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INVERTEBRATE SURVEY OF PROPOSED SITES FOR THE TKRE CABLE TUNNEL AT GRAVESEND AND TILBURY: FINAL REPORT



MARK G. TELFER

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Dr. Mark G. Telfer MA (CANTAB), MCIEEM
Entomological Consultant
Heatherstone
Whitwell Road
Ventnor
Isle of Wight
PO38 1LJ

About the author

Dr Mark G. Telfer: I am one of the foremost entomological consultants in Britain, freelancing since 2005 and working throughout Britain and Ireland. I cover all terrestrial, freshwater and coastal habitats, specialising in brownfield sites, coastal sites, woodlands, ancient parklands, orchards and heathlands. I am well-known for the breadth of my taxonomic coverage, as well as for my specialist knowledge of beetles and bugs.



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1 Summary

- A general invertebrate survey has been carried out of sites at Gravesend and Tilbury.
- Three survey visits were carried out to each site: Gravesend on 26th July, 17th August and 5th September 2023; Tilbury on 27th July, 16th August and 6th September 2023.
- Eleven invertebrate Species of Principal Importance (SPI) were considered to have potential to occur in the survey areas, and were subject to targeted survey as appropriate.
- 307 species of invertebrate were recorded from the Gravesend survey area, and 334 from Tilbury. Both are high totals.
- Six SPI were recorded by this survey: Brown-banded Carder-bee *Bombus humilis*, Shril Carder-bee *Bombus sylvarum* and Small Heath butterfly *Coenonympha pamphilus* were recorded from both areas; Hornet Robberfly *Asilus crabroniformis* from Gravesend only; Tall Fescue Planthopper *Ribautodelphax imitans* and Wall butterfly *Lasiommata megera* from Tilbury only. Phoenix Fly *Dorycera graminum* is very likely to occur at both sites.
- At Gravesend, 27 species from the list of 307 are here regarded as 'Key Species' (i.e., with rare, scarce, threatened or near threatened conservation status); they comprise 8.79% of the total.
- At Gravesend, 6 species from the list of 307 are here regarded as 'Rare Key Species' (i.e., with rare or threatened conservation status); they comprise 1.95% of the total.
- At Tilbury, 35 species from the list of 334 are here regarded as Key Species; they comprise 10.48% of the total.
- At Tilbury, 11 species from the list of 334 are here regarded as Rare Key Species; they comprise 3.29% of the total.
- Key Species analysis has also been carried out after excluding species with out of date and inaccurate conservation statuses.
- The Gravesend survey area is a site of county importance for invertebrate conservation.
- The Tilbury survey area is a site of national importance for invertebrate conservation.
- The key habitat for invertebrates at Gravesend is in three fields of rough pasture, with a population of Hornet Robberfly.
- Recommendations for Gravesend focus on limiting impacts to the rough pasture, reinstating the land as rough pasture after temporary use, and assuring the continuation of appropriate grazing.
- The key habitat for invertebrates at Tilbury is open habitat, including both grasslands and ruderal vegetation. Of particular importance are some areas of tussocky Tall Fescue grassland supporting a population of Tall Fescue Planthopper.
- Recommendations for Tilbury are to avoid the areas of Tall Fescue Planthopper habitat in the first instance, or to compensate for losses by transplanting Tall Fescue tussocks and by enhancing retained areas of Tall Fescue Planthopper habitat, with monitoring of the outcomes.

2 Introduction

2.1 DEVELOPMENT PROPOSAL

The proposal is for a new tunnel under the Thames, carrying cables for the National Grid. The tunnel connects sites at Gravesend on the north Kent coast and Tilbury on the south coast of Essex. At the Gravesend and Tilbury sites, relatively small areas will be subject to permanent development (orange in Figure 1), with much larger areas subject to temporary impact, such as through use as temporary working areas (blue in Figure 1).

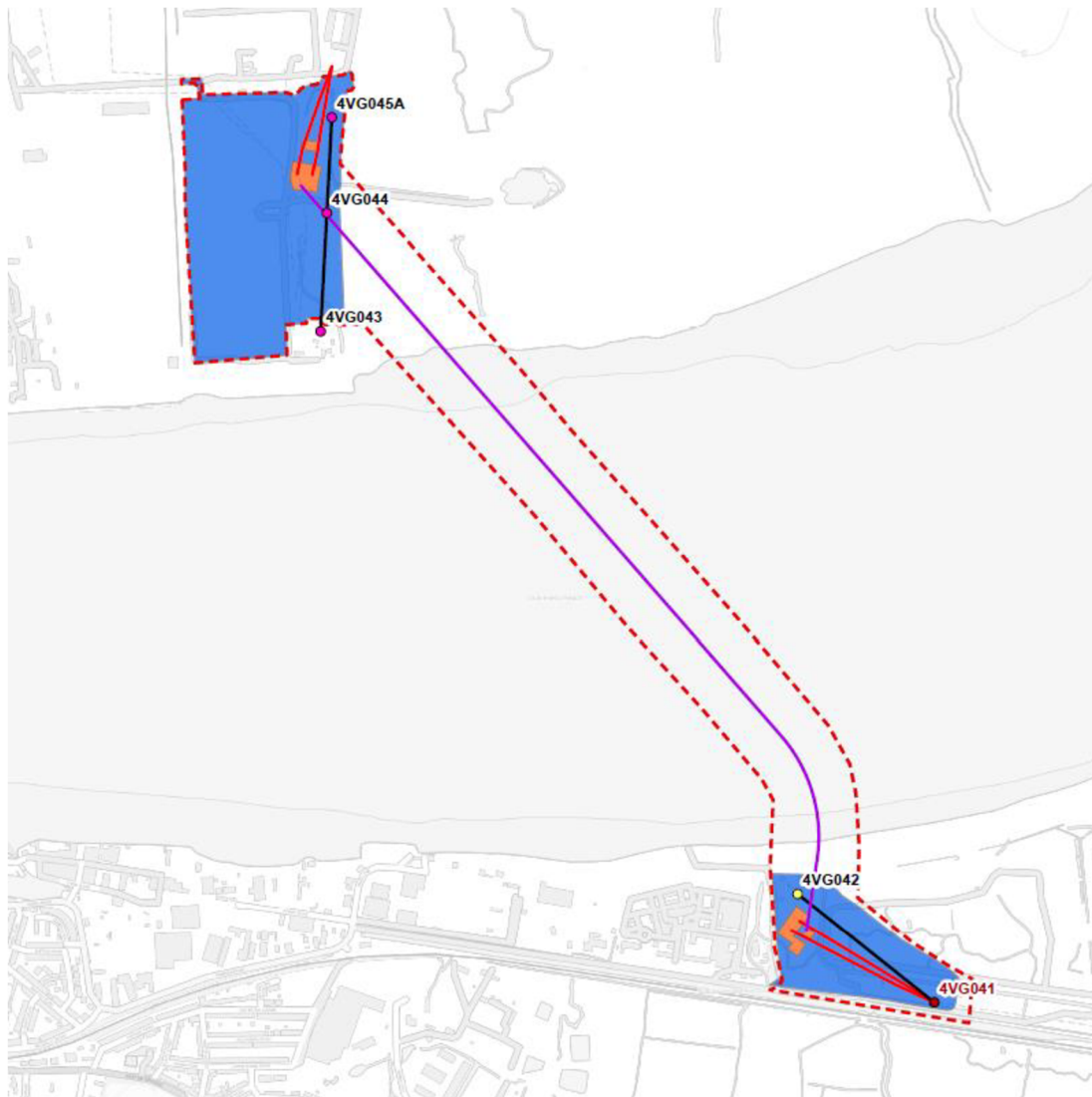


Figure 1: The Tilbury site to the north, and Gravesend site to the south.

2.2 THE SURVEY AREAS AT GRAVESEND AND TILBURY

2.2.1 Gravesend

The Gravesend survey area would once have been an area of traditional coastal grazing marsh with ditches. Part of the area is still managed as pasture, with two of the fields being grazed by small numbers of ponies during the current survey. The remainder of the survey

area appears no longer to be grazed, including the area now managed as a shooting range (Milton Rifle Range).

Lying at the north-west corner of the survey area is the existing cable tunnel compound.

Tidal ditches within the survey area are fed from a sluice lying immediately to the east of the cable tunnel compound. Most of the ditch sections are deep and straightened, but the western fork adjacent to the pasture field has natural sinuosity, and poached, shallowly-shelving margins in places.

A depression within the pasture field appears to be seasonally damp, with *Eleocharis* spike-rushes, though it was dry throughout the survey visits.

Figure 3 gives an approximate indication of the survey area, delimited by a red outline, and indicates the place names used for the purposes of this report.



Figure 2: The Gravesend survey area (delimited by the red line), with place name annotations. Map data © 2023 Imagery © 2023, Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies, The Geoinformation Group.

2.2.2 Tilbury

The Tilbury survey area would likewise once have been an area of traditional coastal grazing marsh with ditches, in all likelihood. In the modern day, the survey area is best described as a brownfield site on the former site of a power station, with a patchwork of hard standing,

mosaics of bare ground and ruderal vegetation, unmanaged grassland, scrub, and trees, with a network of ditches.

Figure 3 gives an approximate indication of the survey area, delimited by a red outline, and indicates the place names used for the purposes of this report.



Figure 3: The Tilbury survey area (delimited by the red line), with place name annotations.

Map data © 2023 Imagery © 2023, Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies, The Geoinformation Group.

2.3 PREVIOUS INVERTEBRATE SURVEY AND RECORDING

At Gravesend, the author is not aware of any recent invertebrate survey work covering the 2023 survey area.

At Tilbury, the author was already familiar with much of the survey area, having carried out a number of invertebrate survey and monitoring projects in the Tilbury area in recent years, including some areas which have been assessed as of very high conservation importance for invertebrates in a national context.

Biological data search reports have been provided to the author by AECOM from both the Kent and Medway Biological Records Centre, and from the Essex Recorders partnership, for the Gravesend and Tilbury survey areas respectively.

2.4 SPECIES OF PRINCIPAL IMPORTANCE

Species of Principal Importance (SPI) are species regarded as 'of principal importance for the purpose of conserving biodiversity' with respect to Section 41 of the Natural Environment and Rural Communities Act 2006.

A number of SPI have been recorded in recent decades (since 2000) from in or near to the Gravesend and Tilbury survey areas. Table 1 lists those eleven Species of Principal Importance which were considered to have potential to occur within the 2023 survey areas, and which have thus been subject to targeted survey effort.

Table 1: Species of Principal Importance which have been recorded in recent decades from the vicinity of the Gravesend or Tilbury survey areas.

Order	Family	Species (scientific name)	Species (English name)	Conservation Status (see Appendix 1)	Gravesend	Tilbury
Hemiptera: Auchenorrhyncha	Delphacidae	<i>Ribautodelphax imitans</i>	Tall Fescue Planthopper	RDBK, S41		✓
Coleoptera	Carabidae	<i>Anisodactylus poeciloides</i>	Saltmarsh Shortspur	LC, NS, S41	✓	✓
Hymenoptera: Aculeata	Crabronidae	<i>Cerceris quinquefasciata</i>	Five-banded Weevil Fox	RDB3, S41		✓
Hymenoptera: Aculeata	Colletidae	<i>Colletes halophilus</i>	Sea Aster Bee	Nationally Scarce (Na), S41		✓
Hymenoptera: Aculeata	Apidae	<i>Bombus ruderarius</i>	Red-shanked Carder-bee	S41		✓
Hymenoptera: Aculeata	Apidae	<i>Bombus humilis</i>	Brown-banded Carder-bee	S41	✓	✓
Hymenoptera: Aculeata	Apidae	<i>Bombus sylvarum</i>	Shrill Carder- bee	Nationally Scarce (Nb), S41	✓	✓

Order	Family	Species (scientific name)	Species (English name)	Conservation Status (see Appendix 1)	Gravesend	Tilbury
Diptera	Asilidae	<i>Asilus crabroniformis</i>	Hornet Robberfly	LC, S41	✓	
Diptera	Ulidiidae	<i>Dorycera graminum</i>	Phoenix Fly	pNT ¹ , S41		✓
Lepidoptera	Nymphalidae	<i>Lasiommata megera</i>	Wall Butterfly	EN, S41	✓	✓
Lepidoptera	Nymphalidae	<i>Coenonympha pamphilus</i>	Small Heath Butterfly	VU, S41	✓	✓

In addition to the species in Table 1, a number of other ‘research only’ Species of Principal Importance have been recorded in or near to the Gravesend and Tilbury survey areas. ‘Research only’ SPI are all moths or butterflies which were previously added to the UK Biodiversity Action Plan for research action only, and currently retain an equivalent status following their transfer to the Section 41 list of SPI. They are all widespread and often common species which have been undergoing declines in abundance or contractions in range. Conservation action for these ‘research only’ species is focused on further research rather than protection of individual sites.

2.4.1 Species accounts

For each of the SPI listed In Table 1, a brief account is provided which covers (i) existing records, (ii) habitat preferences and other ecological requirements, and (iii) survey timing and methodology. The species accounts are presented in the same order as in Table 1.

***Ribautodelphax imitans* (Hemiptera: Auchenorrhyncha: Delphacidae) Tall Fescue Planthopper**

Kirby (1992) was aware of records only from the south coasts of Devon (Axmouth - Lyme Regis) and Dorset (Southwell, Portland; Corfe). It has since been discovered in East Sussex, Middlesex, South Essex, North Essex, South Lincolnshire, Northamptonshire and Cambridgeshire, as well as at additional sites in Dorset and South Devon (Dittrich, 2016). In the Tilbury vicinity, it was discovered at a brownfield site near Tilbury in 2006, then recorded from Tilbury Power Station in 2007 (<http://www.essexfieldclub.org.uk/portal/p/Species+Account/s/Ribautodelphax+imitans>; Colin Plant Associates, 2008), and from the Tilbury 2 Lytag site in 2016 (Telfer, 2017). On 6th May 2022, a single adult male was recorded from the NE verge, Tilbury, by suction sampling, targeting tussocks of Tall Fescue (Telfer, 2023).

It is a specialist grass-feeding species, for which Tall Fescue *Schedonorus arundinaceus* is the sole foodplant (Dittrich, 2016). It occurs in calcareous grassland but also inhabits other types of dry grassland, as at Tilbury.

¹ The ‘p’ prefix indicates a provisional status assessment.

Adults may be found between April and August, peaking in abundance during June and July. Suction sampling is the preferred survey method, though sweeping is also effective (Dittrich, 2016).

Tall Fescue Planthopper is still a relatively poorly known species, and though it still appears to be a rarity in Britain (as it is on the continent (Dittrich, 2016)), the increasing number of known localities that have been discovered in recent decades, over a much wider geographical range, could indicate a species that is under-recorded rather than truly rare.

***Anisodactylus poeciloides* (Coleoptera: Carabidae) Saltmarsh Shortspur beetle**

Saltmarsh Shortspur has recently been recorded from a number of spots within a kilometre of the Tilbury survey area (Telfer, 2023) and there is also a recent record from nearby to the west, from a saline lagoon within grazing marsh north-east of the Tilbury Fort (Telfer, 2017).

The species has been recorded a number of times from Shorne Marshes, to the east of the Gravesend survey area.

It is a specialist of the margins of saline and brackish lagoons which are more remote from the tidal cycle, or receive seawater by seepage through sea defences.

Adults may be found between April and September, peaking between June and August. Survey is best achieved by an experienced surveyor using targeted ground-searching, though suction-sampling may also be effective.

***Cerceris quinquefasciata* (Hymenoptera: Aculeata: Crabronidae) Five-banded Weevil-Fox**

Five-banded Weevil-Fox was recorded from near to the Tilbury survey area by surveys in 2016 (Colin Plant Associates, 2016) and 2018 (Harvey, 2018). In 2022, the species was recorded from Ashfield A1, adjacent to the cable tunnel survey area to the east (Telfer, 2023).

This wasp nests gregariously in areas of well-insolated, often compacted, bare sand. Females provision their brood cells with weevils, using a range of smaller species including Apionidae and *Sitona* species. They appear to depend on unmanaged sites with diverse flower-rich swards from which to collect their prey.

The survey season for adults extends from mid-June to mid-September, peaking in July and August. Survey techniques include spot-netting, sweeping, direct observation and pan-trapping.

***Colletes halophilus* (Hymenoptera: Aculeata: Colletidae) Sea Aster Bee**

Sea Aster Bees have been recorded from on or near the foreshore, south of the Tilbury cable tunnel survey area, during surveys in 2017 and 2022 (Telfer, 2017; Telfer, 2023).

Sea Aster Bees have also been recorded from the vicinity of the Gravesend survey area, but the records from Shorne Marshes date back to 1981 and the absence of more recent records may indicate local extinction.

Female Sea Aster Bees mainly collect pollen from Sea Aster *Aster tripolium*. Nest burrows are made in bare sandy soil, often in large aggregations, in south-facing, sunny situations. Some large populations are associated with silt lagoons and PFA substrates.

The species may be seen from late July to early October, with numbers peaking from mid-August to mid-September, coinciding with the flowering of Sea Aster. Survey may be carried out by direct observation in suitable warm and sunny conditions, stalking bees on Sea Aster inflorescences.

***Bombus ruderarius* (Hymenoptera: Aculeata: Apidae) Red-shanked Carder-bee**

Red-shanked Carder-bee was recorded from the Tilbury Ashfields in 2007 (Colin Plant Associates, 2008) but to the best of this author's knowledge, there have not been any subsequent records from in or near the Tilbury cable tunnel survey area.

It frequents extensive areas of unimproved grassland with an abundance of flowers, especially legumes Fabaceae and labiates Lamiaceae. It is closely associated with tall grasslands which are only cut or grazed intermittently. There also seems to be some connection with areas of tussocky grass and scrub; perhaps required as nesting habitat.

The species may be seen from late April to the end of August or beyond. Survey during the flight period is most effectively achieved by targeted direct observation and spot-netting while walking through suitable foraging habitat.

