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Terrestrial Invertebrate Survey 2015

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AN INVERTEBRATE SURVEY OF ABP LAND, NEWPORT DOCKS

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This report was produced for RPS.

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Cover photograph: *Calophasia lunula* (Toadflax Brocade) larvae.

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1 Summary

- Three days of terrestrial sampling produced a diversity of 329 species.
- Of these 32 (9.7%) are considered here as Key Species, seven of them of Red Data Book (RDB) or equivalent status.
- This is a rather good diversity for such an open site especially given the absence of spring/early summer sampling.
- The proportion of Key Species is good indicating an area of significant invertebrate conservation value.
- While many key species are known to be doing well nationally, and some have good populations in the region, others are rarely recorded or unknown in South Wales.
- One species, *Liriomyza intonsa*, is new for Britain
- Four Biodiversity Action Plan (BAP)/Section 42 species were recorded, including two important bumblebees *Bombus humilis* and *B. sylvarum* for which this part of South Wales is an important stronghold.
- Both these bumblebees require a larger landscape scale habitat mosaic in order to maintain viable populations and many open habitats in and around the survey site will be important for the viability of these populations.
- This survey shows that the saltmarsh beside the River Ebbw, Compartment F is of particular conservation importance.
- Mitigation measures to conserve the invertebrate importance of the site will be important in the design of the new section of motorway.
- Any development beyond the footprint of the new section of motorway, even if within the 250 meter buffer zone, would require specific survey and mitigation plans.

2 Introduction

The large area of land which was surveyed within the working Newport Docks includes some extensive areas of semi-natural habitats. These include areas typical of ex-industrial sites, which provide habitats of a type which are now very rare in the wider countryside. Because of this such sites, often referred to as “brown-field”, are attractive to a large assemblage of invertebrates that no longer find favourable habitats in natural situations or on protected sites.

