up the rest of the canopy.	Speckled Wood - a common species of butterfly, is mentioned on the citation; however, the age of the wood suggest it may support an interesting invertebrate fauna
Harefield Hospital Ponds and the Old Orchard	SNCI	c1.3km (northeast)	The two ponds in the grounds of Harefield Hospital are examples of mid- and late-successional habitats; the eastern pond being full of water with a well-developed marginal flora and the western one of mainly willow scrub, mud and leaf litter with a small area of water. An old orchard of over-mature Apple Malus domestica and plum Prunus domestica trees is part of the council-owned Mount Pleasant Farm. These old fruit trees are likely to be valuable for invertebrates.	The orchard and mature oaks may support important invertebrate assemblages

5.1.2 Historically recorded species

Twenty-four insect species, recorded within a 2.5km radius of the survey area, were returned from the GiGL data search (summarised in the Table below). Of these, three are 'Vulnerable'; two are 'Near Threatened' based on post-2001 IUCN criteria; one species is listed in the RDBK 'unknown' category based on pre-1994 criteria; nine species are currently classed as nationally scarce (or still listed in one of the former Notable A or B categories). One species, the Hairy Dragonfly *Brachytron pratense,* is listed as 'Locally Important' within the Greater London region, whilst three species; Silver-washed Fritillary *Argynnis paphia,* Green Hairstreak *Callophrys rubi* and Essex Skipper *Thymelicus lineola*, have no official status and are listed as 'Low Priority'.

Two of the species including Stag Beetle *Lucanus cervus,* White Admiral *Limenitis camilla* are listed as 'Priority Species' under section 41 of the NERC Act, 2006, whilst a third, the Cinnabar Moth *Tyria jacobaeae* is listed under the section 41 as 'Research only', a status afforded to a number of still widespread and common British moth species, for which a decline has been recorded in recent decades.

A further three species, still listed in the GiGL dataset as Nationally Scarce, have been subject to status revisions and are now considered to be too widely recorded for the NS category. These include *Hercostomus plagiatus* - a species of long-legged fly; the Red-girdled Mining Bee *Andrena labiata* and

the Brown Tree Ant *Lasius brunneus*, a species which has been recorded in numerous sites in the southern UK.

Stag Beetle is also protected under Appendix 1,2 and 3 of the Bern Convention and is listed on Annex 2 of the EU Habitats Directive (Non-priority species) and Purple Emperor *Apatura iris* is also protected for collection and sale under Section 5 of the UK Wildlife and Countryside Act (1981), as amended.

Table 3. Invertebrate species with a conservation status recorded within 2.5km of the survey area.

Scientific Name	English Name	Earliest Year	Latest Year	Total Records	Status	SAT affinities	Habitat-level affinities
Brachytron pratense	Hairy Dragonfly	2018	2019	3	Locally Important	N/a	Acid & sedge peats
Hercostomus plagiatus	A long-legged fly	1987	1987	1	Formerly NS	N/a	Acid & sedge peats
Apatura iris	Purple Emperor	2015	2018	2	NT; protection	N/a	Arboreal
Limenitis camilla	White Admiral	1989	2017	8	S41 Vu	N/a	Arboreal
Phyllocnistis xenia	Kent Bent-wing	2014	2014	1	RL-VU	N/a	Arboreal
Anaspis costai	A scraptiid beetle	2010	2010	2	NS	Bark & sapwood	Decaying wood
Brachyopa pilosa	Dark-shouldered Sap Hoverfly	2009	2009	1	NS	Bark & sapwood decay	Decaying wood
Epuraea longula	A sap beetle	2009	2009	1	NS	Bark & sapwood decay	Decaying wood
Mordellistena neuwaldeggiana	A tumbling flower beetle	2010	2010	2	NS	Bark & sapwood decay	Decaying wood
Cis festivus	A minute treefungus beetle	2010	2010	1	NS	Fungal fruiting bodies	Decaying wood
Gyrophaena munsteri	A rove beetle	2009	2009	1	RDBK	Fungal fruiting bodies	Decaying wood
Lasius brunneus	Brown Tree Ant	2009	2010	2	Formerly NS	Heartwood decay	Decaying wood
Lucanus cervus	Stag Beetle	1998	2018	8	S41; protection	Heartwood decay	Decaying wood
Mordellistena humeralis	A tumbling flower beetle	2010	2010	3	NS	N/a	Decaying wood
Gomphus vulgatissimus	Common Club-tail	1968	1968	1	NT	Slow flowing rivers	Running water
Andrena labiata	Red-girdled Mining Bee	2011	2011	1	Formerly NS	Rich flower resource	Short sward & bare ground
Argynnis paphia	Silver-washed Fritillary	2017	2017	1	Low Priority	Scrub edge	Tall sward & scrub
Apteropeda globosa	A flea beetle	2009	2009	1	NS	N/a	Tall sward & scrub
Callophrys rubi	Green Hairstreak	2011	2011	2	Low Priority	N/a	Tall sward & scrub
Euplagia quadripunctaria	Jersey Tiger	2015	2015	1	HDir2	N/a	Tall sward & scrub
Thymelicus lineola	Essex Skipper	1991	2013	2	Low Priority	N/a	Tall sward & scrub

Tyria jacobaeae	Cinnabar	2012	2013	2	S41 research only	N/a	Tall sward & scrub
Meligethes atramentarius	A pollen beetle	2009	2009	1	NS	N/a	N/a
Mordellistena variegata	A tumbling flower beetle	2010	2010	2	NS	N/a	N/a

5.2 Field survey

5.2.1 Survey area

The site was formerly sand and gravel workings and the vegetation, typical pioneer species, colonised the site when aggregation extraction and processing ceased. In view of the former use, some of the site can be classfied as Open Mosaic Habitats on Previously Developed Land (OMHPDL). Some concrete hardstanding remains on the site and other, demolished parts of the gravel and sand processing facility's infrastructure remain.