***Bombus humilis* (Hymenoptera: Aculeata: Apidae) Brown-banded Carder-bee**

Brown-banded Carder-bee has been widely and commonly recorded in the Tilbury area by recent surveys, e.g., Telfer (2017), Telfer (2023).

There are numerous recent records from the vicinity of the Gravesend survey area.

This ginger bumblebee is strongly associated with tall but open-structured (i.e., not rank) flower-rich grasslands. Brown-banded Carder-bees form small nests, often with fewer than 100 individuals, located on the ground surface, where they are exposed to the sun. Being a relatively long-tongued species, workers prefer to forage from tubular flowers such as those of legumes, labiates and also knapweeds *Centaurea* spp. This bee requires suitable foraging resources (nectar and pollen) throughout the entire season from May to September.

Survey during the flight period is most effectively achieved by targeted direct observation and spot-netting while walking through suitable foraging habitat.

***Bombus sylvarum* (Hymenoptera: Aculeata: Apidae) Shrill Carder-bee**

Shrill Carder-bee has been widely recorded from the vicinity of the Tilbury survey area, though noted as less widespread and less numerous than Brown-banded Carder-bee (Telfer, 2017; Telfer, 2023).

There are numerous recent records from the vicinity of the Gravesend survey area.

Shrill Carder-bee requires foraging habitat, which is rich in legumes and labiates, etc., including Red Clover, Red Bartsia, knapweeds and woundworts. In the Tilbury area, foraging has been noted from Black Horehound, Hound's-tongue, Common Toadflax, Tufted Vetch, Bittersweet, Creeping Thistle, and Sea Aster (pers. obs.). Nests are constructed on the ground surface within tall, open grassland swards.

The flight period extends from late April until mid-October at the extremes but the best period for survey is from the end of July to mid-September when workers are at their most

abundant. Survey during the flight period is most effectively achieved by targeted direct observation and spot-netting while walking through suitable foraging habitat.

***Asilus crabroniformis* (Diptera: Asilidae) Hornet Robberfly**

Hornet Robberfly has not been recently recorded from the immediate vicinity of the Tilbury survey area and is very unlikely to occur in the absence of grazing by livestock.

There are recent (2018) records of Hornet Robberfly from Shorne Marshes, east of the Gravesend survey area.

This is a predatory fly which inhabits grazed pasture, apparently preferring sites with a high abundance and diversity of dung-beetle prey associated with horse dung.

Survey for this species is best carried out by direct observation in late summer.

***Dorycera graminum* (Diptera: Ulidiidae) Phoenix Fly**

The Phoenix Fly is a large picture-winged fly with a southern British distribution concentrated in the Thames Estuary but extending into the Midlands, with outliers northwards to the Scottish Highlands. It has been recorded quite widely in the vicinity of the Tilbury survey area, though there are no records from the vicinity of the Gravesend survey area.

Its ecological requirements are not well understood. It occurs on a wide range of grasslands, growing on a range of soil types, typically with some anthropogenic disturbance (Ismay, 2000).

Adults may be found from mid-May to the end of June, exceptionally into July. Survey is best achieved by sweeping, though beating and direct observation may also be effective.

***Lasiommata megera* (Lepidoptera: Nymphalidae) Wall butterfly**

Wall butterfly was regarded as a 'research only' SPI until recently. However, Natural England's Pantheon application (see Section 3.4.2 for further details) no longer treats it as a 'research only' species, presumably following the assessment by Fox *et al.* (2022) that Wall is now Endangered (EN) (formerly Near Threatened (NT)).

Wall has been recorded quite frequently in the vicinity of the Tilbury and Gravesend survey areas.

This butterfly breeds in short, open grassland where the turf is broken or stony. It is found in coastal grasslands as well as inland habitats such as disturbed or derelict land, disused quarries, cliff-slopes and banks. The caterpillars feed on a variety of grasses including Tor-grass *Brachypodium pinnatum*, False Brome *B. sylvaticum*, Cock's-foot *Dactylis glomerata* and Yorkshire-fog *Holcus lanatus* (Asher *et al.*, 2001).

Survey for this species is best carried out by direct observation, targeting adults during their flight period from late April to October.

***Coenonympha pamphilus* (Lepidoptera: Nymphalidae) Small Heath butterfly**

Small Heath butterfly was regarded as a 'research only' SPI until recently. However, Natural England's Pantheon application (see Section 3.4.2 for further details) no longer treats it as a

'research only' species, presumably following the assessment by Fox *et al.* (2022) that Small Heath is now Vulnerable (VU) (formerly Near Threatened (NT)).

Small Heath has been recorded quite frequently in the vicinity of the Tilbury and Gravesend survey areas.

This butterfly inhabits grassland, favouring shorter swards of fine-leaved grasses on well-drained soils. The caterpillars feed on a variety of grasses including fescues *Festuca*, meadow-grasses *Poa* and bents *Agrostis* (Asher *et al.*, 2001).

Survey for this species is best carried out by direct observation, targeting adults during their flight period from late April to early October.

3 Methods

3.1 FIELDWORK TIMING AND WEATHER

Fieldwork was carried out over the course of three visits to each site.

Survey visits to Gravesend were carried out on 26th July, 17th August and 5th September 2023. Survey visits to Tilbury were carried out on 27th July, 16th August and 6th September 2023. All fieldwork was carried out by the author.

Invertebrate activity is significantly affected by the weather, which can seriously diminish the effectiveness of some sampling techniques. All six survey dates coincided with good or excellent weather for invertebrate survey, which did not constrain the sampling to any significant extent (Table 2).

Table 2 includes brief details of the survey activity on each date, including of the sampling and trapping techniques used. Further details of the sampling and trapping techniques are provided below.

Table 2: Dates of survey visits in 2023, summaries of survey activity and weather conditions.

Date	Activity	Weather conditions
26 th July	Gravesend. Rapid reconnaissance of the survey area. Sampling the dead end path by sweep-netting and direct observation. Sampling the north field and ditch margins by sweep-netting, suction sampling, ground-searching and direct observation. Sampling the south-west field by sweep-netting, suction sampling and ground-searching.	Warm, sunny conditions, up to 23 °C, with a Gentle Breeze (F3) from the WSW. Dry.

Date	Activity	Weather conditions
27 th July	Tilbury. Sampling the hard-standing areas of the NE and SE sectors by ground-searching, sweep-netting, beating, suction sampling and direct observation. Sampling the road verge in the NE sector with suction sampling, targeting Tall Fescue for <i>Ribautodelphax imitans</i> , the Tall Fescue Planthopper.	Drying rapidly after overnight rain, though remaining thickly overcast until the afternoon. Temperatures reaching 22 °C. Gentle Breeze (F3) from the SW. Dry.
16 th August	Tilbury. Having found Tall Fescue Planthopper (TFP) on the road verge grassland in the NE sector on the first visit, further targeted survey was carried out, firstly to establish whether TFP could still be found (it could), and secondly to search for it elsewhere in other patches of potential habitat in the SE and NW sectors. Also further general survey of the hard-standing areas of the NE sector, using yellow pan traps. General survey of the SW sector using sweep-netting, beating and direct observation. General survey of the NW sector using suction sampling and direct observation.	Warm (21 – 24 °C), with a Light Breeze (F2) from the ENE. Cloudless and dry.
17 th August	Gravesend. Sampling in the north field and on the ditch margins by suction sampling, aerial netting over flowering Sea Aster, and sieving pony dung. Sampling along the dead end path using spot-netting, targeting flowers in sheltered, sunny spots. Reconnaissance of remaining unvisited areas of the survey area within the Milton Firing Range, and sampling of ditch habitats by sieving.	Warm (20 – 21 °C), with a Gentle Breeze (F3) from the E. Mostly cloudless, dry.
5 th September	Gravesend. After deploying the yellow pan traps in areas without ponies, much of the morning was spent using the ideal conditions to make targeted searches for Hornet Robberfly, Wall butterfly and Sea Aster Bee, as well as spot-netting and direct observation. Thereafter, the N, SE and SW fields were sampled using sweep-netting, ground-searching and by beating shrubs and tall herbs.	Hot (23 – 25 °C), with a Gentle Breeze (F3) from the east. Cloudless and dry.

Date	Activity	Weather conditions
6 th September	Tilbury. The yellow pan traps were deployed on arrival. A suction sample was taken from the road verge that had proven to be the best spot for Tall Fescue Planthopper on the previous survey visits. None were recorded, so it was presumed that the survey window for this species had closed, and no further targeted survey for it was undertaken on this date. The NE field was sampled by sweeping, suction sampling and by ground-searching of the surrounding ditch-bank. The parts of the SE sector within the ashfields were sampled using sweeping, suction sampling and direct observation.	Hot (20 – 29 °C), with a variable Light Breeze (F1/F2). Cloudless, with hazy conditions in the morning. Dry.

3.2 SAMPLING TECHNIQUES

3.2.1 Manual sampling

On each visit, a range of techniques was used, as appropriate, to sample for invertebrates (Table 3). These sampling techniques are described in further detail by Drake *et al.* (2007).

Throughout the time in the field, direct observation was used to generate records from otherwise redundant time while walking between sampling points, etc., this being a particularly effective way to record butterflies, bumblebees and other conspicuous day-flying insects. This time was particularly focused on looking for the targeted Species of Principal Importance (Section 2.4).

Table 3: Techniques employed on this survey to record invertebrates, and their target groups and target habitats.

Technique	Target groups	Target habitats
Ground-searching, turning over stones, logs, reptile felts, etc. and hand-searching through vegetation and plant litter.	A wide range of ground-living invertebrates, particularly beetles (Coleoptera) and bugs (Heteroptera), ants (Hymenoptera: Formicidae) woodlice (Isopoda) and molluscs.	All open habitats, including ditches and ditch banks.
Sieving.	A wide range of invertebrates including beetles and bugs, being especially effective for smaller species.	Any microhabitat such as leaf-litter, grass tussocks or dung that can be broken up and shaken in a sieve.

Technique	Target groups	Target habitats
Suction-sampling.	As above but particularly effective for finding some of the smaller, well-hidden or well-disguised species living on the ground and in the sward.	All grassland and open habitats.
Sweep-netting with a stout canvas net.	Beetles and bugs and many other invertebrates.	All vegetated habitats, paying particular attention to potential food-plants and to nectar and pollen sources.
Aerial- and spot-netting, with a 'butterfly net'.	A similar fauna to that captured by sweep-netting, but this technique is targeted at flies (Diptera) and bees and wasps (aculeate Hymenoptera) which rapidly escape the canvas sweep-net.	All grassland and open habitats, with spot-netting targeted at particular flowers.
Beating.	Beetles, bugs and many other invertebrates on the branches, flowers and foliage of trees, shrubs and tall herbs.	Trees, shrubs and tall herbs.
Direct observation.	Bees, wasps, flies, butterflies and moths (Lepidoptera), grasshoppers and crickets (Orthoptera), dragonflies (Odonata), etc.	All habitats, paying particular attention to nectar and pollen sources.

3.2.2 Yellow pan trapping

The colour of a yellow pan trap is an attractant to many flower-visiting insects which are foraging in search of yellow flowers. By filling a yellow bowl with water, some of those visitors may become trapped in the water and unable to climb the sides of the bowl. A drop of washing-up liquid was added in the field to reduce the surface tension. For the current survey, small washing-up bowls of a bright sunflower yellow were used (Figure 4). Yellow pan traps were deployed at the start of the day, and collected at the end.



Figure 4: A yellow pan trap in operation.

3.3 IDENTIFICATION

Where practical, invertebrates were identified in the field but wherever the slightest doubt existed, one or more specimens were collected, or photographs taken, for more detailed scrutiny. To achieve rigorously accurate identifications, specimens were identified using the surveyor's own library and entomological collection. Selected specimens have been retained in the surveyor's personal collection as vouchers.

3.4 ANALYSIS

3.4.1 Key Species

To assess the importance of a site for invertebrate conservation, the number and percentage of rare or scarce species found may be calculated. Sites of greater importance support higher percentages of rare or scarce species, and this percentage is a useful starting point for assessing the overall importance of a site, in comparison to other sites surveyed using similar techniques.

A standard definition of 'rare or scarce' is essential to allow a fair comparison to be made between sites. For the analyses in this report, species were only included which have been assigned an official rare or scarce conservation status as defined in the box below, and all such species are here called 'Key Species'.

Conservation status categories of invertebrates

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

A second version of British conservation statuses published in the Species Status series from Natural England and Natural Resources Wales is now gradually replacing the first version. For butterflies, dragonflies, water beetles and several other groups, the most up-to-date British conservation statuses are based on the International Union for Conservation of Nature (IUCN) Red List categories and criteria (IUCN, 2001). This system places less emphasis on rarity and more on factors which suggest a risk of extinction (such as severe declines in range or population). The status categories and criteria of this second version are defined in Appendix 1.2.

A third version of British conservation statuses operates in parallel with the second and is a very simplified version of the first, having just two categories: Nationally Rare or Nationally Scarce. This version is defined in Appendix 1.3.

Key Species are here defined as Red Data Book and Nationally Scarce species from version 1, Threatened, Near Threatened and Data Deficient species from version 2, and Nationally Rare or Nationally Scarce species from version 3.

The Key Species may be further divided into **Rare Key Species** (here defined as Red Data Book species from version 1, Threatened and Data Deficient species from version 2, and Nationally Rare species from version 3) and **Scarce Key Species** (the remainder).

There are frequent examples of invertebrates which have been given a conservation status and have subsequently been found to be more widespread and abundant. This may arise either as a result of an actual increase in range or population size, or as a result of improved understanding by entomologists of how to find or identify them. Where the official conservation status is regarded as being out of date, based on information in Pantheon, supplemented with the author's personal knowledge, this is indicated in the species accounts (Section 4.6) and is taken into account in the survey area assessment (Section 5).

3.4.2 Pantheon

Pantheon is an analytical tool developed by Natural England and the Centre for Ecology & Hydrology to assist invertebrate nature conservation in England. Users import lists of invertebrates into Pantheon, which can then be used to analyse the species, attaching associated habitats and resources, conservation statuses and other data against them. Pantheon has been available online since April 2018 at: <http://www.brc.ac.uk/pantheon/>.

Some of the most informative outputs of Pantheon are the calculations of Species Quality Index (SQI). To calculate the SQI for a list of species, all species are first allocated one of five Species Quality Scores (1, 4, 8, 16 or 32), with the common and widespread species scoring 1 and the most endangered species scoring 32 (<https://pantheon.brc.ac.uk/content/scoring-systems>). SQI is then calculated by summing the Species Quality Scores, dividing the total by the number of species, and multiplying by 100. For example, if a survey recorded 46 species,

and the sum of their 46 Species Quality Scores was 106, the average Species Quality Score would be 2.30 (= 106/46) and the SQI would be 230, derived by multiplying that average by 100.

SQI values based on small species lists may be strongly biased if the list contains species with high Species Quality Scores. For this reason, Pantheon advises against using any SQI value based on a list of fewer than 15 species. Where 15 or more species of an assemblage have been recorded, the assemblage may be said to be 'well represented', and the SQI value is presented.

3.4.3 Assessing the importance of the survey areas

Natural England's pamphlet *Organising surveys to determine site quality for invertebrates: a framework guide for ecologists* (Anon., 2005) advises that 'A survey should classify a site as one of the following:

- 1 Little/ no importance,
- 2 Local/ county importance,
- 3 Regional importance,
- 4 National importance,
- 5 European importance'.

4 Results

4.1 THE SPECIES LISTS

4.1.1 Gravesend

The survey has recorded 307 species of invertebrate from the Gravesend survey area. The full species list is included as Appendix 2.

This is a high total species list for a three visit survey, higher than average, and suggests that the Gravesend survey area is a rather diverse site for invertebrates.

4.1.2 Tilbury

The survey has recorded 334 species of invertebrate from the Tilbury survey area. The full species list is included as Appendix 3.

This is also a high total species list for a three visit survey, substantially higher than average, and suggests that the Tilbury survey area is a very diverse site for invertebrates, more so than the Gravesend survey area.

4.2 TAXONOMIC COVERAGE

Considering the Gravesend and Tilbury sites in combination, Invertebrates have been identified from a very wide range of groups, including woodlice, spiders, pseudoscorpions, harvestmen, millipedes, springtails, dragonflies, earwigs, cockroaches, bush-crickets, grasshoppers, barkflies, psyllids, froghoppers, leafhoppers, planthoppers, bugs, beetles, ants, bees, wasps, lacewings, flies, moths, butterflies, slugs and snails. A more comprehensive and targeted approach was taken to the recording of beetles (Coleoptera, with 201 species recorded), and bugs and hoppers (Hemiptera: Heteroptera and Auchenorrhyncha, 108 species) collectively forming 63% of the total combined species list of 494.

4.3 SPECIES OF PRINCIPAL IMPORTANCE (SPI)

Six of the SPI invertebrate species listed in Table 1 were found during the 2023 survey visits, either by targeted survey or in the course of general invertebrate survey work (Table 4).

For those species not found, assessments have been made of the likelihood that they may nevertheless occur at each site (Table 4). These assessments are a combination of assessing the habitat suitability for each species, and assessing the likelihood of observing the species if it was present. For example, for the Phoenix Fly *Dorycera graminum*, the habitats at both sites were considered to be highly suitable, but the survey had a negligible chance of recording any adult Phoenix Flies, which may be found from mid-May to the end of June, exceptionally into July. Phoenix Fly has been assessed as 'very likely to be present' at both survey areas.

Table 4: Occurrence of Species of Principal Importance at the Gravesend and Tilbury survey areas in 2023.