3 Survey Methodology

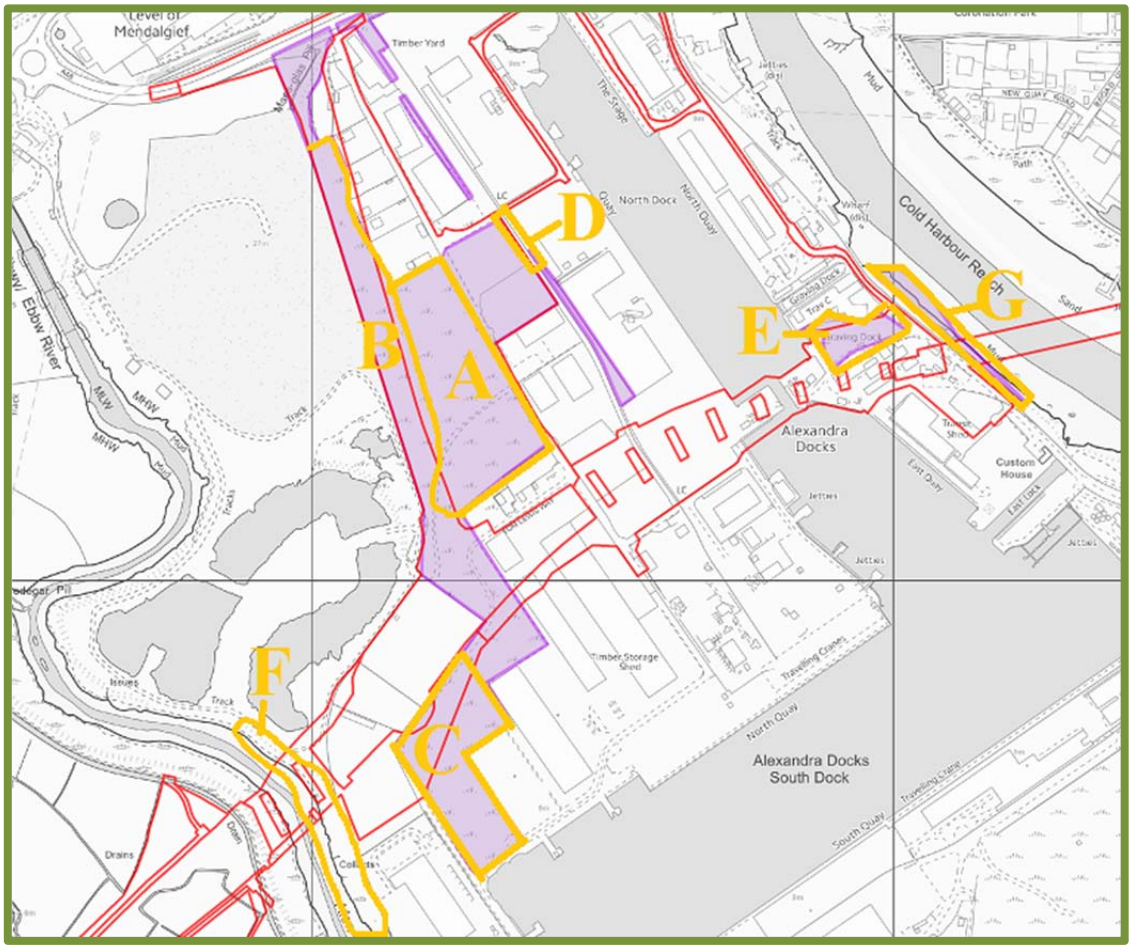
3.1 Sampling Techniques

This very large working industrial area has numerous patches of open habitat varying from small linear sites along roads and rail tracks to large areas where various substrates have been tipped and are developing ruderal vegetation, flower-rich grassland and sallow and Buddleia scrub. Areas of potential habitat within 250 metres of the proposed new section of motorway were initially selected from aerial photographs. These sampling compartments were refined on site and those that seemed to have the most interesting habitat, and produced good results on the first visit, were sampled at least twice and some on each of the three visits. Seven survey compartments were selected over the site based on their habitat type. Compartment A was surveyed twice on 15 July and 28 August, compartments B & C on all three visits, compartments D & E on 15 July and 28 August, compartment F only on 30 July (due to access difficulties) and compartment G on 30 July and 28 August. On the 15 & 30 July most sampling was done with a 40 cm diameter white-bag sweep-net combined with spot searching of particular features and some limited ground searching. The net was swept steadily from side to side whilst pacing steadily through the grass, herbage or scrub foliage, or in scrubby areas specimens were knocked from the foliage. Specimens were extracted from the net with a pooter or, in the case of larger specimens, individually potted in 30 ml soda glass tubes. When sampling was completed or the pooter became too full, the contents were killed with ethyl acetate then transferred to 30 ml soda glass tubes together with a data label.

On the third visit on 28 August all sampling was done with a vacuum sampler. This technique has the advantage in habitats that are sparsely vegetated or with very short vegetation of capturing many terrestrial species that are rarely found with a sweep-net. An additional reason for changing techniques was the short duration between visits. Because the sampling started late in the season, the visits were not sufficiently spaced to avoid significant overlap if the same area was sampled by the same technique so soon after previous visit. The very different suite of invertebrates found with vacuum sampling as opposed to sweep-netting overcomes the potential deficiency of the compressed sampling period.

The sample compartments are marked on the map (Fig 1).

Figure 1 Map showing sample compartments.



3.2 Sample Timing

The site was visited on three occasions in the latter part of the summer. Delays in access arrangements meant that the first sampling date on 15 July 2015 was later than hoped. This late start meant that the gap between the first and second visits was only two weeks, whereas 4-6 weeks would be normal for a three day survey. However, as much as was possible the second visit on 30 July sampled different compartments or areas within a compartment. The final survey on 28 August was reasonably well separated from the second.

3.3 Constraints

Every attempt was made to visit in sunny, dry conditions, but this summer the weather conditions were unreliable and somewhat variable. On 15 July it was overcast, wet, but warm with a light breeze, becoming drier later. These conditions were not ideal for flying, sun-loving insects, but the sweep-netting was unlikely to have been much affected once the vegetation dried out. The 30 July was cloudy with a cool NW wind, but dry with sunny

intervals 18-19°C. On 28 August it was sunny but cool with a light breeze, the vegetation damp in the morning. This latter factor was problematical for the vacuum sampling, damaging some samples taken in the early part of the visit.

The late start of the survey meant that potentially important invertebrates with flight periods between April and June will have been missed. The nature of this site, with its bare and sparsely vegetated substrate that will warm up quickly in the early part of the year, is likely to be favourable for such early flying species. To some extent the likely value of such communities can be extrapolated from the samples obtained in July and August, but it is not possible to estimate what spring species of conservation importance might be present without surveying at that time of the year.