5.2.2 Habitats

Very broadly, the site is a mosaic of habitats, but it has low/medium potential for terrestrial invertebrates because of the few open areas and the predominance of *Buddleja*. The small areas of open habitats offer sunlight and warmth, although the substrate is typically too hard to be of much value for species that excavate burrows in the ground, e.g. solitary bees and wasps.

The pioneer vegetation on the site is dominated by Willows/Sallows *Salix fragilis* and *Salix caprea*, *Buddleja*, Silver Birch *Betula pendula* and Alder *Alnus glutinosa*. Buddleja is used by a relatively small number of insect species as a nectar source, but its value to terrestrial invertebrates in general is low. Willows, Sallows, Silver Birch and Alder are much more valuable. Distinct assemblages use these species and Sallows in particular support many species, including pollinators, leaf feeders and saproxylic insects.

The historical use of the site has left small-scale topographical features with hummocks and hollows, but many of these are shaded and the substrate is too hard to be of use for many species. This was further compounded by the drought conditions during the Summer of 2022. The swards that have developed in some of the open areas are botanically quite diverse and support species typically found on low nutrient soils. The margins of the tracks support plants such as St John's Wort *Hypericum perforatum* and Stonecrops *Sedum* sp.

In Area 1, there is a mosaic of bare ground, wet grassland and scrub grading into wet woodland with abundant dead-wood resources, making it the most interesting part of the site in terms of the potential for terrestrial invertebrates. The largest open area within the site, Area 3, also has some interest for terrestrial invertebrates because of the abundant scrub, nectar sources, low nutrient soils and sheltered microclimate. A more friable substrate in this area would increase its value to terrestrial invertebrates generally.

There are wetland habitats throughout the site, i.e. lake margins, which are typically high value for terrestrial invertebrates. However, the value of these is diminished as the site is used by anglers and marginal vegetation in warm sheltered conditions has been cleared for access to the water.

There are deadwood resources throughout the site, although they're concentrated in the south. There are no significant trees on the site, which would support a suite of specialist species. The deadwood resources are typically *Salix fragilis*, which is a rather short-lived tree and supports a relatively small number of specialist saproxylic species. Most of the larger dead and moribund trees are in the southern area where sampling was not possible because of quicksand.

On the whole, the site has a relatively low botanical diversity, which will be reflected in the terrestrial invertebrate diversity as many herbivorous invertebrate species are monophagous (associated with only one species). A low plant diversity is an indicator of poor-quality invertebrate habitat.

5.2.3 Invertebrate species recorded in 2022

447 terrestrial invertebrate species were recorded (see Appendix A for full list). Of these, 10 have some level of national conservation status (see Appendix A). These statuses of these species is sourced from the Pantheon database. A further 39 of the moth species are considered to be 'Local'.

The Alder Leaf Beetle *Agelastica alni* is currently classed as Nationally Rare, but in recent decades it has undergone a very rapid expansion in range and is now found in suitable habitat across much of the UK. Consequently, its status requires revision. The reed beetle *Donacia thalassina* is a Nationally Scarce species associated with Yellow Flag Iris and other aquatic plants. The larvae develop in the roots of aquatic plants. Two individuals were seen on Yellow Flag Iris in the north of the site. The Nationally Notable rove beetle *Omalium rugatum* was found in suction samples. Little is known of the ecology of this species, but it is normally associated with decaying vegetation.

The small, Nationally Notable soldier fly *Neopachygaster meromelas* was found by sweeping the tall, flower-rich sward in Area 1. The larvae develop under decaying bark or tree wounds of various broadleaved trees, although poplars might be the preferred host. The two Nationally Notable crane flies, *Tipula livida* and *T. helvola,* were found during the final visit to the site in September 2022. The larvae are aquatic.

The Nationally Scarce Slender-horned Leatherbug *Ceraleptus lividus* was found in the North and South of the site. It feeds on various herbaceous legumes such as clovers, vetches and trefoils in dry open habitats such as grasslands, sand dunes and gravel pits.

5.2.3.1 Moths

Any moths for which in situ identification could not be determined were retained and dissected for determination by examination of the genitalia – this constituted very few of the overall catch and was largely limited to some of the smaller moths for which this is necessary for identification, or for a few larger moths which were in such poor condition that they could not otherwise be identified.

The weather on the night of the 19th July was cloudy and extremely warm, being the second day of the short, but extremely hot, heatwave where day-time temperatures in the area had reached the high 30's, possibly over 40°C as was recorded nearby at Heathrow. The weather did however break up on the night, and while setting out the traps there was a heavy rain shower, with light showers throughout the night and temperatures dropped significantly compared to the previous night – though still remained between 20-25°C.

Across the five traps a total of 192 moth species were recorded, including three species that are nationally scarce: *Parascotia fuliginaria* (Waved Black); *Bohemannia quadrimaculella* and *Scrobipalpa obsoletella*) and 39 species that are classed as 'Local'. Waved Black requires dead wood with associated fungi on which the larvae feed while the larvae of *B. quadrimaculella* feed within the leaves of Alder (*Alnus glutinosa*). The larvae of *S. obsoletella* feed on Oraches (*Atriplex* spp.), but this species is predominantly coastal in distribution.

A few species which were once regarded as nationally scarce, but have in recent years undergone enormous and rapid expansion, particularly in the south-east, including Middlesex, were also recorded: *Dioryctria sylvestrella*, *Euplagia quadripunctata* (Jersey Tiger) and *Eilemma caniola* (Hoary Footman). These species are now common in the area, although *D. sylvestrella* is likely to be greatly under-recorded due to the need for dissection to attain an accurate species identification.

Local species included some that are associated with wetland habitats including: Silky, Twin-spotted and Southern Wainscots (*Chilodes maritima*, *Lenisa geminipuncta* and *Mythimna straminea*) and *Phalonidia manniana*.

5.2.4 Pantheon analysis

The species lists obtained for the site were analysed with Pantheon. Pantheon is an online resource for recording and analysis of invertebrate assemblages developed jointly by the CEH and Natural England became available. The resource includes a modified version of ISIS which was formerly available in spreadsheet form and then as trial versions. However, these versions were used extensively both for common standards monitoring of entomological features of SSSIs and for EcIA purposes.