Species (scientific name)	Species (English name)	Conservation Status	Previous records from Gravesend?	Previous records from Tilbury?	Recorded at Gravesend?	Recorded at Tilbury?
<i>Ribautodelphax imitans</i>	Tall Fescue Planthopper	RDBK, S41		✓	No – unlikely to be present	Yes
<i>Anisodactylus poeciloides</i>	Saltmarsh Shortspur	LC, NS, S41	✓	✓	No – unlikely to be present	No – unlikely to be present
<i>Cerceris quinquefasciata</i>	Five-banded Weevil Fox	RDB3, S41		✓	No – unlikely to be present	No – presence possible
<i>Colletes halophilus</i>	Sea Aster Bee	Nationally Scarce (Na), S41		✓	No – unlikely to be present	No – unlikely to be present
<i>Bombus ruderarius</i>	Red-shanked Carder-bee	S41		✓	No – unlikely to be present	No – unlikely to be present
<i>Bombus humilis</i>	Brown-banded Carder-bee	S41	✓	✓	Yes	Yes
<i>Bombus sylvarum</i>	Shrill Carder-bee	Nationally Scarce (Nb), S41	✓	✓	Yes	Yes
<i>Asilus crabroniformis</i>	Hornet Robberfly	LC, S41	✓		Yes	No – unlikely to be present
<i>Dorycera graminum</i>	Phoenix Fly	pNT, S41		✓	No – very likely to be present	No – very likely to be present
<i>Lasiommata megera</i>	Wall Butterfly	EN, S41	✓	✓	No – presence possible	Yes
<i>Coenonympha pamphilus</i>	Small Heath Butterfly	VU, S41	✓	✓	Yes	Yes

4.3.1 Results of targeted surveys for SPI

For each of the SPI, the results of targeted survey are described in greater detail below, along with details of the assessment of their likelihood of occurrence.

***Ribautodelphax imitans* (Hemiptera: Auchenorrhyncha: Delphacidae) Tall Fescue Planthopper**

There appeared to be no suitable habitat for Tall Fescue Planthopper within the Gravesend survey area, where it is considered unlikely to be present.

Within the Tilbury survey area, a suction sample on the NE verge (where a single Tall Fescue Planthopper had been recorded in 2022) on the first visit (27th July) yielded 13 individuals. Suitable habitat appeared to extend throughout the length of the verge, and another 6 individuals were recorded in a suction sample at the northernmost end. On the second visit (16th August) Tall Fescue Planthopper could still be found on the NE verge (2 individuals in one sample), and subsequent samples from other areas of apparently suitable habitat found that it also occurs at similar frequency in the NW sector (1 individual) and in the SE sector (3 individuals) (Figure 5). Adult Tall Fescue Planthoppers may be found between April and August (Dittrich, 2016), so it was not unexpected that suction samples on the third visit (6th September) failed to find any. However, an additional area of apparently suitable habitat was noted on this latter date in the SE sector (Figure 5).



Figure 5: Occurrence of suitable habitat for the Tall Fescue Planthopper in the Tilbury survey area. Map data © 2023 Imagery © 2023, Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies, The Geoinformation Group.

***Anisodactylus poeciloides* (Coleoptera: Carabidae) Saltmarsh Shortspur beetle**

Within the Gravesend survey area, there were two very small areas of very marginally suitable habitat for Saltmarsh Shortspur. Survey did not find any of the beetles, and it is considered unlikely to be present.

Within the Tilbury survey area, no suitable habitat for Saltmarsh Shortspur was found, and hence the beetle is considered unlikely to be present.

***Cerceris quinquefasciata* (Hymenoptera: Aculeata: Crabronidae) Five-banded Weevil-Fox**

The Five-banded Weevil-Fox wasp was not recorded by this survey from either Gravesend or Tilbury, despite the deployment of yellow pan traps and the use of targeted spot-netting, in good weather conditions, over three visits in the wasp's flight period.

With no previous records from the vicinity of the Gravesend survey area, the wasp is considered unlikely to be present there.

Despite the absence of records from the Tilbury survey area in 2023, because this wasp was found in numbers on Ashfield A1 (less than 100 m to the east) in 2022 (Telfer, 2023), it is still regarded as possibly present in the Tilbury survey area.

***Colletes halophilus* (Hymenoptera: Aculeata: Colletidae) Sea Aster Bee**

Within the Gravesend survey area, stands of Sea Aster were found to be growing along the upper reaches of the tidal creek which divides the North field from the SW and SE fields, and these were regarded as apparently suitable habitat for Sea Aster Bee. They were sampled by spot-netting and sweeping on all three visits without yielding any records of the bee, which is considered unlikely to be present.

Within the Tilbury survey area, no suitable habitat for Sea Aster Bee was found, and hence the bee is considered unlikely to be present.

***Bombus ruderarius* (Hymenoptera: Aculeata: Apidae) Red-shanked Carder-bee**

The Red-shanked Carder-bee was not recorded by this survey from either Gravesend or Tilbury, despite the deployment of yellow pan traps and the use of targeted spot-netting, in good weather conditions, over three visits.

With no previous records from the vicinity of the Gravesend survey area, this bumblebee is considered unlikely to be present there.

With apparently no records from the vicinity of the Tilbury survey area since 2007, despite considerable entomological survey work in the area, this bumblebee is also considered unlikely to be present in the Tilbury survey area.

***Bombus humilis* (Hymenoptera: Aculeata: Apidae) Brown-banded Carder-bee**

Brown-banded Carder-bees were noted at both Gravesend and Tilbury on every survey visit.

At Gravesend, they were widespread within the survey area, being noted from the North field, the SE field and the SW field.

At Tilbury, they were noted from the NE road verge and from the well-vegetated southern edge of the SW sector, but may be expected to occur widely across the survey area wherever there are suitable flowers from which to forage.

***Bombus sylvarum* (Hymenoptera: Aculeata: Apidae) Shrill Carder-bee**

Shrill Carder-bees were noted at both Gravesend and Tilbury on every survey visit.

At Gravesend, they were widespread within the survey area, being noted from the dead end path, North field, the SE field and the SW field.

At Tilbury, they were noted from the NE, SE and SW sectors, but may be expected to occur widely across the survey area wherever there are suitable flowers from which to forage.

***Asilus crabroniformis* (Diptera: Asilidae) Hornet Robberfly**

Hornet Robberfly was discovered at the Gravesend survey area on the third visit (5th September), where a minimum of five individuals was found, in both the SW and SE fields (Figure 6). They were usually to be found using piles of pony dung as perches and vantage points from which to hunt their insect prey. The North field appeared to provide equally suitable, pony-grazed, rough pasture habitat but was less sheltered and no Hornet Robberflies were observed there.



Figure 6: A Hornet Robberfly at Gravesend.

At Tilbury, with no recent records and no suitable grazed pasture within the survey area, Hornet Robberfly is very unlikely to occur.

***Dorycera graminum* (Diptera: Ulidiidae) Phoenix Fly**

The first fieldwork visit of this survey was on 26th July, which is already too late in the season for any realistic chance of recording Phoenix Fly.

This is a rather widespread and frequent species of grasslands and brownfield sites in the Thames Estuary. In recent years it has been becoming more frequent and expanding its range. There is much apparently highly suitable habitat for Phoenix Fly in both survey areas. The fly could confidently be expected to occur within the Tilbury survey area, where there are already recent records, and probably also occurs within the Gravesend survey area, despite there being no recent records from the vicinity.

***Lasiommata megera* (Lepidoptera: Nymphalidae) Wall butterfly**

Despite good or excellent conditions for survey, Wall butterfly was not recorded at the Gravesend survey area and is considered unlikely to be present.

Wall butterflies were noted at the Tilbury survey area in July and August, occurring in the NE, NW, SE and SW sectors.

***Coenonympha pamphilus* (Lepidoptera: Nymphalidae) Small Heath butterfly**

Small Heath butterfly was noted as being present at both the Gravesend and Tilbury survey areas

4.4 KEY SPECIES RESULTS

4.4.1 Gravesend

Amongst the 307 species recorded by this survey, 27 species are here regarded as Key Species (using the criteria defined in Section 3.4.1). These 27 species comprise 8.79% of the total species list of 307, and are listed in Table 5.

Within the 27 Key Species, there were 6 Rare Key Species. These 6 species comprise 1.95% of the total species list of 307.

4.4.2 Tilbury

Amongst the 334 species recorded by this survey, 35 species are here regarded as Key Species (using the criteria defined in Section 3.4.1). These 35 species comprise 10.48% of the total species list of 334, and are listed in Table 6.

Within the 35 Key Species, there were 11 Rare Key Species. These 11 species comprise 3.29% of the total species list of 334.

4.4.3 Correcting for species with out of date and inaccurate conservation statuses

As mentioned in Section 3.4.1, there are frequent examples of invertebrate conservation statuses which have become out of date and inaccurate, which could cause substantial bias in Key Species analysis.

The Rare Key Species accounts (Section 4.6) include discussion of the accuracy of the conservation status of each species as appropriate. All of the Key Species which are here regarded as having Out Of Date and inaccurate ('OOD') conservation statuses are indicated in Table 5 and Table 6.

Gravesend

For the Gravesend survey area, of the 27 Key Species recorded by this survey, 7 are here regarded as having out of date and inaccurate statuses, and 2 further species are regarded as meriting Scarce Key Species status rather than Rare Key Species status. The remaining 18 Key Species should be regarded as having accurate conservation statuses, though for some of these also there is evidence of an upward trend in range and/or abundance.

If the Key Species with out of date and inaccurate conservation statuses are excluded from the analysis, this survey recorded 6.51% Key Species (20 out of 307) and 0.33% Rare Key Species (1 out of 307).

Tilbury

For the Tilbury survey area, of the 35 Key Species recorded by this survey, 9 are here regarded as having out of date and inaccurate statuses, and 2 further species are regarded as meriting Scarce Key Species status rather than Rare Key Species status. The remaining 24 Key Species should be regarded as having accurate conservation statuses, though for some of these also there is evidence of an upward trend in range and/or abundance.

If the Key Species with out of date and inaccurate conservation statuses are excluded from the analysis, this survey recorded 7.78% Key Species (26 out of 334) and 1.50% Rare Key Species (5 out of 334).

Table 5: The Key Species recorded by this survey from Gravesend. Rare Key Species are listed before Scarce Key Species, then in taxonomic order within each group. Species considered to have Out Of Date and inaccurate ('OOD') conservation statuses are indicated.

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	OOD?
Insecta	Hemiptera: Heteroptera	Miridae	<i>Lygus pratensis</i>	a mirid bug	RDB3	Yes
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Nysius graminicola</i>	a ground-bug	RDB3	Yes (NS)
Insecta	Coleoptera	Curculionidae	<i>Lixus scabricollis</i>	a weevil	RDBK	Yes
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Myrmica specioides</i>	an ant	RDB3	Yes (NS)
Insecta	Hymenoptera: Aculeata	Apidae	<i>Ceratina cyanea</i>	Blue Carpenter-bee	RDB3	Yes
Insecta	Lepidoptera	Nymphalidae	<i>Coenonympha pamphilus</i>	Small Heath	VU, S41	
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Anoscopus albiger</i>	a leafhopper	Nationally Scarce (Nb)	
Insecta	Hemiptera: Auchenorrhyncha	Cixiidae	<i>Reptalus quinquecostatus</i>	a lacehopper	Nationally Scarce (Nb)	
Insecta	Hemiptera: Auchenorrhyncha	Delphacidae	<i>Asiraca clavicornis</i>	a planthopper	Nationally Scarce (Nb)	Yes
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Raglius alboacuminatus</i>	a ground-bug	Nationally Scarce (Nb)	
Insecta	Hemiptera: Heteroptera	Pentatomidae	<i>Sciocoris cursitans</i>	Sand-runner Shieldbug	LC, NS	
Insecta	Coleoptera	Carabidae	<i>Bembidion fumigatum</i>	a ground beetle	LC, NS	
Insecta	Coleoptera	Hydrophilidae	<i>Cryptopleurum crenatum</i>	a beetle	Nationally Scarce	
Insecta	Coleoptera	Staphylinidae	<i>Carpelimus halophilus</i>	a rove-beetle	LC, NS	
Insecta	Coleoptera	Coccinellidae	<i>Hippodamia variegata</i>	Adonis' Ladybird	Nationally Scarce (Nb)	Yes
Insecta	Coleoptera	Corylophidae	<i>Orthoperus nigrescens</i>	a beetle	Nationally Scarce (Nb)	Yes
Insecta	Coleoptera	Anthicidae	<i>Cyclodinus constrictus</i>	an ant-like flower beetle	LC, NS	
Insecta	Coleoptera	Chrysomelidae	<i>Cassida nobilis</i>	a tortoise beetle	LC, NS	
Insecta	Coleoptera	Chrysomelidae	<i>Aphthona nigriceps</i>	a flea-beetle	LC, NS/ DD	
Insecta	Coleoptera	Chrysomelidae	<i>Podagrica fuscicornis</i>	a flea-beetle	LC, NS	
Insecta	Coleoptera	Chrysomelidae	<i>Podagrica fuscipes</i>	a flea-beetle	LC, NS	
Insecta	Coleoptera	Curculionidae	<i>Trichosirocalus rufulus</i>	a weevil	Nationally Scarce (Na)	
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Myrmica schencki</i>	an ant	Nationally Scarce (Nb)	
Insecta	Hymenoptera: Aculeata	Crabronidae	<i>Didineis lunicornis</i>	a digger wasp	Nationally Scarce (Na)	Yes

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	OOD?
Insecta	Hymenoptera: Aculeata	Apidae	<i>Bombus sylvarum</i>	Shrill Carder-bee	Nationally Scarce (Nb), S41	
Insecta	Lepidoptera	Coleophoridae	<i>Coleophora adpersella</i>	Dusted Case-bearer	Nationally Scarce (Nb)	
Gastropoda	Neotaenioglossa	Assimineidae	<i>Assiminea grayana</i>	Dun Sentinel	LC, NS	

Table 6: The Key Species recorded by this survey from Tilbury. Rare Key Species are listed before Scarce Key Species, then in taxonomic order within each group. Species considered to have Out Of Date and inaccurate ('OOD') conservation statuses are indicated.

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	OOD?
Insecta	Hemiptera: Auchenorrhyncha	Delphacidae	<i>Ribautodelphax imitans</i>	a planthopper	RDBK, S41	
Insecta	Hemiptera: Heteroptera	Miridae	<i>Lygus pratensis</i>	a mirid bug	RDB3	Yes
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Nysius graminicola</i>	a ground-bug	RDB3	Yes (NS)
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Ortholomus punctipennis</i>	a ground-bug	RDB3	
Insecta	Coleoptera	Coccinellidae	<i>Nephus quadrimaculatus</i>	a ladybird	RDB2	Yes
Insecta	Coleoptera	Corylophidae	<i>Orthoperus brunnipes</i>	a beetle	RDB3	
Insecta	Coleoptera	Curculionidae	<i>Lixus scabricollis</i>	a weevil	RDBK	Yes
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Myrmica specioides</i>	an ant	RDB3	Yes (NS)
Insecta	Hymenoptera: Aculeata	Crabronidae	<i>Philanthus triangulum</i>	Bee Wolf	RDB2	Yes
Insecta	Lepidoptera	Nymphalidae	<i>Lasiommata megera</i>	Wall	EN, S41	
Insecta	Lepidoptera	Nymphalidae	<i>Coenonympha pamphilus</i>	Small Heath	VU, S41	
Arachnida	Araneae	Salticidae	<i>Sibianor aurocinctus</i>	a jumping spider	LC, NS	
Arachnida	Araneae	Salticidae	<i>Synageles venator</i>	a jumping spider	LC, NS	
Insecta	Dermaptera	Forficulidae	<i>Forficula lesnei</i>	Lesne's Earwig	LC, NS	Yes
Insecta	Hemiptera: Auchenorrhyncha	Delphacidae	<i>Asiraca clavicornis</i>	a planthopper	Nationally Scarce (Nb)	Yes
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Raglius alboacuminatus</i>	a ground-bug	Nationally Scarce (Nb)	
Insecta	Hemiptera: Heteroptera	Coreidae	<i>Ceraleptus lividus</i>	Slender-horned Leatherbug	LC, NS	

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	OOD?
Insecta	Hemiptera: Heteroptera	Scutelleridae	<i>Eurygaster maura</i>	Scarce Tortoise Shieldbug	LC, NS	
Insecta	Hemiptera: Heteroptera	Pentatomidae	<i>Sciocoris cursitans</i>	Sand-runner Shieldbug	LC, NS	
Insecta	Coleoptera	Carabidae	<i>Tachyura parvula</i>	a ground beetle	LC, NS	
Insecta	Coleoptera	Staphylinidae	<i>Astenus immaculatus</i>	a rove-beetle	LC, NS	
Insecta	Coleoptera	Staphylinidae	<i>Quedius simplicifrons</i>	a rove-beetle	LC, NS	
Insecta	Coleoptera	Coccinellidae	<i>Platynaspis luteorubra</i>	a ladybird	Nationally Scarce (Na)	
Insecta	Coleoptera	Coccinellidae	<i>Hippodamia variegata</i>	Adonis' Ladybird	Nationally Scarce (Nb)	Yes
Insecta	Coleoptera	Anthicidae	<i>Cyclodinus constrictus</i>	an ant-like flower beetle	LC, NS	
Insecta	Coleoptera	Anthicidae	<i>Cordicollis instabilis</i>	an ant-like flower beetle	LC, NS	
Insecta	Coleoptera	Chrysomelidae	<i>Longitarsus ochroleucus</i>	a flea-beetle	LC, NS	
Insecta	Coleoptera	Chrysomelidae	<i>Cryptocephalus hypochaeridis</i>	a leaf-beetle	LC, NS	
Insecta	Coleoptera	Curculionidae	<i>Otiorhynchus raucus</i>	a weevil	Nationally Scarce (Nb)	
Insecta	Coleoptera	Curculionidae	<i>Larinus carlinae</i>	a weevil	Nationally Scarce (Nb)	Yes
Insecta	Coleoptera	Curculionidae	<i>Tychius squamulatus</i>	a weevil	Nationally Scarce (Nb)	
Insecta	Hymenoptera: Aculeata	Melittidae	<i>Dasypoda hirtipes</i>	Pantaloön Bee	Nationally Scarce (Nb)	Yes
Insecta	Hymenoptera: Aculeata	Andrenidae	<i>Andrena nigrospina/pilipes</i>	a mining-bee	pRDB2/ Nationally Scarce (Nb)	
Insecta	Hymenoptera: Aculeata	Apidae	<i>Bombus sylvarum</i>	Shrill Carder-bee	Nationally Scarce (Nb), S41	
Insecta	Diptera	Opomyzidae	<i>Geomyza subnigra</i>	an opomyzid fly	pNationally Scarce (Falk, Ismay & Chandler, 2016)	

4.5 PANTHEON RESULTS

During the period in which this report was in preparation, analysis of the final results using Pantheon revealed a substantial number of errors with regards to species conservation status. In this instance, the value of Pantheon's output is diminished and it seems best not to place any confidence in it.