3.4 IDENTIFICATION

Where practical, invertebrates were identified in the field but, wherever the slightest doubt existed, one or more specimens were collected for more detailed scrutiny. To achieve rigorously accurate identifications, specimens were identified using the author's own library and entomological collection. Where these proved insufficient, specimens were submitted to relevant experts. Selected specimens have been retained in the author's personal collection as vouchers.

3.5 TAXONOMIC COVERAGE

It is desirable that as wide a taxonomic range as possible is identified, in order to sample numerous ecological types, i.e. invertebrates with widely differing natural histories. In order to make the best use of the time available for identification, it was important to name the more readily identified groups which do not require very time consuming techniques and are within the experience of the worker.

The following orders and families of invertebrates were sampled and named to species level.

Mollusca – slugs and snails

Isopoda - woodlice

Diplopoda – millipedes

Chilopoda - centipedes

Araneae – Spiders

Neuroptera - lacewings

Odonata - Dragonflies and Damselflies

Orthoptera – Grasshoppers and crickets

Dermaptera - earwigs

Hemiptera, Auchenorrhyncha - Froghoppers, Leafhoppers and Planthoppers (excluding females of difficult genera)

Hemiptera, **Heteroptera - True Bugs** (excluding smaller Miridae)

Trichoptera – Caddisflies

Lepidoptera – Butterflies and Moths

Trichoptera - caddisflies

Coleoptera – **Beetles** (all except small Aleocharine rove beetles and other very small obscure families)

Diptera - True Flies (except, Cecidomyiidae, Chironomidae, Ceratopogonidae, Simulidae, Phoridae, Sphaeroceridae, and females of some groups which are not identifiable).

Hymenoptera, Symphyta - sawflies

Hymenoptera, Aculeata - Ants, wasps and bees

3.6 ANALYSIS

A system of British conservation status for invertebrates has been in use since publication of the Red Data Book for insects (Shirt, 1987), amended and supplemented by a series of JNCC Nature Conservation reviews (e.g. Falk, 1991a; Falk, 1991b). By this system, the rarest and most threatened species are given one of the Red Data Book (RDB) statuses. Species which do not qualify as RDB but are nonetheless uncommon are given one of the Nationally Scarce statuses. The status categories and criteria relevant to this report are defined in Annex A.

'Key Species' are here defined by the following categories.

- British Red Data Book (RDB) and Nationally Scarce species (including statuses from JNCC texts which are published, 'in press' or 'in prep.').
- Species formerly regarded as either RDB or Nationally Scarce but recently downgraded.

For site assessment, the percentage of Key Species is a useful guide to the overall quality of the site for invertebrates, in comparison to other sites surveyed by the author using similar techniques. Higher quality sites support higher percentages of Key Species. To enable a fair comparison with survey data accumulated by the author over many years, species formerly regarded as either RDB or Nationally Scarce but recently downgraded are still treated as Key Species.

There are numerous examples of invertebrates which have been listed as either RDB or Nationally Scarce and have subsequently been found to be more widespread and abundant, either as a result of actual increase in range size or population size, or as a result of improved understanding by entomologists of how to find or identify them. Where the authors regard the official conservation status to be out of date, this is indicated in the Key Species accounts (Section 5).

4 Results

4.1 OVERALL RESULTS

The survey identified 329 species of invertebrate (Annex B), a good diversity for three days of survey, especially as it was over little more than a six week period, with no spring sampling. To some extent, the lack of spring species was compensated for by the use of vacuum sampling which found a different range of species than did the sweep-netting and spot searching. A broad range of invertebrate groups was covered to a greater or lesser extent and the species list includes representatives of the following groups: snails, woodlice, harvestmen, spiders, lacewings, dragonflies & damselflies, grasshoppers & crickets, earwigs, true bugs, froghoppers, planthoppers & leafhoppers, moths, butterflies, beetles, true flies, ants, wasps and bees. The main technique of sweep-netting was most efficient at sampling flying insects, with Diptera found in the greatest number (112 species, 34%). The second largest group found was Coleoptera (78 species, 24%), including many phytophagous species swept from herbage, but also a good proportion of terrestrial species found using the vacuum sampler. Third in diversity was Lepidoptera, (37 species 11%), largely butterflies, day flying moths and micromoths. The Hymenoptera are rather poorly represented, given the habitat. The lack of spring visits and relatively cool conditions during some visits will have detracted from the diversity of these sun-loving insects found.