The Species Quality Indices (SQIs) reflect the proportion of rarities attributed to an assemblage and scores of around 100 generally indicate assemblages comprised of a high proportion of common species. In broad terms, scores of around 140 indicate the presence of assemblages of some conservation value. However, it is important to note that Species Quality Indices (SQIs) calculated from less than 15 species may not be reliable.

Table 4: Habitats & Resources – Broad Biotopes

Broad biotope	No. of species	% representation	SQI	Species with conservation status	Conservation status

open habitats	196	5	108	45	LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|Section 41 Priority Species - research only|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|[RDB 3]|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|Section 41 Priority Species - research only|LC (Global)|LC (Global)|LC (Global)|Section 41 Priority Species - research only|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|VU|LC (Global)|Section 41 Priority Species - research only|NS|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)
tree-associated	125	4	125	49	LC (Global)|LC (Global)|LC (Global)|Notable|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|Notable|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|NR|NT|Section 41 Priority Species - research only|Notable|LC (Global)|LC (Global)|DD|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|NT|LC (Global)|Section 41 Priority Species - research only|LC (Global)|LC (Global)|LC (Global)|LC (Global)|Section 41 Priority Species - research only|LC (Global)|NS|LC (Global)|LC (Global)|LC (Global)
wetland	48	2	118	7	LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|NS|LC (Global)
shaded woodland floor	2	67	100		
coastal	2	<1	400	1	LC (Global)

Table 5: Habitats and Resources – Habitats

Broad biotope	Habitat	No. of species	% representation	SQI	Species with conservation status	Conservation status
open habitats	tall sward & scrub	147	6	107	40	LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|Section 41 Priority Species - research only|LC (Global)|LC (Global)|LC (Global)|Section 41 Priority Species - research only|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|Section 41 Priority Species - research only|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|Section 41 Priority Species - research only|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)
tree-associated	arboreal	87	7	110	41	LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|NR|LC (Global)|LC (Global)|LC (Global)|Section 41 Priority Species - research only|NT|LC (Global)|LC (Global)|DD|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|Section 41 Priority Species - research only|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|Section 41 Priority Species - research only|NT|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)|LC (Global)
open habitats	short sward & bare ground	42	3	115	4	NS|LC (Global)|LC (Global)|LC (Global)

wetland	marshland	28	3	130	1	NS
tree-associated	shaded woodland floor	22	2	141	6	LC (Global)|Notable|LC (Global)|Notable|LC (Global)|Notable
tree-associated	decaying wood	18	2	160	2	LC (Global)|NS
wetland	acid & sedge peats	16	1	100	4	LC (Global)|LC (Global)|LC (Global)|LC (Global)
tree-associated	wet woodland	5	2	100		
wetland	running water	4	<1	100		
wetland	wet woodland	4	1	100		
coastal	sea cliff	1	2	400	1	LC (Global)
open habitats	upland	1	<1	100		
coastal	saltmarsh	1	<1			
wetland	lake	1	<1	100		

Table 6: Habitats and Resources – Specific Assemblage Types

Broad biotope	Habitat	SAT	No. of species	% representation		SQI	Species with conservation status	Conservation status	Code	Reported condition
open habitats		rich flower resource	21	9	100				F002	Favourable (21 species, 15 required)
open habitats		scrub edge	14	6	100	2		LC (Global)|LC (Global)	F001	Favourable (14 species, 11 required)
tree-associated	decaying wood	bark & sapwood decay	9	2	175	1		NS	A212	Unfavourable (9 species, 19 required)
open habitats	short sward & bare ground	bare sand & chalk	6	1	150	1		LC (Global)	F111	Unfavourable (6 species, 19 required)
wetland	acid & sedge peats	reed-fen & pools	4	4	100	4		LC (Global)|LC (Global)|LC (Global)|LC (Global)	W314	Unfavourable (4 species, 11 required)
open habitats		scrub-heath & moorland	4	1	100	2		VU|[RDB 3]	F003	Unfavourable (4 species, 9 required)
open habitats	short sward & bare ground	open short sward	4	2	100				F112	Unfavourable (4 species, 13 required)
		epiphyte fauna	3	15	100	3		LC (Global)|LC (Global)|LC (Global)	A215	Favourable (3 species, 3 required)

tree-associated	decaying wood	heartwood decay	2	1	100			A211	Unfavourable (2 species, 6 required)
tree-associated	decaying wood	fungal fruiting bodies	1	1	400	1	LC (Global)	A213	Unfavourable (1 species, 7 required)
open habitats	short sward & bare ground	exposed sea-cliff	1	2	400	1	LC (Global)	F113	
wetland	running water	slow-flowing rivers	1	4	100			W125	Unfavourable (1 species, 4 required)
wetland	marshland	northern lakes & lochs	1	6	400	1	NS	W212	Unfavourable (1 species, 3 required)

5.3 Discussion

5.3.1 Discussion of results

During this survey 10 species with some level of national conservation concern were recorded. As highlighted above, several of these species have undergone fairly recent range expansions and their conservation status requires revision.

The Pantheon analysis of the species list shows that the value of this site lies in the open habitats it offers. Specifically, the tall sward and scrub and scrub edge habitats. On a landscape (broad biotope) level, the greatest number of recorded species by far was attributed to the 'Open habitats' classification, with 196 recognised species. 125 and 48 species were 'tree-associated' and 'wetland-associated', respectively. Proportionately, the 'Open habitats' classification supports a greater number of species than the other two assemblages in terms of the national pool of species attributed in the Pantheon database. The representation of this entire species pool was 5%, compared with 4% and 2% of the national species pools represented from the survey data for the tree-associated and wetland assemblages, respectively at a biotope level. These findings would be expected in consideration of the habitats available.

On the Pantheon 'habitat' level tier, there were four assemblages attributed with a sufficient number of species recognised in ISIS to be considered robust. 147 species were attributed to the 'tall sward and scrub' habitat, which basically includes species associated with taller grassland, scrub and scrub edge habitats. Eighty-seven, 42, 28, 22, 18 and 16 species were attributed to arboreal, short sward and bare ground, marshland, shaded woodland floor, decaying wood and acid & sedge peats, respectively. In terms of the specific assemblage types (SATs) within these habitats, the only one with more than 15 associated species was the 'rich flower resource' SAT. The number of species associated with the other SATs was lower than the threshold of 15. Anything lower than 15 species and the SQI is not considered to be reliable.