4.6 RARE KEY SPECIES ACCOUNTS

For each of the Rare Key Species found by this survey, a brief account is provided which describes the species' ecology, distribution and conservation status, as appropriate, followed by details of its occurrence during the current survey.

***Ribautodelphax imitans* (Hemiptera: Auchenorrhyncha: Delphacidae) Tall Fescue Planthopper, RDBK, S41**

See the accounts of this Species of Principal Importance in Sections 2.4.1 and 4.3.1.

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

This is a large mirid bug. On the continent it is known to be polyphagous (Kirby, 1992). It was formerly known only in south-eastern England from Kent westwards to Hampshire and northwards to Berkshire, where it was mostly confined to rides in ancient woodland, open herb-rich areas and heathland. However, in recent years this bug has undergone a dramatic range expansion. It is now widespread and frequently recorded throughout much of southern Britain northwards to County Durham (Ryan, 2020) and undoubtedly no longer merits rare or even scarce conservation status. This is recognised within Pantheon which lists its status in square brackets as '[RDB3]' though a formal revision of the conservation status assigned by Kirby (1992) has yet to be carried out.

On the current survey, this species was recorded at both Gravesend and Tilbury.

***Nysius graminicola* (Hemiptera: Heteroptera: Lygaeidae) a ground-bug, RDB3**

This is a largely ground-dwelling bug which is presumed to feed on seeds. It is thought to favour open habitats, often on dry, sandy soils. Kirby (1992) knew of this bug from only one British specimen, discovered at Studland Bay, Dorset, in the 1980s. It has been found more widely in the subsequent years, with records from Dorset, South Hampshire, the Isle of Wight, West Sussex, East Kent, South Essex, Hertfordshire, Oxfordshire, Cambridgeshire, Huntingdonshire and East Gloucestershire (Ryan, 2019, 2020) and with internet sources reporting records for Worcestershire in addition. This is still an uncommon or rarely recorded species but would perhaps be better classified as Nationally Scarce than RDB3.

On the current survey, this species was widely recorded and in numbers at both Gravesend and Tilbury.

***Ortholomus punctipennis* (Hemiptera: Heteroptera: Lygaeidae) a ground-bug, RDB3**

A seed-feeding and largely ground-dwelling bug, which inhabits dry, open habitats, typically with extensive cover of bare ground, mosses and lichens, and rather sparse cover of herbaceous plants. It is a rare species of coastal habitats in south and east England, and inland in the Breckland region of East Anglia. In recent years, it has been found more

frequently in Kent and may be on a trajectory to becoming a more common and widespread species.

On the current survey, a single specimen was swept at Tilbury, in the NW sector.

***Nephus quadrimaculatus* (Coleoptera: Coccinellidae) a ladybird, RDB2**

This is one of the smaller coccinellids, black with four orange spots on the wing-cases. This species has been known from Britain since the 19th century but only as a rare species. It was regarded as Vulnerable (RDB2) by Hyman and Parsons (1992). However, it was discovered in Kent in the early 1990s and by the turn of the millennium had become common in much of Surrey (Hawkins, 2000) being found on ivy on trees and walls. It has continued to become commoner and more widespread in recent years, though it is still largely restricted to south-east England and East Anglia (Roy *et al.*, 2011). It undoubtedly no longer merits RDB status, and this is recognised within Pantheon which lists its status in square brackets: '[RDB2]'.

On the current survey, found at Tilbury by beating ivy in the SW sector.

***Orthoperus brunnipes* (Coleoptera: Corylophidae) a beetle, RDB3**

This is a tiny (0.90 - 1.03 mm), globular, black beetle. Hyman and Parsons (1992) noted pre-1970 records from 15 counties, mostly in southern England, from South Devon to East Kent and northwards to South-east Yorkshire and Roxburghshire. The same authors were only able to list three counties with records from 1970 onwards: West Kent, Berkshire and South-east Yorkshire. It was found at Catcott Lows, Somerset, in 1997 (Duff, 2009) and has also been recorded from Sussex since 1970 (Hodge, 2010). In 2012, this beetle was discovered in saline lagoon margin habitat on Orford Ness (East Suffolk) (Telfer, 2013), since which the author has discovered this species at Oakington Barracks (Cambridgeshire), Tilbury (South Essex), Freiston Shore (South Lincolnshire) and rediscovered it (after a gap of more than 100 years) at Wicken Fen (Cambridgeshire). This amounts to a resurgence of records and perhaps indicates a reversal of fortunes for this species. Bowstead (1999) regarded *O. brunnipes* as a fen species, with a decline across the Western Palaearctic region driven perhaps by increased drainage. It has been found under grass, fallen leaves, compost, straw, fen cuttings and seaweed.

On the current survey, found at Tilbury by suction sampling in the NE field.

***Lixus scabricollis* (Coleoptera: Curculionidae) a weevil, RDBK**

When Hyman and Parsons (1992) accorded this weevil RDBK status, it had recently been discovered new to Britain in 1987 from Grain in West Kent (Heal, 1992). They regarded it as probably a recent [natural] colonist or possibly an accidental introduction. Whatever the circumstances of its arrival in Britain, it has established widely in southern English coastal counties from East Gloucestershire to East Suffolk and in much of Wales including some inland counties. Were it to be reassessed, it would no longer merit RDB status. Adults are associated with Sea Beet *Beta vulgaris* and other Chenopodiaceae, and larvae develop within the stems of these plants. It is typically found on shingle beaches but occupies a wider range of habitats which support the foodplants.

On the current survey, found at both Gravesend and Tilbury by suction sampling in disturbed habitats with *Beta vulgaris* present.

***Myrmica specioides* (Hymenoptera: Aculeata: Formicidae) an ant, RDB3**

There is some controversy over the name of this species with some authors still using the name *M. bessarabica*. This is an ant of dry, sunny, open, sparsely vegetated habitats, typically in coastal locations. *Myrmica specioides* was recorded new to Britain from the East Kent coast by Collingwood (1962). Bolton and Collingwood (1975) stated that it occurred only on the East Kent coast between Sea-Salter and Sandwich, and this is how the known distribution remained until 1988 when it started to be recorded from Essex. It was subsequently discovered more widely on the East Anglian coast (Blacker, 2006) as far as the north coast of Norfolk (Telfer, 2007). It has also expanded westwards to the Solent, South Hampshire. In view of this expansion of range, its conservation status is in need of revision; it may still merit Nationally Scarce status.

On the current survey, found at both Gravesend and Tilbury.

***Philanthus triangulum* (Hymenoptera: Aculeata: Crabronidae) Bee Wolf, RDB2**

The Bee Wolf is a large, spectacular black and yellow wasp which had, until recently, been a great rarity in Britain. It frequents warm sunny areas on light, well-drained soil where it digs many-chambered nesting burrows of up to a metre in length. These are stocked with worker honeybees *Apis mellifera* (Edwards, 1997). Once confined to just a couple of sites on the Isle of White (Richards, 1980), it has expanded rapidly to become widespread over southern England (Edwards, 1997). It undoubtedly no longer merits RDB status, and this is recognised within Pantheon which lists its status in square brackets: '[RDB2]'.

On the current survey, found in numbers at Tilbury in the SE sector.

***Ceratina cyanea* (Hymenoptera: Aculeata: Apidae) Blue Carpenter-bee, RDB3**

Blue Carpenter-bees nest in hollow twigs and stems, typically of brambles and roses. They inhabit a wide range of open habitats including chalk downs, open woodlands, heathlands and brownfield sites, and forage from a wide range of flowering herbaceous plants. Once regarded as a rare species, it has become, or been found to be, more common and widespread in southern England, and no longer merits the status of RDB3.

On the current survey, found at Gravesend in the North field.

***Lasiommata megera* (Lepidoptera: Nymphalidae) Wall Butterfly, EN, S41**

See the accounts of this Species of Principal Importance in Sections 2.4.1 and 4.3.1.

***Coenonympha pamphilus* (Lepidoptera: Nymphalidae) Small Heath Butterfly, VU, S41**

See the accounts of this Species of Principal Importance in Sections 2.4.1 and 4.3.1.

4.7 OTHER SPECIES

4.7.1 Divided Sedge *Carex divisa*

A population of Divided Sedge was found at Gravesend in a small ephemerally wet, brackish area within the Milton Rifle Range. This plant is protected on Schedule 8 of the Wildlife and

Countryside Act 1981, and listed as a plant Species of Principal Importance in Section 41 of the Natural Environment and Rural Communities Act 2006².

The area occupied by Divided Sedge is indicated by the yellow polygon in Figure 7, due east of the current cable tunnel compound. The red square indicates the grid reference location TQ67507425.

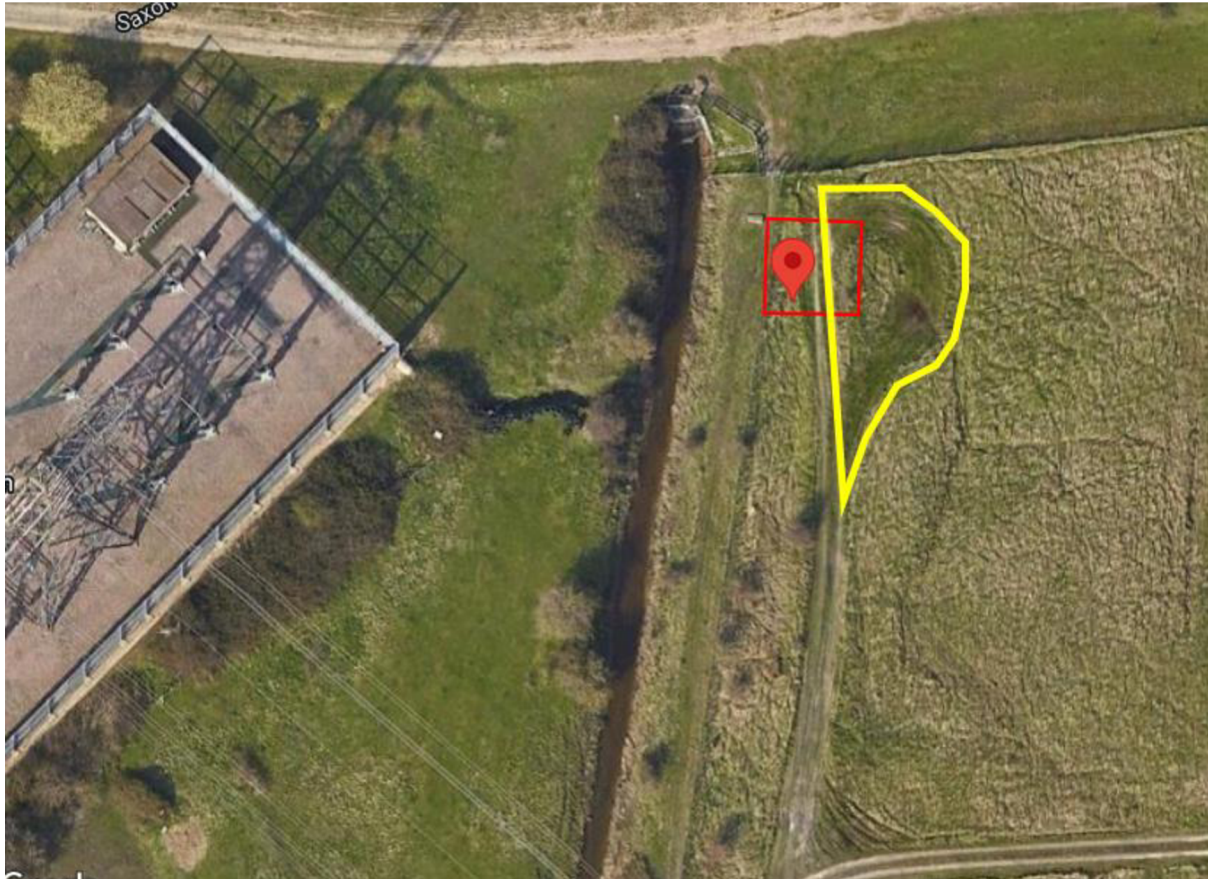


Figure 7: Location of the population of Divided Sedge (yellow polygon) within the Milton Rifle Range. Map data © 2023 Imagery © 2023, Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies, The Geoinformation Group.

5 Survey area assessments

These survey area assessments are based on a combined list of 494 species for both survey areas, which is a high total and indicates that the survey has generated an ample dataset from which to make a robust and accurate assessments of the survey areas. The high total also suggests that the survey areas include a diversity of habitats in favourable condition for invertebrates.

5.1 GRAVESEND

27 Key Species were recorded from the Gravesend survey area, comprising 8.79% of the total species list of 307. Compared to other sites which the author has surveyed under comparable circumstances and which are proposed for development (i.e., excluding nature reserves and other sites in nature conservation management), the figure of 8.79% is high, substantially higher than the mean of 5.74% (standard deviation = 3.57, sample size = 86).

² <https://plantatlas2020.org/atlas/2cd4p9h.4s7>

This statistic suggests that the Gravesend survey area is a site of at least county importance for invertebrate conservation.

Of the 27 Key Species, a quarter (7 species) are here regarded as having out of date and inaccurate conservation statuses. If the Key Species with out of date and inaccurate statuses are taken into account in the calculation, the percentage is reduced to 6.51% (20 accurately-rated Key Species out of a total species list of 307). The figure of 6.51% is still higher than the average and suggests that the Gravesend survey area is a site of county importance for invertebrate conservation.

Six Rare Key Species were found, comprising 1.95% of the 307 species recorded from this survey area in total. Compared to other sites which the author has surveyed under comparable circumstances and which are proposed for development, the figure of 1.95% is high, substantially higher than the mean of 0.86% (standard deviation = 0.99, sample size = 86). However, all but one of the six Rare Key Species are here considered to have out of date and inaccurate statuses. Only the Vulnerable Small Heath butterfly remains as an accurately-rated Rare Key Species; a species which still retains a widespread distribution despite showing severe declines. Thus, only one accurately-rated Rare Key Species was found, comprising 0.33% of the 307 species recorded from this survey area in total. These results show rather clearly that the Gravesend survey area is not a site of national importance, though it may be a site of county importance for invertebrate conservation.

Four SPI were recorded from the Gravesend survey area: Brown-banded Carder-bee *Bombus humilis*, Shrill Carder-bee *Bombus sylvarum*, Hornet Robberfly *Asilus crabroniformis* and Small Heath butterfly *Coenonympha pamphilus*. In addition, Phoenix Fly *Dorycera graminum* is considered to be very likely to occur, and Wall butterfly *Lasiommata megera* is considered possibly to occur.

Considering the results of Key Species analysis, and the occurrence of invertebrate SPI, the Gravesend survey area should be assessed as a site of county importance for invertebrate conservation.

5.1.1 Key habitats and habitat features at Gravesend

The most important feature of the Gravesend survey area is that it provides habitat for Hornet Robberfly *Asilus crabroniformis*, that habitat being grazed rough pasture with dung beetles for it to prey upon (Figure 8). Because of its strong association with grazing livestock, Hornet Robberfly is a species that must have an ability to move over medium distances in order to follow the changing numbers and distribution of livestock. Hornet Robberfly may be regarded as having a meta-population across the north Kent grazing marshes, and the Gravesend survey area may be regarded as a site which contributes to supporting that metapopulation.



Figure 8: A Hornet Robberfly using a pile of pony dung as a hunting perch.

Brown-banded Carder-bee and Shril Carder-bee are likewise species that need extensive and interconnected areas of suitable habitat at a landscape scale, and which are widespread and locally not uncommon in the Thames Estuary. The Gravesend survey area provides flowery foraging habitat and potentially also tussocky grassland nesting habitat for these species, and thus makes some contribution to the conservation of their metapopulations in the Thames Estuary.

The key habitat at the Gravesend survey area is the grassland of the North, SE and SW fields, along with the dead end path. All of the Key Species are associated with grassland and open habitats except for three wetland species which are associated with the margins of the tidal creek. Within the list of Key Species of grassland and open habitats, there are a number which benefit from the light or infrequent grazing regime, which has allowed quite a diverse range of herbaceous plants to grow (Figure 9), and a number which benefit from the areas of ruderal vegetation which have developed following soil disturbance. Several of the Key Species are coastal species, with more or less strongly coastal distributions, or associated with coastal habitats.



Figure 9: A view of the SE field.

The eastern part of the survey area, within the perimeter of the Milton Rifle Range, appears to have been ungrazed for several years and the grassland is thick and rank, with little potential to support invertebrate species and assemblages of conservation importance. This area may be regarded as habitat of low importance for invertebrates.

5.2 TILBURY

35 Key Species were recorded from the Tilbury survey area, comprising 10.48% of the total species list of 334. Compared to other sites which the author has surveyed under comparable circumstances and which are proposed for development, the figure of 10.48% is very high, substantially higher than the mean of 5.74% (standard deviation = 3.57, sample size = 86). This statistic suggests that the Tilbury survey area is a site of at least county importance, and perhaps of national importance, for invertebrate conservation.

Of the 35 Key Species, a quarter (9 species) are here regarded as having out of date and inaccurate conservation statuses. If the Key Species with out of date and inaccurate statuses are taken into account in the calculation, the percentage is reduced to 7.78% Key Species (26 accurately-rated Key Species out of a total species list of 334). The figure of 7.78% is still higher than the average and suggests that the Tilbury survey area is a site of county importance for invertebrate conservation.