Of the 329 species identified by this survey, 32 (9.7%) are considered here as Key Species (defined in Section 3.6). 9.7% is a good proportion of Key Species, and indicates an area of significant invertebrate conservation value. Seven of these species have RDB status (2.1%), again a high proportion further indicating the quality of the site for invertebrates of conservation concern. This diversity and quality is not atypical of large ex-industrial sites;

compared to all the sites the author has surveyed over the last 15+ years, this site comes just in the upper quartile for quality based on the proportion of Key Species.

An analysis of the Key Species found reveals that several are not of great conservation concern. In Table 1 below, 15 species have been highlighted in grey as no longer of national conservation status despite still having this status officially. However, at least three of these species are still of local significance, being rare in South Wales or at least with very few records in the country; these are highlighted in yellow in the Regional status column. Eight species highlighted in yellow in the species column do merit attention as they are judged still to be of national conservation significance. One of these, *Bombus sylvarum*, is known from nearby sites, so the colony found in Newport Docks is part of an important meta-population that adds to the viability and significance of this species locally, especially as this bumblebee seems to occur at a higher density here than in most places across the Gwent Levels. Others such as *Paralimnus phragmitis*, *Elaphropus parvulus*, *Agriotes sordidus*, *Sitona waterhousei*, *Ensina sonchi* and *Acanthiophilus helianthi* all appear to be as rare in Britain as their status suggests and equally rare in South Wales. Add to this the discovery of a species new for Britain, the tiny Agromyzid fly *Liriomyza intonsa* and there is still reason to regard this site overall as having considerable importance for invertebrates. Species in Table 1 not highlighted in the species column are either showing signs of increasing nationally but are still very scarce, or are data deficient.

Table 1 Summary of key species.

Species	English Name	Key species designation	current national status	Regional status
Conocephalus discolor	Long-winged Conehead (a cricket)	**Nationally Scarce a**	no longer of conservation concern	rapidly increasing
Forficula lesnei	Lesne's Earwig	**Nationally Scarce b**	Increasing in range	still very local
Paralimnus phragmitis	A leaf-hopper	**Nationally Scarce b**	Very local	Rare in wales
Pentastiridius leporinus	A Cixiid leaf hopper	**Nationally Scarce b**	relatively frequent but very local	relatively frequent but very local
Bembecia ichneumoniformis	Six-belted Clearwing (a moth)	**Nationally Scarce b**	becoming more frequent	becoming more frequent
Calophasia lunula	Toadflax Brocade (a moth)	**RDB3**	rapidly spreading north and west	very rare, first larval records
Elaphropus parvulus	A ground beetle	**Nationally Scarce b**	very local	very rare in Wales
Agriotes sordidus	A click beetle	**RDB3**	Rare	very rare in Wales
Silis ruficollis	A soldier beetle	**Nationally Scarce b**	Increasingly frequent	Increasingly frequent
Meligethes fulvipes	A pollen beetle	**Nationally Scarce**	probably overlooked	probably overlooked
Meligethes rotundicollis	A pollen beetle	**Nationally Scarce**	probably overlooked	rare but probably under recorded
Hippodamia variegata	Adonis Ladybird	**Nationally Scarce b**	Increasingly frequent	Increasingly frequent
Sitona waterhousei	A weevil	**Nationally Scarce b**	Scarce	Scarce
Sibinia primita	A weevil	**Nationally Scarce b**	very local	local but well established
Platypalpus ruficornis	A hybotid fly	**(Nationally Scarce) None**	apparently increasing	few records, overlooked?
Platypalpus stabilis	An empid fly	**(Nationally Scarce) None**	Increasingly frequent	frequent
Micromorphus albipes s.l.	A dolichopodid fly	**(Nationally Scarce) None**	frequent but taxonomy unresolved	frequent but taxonomy unresolved
Pipizella virens	A hoverfly	**Nationally Scarce**	Increasingly frequent	well established