In conservation assessments, SATs are generally regarded as the most valuable metrics for assessing site quality. This is because SATs are made up of species with a high degree of habitat specialisation. Such species tend to be both uncommon and representative of sites supporting habitat of quality in terms of conservation value. However, SATs often require targeted sampling of specific

habitat features and are not always well represented in broad-brushstroke surveys designed to gain an overall, or baseline assessment of a site's value.

5.4 Assessment

The site was found to support some habitat of moderate conservation value for invertebrate assemblages associated with rich flower resources, tall sward and scrub edge. Area 1 had the greatest amount of these habitats, but warm sunlit scrub edges were scattered through the site.

The majority of species recorded during the survey were representative of open habitats, thus reflecting sampling effort and habitat area. The results of the Pantheon analysis did not reveal any assemblages of high conservation value.

It is important to note the caveats associated with surveys of this type, principally the number of visits to the site and the weather in the survey season. Three or four visits is generally accepted as the standard for terrestrial invertebrate surveys, but species in any given area will always be missed. The summer of 2022 was extremely warm and dry. Such conditions are not ideal for surveying terrestrial invertebrates as the diversity and abundance of many taxa will be lower, especially in the peak of the drought.

The site does have potential to support some of the species of conservation concern that have been recorded from the surrounding area, although none of these species were recorded during these surveys.

6 Assessment of Effects

6.1 Approach

The assessment of effects is considered in two main sections (i) effects arising from construction of the development including direct habitat losses and indirect effects such as pollution events or effects on site drainage and hydrology, and (ii) effects arising from 'operation' of the development as the new population takes up residence.

Particular attention is given to effects on those areas of substantive nature conservation value, especially those which support habitats and species which are a priority for conservation in a national context, as well as those which are otherwise notable at a national or regional/county level

6.2 Construction effects

6.2.1 Impacts on the Habitats

It is not known exactly how much of the more valuable invertebrate habitats will be lost during the development. Area 1 is the most interesting of the surveyed areas, having moderate value for terrestrial invertebrates.

The unmitigated, combined loss of all the areas has some significance as a moderately interesting invertebrate assemblage is present. It is important to remember that surveys of this type only reveal a proportion of the species that inhabit a given area.

Pollution arising from construction could affect any retained habitats. Dust could affect retained areas of grassland and scrub if basking sites, nesting areas, foodplants and nectar sources are smothered. Pollution may cause degradation of habitats, reducing their suitability for the existing range of flora and fauna and their overall ecological value.

6.3 Operational effects

The main potential operational effects on nature conservation interests are considered to be as follows:

- Increased human disturbance and damage to any sensitive retained habitats including trampling, fly-tipping, etc.
- Increases in nutrient status of low fertility substrates through littering and fly-tipping;
- Invasion by non-native plant species;
- Changes in drainage regime of the site affecting site hydrology in the medium to long term with possible deleterious effects on the site and surrounding areas.

7 Avoidance, reduction, compensation and enhancement measures

7.1 Avoiding and reducing construction risks

During detailed design and construction of the development, it is likely that additional actions may be required to safeguard the current invertebrate populations. These actions would be specified within a Construction Environmental Management Plan (CEMP) and would include:

- Clear demarcation of areas that are to be retained (if any) with minimal disturbance to the buffers. Many species of invertebrate overwinter as eggs, larvae or adults in the soil, leaf-litter, under bark, etc. so it is imperative that these habitats are not disturbed in the buffers surrounding the more important retained habitats;
- Any trees that are cut in the retained areas should be left as dead-wood with a mixture of standing (2-3m high) and boughs and trunks on the ground;
- Appropriate measures are put in place to control dust and other emissions that could affect air quality and smother retained habitats;
- Site compounds, storage facilities and staff facilities are suitably bunded and located in places that would not have an adverse effect on the environment; in particular, the CEMP would ensure that retained trees are protected;

- In advance of site clearance, protective fencing is installed to protect retained and/or ecologically sensitive habitats and their associated buffer zones to ensure that they are not subject to accidental damage (to be determined on a phase by phase basis);
- Haul routes, storage compounds and staff facilities would be located away from retained habitats to minimise disturbance to the species they support;
- An ecological clerk of works is in place to oversee site operations.

7.2 Enhancement of the retained areas

Any retained areas in the development zone should preserve the habitats that are currently of greatest value to terrestrial invertebrates, principally botanically rich sward and scrub edge. These could be further enhanced by offering additional bare ground, water-bodies and dead wood resources. It is crucial that ornamental species of little or no value to native terrestrial invertebrates are not used in the planting schemes throughout the proposed development.

Areas of bare, hard substrate could be enhanced by over-topping with more friable substrates that favour species that burrow for all or part of their lifecycle.

7.3 Creation of new habitats

There are two tenets for creating habitats for terrestrial invertebrates: maximising plant diversity and structural complexity of the area in question. A plan for the development should be formulated that considers the current habitats and habitat connectivity in the broader landscape.

The emphasis for this green infrastructure needs to be on native species, habitat heterogeneity and connectivity. The habitats in the sites should be replicated and enhanced throughout the development with the provision of nectar-source rich grassland, bare and sparsely vegetated ground, scrub, water-bodies and dead wood resources.

8 Conclusions

Five surveys of the site were conducted of the site between June and September 2022, one of which was solely for the purpose of moth-trapping. Standardised sampling methods and protocols were used to sample the invertebrate fauna of the site, with subsequent identification of material.

447 terrestrial invertebrate species were recorded, of which 10 have some level of national conservation status. One of these species, *Agelastica alni,* has undergone a significant range expansion in recent years and a revision of its conservation status is warranted. The site has some habitats that have moderate value for terrestrial invertebrates, particularly the tall, flower-rich sward and scrub edge in Area 1. The large areas of *Buddleja* scrub are of very limited value.