Eleven Rare Key Species were found, comprising 3.29% of the 334 species recorded from this survey area in total. Compared to other sites which the author has surveyed under comparable circumstances and which are proposed for development, the figure of 3.29% is

extremely high, very much higher than the mean of 0.86% (standard deviation = 0.99, sample size = 86). However, more than half (6 species) of the Rare Key Species are here considered to have out of date and inaccurate statuses. Thus, only 5 accurately-rated Rare Key Species were found, comprising 1.50% of the 334 species recorded from this survey area in total. This is still a high percentage, and suggests that the Tilbury survey area may be of national importance for invertebrate conservation.

Five SPI have been recorded: Tall Fescue Planthopper *Ribautodelphax imitans*, Brown-banded Carder-bee *Bombus humilis*, Shrill Carder-bee *Bombus sylvarum*, Wall butterfly *Lasiommata megera* and Small Heath butterfly *Coenonympha pamphilus*. In addition, Phoenix Fly *Dorycera graminum* is considered to be very likely to occur, and Five-banded Weevil Fox wasp *Cerceris quinquefasciata* is considered possibly to occur.

Considering the results of Key Species analysis, and in particular the high percentage of Rare Key Species, along with the occurrence of several invertebrate SPI, the Tilbury survey area should be assessed as a site of national importance for invertebrate conservation overall.

The Tilbury survey area is of greater importance for invertebrate conservation than the Gravesend survey area.

5.2.1 Key habitats and habitat features at Tilbury

The overall assessment of the Tilbury survey area as of national importance masks considerable variation in importance, with some areas of very high importance and others of much lower importance.

The most important species at the Tilbury survey area is Tall Fescue Planthopper. It inhabits areas of unmanaged, tussocky grassland in which tussocks of Tall Fescue *Schedonorus arundinaceus* are frequent or dominant. There may also be tussocks of Cock's-foot and False Oat-grass. The grassland habitats occupied by Tall Fescue Planthopper were judged to have a rather open structure, with rather well-spaced, spreading tussocks (Figure 10), and shorter interstitial vegetation. This may be contrasted with the rank grassland of the NE field, dominated by dense, close-packed tussocks of False Oat-grass; habitat of relatively low importance for invertebrates. The grassland habitats occupied by Tall Fescue Planthopper might be growing on a substrate with a high PFA content.



Figure 10: A tussock of Tall Fescue with spreading growth form.

As well as supporting a population of Tall Fescue Planthopper, the same grasslands also yielded many of the other invertebrate SPI and Key Species.

Open habitats, including both grasslands and ruderal habitats, are the key habitat for invertebrates at the Tilbury survey area. All of the Key Species are associated with open

habitats except for one: the ladybird *Nephus quadrimaculatus* which is associated with ivy and which has become common since its conservation status was last reviewed.

In general, the Key Species recorded from the Tilbury survey area are species which favour open habitats with a degree of disturbance. Disturbance provides elements of bare ground which are strongly favoured by some of the species. In the wake of soil disturbance, a botanically and structurally diverse vegetation may develop, which provides host plants for some of the Key Species and nectaring and pollen-gathering resources for some of the SPI and Key Species.

The unmanaged, tussocky grassland swards occupied by Tall Fescue Planthopper may be regarded as the late stage of grassland development following soil disturbance. The next stage of vegetation development is for bramble and shrubs to establish and gradually close up, turning grassland into scrub. For much of this process, invertebrates often continue to flourish in the sheltered interstices between patches of scrub but ultimately the invertebrate interest of a site is greatly diminished by the establishment of dense, continuous scrub.

6 Recommendations

6.1 GRAVESEND

It is understood that the proposals will entail the loss of a small area of the North field, and that impacts due to the use of land as temporary working areas will be largely restricted to the North field.

In order for the area to continue to provide habitat for species of grassland and open habitats, and in particular to continue to make a contribution to supporting the local metapopulations of Hornet Robberfly, Brown-banded Carder-bee and Shrill Carder-bee, the following recommendations are made:

- (i) Subsequent to use as temporary working areas, it would be highly desirable to return the land to use as rough pasture. A certain amount of disturbance to the soil may be beneficial to invertebrates, favouring species associated with bare ground and ruderal vegetation, but the land would need to retain sufficient grassland sward to support grazing.
- (ii) To assure the continuation of appropriate grazing, work should be undertaken, in liaison with graziers, to establish grazing agreements where necessary, provide suitable fencing, gates and access, and to provide drinking water. It would be desirable to repair the fencing and reinstate grazing in the SW field.

6.2 TILBURY

As noted above, there is considerable variation within the Tilbury survey area in terms of its importance for invertebrates.

The very least important area, and thus the first priority for use as a temporary working area, is the major part of the NW sector which has been laid with aggregate and is currently used as a storage area for Hyundai vehicles.

Another area of low importance is the extensive hard standing of the SW sector (excluding the vegetated strip along the southern edge). The concrete surface supports a sparse growth of ruderals and other vegetation, and does provide habitat for a number of Key Species. However, this is an area of relatively low importance and is recommended as the second priority for use as a temporary working area.

Three important areas of grassland habitat, which support Tall Fescue Planthopper, lie immediately adjacent to the Hyundai parking and to the SW sector's hard standing (Figure 5). These are:

- the road verge in the NE sector, which is the largest and best area of Tall Fescue Planthopper habitat (Figure 11, Figure 12);
- the retained ditch along the northern and eastern edges of the Hyundai parking in the NW sector, the grassland alongside which also supports Tall Fescue Planthopper; and
- the scrubby grassland strip in the SE sector, between the SE hard standing and the perimeter fence of the SW sector, which also supports Tall Fescue Planthopper.



Figure 11: Grassland dominated by Tall Fescue tussocks on the road verge in the NE sector. Facing north, with the access road and the perimeter fence of the Hyundai compound on the left.



Figure 12: The NE road verge, viewed south, at 180° to Figure 11.

It is recommended, in the first instance, that impacts to these three areas be avoided.

However, it is understood that the proposals will entail some loss of Tall Fescue Planthopper habitat, including a c. 5 m wide section of the ditch-side habitat in the NW sector (for a road crossing), and about 40% of the road verge in the NE sector (the part that adjoins the NE hard standing).

It is recommended that efforts should be made to provide adequate habitat for Tall Fescue Planthopper nearby, to compensate for these losses.

To provide adequate compensation, the following are recommended:

- (i) transplant Tall Fescue tussocks from areas where habitat will be lost into nearby receptor sites where they can be assured of favourable future land management; and
- (ii) enhance retained areas of Tall Fescue Planthopper habitat by removing encroaching scrub and brambles.

To the best of this author's knowledge, there have been no previous attempts to translocate Tall Fescue Planthopper habitat, nor even to manage habitat for the direct benefit of Tall Fescue Planthopper (Dittrich, 2016). Therefore, such operations would necessarily be rather experimental.

For the translocation of Tall Fescue tussocks, it is recommended that the best time of year to carry out this work would be between mid-July and the end of August. At this time of

year, the second generation of Tall Fescue Planthopper adult females will be laying eggs (Dittrich, 2016), and so translocating tussocks during this period also gives the best chance of transporting eggs as well, to found a population at the receptor site.

For the enhancement of existing Tall Fescue Planthopper habitat by removing scrub and brambles, it is recommended that they be dug out by the roots, individually by digger bucket, or wholesale by bulldozer blade, with the aim of leaving disturbed, bare ground. The aftermath may be left for natural recolonisation, or could form a suitable receptor site for transplanted tussocks.

With regard to the area of apparently suitable Tall Fescue Planthopper habitat in the SE sector (Figure 5), there is a reasonable likelihood that Tall Fescue Planthopper also occurs here, and hence:

- (i) it would be desirable to avoid impacts to this area, or to translocate habitat if impacts are unavoidable, and
- (ii) the adjacent scrub-dominated habitat patches in the SE sector would make suitable areas for habitat enhancement work by removing bramble and scrub.

It is further recommended that some provision should be made to monitor the success of habitat translocation and of habitat enhancement. For a relatively poorly known species such as Tall Fescue Planthopper, such monitoring work would yield additional valuable information about monitoring techniques, life history, phenology, and population dynamics, all of which would benefit the conservation of this species in Britain.

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Appendix 1: British Conservation Status Categories – Definitions.

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

These status categories and criteria were introduced for British insects by Shirt (1987) and received some modifications by later authors (e.g., Hyman and Parsons (1992, 1994)). The most recent application of these categories and criteria was for micro-moths by Davis (2012).

Red Data Book category EXTINCT (RDB Extinct)

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

Red Data Book category 1, Endangered (RDB1)

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

Red Data Book category 2, Vulnerable (RDB2)

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

Red Data Book category 3, Rare (RDB3)

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

Red Data Book category I, Indeterminate (RDBi)

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

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

Red Data Book category K, Insufficiently Known (RDBK)

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

Nationally Scarce Category A (Na)

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

Nationally Scarce Category B (Nb)

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

Nationally Scarce (N)

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

Note: the terms 'Nationally Scarce' and 'Nationally Notable' are synonymous. For consistency in this report, the term 'Nationally Scarce' is preferred, even where the original source used 'Nationally Notable'.

1.2 Status Categories and Criteria Version 2 (IUCN, 2001)

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

Critically Endangered (CR)

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

Endangered (EN)

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

Vulnerable (VU)

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

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

Data Deficient (DD)

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

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

Near Threatened (NT)

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

Least Concern (LC)

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

Not Applicable (NA)

A taxon is Not Applicable when it is either regarded as a non-native in Britain or occurs solely as a natural vagrant.

1.3 Status Categories and Criteria Version 3 (GB Rarity Status)

These status categories and criteria operate in parallel with version 2 and are defined specifically for use in Britain where they provide some continuity with version 1, allowing the continued use of “rare and scarce” species for site assessment purposes.

Nationally Rare (NR)

Native species which have not been recorded from more than 15 British hectads in recent decades and where there is reasonable confidence that exhaustive recording would not find them in more than 15 hectads. This category includes species which are probably extinct.

Nationally Scarce (NS)

Native species which are not regarded as Nationally Rare AND which have not been recorded from more than 100 British hectads in recent decades and where there is reasonable confidence that exhaustive recording would not find them in more than 100 hectads.

Appendix 2: List of invertebrates recorded at Gravesend in 2023

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

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Malacostraca	Isopoda	Trichoniscidae	<i>Trichoniscus provisorius/pusillus</i>	Common Pygmy Woodlouse	LC
Malacostraca	Isopoda	Philosciidae	<i>Philoscia muscorum sens. str.</i>	a common striped woodlouse	LC
Malacostraca	Isopoda	Armadillidiidae	<i>Armadillidium vulgare</i>	Common Pill-woodlouse	LC
Malacostraca	Isopoda	Armadillidiidae	<i>Eluma caelatum</i>	a woodlouse	NA
Malacostraca	Isopoda	Porcellionidae	<i>Porcellio scaber</i>	Common Rough Woodlouse	LC
Arachnida	Araneae	Theridiidae	<i>Enoplognatha ovata/latimana</i>	a spider	None
Arachnida	Araneae	Linyphiidae	<i>Oedothorax fuscus</i>	a spider	LC
Arachnida	Araneae	Linyphiidae	<i>Oedothorax retusus</i>	a spider	LC
Arachnida	Araneae	Linyphiidae	<i>Erigone atra</i>	a spider	LC
Arachnida	Araneae	Linyphiidae	<i>Bathypantes gracilis</i>	a spider	LC
Arachnida	Araneae	Linyphiidae	<i>Tenuiphantes tenuis</i>	a spider	LC
Arachnida	Araneae	Linyphiidae	<i>Microlinyphia pusilla</i>	a spider	LC
Arachnida	Araneae	Tetragnathidae	<i>Tetragnatha extensa</i>	a spider	LC
Arachnida	Araneae	Tetragnathidae	<i>Pachygnatha degeeri</i>	a spider	LC
Arachnida	Araneae	Araneidae	<i>Araneus diadematus</i>	a spider	LC
Arachnida	Araneae	Lycosidae	<i>Pardosa palustris</i>	a spider	LC
Arachnida	Araneae	Lycosidae	<i>Trochosa ruricola</i>	a spider	LC
Arachnida	Araneae	Pisauridae	<i>Pisaura mirabilis</i>	a spider	LC
Arachnida	Araneae	Thomisidae	<i>Xysticus cristatus</i>	a spider	LC
Arachnida	Opiliones	Phalangidae	<i>Paroligolophus agrestis</i>	a harvestman	None
Insecta	Odonata	Lestidae	<i>Lestes viridis</i>	Willow Emerald Damselfly	NA
Insecta	Odonata	Aeshnidae	<i>Aeshna mixta</i>	Migrant Hawker	LC

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Odonata	Libellulidae	<i>Sympetrum striolatum</i>	Common Darter	LC
Insecta	Odonata	Libellulidae	<i>Sympetrum sanguineum</i>	Ruddy Darter	LC
Insecta	Dermoptera	Forficulidae	<i>Forficula auricularia</i>	Common Earwig	LC
Insecta	Orthoptera	Tettigoniidae	<i>Metrioptera roeselii</i>	Roesel's Bush-cricket	LC
Insecta	Orthoptera	Acrididae	<i>Chorthippus albomarginatus</i>	Lesser Marsh Grasshopper	LC
Insecta	Orthoptera	Acrididae	<i>Chorthippus brunneus</i>	Field Grasshopper	LC
Insecta	Orthoptera	Acrididae	<i>Chorthippus parallelus</i>	Meadow Grasshopper	LC
Insecta	Psocoptera	Ectopsocidae	<i>Ectopsocus briggsi</i>	a barkfly	None
Insecta	Psocoptera	Ectopsocidae	<i>Ectopsocus petersi</i>	a barkfly	None
Insecta	Psocoptera	Stenopsocidae	<i>Graphopsocus cruciatus</i>	a barkfly	None
Insecta	Hemiptera: Sternorrhyncha	Triozidae	<i>Trioza chenopodii</i>	a psyllid	None
Insecta	Hemiptera: Auchenorrhyncha	Aphrophoridae	<i>Philaenus spumarius</i>	a froghopper	None
Insecta	Hemiptera: Auchenorrhyncha	Aphrophoridae	<i>Neophilaenus campestris</i>	a froghopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Anaceratagallia ribauti</i>	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Aphrodes makarovi</i>	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Anoscopus albiger</i>	a leafhopper	Nationally Scarce (Nb)
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Anoscopus flavostriatus</i>	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Anoscopus serratulae</i>	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Stroggylocephalus agrestis</i>	a leafhopper	None

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Paramesus obtusifrons</i>	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Arthaldeus pascuellus</i>	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Euscelis incisus</i>	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Mocydia crocea</i>	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Macrosteles viridigriseus</i>	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Zyginidia scutellaris</i>	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cixiidae	<i>Reptalus quinquecostatus</i>	a lacehopper	Nationally Scarce (Nb)
Insecta	Hemiptera: Auchenorrhyncha	Delphacidae	<i>Asiraca clavicornis</i>	a planthopper	Nationally Scarce (Nb)
Insecta	Hemiptera: Auchenorrhyncha	Delphacidae	<i>Dicranotropis hamata</i>	a planthopper	None
Insecta	Hemiptera: Auchenorrhyncha	Delphacidae	<i>Javesella dubia</i>	a planthopper	None
Insecta	Hemiptera: Auchenorrhyncha	Delphacidae	<i>Javesella pellucida</i>	a planthopper	None
Insecta	Hemiptera: Heteroptera	Saldidae	<i>Saldula saltatoria</i>	a shore-bug	LC
Insecta	Hemiptera: Heteroptera	Tingidae	<i>Kalama tricornis</i>	a lacebug	None
Insecta	Hemiptera: Heteroptera	Tingidae	<i>Physatocheila confinis</i>	a lacebug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Deraeocoris flavilinea</i>	a mirid bug	None

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Hemiptera: Heteroptera	Miridae	<i>Lygus pratensis</i>	a mirid bug	RDB3
Insecta	Hemiptera: Heteroptera	Miridae	<i>Lygus rugulipennis</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Miridius quadrivirgatus</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Phytocoris varipes</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Stenotus binotatus</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Megaloceroea recticornis</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Notostira elongata</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Stenodema calcarata</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Stenodema laevigata</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Orthotylus flavosparsus</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Megalocoleus molliculus</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Plagiognathus arbustorum</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Plagiognathus chrysanthemi</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Nabidae	<i>Himacerus major</i>	Grey Damsel-bug	None
Insecta	Hemiptera: Heteroptera	Nabidae	<i>Himacerus mirmicoides</i>	Ant Damsel-bug	None

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Hemiptera: Heteroptera	Nabidae	<i>Nabis limbatus</i>	Marsh Damsel-bug	None
Insecta	Hemiptera: Heteroptera	Nabidae	<i>Nabis ferus</i>	Field Damsel-bug	None
Insecta	Hemiptera: Heteroptera	Anthocoridae	<i>Anthocoris nemoralis</i>	a flower bug	None
Insecta	Hemiptera: Heteroptera	Anthocoridae	<i>Orius vicinus</i>	a flower bug	None
Insecta	Hemiptera: Heteroptera	Anthocoridae	<i>Orius laevigatus</i>	a flower bug	None
Insecta	Hemiptera: Heteroptera	Anthocoridae	<i>Orius niger</i>	a flower bug	None
Insecta	Hemiptera: Heteroptera	Anthocoridae	<i>Cardiastethus fasciiventris</i>	a flower bug	None
Insecta	Hemiptera: Heteroptera	Piesmatidae	<i>Piesma maculatum</i>	a beetbug	None
Insecta	Hemiptera: Heteroptera	Piesmatidae	<i>Parapiesma quadratum</i>	a bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Nysius graminicola</i>	a ground-bug	RDB3
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Nysius huttoni</i>	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Nysius senecionis</i>	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Ischnodemus sabuleti</i>	European Chinch-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Heterogaster urticae</i>	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Stygnocoris fuliginus</i>	a ground-bug	None

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Megalonotus emarginatus</i>	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Raglius alboacuminatus</i>	a ground-bug	Nationally Scarce (Nb)
Insecta	Hemiptera: Heteroptera	Coreidae	<i>Coreus marginatus</i>	Dock Bug	LC
Insecta	Hemiptera: Heteroptera	Rhopalidae	<i>Stictopleurus punctatonervosus</i>	a rhopalid bug	NA
Insecta	Hemiptera: Heteroptera	Cydnidae	<i>Tritomegas bicolor</i>	Pied Shieldbug	LC
Insecta	Hemiptera: Heteroptera	Cydnidae	<i>Tritomegas sexmaculatus</i>	Rambur's Shieldbug	None
Insecta	Hemiptera: Heteroptera	Pentatomidae	<i>Sciocoris cursitans</i>	Sand-runner Shieldbug	LC, NS
Insecta	Hemiptera: Heteroptera	Pentatomidae	<i>Dolycoris baccarum</i>	Hairy Shieldbug	LC
Insecta	Hemiptera: Heteroptera	Pentatomidae	<i>Eysarcoris venustissimus</i>	Woundwort Shieldbug	LC
Insecta	Coleoptera	Carabidae	<i>Bembidion lunulatum</i>	a ground beetle	LC
Insecta	Coleoptera	Carabidae	<i>Bembidion varium</i>	a ground beetle	LC
Insecta	Coleoptera	Carabidae	<i>Bembidion assimile</i>	a ground beetle	LC
Insecta	Coleoptera	Carabidae	<i>Bembidion fumigatum</i>	a ground beetle	LC, NS
Insecta	Coleoptera	Carabidae	<i>Bembidion minimum</i>	a ground beetle	LC
Insecta	Coleoptera	Carabidae	<i>Bembidion obtusum</i>	a ground beetle	LC
Insecta	Coleoptera	Carabidae	<i>Syntomus foveatus</i>	a ground beetle	LC
Insecta	Coleoptera	Carabidae	<i>Syntomus obscuroguttatus</i>	a ground beetle	LC
Insecta	Coleoptera	Hydrophilidae	<i>Anacaena limbata</i>	an aquatic beetle	LC
Insecta	Coleoptera	Hydrophilidae	<i>Sphaeridium bipustulatum</i>	a beetle	None
Insecta	Coleoptera	Hydrophilidae	<i>Sphaeridium scarabaeoides</i>	a beetle	None

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Coleoptera	Hydrophilidae	<i>Cercyon lateralis</i>	a beetle	None
Insecta	Coleoptera	Hydrophilidae	<i>Cercyon marinus</i>	an aquatic beetle	None
Insecta	Coleoptera	Hydrophilidae	<i>Cercyon melanocephalus</i>	a beetle	None
Insecta	Coleoptera	Hydrophilidae	<i>Cercyon pygmaeus</i>	a beetle	None
Insecta	Coleoptera	Hydrophilidae	<i>Cercyon quisquilius</i>	a beetle	None
Insecta	Coleoptera	Hydrophilidae	<i>Cryptopleurum crenatum</i>	a beetle	Nationally Scarce
Insecta	Coleoptera	Hydrophilidae	<i>Cryptopleurum minutum</i>	a beetle	None
Insecta	Coleoptera	Histeridae	<i>Margarinotus ventralis</i>	a beetle	LC
Insecta	Coleoptera	Staphylinidae	<i>Metopsia clypeata</i>	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	<i>Rybaxis longicornis</i>	a pselaphine rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Brachygluta fossulata</i>	a pselaphine rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Tachyporus dispar</i>	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	<i>Tachyporus hypnorum</i>	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	<i>Tachyporus nitidulus</i>	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	<i>Ischnosoma splendidum</i>	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	<i>Gnypeta carbonaria</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Amischa analis</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Amischa decipiens</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Amischa forcipata</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Amischa nigrofusca</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Mocyta fungi agg.</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Chaetida longicornis</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Aleochara tristis</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Drusilla canaliculata</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Cypha longicornis</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Oligota pumilio</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Oligota punctulata</i>	a rove-beetle	None

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Coleoptera	Staphylinidae	<i>Oligota pusillima</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Carpelimus corticinus</i>	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	<i>Carpelimus halophilus</i>	a rove-beetle	LC, NS
Insecta	Coleoptera	Staphylinidae	<i>Stenus fulvicornis</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Stenus pallipes</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Paederus littoralis</i>	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	<i>Astenus lyonessius</i>	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	<i>Philonthus cognatus</i>	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	<i>Philonthus quisquiliarius</i>	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	<i>Philonthus tenuicornis</i>	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	<i>Gabrius breviventer</i>	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	<i>Ontholestes murinus</i>	a rove-beetle	LC
Insecta	Coleoptera	Scarabaeidae	<i>Acrossus rufipes</i>	a dung beetle	LC
Insecta	Coleoptera	Scarabaeidae	<i>Aphodius fimetarius</i>	a dung beetle	LC
Insecta	Coleoptera	Scirtidae	<i>Contacyphon laevipennis</i>	a beetle	LC
Insecta	Coleoptera	Throscidae	<i>Trixagus obtusus</i>	a beetle	None
Insecta	Coleoptera	Cantharidae	<i>Rhagonycha fulva</i>	a soldier-beetle	LC
Insecta	Coleoptera	Kateretidae	<i>Brachypterus glaber</i>	a nettle pollen beetle	None
Insecta	Coleoptera	Nitidulidae	<i>Meligethes morosus</i>	a pollen beetle	None
Insecta	Coleoptera	Nitidulidae	<i>Meligethes ruficornis</i>	a pollen beetle	None
Insecta	Coleoptera	Monotomidae	<i>Monotoma bicolor</i>	a beetle	LC
Insecta	Coleoptera	Phalacridae	<i>Olibrus aeneus</i>	a beetle	LC
Insecta	Coleoptera	Phalacridae	<i>Olibrus flavicornis</i>	a beetle	LC
Insecta	Coleoptera	Phalacridae	<i>Stilbus oblongus</i>	a beetle	LC
Insecta	Coleoptera	Phalacridae	<i>Stilbus testaceus</i>	a beetle	LC
Insecta	Coleoptera	Cryptophagidae	<i>Atomaria atra (incl. gutta)</i>	a beetle	None
Insecta	Coleoptera	Cryptophagidae	<i>Atomaria testacea</i>	a beetle	None

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Coleoptera	Cryptophagidae	<i>Ephistemus reitteri</i>	a beetle	None
Insecta	Coleoptera	Coccinellidae	<i>Rhyzobius chrysomeloides</i>	a ladybird	None
Insecta	Coleoptera	Coccinellidae	<i>Rhyzobius litura</i>	a ladybird	None
Insecta	Coleoptera	Coccinellidae	<i>Psyllobora vigintiduopunctata</i>	22-spot Ladybird	None
Insecta	Coleoptera	Coccinellidae	<i>Propylea quattuordecimpunctata</i>	14-spot Ladybird	None
Insecta	Coleoptera	Coccinellidae	<i>Harmonia axyridis</i>	Harlequin Ladybird	None
Insecta	Coleoptera	Coccinellidae	<i>Coccinella septempunctata</i>	7-spot Ladybird	None
Insecta	Coleoptera	Coccinellidae	<i>Hippodamia variegata</i>	Adonis' Ladybird	Nationally Scarce (Nb)
Insecta	Coleoptera	Coccinellidae	<i>Anisosticta novemdecimpunctata</i>	Water Ladybird	None
Insecta	Coleoptera	Coccinellidae	<i>Tytthaspis sedecimpunctata</i>	16-spot Ladybird	None
Insecta	Coleoptera	Coccinellidae	<i>Subcoccinella vigintiquatuorpunctata</i>	24-spot Ladybird	None
Insecta	Coleoptera	Corylophidae	<i>Corylophus sublaevipennis</i>	a beetle	None
Insecta	Coleoptera	Corylophidae	<i>Orthoperus nigrescens</i>	a beetle	Nationally Scarce (Nb)
Insecta	Coleoptera	Corylophidae	<i>Sericoderus brevicornis</i>	a beetle	None
Insecta	Coleoptera	Latridiidae	<i>Enicmus histrio</i>	a beetle	None
Insecta	Coleoptera	Latridiidae	<i>Enicmus transversus</i>	a beetle	None
Insecta	Coleoptera	Latridiidae	<i>Cartodere bifasciata</i>	a beetle	None
Insecta	Coleoptera	Latridiidae	<i>Corticaria impressa</i>	a beetle	None
Insecta	Coleoptera	Latridiidae	<i>Melanophthalma suturalis</i>	a beetle	None
Insecta	Coleoptera	Latridiidae	<i>Corticarina minuta</i>	a beetle	None
Insecta	Coleoptera	Latridiidae	<i>Corticaria gibbosa</i>	a beetle	None
Insecta	Coleoptera	Tenebrionidae	<i>Lagria hirta</i>	a darkling beetle	LC
Insecta	Coleoptera	Oedemeridae	<i>Oedemera lurida</i>	a beetle	LC
Insecta	Coleoptera	Anthicidae	<i>Cyclodinus constrictus</i>	an ant-like flower beetle	LC, NS
Insecta	Coleoptera	Chrysomelidae	<i>Bruchidius imbricornis</i>	a seed-beetle	NA

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Coleoptera	Chrysomelidae	<i>Cassida nobilis</i>	a tortoise beetle	LC, NS
Insecta	Coleoptera	Chrysomelidae	<i>Cassida rubiginosa</i>	Thistle Tortoise Beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Phyllotreta atra</i>	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Phyllotreta astrachanica</i>	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Phyllotreta nigripes</i>	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Phyllotreta undulata</i>	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Aphthona nigriceps</i> (incl. <i>pallida</i>)	a flea-beetle	LC, NS/ DD
Insecta	Coleoptera	Chrysomelidae	<i>Longitarsus luridus</i>	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Longitarsus melanocephalus</i>	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Longitarsus parvulus</i>	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Longitarsus pratensis</i>	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Neocrepidodera ferruginea</i>	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Crepidodera aurata</i>	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Podagrica fuscicornis</i>	a flea-beetle	LC, NS
Insecta	Coleoptera	Chrysomelidae	<i>Podagrica fuscipes</i>	a flea-beetle	LC, NS
Insecta	Coleoptera	Chrysomelidae	<i>Chaetocnema concinna</i>	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Chaetocnema arida</i>	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Chaetocnema hortensis</i>	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Sphaeroderma testaceum</i>	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Psylliodes chrysocephala</i>	a flea-beetle	LC
Insecta	Coleoptera	Apionidae	<i>Ceratapion onopordi</i>	a weevil	None
Insecta	Coleoptera	Apionidae	<i>Ceratapion carduorum</i>	a weevil	None
Insecta	Coleoptera	Apionidae	<i>Ceratapion gibbirostre</i>	a weevil	None
Insecta	Coleoptera	Apionidae	<i>Aspidapion radiolus</i>	a weevil	None
Insecta	Coleoptera	Apionidae	<i>Aspidapion aeneum</i>	a weevil	None
Insecta	Coleoptera	Apionidae	<i>Taeniapion urticarium</i>	a weevil	None

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Coleoptera	Apionidae	<i>Pseudapion rufirostre</i>	a weevil	None
Insecta	Coleoptera	Apionidae	<i>Malvapion malvae</i>	a weevil	None
Insecta	Coleoptera	Apionidae	<i>Protapion fulvipes</i>	White Clover Seed Weevil	None
Insecta	Coleoptera	Apionidae	<i>Protapion trifolii</i>	a weevil	None
Insecta	Coleoptera	Apionidae	<i>Apion frumentarium</i>	a weevil	None
Insecta	Coleoptera	Apionidae	<i>Catapion seniculus</i>	a weevil	None
Insecta	Coleoptera	Apionidae	<i>Stenopterapion tenue</i>	a weevil	None
Insecta	Coleoptera	Apionidae	<i>Ischnopterapion virens</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Sitona hispidulus</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Sitona lineatus</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Lixus scabricollis</i>	a weevil	RDBK
Insecta	Coleoptera	Curculionidae	<i>Hypera postica</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Rhinoncus pericarpus</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Amalus scortillum</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Hadroplontus litura</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Ceutorhynchus pallidactylus</i>	Cabbage Stem Weevil	None
Insecta	Coleoptera	Curculionidae	<i>Trichosirocalus rufulus</i>	a weevil	Nationally Scarce (Na)
Insecta	Coleoptera	Curculionidae	<i>Trichosirocalus troglodytes</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Anthonomus rubi</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Tychius junceus</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Tychius picirostris</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Mecinus labilis</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Mecinus pascuorum</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Mecinus pyraeaster</i>	a weevil	None
Insecta	Hymenoptera: Aculeata	Bethylidae	<i>Epyris niger</i>	a solitary wasp	None

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Formica cunicularia</i>	an ant	None
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Lasius flavus</i>	an ant	None
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Lasius niger sens. str.</i>	an ant	None
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Myrmica ruginodis</i>	an ant	None
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Myrmica sabuleti</i>	an ant	None
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Myrmica schencki</i>	an ant	Nationally Scarce (Nb)
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Myrmica specioides</i>	an ant	RDB3
Insecta	Hymenoptera: Aculeata	Crabronidae	<i>Didineis lunicornis</i>	a digger wasp	Nationally Scarce (Na)
Insecta	Hymenoptera: Aculeata	Halictidae	<i>Halictus tumulorum</i>	Bronze Furrow-bee	None
Insecta	Hymenoptera: Aculeata	Halictidae	<i>Lasioglossum calceatum</i>	Slender Mining-bee	None
Insecta	Hymenoptera: Aculeata	Halictidae	<i>Lasioglossum lativentre</i>	Furry-claspered Furrow-bee	None
Insecta	Hymenoptera: Aculeata	Halictidae	<i>Lasioglossum morio</i>	Green Furrow-bee	None
Insecta	Hymenoptera: Aculeata	Halictidae	<i>Lasioglossum villosulum</i>	Shaggy Mining-bee	None
Insecta	Hymenoptera: Aculeata	Colletidae	<i>Hylaeus dilatatus</i>	Chalk Yellow-faced Bee	None
Insecta	Hymenoptera: Aculeata	Colletidae	<i>Hylaeus brevicornis</i>	Short-horned Yellow-faced Bee	None

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Hymenoptera: Aculeata	Melittidae	<i>Osmia spinulosa</i>	Spined Mason Bee	None
Insecta	Hymenoptera: Aculeata	Apidae	<i>Bombus humilis</i>	Brown-banded Carder-bee	S41
Insecta	Hymenoptera: Aculeata	Apidae	<i>Bombus lapidarius</i>	Large Red-tailed Bumblebee	None
Insecta	Hymenoptera: Aculeata	Apidae	<i>Bombus lucorum sens. lat.</i>	White-tailed Bumblebee	None
Insecta	Hymenoptera: Aculeata	Apidae	<i>Bombus pascuorum</i>	Common Carder-bee	None
Insecta	Hymenoptera: Aculeata	Apidae	<i>Bombus sylvarum</i>	Shrill Carder-bee	Nationally Scarce (Nb), S41
Insecta	Hymenoptera: Aculeata	Apidae	<i>Bombus terrestris</i>	Buff-tailed Bumblebee	None
Insecta	Hymenoptera: Aculeata	Apidae	<i>Apis mellifera</i>	Honey Bee	None
Insecta	Hymenoptera: Aculeata	Apidae	<i>Ceratina cyanea</i>	Blue Carpenter-bee	RDB3
Insecta	Neuroptera	Hemerobiidae	<i>Micromus variegatus</i>	a brown lacewing	None
Insecta	Neuroptera	Chrysopidae	<i>Chrysoperla carnea agg.</i>	a green lacewing	None
Insecta	Diptera	Cecidomyiidae	<i>Kiefferia pericarpicola</i>	a gall midge	None
Insecta	Diptera	Stratiomyidae	<i>Chloromyia formosa</i>	Broad Centurion	LC
Insecta	Diptera	Asilidae	<i>Asilus crabroniformis</i>	Hornet Robberfly	LC, S41
Insecta	Diptera	Asilidae	<i>Machimus cingulatus</i>	Brown Heath Robberfly	LC
Insecta	Diptera	Syrphidae	<i>Eristalis arbustorum</i>	a hoverfly	LC
Insecta	Diptera	Syrphidae	<i>Eristalis tenax</i>	a hoverfly	LC
Insecta	Diptera	Syrphidae	<i>Volucella pellucens</i>	a hoverfly	LC
Insecta	Diptera	Syrphidae	<i>Volucella zonaria</i>	a hoverfly	LC
Insecta	Diptera	Syrphidae	<i>Syrpitta pipiens</i>	a hoverfly	LC