The areas of wet woodland and the abundant deadwood resources therein could not be adequately surveyed because of the large swathes of quicksand.

Specific measures will be needed to mitigate for the consequences of the construction process and the eventual use of the site. Pollution will need to be controlled during and after construction and measures taken to minimise disturbance of any retained/created habitats, as well as limiting nutrient and pesticide inputs.

There is a great deal of scope to create habitat for terrestrial invertebrates in the development that will serve to improve habitat connectivity through the wider landscape. Sympathetic habitat creation could increase the value of the site for terrestrial invertebrates. Retaining a network of existing habitat throughout the site and linking these with created habitats and surrounding habitats could provide a connected, landscape scale mosaic of resources that will become more valuable to terrestrial invertebrates as they evolve.

9 References

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APPENDIX A: SPECIES LIST FOR THIS SURVEY

Statuses sourced from the Pantheon database. NS= Nationally Scarce; Notable= Notable or Nationally Scarce; DD=Data Deficient [*status*]= Status considered out of date, use with caution.

Species	Common Name	Conservation status
Coleoptera		
Apion frumentarium	An Apionid Weevil	
Protapion assimile	An Apionid Weevil	
Anthonomus pomorum	A Weevil	
Ceutorhynchus pallidactylus	A Weevil	
Dorytomus tortrix	A Weevil	
Euophryum confine	A Weevil	
Hypera nigrirostris	A Weevil	
Sciaphilus asperatus	A Weevil	
Sitona lineatus	A Weevil	
Deporaus betulae	A leaf-rolling weevil	
Altica lythri	A Flea Beetle	
Crepidodera aurea	A Flea Beetle	
Longitarsus jacobaeae	A Flea Beetle	
Longitarsus parvulus	A Flea Beetle	
Phyllotreta nigripes	A Flea Beetle	
Psylliodes chrysocephala	A Flea Beetle	
Agelastica alni	Alder Leaf Beetle	DD;NR
Donacia thalassina	A Reed Beetle	NS
Cryptocephalus moraei	A Pot Beetle	
Grammoptera ruficornis	A Longhorn Beetle	
Cantharis rustica	A Soldier Beetle	
Oedemera nobilis	Thick-Legged Flower Beetle	
Malachius bipustulatus	A Flower Beetle	
Adalia bipunctata	2-spot Ladybird	
Adalia decempunctata	10-spot Ladybird	
Aphidecta obliterata	Larch Ladybird	
Calvia quattuordecimguttata	Cream-spot ladybird	

Coccinella septempunctata	7-spot Ladybird	
Halyzia sedecimguttata	Orange ladybird	
Harmonia axyridis	Harlequin Ladybird	
Harmonia quadripunctata	Cream-streaked Ladybird	
Nephus redtenbacheri	A Ladybird	
Propylea quattuordecimpunctata	14-spot Ladybird	
Psyllobora vigintiduopunctata	22-spot Ladybird	
Rhyzobius chrysomeloides	A Ladybird	
Rhyzobius litura	A Ladybird	
Subcoccinella vigintiquattuorpunctata	24-spot Ladybird	
Anotylus sculpturatus	A Rove Beetle	
Carpelimus corticinus	A Rove Beetle	
Omalium rugatum	A Rove Beetle	Notable
Philonthus carbonarius	A Rove Beetle	
Stenus impressus	A Rove Beetle	
Tachyporus nitidulus	A Rove Beetle	
Stenus flavipes	A Rove Beetle	
Phosphuga atrata	A Carrion Beetle	
Abax parallelepipedus	A carabid beetle	
Acupalpus parvulus	A carabid beetle	
Agonum marginatum	A carabid beetle	
Amara aenea	A carabid beetle	
Amara plebeja	A carabid beetle	
Amara similata	A carabid beetle	
Asaphidion curtum	A carabid beetle	
Bembidion articulatum	A carabid beetle	
Bembidion assimile	A carabid beetle	
Bembidion lunulatum	A carabid beetle	
Carabus violaceus	Violet Ground Beetle	
Dyschirius tristis	A carabid beetle	
Harpalus affinis	A carabid beetle	

Harpalus rufipes	A carabid beetle	
Leistus ferrugineus	A carabid beetle	
Leistus fulvibarbis	A carabid beetle	
Nebria brevicollis	A carabid beetle	
Nebria salina	A carabid beetle	
Notiophilus biguttatus	A carabid beetle	
Notiophilus substriatus	A carabid beetle	
Ophonus puncticeps	A carabid beetle	
Ophonus rufibarbis	A carabid beetle	
Oxypselaphus obscurus	A carabid beetle	
Pterostichus madidus	A carabid beetle	
Pterostichus melanarius	A carabid beetle	
Syntomus foveatus	A carabid beetle	
Syntomus obscuroguttatus	A carabid beetle	
Ocypus olens	Devil's Coach-horse	
Anacaena limbata	A Water Scavenger beetle	
Anacaena lutescens	A Water Scavenger beetle	
Helophorus brevipalpis	A Water Scavenger beetle	
Endomychus coccineus	A handsome fungus beetle	
Melolontha melolontha	Common Cockchafer	
Diptera		
Bombylius major	Dark-edged Bee-fly	
Criorhina berberina	A Hoverfly	
Episyrphus balteatus	A Hoverfly	
Eristalis pertinax	A Drone Fly	
Myathropa florea	A Hoverfly	
Syrphus ribesii	A Hoverfly	
Xylota sylvarum	A Hover Fly	
Pollenia amentaria	A cluster fly	
Chloromyia formosa	Broad Centurion	
Neopachygaster meromelas	Silver-strips Black	NS