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Diptera	Tephritidae	<i>Urophora cardui</i>	a picture-winged fly	None
Insecta	Diptera	Tephritidae	<i>Campiglossa plantaginis</i>	a picture-winged fly	None
Insecta	Diptera	Chloropidae	<i>Elachiptera brevipennis</i>	a frit fly	None (Falk, Ismay & Chandler, 2016)
Insecta	Diptera	Tachinidae	<i>Eriothrix rufomaculata</i>	a parasitic fly	None (Falk, Pont & Chandler, 2005)
Insecta	Lepidoptera	Coleophoridae	<i>Coleophora adspersella</i>	Dusted Case-bearer	Nationally Scarce (Nb)
Insecta	Lepidoptera	Coleophoridae	<i>Coleophora versurella</i>	Pale Orache Case-bearer	None
Insecta	Lepidoptera	Blastobasidae	<i>Blastobasis lacticolella</i>	London Dowd	None
Insecta	Lepidoptera	Tortricidae	<i>Neocochylis hybridella</i>	White-bodied Conch	None
Insecta	Lepidoptera	Tortricidae	<i>Epiphyas postvittana</i>	Light Brown Apple-moth	None
Insecta	Lepidoptera	Crambidae	<i>Agriphila tristella</i>	Common Grass-veneer	None
Insecta	Lepidoptera	Pyalidae	<i>Homoeosoma sinuella</i>	Twin-barred Knot-horn	None
Insecta	Lepidoptera	Hesperiidae	<i>Thymelicus lineola</i>	Essex Skipper	LC
Insecta	Lepidoptera	Pieridae	<i>Colias croceus</i>	Clouded Yellow	LC
Insecta	Lepidoptera	Pieridae	<i>Pieris brassicae</i>	Large White	LC
Insecta	Lepidoptera	Pieridae	<i>Pieris rapae</i>	Small White	LC
Insecta	Lepidoptera	Pieridae	<i>Pieris napi</i>	Green-veined White	LC
Insecta	Lepidoptera	Lycaenidae	<i>Polyommatus icarus</i>	Common Blue	LC
Insecta	Lepidoptera	Nymphalidae	<i>Vanessa atalanta</i>	Red Admiral	LC
Insecta	Lepidoptera	Nymphalidae	<i>Aglais io</i>	Peacock	LC
Insecta	Lepidoptera	Nymphalidae	<i>Melanargia galathea</i>	Marbled White	LC
Insecta	Lepidoptera	Nymphalidae	<i>Pyronia tithonus</i>	Gatekeeper	LC
Insecta	Lepidoptera	Nymphalidae	<i>Maniola jurtina</i>	Meadow Brown	LC
Insecta	Lepidoptera	Nymphalidae	<i>Coenonympha pamphilus</i>	Small Heath	VU, S41
Insecta	Lepidoptera	Erebidae	<i>Spilosoma lubricipeda</i>	White Ermine	LC, S41 (research only)
Insecta	Lepidoptera	Erebidae	<i>Euplagia quadripunctaria</i>	Jersey Tiger	LC

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Lepidoptera	Erebidae	<i>Tyria jacobaeae</i>	Cinnabar	LC, S41 (research only)
Insecta	Lepidoptera	Noctuidae	<i>Autographa gamma</i>	Silver Y	None
Gastropoda	Neotaenioglossa	Assimineidae	<i>Assiminea grayana</i>	Dun Sentinel	LC, NS
Gastropoda	Pulmonata	Helicidae	<i>Cepaea nemoralis</i>	Brown-lipped Snail	LC
Gastropoda	Pulmonata	Helicidae	<i>Cornu aspersum</i>	Garden Snail	LC
Gastropoda	Pulmonata	Hygromiidae	<i>Candidula intersecta</i>	Wrinkled Snail	LC
Gastropoda	Pulmonata	Hygromiidae	<i>Cernuella virgata</i>	Striped Snail	LC
Gastropoda	Pulmonata	Hygromiidae	<i>Monacha cantiana</i>	Kentish Snail	LC
Gastropoda	Pulmonata	Hygromiidae	<i>Trochulus hispidus</i>	Hairy Snail	LC
Gastropoda	Pulmonata	Valloniidae	<i>Vallonia costata</i>	Ribbed Grass-snail	LC
Gastropoda	Pulmonata	Vertiginidae	<i>Vertigo pygmaea</i>	Common Whorl-snail	LC

Appendix 3: List of invertebrates recorded at Tilbury in 2023

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

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Malacostraca	Isopoda	Trichoniscidae	<i>Haplophthalmus danicus</i>	a woodlouse	LC
Malacostraca	Isopoda	Trichoniscidae	<i>Trichoniscus provisorius/pusillus</i>	Common Pygmy Woodlouse	LC
Malacostraca	Isopoda	Philosciidae	<i>Philoscia muscorum sens. str.</i>	a common striped woodlouse	LC
Malacostraca	Isopoda	Platyarthridae	<i>Platyarthrus hoffmannseggii</i>	Ant Woodlouse	LC
Malacostraca	Isopoda	Oniscidae	<i>Oniscus asellus</i>	Common Shiny Woodlouse	LC
Malacostraca	Isopoda	Armadillidiidae	<i>Armadillidium nasatum</i>	a pill-woodlouse	LC
Malacostraca	Isopoda	Armadillidiidae	<i>Armadillidium vulgare</i>	Common Pill-woodlouse	LC
Malacostraca	Isopoda	Porcellionidae	<i>Porcellio scaber</i>	Common Rough Woodlouse	LC
Arachnida	Araneae	Mimetidae	<i>Ero furcata</i>	a spider	LC
Arachnida	Araneae	Linyphiidae	<i>Oedothorax fuscus</i>	a spider	LC
Arachnida	Araneae	Linyphiidae	<i>Oedothorax apicatus</i>	a spider	LC
Arachnida	Araneae	Linyphiidae	<i>Tenuiphantes tenuis</i>	a spider	LC
Arachnida	Araneae	Araneidae	<i>Neoscona adianta</i>	a spider	LC
Arachnida	Araneae	Araneidae	<i>Hypsosinga pygmaea</i>	a spider	LC
Arachnida	Araneae	Araneidae	<i>Zygiella x-notata</i>	a spider	LC
Arachnida	Araneae	Araneidae	<i>Argiope bruennichi</i>	Wasp Spider	LC
Arachnida	Araneae	Pisauridae	<i>Pisaura mirabilis</i>	a spider	LC
Arachnida	Araneae	Agelenidae	<i>Tegenaria silvestris</i>	a spider	LC
Arachnida	Araneae	Dictynidae	<i>Nigma walckenaeri</i>	a spider	LC
Arachnida	Araneae	Phrurolithidae	<i>Phrurolithus festivus</i>	a spider	LC
Arachnida	Araneae	Clubionidae	<i>Clubiona brevipes</i>	a spider	LC

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Arachnida	Araneae	Clubionidae	<i>Clubiona subtilis</i>	a spider	LC
Arachnida	Araneae	Gnaphosidae	<i>Zelotes latreillei</i>	a spider	LC
Arachnida	Araneae	Philodromidae	<i>Tibellus oblongus</i>	a spider	LC
Arachnida	Araneae	Thomisidae	<i>Misumena vatia</i>	a spider	LC
Arachnida	Araneae	Thomisidae	<i>Ozyptila sanctuaria</i>	a spider	LC
Arachnida	Araneae	Thomisidae	<i>Ozyptila brevipes</i>	a spider	LC
Arachnida	Araneae	Salticidae	<i>Sibianor aurocinctus</i>	a jumping spider	LC, NS
Arachnida	Araneae	Salticidae	<i>Synageles venator</i>	a jumping spider	LC, NS
Arachnida	Pseudoscorpiones	Chthoniidae	<i>Chthonius ischnocheles</i>	Common Chthoniid	None
Arachnida	Opiliones	Leiobunidae	<i>Dicranopalpus caudatus/ramosus</i>	a harvestman	None
Diplopoda	Chordeumatida	Craspedosomatidae	<i>Nanogona polydesmoides</i>	Eyed Flat-backed Millipede	LC
Collembola	Entomobryomorpha	Entomobryidae	<i>Orchesella cincta</i>	a springtail	None
Insecta	Odonata	Lestidae	<i>Lestes viridis</i>	Willow Emerald Damselfly	NA
Insecta	Odonata	Coenagriidae	<i>Ischnura elegans</i>	Blue-tailed Damselfly	LC
Insecta	Odonata	Aeshnidae	<i>Aeshna mixta</i>	Migrant Hawker	LC
Insecta	Odonata	Libellulidae	<i>Orthetrum cancellatum</i>	Black-tailed Skimmer	LC
Insecta	Odonata	Libellulidae	<i>Sympetrum striolatum</i>	Common Darter	LC
Insecta	Odonata	Libellulidae	<i>Sympetrum sanguineum</i>	Ruddy Darter	LC
Insecta	Dermaptera	Forficulidae	<i>Forficula lesnei</i>	Lesne's Earwig	LC, NS
Insecta	Dictyoptera	Blattellidae	<i>Planuncus tingitanus-complex</i>	Garden Cockroach	None
Insecta	Orthoptera	Meconematidae	<i>Meconema meridionale</i>	Southern Oak Bush-cricket	NA
Insecta	Orthoptera	Tettigoniidae	<i>Metrioptera roeselii</i>	Roesel's Bush-cricket	LC
Insecta	Orthoptera	Conocephalidae	<i>Conocephalus fuscus</i>	Long-winged Conehead	LC
Insecta	Orthoptera	Acrididae	<i>Chorthippus albomarginatus</i>	Lesser Marsh Grasshopper	LC
Insecta	Orthoptera	Acrididae	<i>Chorthippus brunneus</i>	Field Grasshopper	LC
Insecta	Orthoptera	Acrididae	<i>Chorthippus parallelus</i>	Meadow Grasshopper	LC
Insecta	Psocoptera	Amphipsocidae	<i>Kolbia quisquiliarum</i>	a barkfly	None

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Psocoptera	Ectopsocidae	<i>Ectopsocus petersi</i>	a barkfly	None
Insecta	Psocoptera	Elipsocidae	<i>Propocus pulchripennis</i>	a barkfly	None
Insecta	Hemiptera: Sternorrhyncha	Psyllidae	<i>Cacopsylla fulguralis</i>	Eleagnus Sucker	None
Insecta	Hemiptera: Sternorrhyncha	Triozidae	<i>Triozia chenopodii</i>	a psyllid	None
Insecta	Hemiptera: Sternorrhyncha	Triozidae	<i>Triozia urticae</i>	Nettle Psyllid	None
Insecta	Hemiptera: Auchenorrhyncha	Aphrophoridae	<i>Philaenus spumarius</i>	a froghopper	None
Insecta	Hemiptera: Auchenorrhyncha	Aphrophoridae	<i>Neophilaenus lineatus</i>	a froghopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Anaceratagallia ribauti</i>	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Aphrodes makarovi</i>	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Anoscopus albifrons</i>	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Recilia coronifera</i>	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Arthaldeus pascuellus</i>	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Arthaldeus striifrons</i>	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Limotettix striola</i>	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Conosanus obsoletus</i>	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Athysanus argentarius</i>	a leafhopper	None

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Mocydia crocea</i>	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Mocydiopsis attenuata</i>	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Mocydiopsis parvicauda</i>	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Opsius stactogalus</i>	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Empoasca pteridis</i>	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Zyginidia scutellaris</i>	a leafhopper	None
Insecta	Hemiptera: Auchenorrhyncha	Delphacidae	<i>Asiraca clavicornis</i>	a planthopper	Nationally Scarce (Nb)
Insecta	Hemiptera: Auchenorrhyncha	Delphacidae	<i>Stenocranus minutus</i>	a planthopper	None
Insecta	Hemiptera: Auchenorrhyncha	Delphacidae	<i>Euides basilinea</i>	a planthopper	None
Insecta	Hemiptera: Auchenorrhyncha	Delphacidae	<i>Eurybregma nigrolineata</i>	a planthopper	None
Insecta	Hemiptera: Auchenorrhyncha	Delphacidae	<i>Dicranotropis hamata</i>	a planthopper	None
Insecta	Hemiptera: Auchenorrhyncha	Delphacidae	<i>Javesella dubia</i>	a planthopper	None
Insecta	Hemiptera: Auchenorrhyncha	Delphacidae	<i>Javesella pellucida</i>	a planthopper	None
Insecta	Hemiptera: Auchenorrhyncha	Delphacidae	<i>Ribautodelphax imitans</i>	a planthopper	RDBK, S41
Insecta	Hemiptera: Auchenorrhyncha	Issidae	<i>Issus coleoptratus</i>	a planthopper	None

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Insecta	Hemiptera: Heteroptera	Tingidae	<i>Acalypta parvula</i>	a lacebug	None
Insecta	Hemiptera: Heteroptera	Tingidae	<i>Kalama tricornis</i>	a lacebug	None
Insecta	Hemiptera: Heteroptera	Tingidae	<i>Physatocheila confinis</i>	a lacebug	None
Insecta	Hemiptera: Heteroptera	Tingidae	<i>Tingis ampliata</i>	a lacebug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Deraeocoris flavilinea</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Adelphocoris lineolatus</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Lygus maritimus</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Lygus pratensis</i>	a mirid bug	RDB3
Insecta	Hemiptera: Heteroptera	Miridae	<i>Lygus rugulipennis</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Orthops kalmii</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Phytocoris varipes</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Pinalitus cervinus</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Notostira elongata</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Stenodema calcarata</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Heterotoma planicornis</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Campylomma verbasci</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Macrotylus horvathi</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Tuponia hippophaes</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Miridae	<i>Tytthus pygmaeus</i>	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Nabidae	<i>Himacerus major</i>	Grey Damsel-bug	None
Insecta	Hemiptera: Heteroptera	Nabidae	<i>Himacerus mirmicoides</i>	Ant Damsel-bug	None
Insecta	Hemiptera: Heteroptera	Nabidae	<i>Nabis ferus</i>	Field Damsel-bug	None
Insecta	Hemiptera: Heteroptera	Anthocoridae	<i>Anthocoris nemoralis</i>	a flower bug	None
Insecta	Hemiptera: Heteroptera	Anthocoridae	<i>Orius laevigatus</i>	a flower bug	None
Insecta	Hemiptera: Heteroptera	Anthocoridae	<i>Orius niger</i>	a flower bug	None
Insecta	Hemiptera: Heteroptera	Piesmatidae	<i>Parapiesma quadratum</i>	a bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Nysius graminicola</i>	a ground-bug	RDB3

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Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Nysius huttoni</i>	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Nysius senecionis</i>	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Ortholomus punctipennis</i>	a ground-bug	RDB3
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Cymus clavicolus</i>	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Ischnodemus sabuleti</i>	European Chinch-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Heterogaster urticae</i>	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Stygnocoris fuliginus</i>	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Stygnocoris sabulosus</i>	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Scolopostethus affinis</i>	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Beosus maritimus</i>	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Peritrechus geniculatus</i>	a ground-bug	None
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Raglius alboacuminatus</i>	a ground-bug	Nationally Scarce (Nb)
Insecta	Hemiptera: Heteroptera	Coreidae	<i>Coreus marginatus</i>	Dock Bug	LC
Insecta	Hemiptera: Heteroptera	Coreidae	<i>Gonocerus acuteangulatus</i>	Box Bug	LC
Insecta	Hemiptera: Heteroptera	Coreidae	<i>Ceraleptus lividus</i>	Slender-horned Leatherbug	LC, NS
Insecta	Hemiptera: Heteroptera	Coreidae	<i>Coriomeris denticulatus</i>	Denticulate Leatherbug	LC
Insecta	Hemiptera: Heteroptera	Rhopalidae	<i>Corizus hyoscyami</i>	a rhopalid bug	LC
Insecta	Hemiptera: Heteroptera	Rhopalidae	<i>Rhopalus subrufus</i>	a rhopalid bug	LC
Insecta	Hemiptera: Heteroptera	Rhopalidae	<i>Myrmus miriformis</i>	a rhopalid bug	LC
Insecta	Hemiptera: Heteroptera	Rhopalidae	<i>Brachycarenum tigrinus</i>	a rhopalid bug	NA
Insecta	Hemiptera: Heteroptera	Cydidae	<i>Tritomegas sexmaculatus</i>	Rambur's Shieldbug	None
Insecta	Hemiptera: Heteroptera	Scutelleridae	<i>Eurygaster maura</i>	Scarce Tortoise Shieldbug	LC, NS
Insecta	Hemiptera: Heteroptera	Pentatomidae	<i>Podops inunctus</i>	Knobbed Shieldbug	LC
Insecta	Hemiptera: Heteroptera	Pentatomidae	<i>Sciocoris cursitans</i>	Sand-runner Shieldbug	LC, NS
Insecta	Hemiptera: Heteroptera	Pentatomidae	<i>Aelia acuminata</i>	Bishop's Mitre Shieldbug	LC
Insecta	Hemiptera: Heteroptera	Pentatomidae	<i>Dolycoris baccarum</i>	Hairy Shieldbug	LC
Insecta	Hemiptera: Heteroptera	Pentatomidae	<i>Eysarcoris venustissimus</i>	Woundwort Shieldbug	LC

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Insecta	Hemiptera: Heteroptera	Pentatomidae	<i>Palomena prasina</i>	Common Green Shieldbug	LC
Insecta	Hemiptera: Heteroptera	Pentatomidae	<i>Eurydema oleracea</i>	Crucifer Shieldbug	LC
Insecta	Hemiptera: Heteroptera	Pentatomidae	<i>Rhaphigaster nebulosa</i>	Mottled Shieldbug	NA
Insecta	Coleoptera	Carabidae	<i>Notiophilus substriatus</i>	a ground beetle	LC
Insecta	Coleoptera	Carabidae	<i>Bembidion properans</i>	a ground beetle	LC
Insecta	Coleoptera	Carabidae	<i>Bembidion minimum</i>	a ground beetle	LC
Insecta	Coleoptera	Carabidae	<i>Bembidion obtusum</i>	a ground beetle	LC
Insecta	Coleoptera	Carabidae	<i>Tachyura parvula</i>	a ground beetle	LC, NS
Insecta	Coleoptera	Carabidae	<i>Amara aenea</i>	a ground beetle	LC
Insecta	Coleoptera	Carabidae	<i>Curtonotus aulicus</i>	a ground beetle	LC
Insecta	Coleoptera	Carabidae	<i>Harpalus affinis</i>	a ground beetle	LC
Insecta	Coleoptera	Carabidae	<i>Harpalus rubripes</i>	a ground beetle	LC
Insecta	Coleoptera	Carabidae	<i>Anisodactylus binotatus</i>	a ground beetle	LC
Insecta	Coleoptera	Carabidae	<i>Demetrias atricapillus</i>	a ground beetle	LC
Insecta	Coleoptera	Carabidae	<i>Paradromius linearis</i>	a ground beetle	LC
Insecta	Coleoptera	Carabidae	<i>Philorhizus melanocephalus</i>	a ground beetle	LC
Insecta	Coleoptera	Carabidae	<i>Syntomus foveatus</i>	a ground beetle	LC
Insecta	Coleoptera	Carabidae	<i>Microlestes minutulus</i>	a ground beetle	LC
Insecta	Coleoptera	Hydrophilidae	<i>Anacaena limbata</i>	an aquatic beetle	LC
Insecta	Coleoptera	Hydrophilidae	<i>Cercyon sternalis</i>	an aquatic beetle	LC
Insecta	Coleoptera	Hydrophilidae	<i>Megasternum concinnum</i>	a beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Metopsia clypeata</i>	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	<i>Rybaxis longicornis</i>	a pselaphine rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Sepedophilus nigripennis</i>	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	<i>Tachyporus hypnorum</i>	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	<i>Tachyporus nitidulus</i>	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	<i>Amischa decipiens</i>	a rove-beetle	None