Pachygaster leachii	Yellow-legged Black	
Sargus flavipes	Yellow-legged Centurion	
Sepsis fulgens	A sepsid fly	
Themira annulipes	A sepsid fly	
Lonchaea caucasica	A lance fly	
Achyrolimonia decemmaculata	A crane fly	
Erioptera lutea	A crane fly	
Molophilus ochraceus	A crane fly	
Rhipidia maculata	A crane fly	
Tipula livida	A crane fly	Notable
Tipula helvola	A crane fly	Notable
Tipula pagana	A crane fly	
Ptychoptera albimana	A Fold-winged Cranefly	
Machimus atricapillus	Kite-tailed Robberfly	
Dioctria linearis	Small Yellow-legged Robberfly	
Rhagio lineola	Small Fleck-winged Snipefly	
Rhagio scolopaceus	Downlooker Snipefly	
Chrysopilus cristatus	Black Snipefly	
Lepidoptera		
Aglais io	Peacock Butterfly	
Aglais urticae	Small Tortoiseshell Butterfly	
Polyommatus icarus	Common Blue Butterfly	
Gonepteryx rhamni	Brimstone	
Pararge aegeria	Speckled Wood Butterfly	
Pieris rapae	Small White Butterfly	
Pieris brassicae	Large White Butterfly	
Vanessa atalanta	Red Admiral Butterfly	
Vanessa cardui	Painted Lady Butterfly	
Abrostola tripartita	Spectacle	
Abrostola triplasia	Dark Spectacle	
Acentria ephemerella	Water Veneer	

Acleris emargana	Notch Wing Tortix	
Acrobasis advenella	Grey Knot-horn	
Acrobasis consociella	Broad-barred Knot-horn	
Acronicta leporina	Miller	
Acronicta psi	Grey Dagger	
Acronicta rumicis	Knot Grass	
Aethes rubigana	Burdock Conch	
Agonopterix alstromeriana	Brown-spot Flat-body	
Agriphila straminella	Straw Grass-veneer	
Agrotis exclamationis	Heart & Dart	
Agrotis puta	Shuttle-shaped Dart	
Agrotis segetum	Turnip Moth	
Alucita hexadactyla	Twenty-plume Moth	
Amphipoea oculea	Ear Moth	
Amphipyra pyramidea	Copper Underwing	
Anania coronata	Spotted Magpie	
Anania hortulata	Small Magpie	
Apamea epomidion	Clouded Brindle	
Apamea lithoxylaea	Light Arches	
Apamea monoglypha	Dark Arches	
Apamea scolopacina	Slender Brindle	
Apotomis betuletana	Birch Marble	
Archanara dissoluta	Brown-veined Wainscot	
Argyresthia goedartella	Golden Argent	
Axylia putris	Flame	
Bactra lancealana	Rush Marble	
Batrachedra praeangusta	Poplar Cosmet	
Blastobasis adustella	Furness Dowd	
Blastobasis lacticolella	Wakely's Dowd	
Bohemannia quadrimaculella	Four-spot Pigmy	NS
Brachmia blandella	Gorse Crest	

Bryotropha senectella	Dull Red Neb	
Cabera exanthemata	Common Wave	
Cabera pusaria	Common White Wave	
Calamotropha paludella	Bulrush Veneer	
Cameraria ohridella	Horse-Chestnut Leaf-miner	
Carcina quercana	Long-horned Flat-body	
Carpatolechia alburnella	Suffused Groundling	
Cataclysta lemnata	Small China-mark	
Catoptria falsella	Chequered Grass-veneer	
Catoptria pinella	Pearl Grass-veneer	
Celypha striana	Barred Marble	
Chilodes maritima	Silky Wainscot	
Chrysoteuchia culmella	Garden Grass-veneer	
Clepsis consimilana	Privet Twist	
Clepsis spectrana	Cyclamen Tortrix	
Cnephasia asseclana	Flax Tortix	
Cnephasia genitalana	Dover Shade	
Cochylis atricapitana	Black-headed Conch	
Cochylis roseana	Rosy Conch	
Coleophora alcyonipennella	Clover Case-bearer	
Coleophora glaucicolella	Grey Rush Case-bearer	
Coleophora lutipennella	Common Oak Case-bearer	
Coleophora milvipennis	Buff Birch Case-beaerer	
Coleophora serratella	Common Case-bearer	
Colocasia coryli	Nut-tree Tussock	
Cosmia trapezina	Dun-bar	
Craniophora ligustri	Coronet	
Crassa unitella	Golden-brown Tubic	
Crocallis elinguaria	Scalloped Oak	
Cryphia algae	Tree-lichen Beauty	
Cyclophora albipunctata	Birch Mocha	

Cyclophora punctaria	Maiden's Blush	
Cydalima perspectalis	Box Tree Moth	
Cydia fagiglandana	Large Beech Piercer	
Cydia splendana	Marbled Piercer	
Cydia ulicetana	Grey Gorse Piercer	
Deilephila elpenor	Elephant Hawk-moth	
Diachrysia chrysitis	Burnished Brass	
Dioryctria sylvestrella	New Pine Knot-horn	
Drepana falcataria	Pebble Hook-tip	
Eilema caniola	Hoary Footman	
Eilema complana	Scarce Footman	
Eilema depressa	Buff Footman	
Eilema griseola	Dingy Footman	
Eilema lurideola	Common Footman	
Endotricha flammealis	Rosy Tabby	
Ennomos alniaria	Canary-shouldered Thorn	
Ennomos erosaria	September Thorn	
Ennomos fuscantaria	Dusky Thorn	
Epiblema foenella	White-foot Bell	
Epinotia nisella	Grey Poplar Bell	
Epione repandaria	Bordered Beauty	
Epirrhoe alternata	Common Carpet	
Eremobia ochroleuca	Dusky Sallow	
Euchoeca nebulata	Dingy Shell	
Eucosma cana	Hoary Belle	
Eucosma conterminana	Pale Lettuce Bell	
Eucosma hohenwartiana	Bright Bell	
Eudonia lacustrata	Little Grey	
Eudonia mercurella	Small Grey	
Eulithis prunata	Phoenix	
Eupithecia assimilata	Currant Pug	

Eupithecia centaureata	Lime-speck Pug	
Eupithecia haworthiata	Haworth's Pug	
Eupithecia tenuiata	Slender Pug	
Eupithecia tripunctaria	White-spotted Pug	
Euplagia quadripunctaria	Jersey Tiger	
Euproctis similis	Yellow-tail	
Euzophera pinguis	Ash-bark Knot-horn	
Falcaria lacertinaria	Scalloped Hook-tip	
Furcula furcula	Sallow Kitten	
Gymnoscelis rufifasciata	Double-striped Pug	
Gypsonoma dealbana	Common Cloaked Shoot	
Habrosyne pyritoides	Buff Arches	
Hedya salicella	White-backed Marble	
Herminia tarsipennalis	Fan-foot	
Hoplodrina blanda	Rustic	
Hoplodrina octogenaria	Uncertain	
Horisme tersata	Fern	
Hydraecia micacea	Rosy Rustic	
Hypena proboscidalis	Snout	
Hypsopygia costalis	Gold Triangle	
Idaea aversata	Riband Wave	
Idaea biselata	Small Fan-footed Wave	
Idaea dimidiata	Single-dotted Wave	
Idaea emarginata	Small Scallop	
Idaea rusticata	Least Carpet	
Ipimorpha subtusa	Olive	
Lacanobia oleracea	Bright-line Brown-eye	
Laothoe populi	Poplar Hawk-moth	
Lateroligia ophiogramma	Double Lobed	
Lathronympha strigana	Red Piercer	
Lenisa geminipuncta	Twin-spotted Wainscot	

Limnaecia phragmitella	Bulrush Cosmet	
Lomaspilis marginata	Clouded Border	
Lycophotia porphyrea	True Lover's Knot	
Lymantria monacha	Black Arches	
Lyonetia clerkella	Apple Leaf Miner	
Macdunnoughia confusa	Dewick's Plusia	
Mesapamea secalis/didyma	Common/Lesser Rustic	
Mesoligia furuncula	Cloaked Minor	
Metalampra italica	Italian Tubic	
Miltochrista miniata	Rosy Footman	
Monopis crocicapitella	Pale-backed Clothes Moth	
Mythimna conigera	Brown-line Bright-eye	
Mythimna ferrago	Clay	
Mythimna impura	Smoky Wainscot	
Mythimna pallens	Common Wainscot	
Mythimna straminea	Southern Wainscot	
Noctua comes	Lesser Yellow Underwing	
Noctua fimbriata	Broad-bordered Yellow Underwing	
Noctua janthe	Lesser Broad-bordered Yellow Underwing	
Noctua pronuba	Large Yellow Underwing	
Nomophila noctuella	Rush Veneer	
Nonagria typhae	Bulrush Wainscot	
Notodonta dromedarius	Iron Prominent	
Notodonta ziczac	Pebble Prominent	
Nycteola revayana	Oak Nycteoline	
Ochropleura plecta	Flame Shoulder	
Oegoconia quadripuncta	Four-spotted Obscure	
Ostrinia nubilalis	European Corn-borer	
Pandemis heparana	Dark Fruit-tree Tortrix	
Parapoynx stratiotata	Ringed China-mark	
Parascotia fuliginaria	Waved Black	NS

Parastichtis suspecta	Suspected	
Parornix torquillella	Blackthorn Slender	
Peribatodes rhomboidaria	Willow Beauty	
Phalera bucephala	Buff-tip	
Phalonidia manniana	Water-mint Conch	
Photedes minima	Small Dotted Buff	
Phragmatobia fuliginosa	Ruby Tiger	
Phycita roborella	Dotted Oak Knot-horn	
Phyllonorycter harrisella	White Oak Midget	
Phyllonorycter stettinensis	Small Alder Midget	
Pleuroptya ruralis	Mother of Pearl	
Pterapherapteryx sexalata	Small Seraphim	
Pterostoma palpina	Pale Prominent	
Pyrausta aurata	Small Purple & Gold	
Rhopobota naevana	Holly Tortrix	
Rivula sericealis	Straw Dot	
Scoparia ambigualis	Common Grey	
Scoparia basistrigalis	Base-lined Grey	
Scrobipalpa acuminatella	Pointed Groundling	
Scrobipalpa obsoletella	Summer Groundling	NS
Selenia dentaria	Early Thorn	
Sphinx pinastri	Pine Hawk-moth	
Subacronicta megacephala	Poplar Grey	
Synaphe punctalis	Long-legged Tabby	
Thumatha senex	Round-winged Muslin	
Timandra comae	Blood-vein	
Tischeria ekebladella	Oak Carl	
Xanthorhoe fluctuata	Garden Carpet	
Xestia c-nigrum	Setaceous Hebrew Character	
Xestia triangulum	Double-square Spot	
Yponomeuta padella/malinellus/cagnagella	Orchard/Apple/Spindle Ermine	

Yponomeuta evonymella	Bird-cherry Ermine	
Yponomeuta rorrella	Willow Ermine	
Zeiraphera isertana	Cock's-head Bell	
Hymenoptera		
Ancistrocerus trifasciatus	A Mason Wasp	
Crossocerus megacephalus	A solitary wasp	
Tachysphex pompiliformis	A solitary wasp	
Trypoxylon attenuatum	A solitary wasp	
Trypoxylon clavicerum	A solitary wasp	
Hedychridium ardens	A cuckoo wasp	
Chrysis ignita agg	A cuckoo wasp	
Omalus aeneus	A cuckoo wasp	
Vespula vulgaris	Common Wasp	
Vespula germanica	German Wasp	
Andrena chrysosceles	Hawthorn Mining Bee	
Andrena dorsata	A Solitary Bee	
Andrena flavipes	Yellow-legged Mining Bee	
Andrena fulva	Tawny Mining Bee	
Andrena haemorrhoa	Orange-tailed Mining Bee	
Andrena minutula	Common Mini-miner	
Andrena nigroaenea	Buffish Mining Bee	
Andrena scotica	Chocolate Mining Bee	
Lasioglossum calceatum	A Furrow Bee	
Lasioglossum leucopus	A Furrow Bee	
Lasioglossum parvulum	A Furrow Bee	
Lasioglossum smeathmanellum	A Furrow Bee	
Halictus tumulorum	A Solitary Bee	
Hylaeus communis	A Yellow-faced Bee	
Sphecodes monilicornis	A Blood Bee	
Apis mellifera	HoneyBee	
Bombus hortorum	Garden Bumblebee	