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Insecta	Coleoptera	Staphylinidae	<i>Mocyta fungi</i> agg.	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Drusilla canaliculata</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Cypha longicornis</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Cypha punctum</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Oligota muensteri</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Oligota pumilio</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Stenus aceris</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Stenus ossium</i>	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	<i>Paederus littoralis</i>	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	<i>Astenus immaculatus</i>	a rove-beetle	LC, NS
Insecta	Coleoptera	Staphylinidae	<i>Astenus lyonessius</i>	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	<i>Ocypus olens</i>	Devil's Coach-horse	LC
Insecta	Coleoptera	Staphylinidae	<i>Tasgius ater</i>	a rove-beetle	LC
Insecta	Coleoptera	Staphylinidae	<i>Quedius simplicifrons</i>	a rove-beetle	LC, NS
Insecta	Coleoptera	Scirtidae	<i>Contacyphon laevipennis</i>	a beetle	LC
Insecta	Coleoptera	Byrrhidae	<i>Simplocaria semistriata</i>	a pill-beetle	LC
Insecta	Coleoptera	Cantharidae	<i>Rhagonycha fulva</i>	a soldier-beetle	LC
Insecta	Coleoptera	Ptinidae	<i>Mesocoelopus collaris</i>	a woodworm	None
Insecta	Coleoptera	Nitidulidae	<i>Meligethes carinulatus</i>	a pollen beetle	None
Insecta	Coleoptera	Nitidulidae	<i>Meligethes ruficornis</i>	a pollen beetle	None
Insecta	Coleoptera	Phalacridae	<i>Phalacrus championi</i>	a beetle	LC
Insecta	Coleoptera	Phalacridae	<i>Olibrus aeneus</i>	a beetle	LC
Insecta	Coleoptera	Phalacridae	<i>Olibrus corticalis</i>	a beetle	LC
Insecta	Coleoptera	Phalacridae	<i>Olibrus flavicornis</i>	a beetle	LC
Insecta	Coleoptera	Phalacridae	<i>Stilbus testaceus</i>	a beetle	LC
Insecta	Coleoptera	Cryptophagidae	<i>Ephistemus globulus</i>	a beetle	None
Insecta	Coleoptera	Alexiidae	<i>Sphaerosoma pilosum</i>	a beetle	None

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Insecta	Coleoptera	Coccinellidae	<i>Rhyzobius chrysomeloides</i>	a ladybird	None
Insecta	Coleoptera	Coccinellidae	<i>Rhyzobius litura</i>	a ladybird	None
Insecta	Coleoptera	Coccinellidae	<i>Nephus quadrimaculatus</i>	a ladybird	RDB2
Insecta	Coleoptera	Coccinellidae	<i>Nephus redtenbacheri</i>	a ladybird	None
Insecta	Coleoptera	Coccinellidae	<i>Scymnus frontalis</i>	a ladybird	None
Insecta	Coleoptera	Coccinellidae	<i>Platynaspis luteorubra</i>	a ladybird	Nationally Scarce (Na)
Insecta	Coleoptera	Coccinellidae	<i>Psyllobora vigintiduopunctata</i>	22-spot Ladybird	None
Insecta	Coleoptera	Coccinellidae	<i>Coccinella septempunctata</i>	7-spot Ladybird	None
Insecta	Coleoptera	Coccinellidae	<i>Hippodamia variegata</i>	Adonis' Ladybird	Nationally Scarce (Nb)
Insecta	Coleoptera	Coccinellidae	<i>Tytthaspis sedecimpunctata</i>	16-spot Ladybird	None
Insecta	Coleoptera	Coccinellidae	<i>Subcoccinella vigintiquattuorpunctata</i>	24-spot Ladybird	None
Insecta	Coleoptera	Corylophidae	<i>Corylophus sublaevipennis</i>	a beetle	None
Insecta	Coleoptera	Corylophidae	<i>Orthoperus brunnipes</i>	a beetle	RDB3
Insecta	Coleoptera	Latridiidae	<i>Enicmus transversus</i>	a beetle	None
Insecta	Coleoptera	Latridiidae	<i>Cartodere bifasciata</i>	a beetle	None
Insecta	Coleoptera	Latridiidae	<i>Cartodere nodifer</i>	a beetle	None
Insecta	Coleoptera	Latridiidae	<i>Corticaria crenulata</i>	a beetle	None
Insecta	Coleoptera	Latridiidae	<i>Corticaria impressa</i>	a beetle	None
Insecta	Coleoptera	Latridiidae	<i>Melanophthalma suturalis</i>	a beetle	None
Insecta	Coleoptera	Latridiidae	<i>Corticarina minuta</i>	a beetle	None
Insecta	Coleoptera	Latridiidae	<i>Corticaria gibbosa</i>	a beetle	None
Insecta	Coleoptera	Tenebrionidae	<i>Lagria hirta</i>	a darkling beetle	LC
Insecta	Coleoptera	Oedemeridae	<i>Oedemera lurida</i>	a beetle	LC
Insecta	Coleoptera	Anthicidae	<i>Anthicus antherinus</i>	an ant-like flower beetle	LC
Insecta	Coleoptera	Anthicidae	<i>Cyclodinus constrictus</i>	an ant-like flower beetle	LC, NS
Insecta	Coleoptera	Anthicidae	<i>Cordicollis instabilis</i>	an ant-like flower beetle	LC, NS

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Insecta	Coleoptera	Scraptiidae	<i>Anaspis pulicaria</i>	a beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Bruchidius imbricornis</i>	a seed-beetle	NA
Insecta	Coleoptera	Chrysomelidae	<i>Bruchus brachialis</i>	a seed-beetle	NA
Insecta	Coleoptera	Chrysomelidae	<i>Bruchus rufimanus</i>	a seed-beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Cassida rubiginosa</i>	Thistle Tortoise Beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Phyllotreta nigripes</i>	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Phyllotreta vittula</i>	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Aphthona euphorbiae</i>	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Longitarsus flavicornis</i>	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Longitarsus ochroleucus</i>	a flea-beetle	LC, NS
Insecta	Coleoptera	Chrysomelidae	<i>Longitarsus pratensis</i>	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Sphaeroderma testaceum</i>	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Psylliodes chrysocephala</i>	a flea-beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Cryptocephalus fulvus</i>	a leaf-beetle	LC
Insecta	Coleoptera	Chrysomelidae	<i>Cryptocephalus hypochaeridis</i>	a leaf-beetle	LC, NS
Insecta	Coleoptera	Chrysomelidae	<i>Cryptocephalus pusillus</i>	a leaf-beetle	LC
Insecta	Coleoptera	Apionidae	<i>Ceratapion onopordi</i>	a weevil	None
Insecta	Coleoptera	Apionidae	<i>Ceratapion carduorum</i>	a weevil	None
Insecta	Coleoptera	Apionidae	<i>Diplapion confluens</i>	a weevil	None
Insecta	Coleoptera	Apionidae	<i>Protapion apricans</i>	a weevil	None
Insecta	Coleoptera	Apionidae	<i>Protapion assimile</i>	a weevil	None
Insecta	Coleoptera	Apionidae	<i>Apion frumentarium</i>	a weevil	None
Insecta	Coleoptera	Apionidae	<i>Stenopteropion tenue</i>	a weevil	None
Insecta	Coleoptera	Apionidae	<i>Ischnopterapion loti</i>	a weevil	None
Insecta	Coleoptera	Apionidae	<i>Holotrichapion pisi</i>	a weevil	None
Insecta	Coleoptera	Apionidae	<i>Oxystoma pomonae</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Otiorhynchus raucus</i>	a weevil	Nationally Scarce (Nb)

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Insecta	Coleoptera	Curculionidae	<i>Otiorhynchus ovatus</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Romualdius angustisetulus</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Sitona hispidulus</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Sitona humeralis</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Sitona lineatus</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Lixus scabricollis</i>	a weevil	RDBK
Insecta	Coleoptera	Curculionidae	<i>Larinus carlinae</i>	a weevil	Nationally Scarce (Nb)
		Curculionidae	<i>Larinus turbinatus</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Hypera plantaginis</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Hypera postica</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Hadroplontus litura</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Trichosirocalus troglodytes</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Anthonomus rubi</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Tychius picirostris</i>	a weevil	None
Insecta	Coleoptera	Curculionidae	<i>Tychius squamulatus</i>	a weevil	Nationally Scarce (Nb)
Insecta	Coleoptera	Curculionidae	<i>Mecinus pascuorum</i>	a weevil	None
Insecta	Hymenoptera: Parasitica	Cynipidae	<i>Diplolepis rosae</i>	Rose Bedeguar Gall causer	None
Insecta	Hymenoptera: Aculeata	Bethylidae	<i>Bethylus boops</i>	a solitary wasp	None
Insecta	Hymenoptera: Aculeata	Bethylidae	<i>Bethylus cephalotes</i>	a solitary wasp	None
Insecta	Hymenoptera: Aculeata	Bethylidae	<i>Epyris niger</i>	a solitary wasp	None
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Formica cunicularia</i>	an ant	None
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Lasius flavus</i>	an ant	None
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Lasius niger sens. str.</i>	an ant	None
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Myrmica ruginodis</i>	an ant	None
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Myrmica sabuleti</i>	an ant	None
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Myrmica scabrinodis</i>	an ant	None
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Myrmica specioides</i>	an ant	RDB3

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Insecta	Hymenoptera: Aculeata	Vespidae	<i>Vespula germanica</i>	German Wasp	None
Insecta	Hymenoptera: Aculeata	Sphecidae	<i>Ammophila sabulosa</i>	Red-banded Sand Wasp	None
Insecta	Hymenoptera: Aculeata	Crabronidae	<i>Cerceris rybyensis</i>	Ornate Bee Fox	None
Insecta	Hymenoptera: Aculeata	Crabronidae	<i>Crabro cribrarius</i>	Slender-bodied Digger-wasp	None
Insecta	Hymenoptera: Aculeata	Crabronidae	<i>Ectemnius continuus</i>	a digger-wasp	None
Insecta	Hymenoptera: Aculeata	Crabronidae	<i>Philanthus triangulum</i>	Bee Wolf	RDB2
Insecta	Hymenoptera: Aculeata	Crabronidae	<i>Trypoxylon attenuatum</i>	Slender Wood-borer Wasp	None
Insecta	Hymenoptera: Aculeata	Melittidae	<i>Dasypoda hirtipes</i>	Pantaloone Bee	Nationally Scarce (Nb)
Insecta	Hymenoptera: Aculeata	Megachilidae	<i>Megachile willughbiella</i>	Willughby's Leaf-cutter Bee	None
Insecta	Hymenoptera: Aculeata	Megachilidae	<i>Anthidium manicatum</i>	Wool-carder Bee	None
Insecta	Hymenoptera: Aculeata	Andrenidae	<i>Andrena nigrospina/pilipes</i>	a mining-bee	Nationally Scarce (Nb)
Insecta	Hymenoptera: Aculeata	Apidae	<i>Bombus hortorum</i>	Small Garden Bumblebee	None
Insecta	Hymenoptera: Aculeata	Apidae	<i>Bombus humilis</i>	Brown-banded Carder-bee	S41
Insecta	Hymenoptera: Aculeata	Apidae	<i>Bombus pascuorum</i>	Common Carder-bee	None
Insecta	Hymenoptera: Aculeata	Apidae	<i>Bombus sylvarum</i>	Shrill Carder-bee	Nationally Scarce (Nb), S41
Insecta	Hymenoptera: Aculeata	Apidae	<i>Bombus terrestris</i>	Buff-tailed Bumblebee	None
Insecta	Hymenoptera: Aculeata	Apidae	<i>Anthophora bimaculata</i>	Green-eyed Flower-bee	None
Insecta	Neuroptera	Hemerobiidae	<i>Psectra diptera</i>	a brown lacewing	None
Insecta	Neuroptera	Chrysopidae	<i>Chrysoperla carnea agg.</i>	a green lacewing	None
Insecta	Diptera	Syrphidae	<i>Episyrphus balteatus</i>	a hoverfly	LC
Insecta	Diptera	Syrphidae	<i>Eristalis tenax</i>	a hoverfly	LC
Insecta	Diptera	Syrphidae	<i>Myathropa florea</i>	a hoverfly	LC
Insecta	Diptera	Conopidae	<i>Sicus ferrugineus</i>	a thick-headed fly	None
Insecta	Diptera	Tephritidae	<i>Urophora cardui</i>	a picture-winged fly	None
Insecta	Diptera	Tephritidae	<i>Sphenella marginata</i>	a picture-winged fly	None
Insecta	Diptera	Tephritidae	<i>Terellia ruficauda</i>	a picture-winged fly	None

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status (refer to Appendix 1)
Insecta	Diptera	Tephritidae	<i>Xyphosia miliaria</i>	a picture-winged fly	None
Insecta	Diptera	Sciomyzidae	<i>Coremacera marginata</i>	a snail-killing fly	None
Insecta	Diptera	Agromyzidae	<i>Phytomyza vitalbae</i>	a leaf-miner fly	None (Falk, Ismay & Chandler, 2016)
Insecta	Diptera	Opomyzidae	<i>Geomyza subnigra</i>	an opomyzid fly	pNationally Scarce (Falk, Ismay & Chandler, 2016)
Insecta	Diptera	Opomyzidae	<i>Geomyza tripunctata</i>	an opomyzid fly	None (Falk, Ismay & Chandler, 2016)
Insecta	Diptera	Chloropidae	<i>Elachiptera brevipennis</i>	a frit fly	None (Falk, Ismay & Chandler, 2016)
Insecta	Diptera	Tachinidae	<i>Eriothrix rufomaculata</i>	a parasitic fly	None (Falk, Pont & Chandler, 2005)
Insecta	Lepidoptera	Nepticulidae	<i>Stigmella aurella</i>	Golden Pigmy	None
Insecta	Lepidoptera	Psychidae	<i>Psyche casta</i>	Common Sweep	None
Insecta	Lepidoptera	Coleophoridae	<i>Coleophora versurella</i>	Pale Orache Case-bearer	None
Insecta	Lepidoptera	Depressariidae	<i>Agonopterix alstromeriana</i>	Brown-spot Flat-body	None
Insecta	Lepidoptera	Gelechiidae	<i>Aproaerema anthyllidella</i>	Vetch Sober	None
Insecta	Lepidoptera	Tortricidae	<i>Neocochylis hybridella</i>	White-bodied Conch	None
Insecta	Lepidoptera	Tortricidae	<i>Cacoecimorpha pronubana</i>	Carnation Tortrix	None
Insecta	Lepidoptera	Tortricidae	<i>Epiphyas postvittana</i>	Light Brown Apple-moth	None
Insecta	Lepidoptera	Pieridae	<i>Colias croceus</i>	Clouded Yellow	LC
Insecta	Lepidoptera	Pieridae	<i>Pieris brassicae</i>	Large White	LC
Insecta	Lepidoptera	Pieridae	<i>Pieris rapae</i>	Small White	LC
Insecta	Lepidoptera	Pieridae	<i>Pieris napi</i>	Green-veined White	LC
Insecta	Lepidoptera	Lycaenidae	<i>Aricia agestis</i>	Brown Argus	LC
Insecta	Lepidoptera	Lycaenidae	<i>Polyommatus icarus</i>	Common Blue	LC
Insecta	Lepidoptera	Lycaenidae	<i>Celastrina argiolus</i>	Holly Blue	LC
Insecta	Lepidoptera	Nymphalidae	<i>Vanessa atalanta</i>	Red Admiral	LC

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Insecta	Lepidoptera	Nymphalidae	<i>Vanessa cardui</i>	Painted Lady	LC
Insecta	Lepidoptera	Nymphalidae	<i>Aglaia io</i>	Peacock	LC
Insecta	Lepidoptera	Nymphalidae	<i>Lasiommata megera</i>	Wall	EN, S41 (research only)
Insecta	Lepidoptera	Nymphalidae	<i>Pyronia tithonus</i>	Gatekeeper	LC
Insecta	Lepidoptera	Nymphalidae	<i>Maniola jurtina</i>	Meadow Brown	LC
Insecta	Lepidoptera	Nymphalidae	<i>Coenonympha pamphilus</i>	Small Heath	VU, S41
Insecta	Lepidoptera	Geometridae	<i>Idaea rusticata</i>	Least Carpet	LC
Insecta	Lepidoptera	Sphingidae	<i>Macroglossum stellatarum</i>	Humming-bird Hawk-moth	LC
Insecta	Lepidoptera	Erebidae	<i>Euplagia quadripunctaria</i>	Jersey Tiger	LC
Insecta	Lepidoptera	Noctuidae	<i>Autographa gamma</i>	Silver Y	None
Gastropoda	Pulmonata	Agriolimacidae	<i>Deroceras reticulatum</i>	Netted Field Slug	LC
Gastropoda	Pulmonata	Helicidae	<i>Cornu aspersum</i>	Garden Snail	LC
Gastropoda	Pulmonata	Hygromiidae	<i>Candidula intersepta</i>	Wrinkled Snail	LC
Gastropoda	Pulmonata	Hygromiidae	<i>Monacha cantiana</i>	Kentish Snail	LC
Gastropoda	Pulmonata	Pupillidae	<i>Lauria cylindracea</i>	Common Chrysalis-snail	LC
Gastropoda	Pulmonata	Limacidae	<i>Ambigolimax valentianus</i>	Iberian Threeband Slug	NA
Gastropoda	Pulmonata	Valloniidae	<i>Vallonia costata</i>	Ribbed Grass-snail	LC
Gastropoda	Pulmonata	Vertiginidae	<i>Vertigo pygmaea</i>	Common Whorl-snail	LC

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