Bombus lapidarius	Red-tailed Bumblebee	
Bombus pascuorum	Common Carder Bee	
Bombus pratorum	Early Bumblebee	
Bombus terrestris	Buff-tailed Bumblebee	
Bombus vestalis	Southern Cuckoo Bumblebee	
Lasius niger	An Ant	
Myrmica rubra	An Ant	
Myrmica ruginodis	An Ant	
Myrmica sabuleti	An Ant	
Trichoptera		
Mystacides longicornis	A Caddisfly	
Mecoptera		
Panorpa communis	A Scorpionfly	
Hemiptera		
Conomelus anceps	A Planthopper	
Stenocranus minutus	A Planthopper	
Athysanus argentarius	A Leafhopper	
Cicadula quadrinotata	A Leafhopper	
Neophilaenus lineatus	A Froghopper	
Philaenus spumarius	Common Froghopper	
Aelia acuminata	Bishop's Mitre Shieldbug	
Dolycoris baccarum	Hairy Shieldbug	
Eurygaster testudinaria	Tortoise Shieldbug	
Palomena prasina	Common Green Shieldbug	
Ceraleptus lividus	Slender-horned Leatherbug	NS
Pentatoma rufipes	Red-Legged Shieldbug	
Coreus marginatus	Dock Bug	
Syromastus rhombeus	Rhombic Leatherbug	
Tingis ampliata	A Lacebug	
Tingis cardui	A Lacebug	
Myrmus miriformis	A Rhopalid Bug	

Stictopleurus punctatonervosus	A Rhopalid Bug	
Corizus hyoscyami	A Ground Bug	
Cymus claviculus	A Ground Bug	
Cymus glandicolor	A Ground Bug	
Kleidocerys resedae	Birch Catkin Bug	
Anthocoris nemoralis	A Flower Bug	
Temnostethus pusillus	A Flower Bug	
Nabis ferus	A Damsel Bug	
Nabis limbatus	A Damsel Bug	
Closterotomus norwegicus	A Plant Bug	
Deraeocoris lutescens	A Plant Bug	
Dryophilocoris flavoquadrimaculatus	A Plant Bug	
Heterotoma planicornis	A Plant Bug	
Lygus rugulipennis	A Plant Bug	
Lygus pratensis	A Plant Bug	
Phytocoris varipes	A Plant Bug	
Plagiognathus arbustorum	A Plant Bug	
Psallus varians	A Plant Bug	
Orthoptera		
Tetrix subulata	Slender Ground Hopper	
Leptophyes punctatissima	Speckled Bush Cricket	
Conocephalus dorsalis	Short-winged Cone-head	
Conocephalus fuscus	Long-winged Cone-head	
Pseudochorthippus parallelus	Meadow Grasshopper	
Chorthippus brunneus	Field Grasshopper	
Dermaptera		
Forficula auricularia	Common Earwig	
Odonata		
Calopteryx splendens	Banded demoiselle	
Erythromma najas	Red-eyed Damselfly	
Platycnemis pennipes	White-legged damselfly	

Coenagrion puella	Azure damselfly	
Enallagma cyathigerum	Common Blue Damselfly	
Ischnura elegans	Blue-Tailed Damselfly	
Pyrrhosoma nymphula	Large Red Damselfly	
Sympetrum striolatum	Common Darter	
Sympetrum sanguineum	Ruddy Darter	
Aeshna grandis	Brown Hawker	
Aeshna mixta	Migrant Hawker	
Libellula quadrimaculata	Four-spotted Chaser	
Libellula depressa	Broad-bodied Chaser	
Anax imperator	Emperor Dragonfly	
Aeshna cyanea	Southern Hawker	
Pseudoscorpiones		
Pselaphochernes scorpioides	Common Chernes	
Chernes cimicoides	Common Tree Chernes	
Opiliones		
Leiobunum rotundum	A Harvestman	
Phalangium opilio	A Harvestman	
Araneae		
Agelena labyrinthica	A funnelweb spider	
Araniella cucurbitina	Cucumber Spider	
Clubiona lutescens	A Sac Spider	
Dictyna arundinacea	A Mesh-web Spider	
Nigma walckenaeri	A Mesh-web Spider	
Euophrys frontalis	A Jumping Spider	
Heliophanus flavipes	A Jumping Spider	
Araneus diadematа	An orb web spider	
Araneus marmoreus	An orb web spider	
Gibbaranea gibbosa	An Orb-web Spider	
Hypsosinga pygmaea	An Orb-web Spider	
Nuctenea umbratica	An Orb-web Spider	

Zilla diodia	An Orb-web Spider	
Misumena vatia	A Crab Spider	
Philodromus aureolus	A Running Crab Spider	
Xysticus cristatus	A Crab Spider	
Pachygnatha degeeri	A Large-jawed Orb-web Spider	
Tetragnatha montana	A Large-jawed Orb-weaver	
Anelosimus vittatus	A Comb-footed Spider	
Enoplognatha ovata	A Comb-footed Spider	
Platnickina tincta	A Comb-footed Spider	
Theridion mystaceum	A Comb-footed Spider	
Theridion varians	A Comb-footed Spider	
Steatoda nobilis	Noble False Widow	
Pisaura mirabilis	Nursery-web Spider	
Tibellus oblongus	A grass spider	
Pardosa nigriceps	A Wolf Spider	
Pardosa pullata	A Wolf Spider	
Trochosa terricola	A Wolf Spider	
Diplopoda		
Glomeris marginata	Pill Millipede	
Tachypodoiulus niger	White-legged Snake Millipede	
Polydesmus angustus	Common Flat-backed Millipede	
Polydesmus denticulatus	A Flat-backed Millipede	
Gastropoda		
Candidula intersecta	A Snail	
Cepaea nemoralis	Brown-lipped Snail	
Cornu aspersum	Garden Snail	
Discus rotundatus	Rounded Snail	
Monacha cantiana	Kentish Snail	