Species	English Name	Key species designation	current national status	Regional status
Melieria picta	A picture-winged fly	**Nationally Scarce**	Local, coastal	Local, coastal
Ensina sonchi	A gallfly	**None (Nationally Scarce b)**	Scarce	possibly new record for Wales
Acanthiophilus helianthi	A gallfly	**Nationally Scarce b**	Local	Local
Campiglossa malaris	A gallfly	**RDB1 (RDBK)**	increasing rapidly	recent arrival and increasing
Tephritis matricariae	A gallfly	**(RDBK)**	increasing rapidly	recent arrival and increasing
Homoneura interstincta	A lauxanid fly	**RDB3**	Increasingly frequent	few records, overlooked?
Homoneura patelliformis	A lauxanid fly	**Nationally Scarce**	Local, overlooked	Possibly 1st Welsh record but probably overlooked
Homoneura thalhammeri	A lauxanid fly	**Nationally Scarce**	Frequent and under recorded	local but under recorded
Pherbellia griseola	A snail-killing fly	**Nationally Scarce**	Local	Local but well established
Liriomyza intonsa	An agromyzid fly	**New for Britain**	First for Britain but certainly overlooked	First for Wales but certainly overlooked
Trachysiphonella scutellata	A frit fly	**Nationally Scarce (None)**	frequent and much under recorded	Rare but very under recorded
Cistogaster globosa	A parasite fly	**RDB1 (RDB2)**	Spreading and becoming more frequent	Recent arrival but increasing
Bombus sylvarum	Shrill Carder Bee	**Nationally Scarce b**	Very local but common in places	very important colony locally
Hylaeus signatus	Large Yellow-faced Bee	**Nationally Scarce b**	Local but commoner than formerly	Local and scarce

4.2 ASSESSMENT OF COMPARTMENTS

4.2.1 Compartment A

This is a large area of open, sparsely vegetated ground with scattered sallow scrub and some wetter areas although no permanent water. It is well defined on the east, north and south boundaries by roads and buildings, but to the west it is bordered by compartment B, which encompasses a much more scrub-dominated area, and the boundary between them is not clear cut, in places grading gradually from open ruderal habitat to scrub.

This large area was thoroughly sampled with a sweep-net on 15 July and with three separate vacuum samples on 28 August (ST3128185326, 3130785278 & 3132485193). This produced a diversity of 95 species, a good number for the effort and timing of visits. Of these five have national status, a proportion of 5.3% and one has RDB status (1.1%). This is lower than any other area sampled. Of the five key species found, three of them *Hippodamia variegata*, *Tephritis matricariae* and *Trachysiphonella scutellata* are all doing well at a national level and no longer merit the status they currently have. *Sibinia primita*, while of interest and worthy of consideration, is not that infrequent in South Wales. Only *Bombus sylvarum* is both of national conservation importance and of regional significance.

4.2.2 Compartment B

This is a long, narrow strip along the western boundary squeezed between compartment A and the boundary fence. This compartment is a mosaic of sallow/buddleia scrub, open areas with bare substrate and sparse vegetation, denser herbaceous areas and some wetland with *Phragmites*. This compartment was well sampled, with limited sweep-netting on 15 July, a more thorough sample on 30 July and two vacuum samples on 28 August (ST3110085358 & 3114885400). The complex mix of habitats here produced a diversity of 99 species, a good number reflecting the diversity of flora and habitat structure. Of these, nine species are treated here as Key Species, a proportion of 9.1%, a high proportion indicative of a site of considerable conservation value.

However, consideration of the species involved indicates that this crude figure needs further interpretation. Of the nine scarce species, a little more than half fall into the category of increasing and therefore of limited conservation value now (*Silis ruficollis*, *Platypalpus stabilis*, *Tephritis matricariae*, *Homoneura interstincta* and *Homoneura thalhammeri*). Only two species (*Acanthiophilus helianthi* & *Bombus sylvarum*) are still nationally rare and with no clear sign of increasing.

So although at first sight much better than compartment A, this is largely down to the better variety of habitat, and it is only of marginally greater conservation importance.

4.2.3 Compartment C

This is a largely open compartment with scrub encroachment largely confined to the northern part and not yet dense. The open areas are tall, coarse grassland with many herbaceous plants including a good variety of species important for invertebrates as foodplants or nectar sources. Exposed substrate is limited to recently disturbed areas. This compartment was sampled on all three dates, although only a single vacuum sample was taken on 28 August (ST3127984554).

A diversity of 137 species was found, the highest number of any compartment by some way. In part this was due to the effort put in and the size of the compartment, but this is not the sole reason as less time was spent and fewer vacuum samples taken here than in compartment B, so the favourability of the habitat must be a contributing factor. Of these 137 species, 12 (8.8%) have national conservation status, a high proportion indicative of a site of conservation importance. Three of these have RDB status (2.2%), a very good proportion further indicating the quality of this compartment.

Of these 12 species, half fall into the category of increasing and spreading so of limited conservation concern (*Conocephalus discolor*, *Forficula lesnei*, *Hippodamia variegata*, *Campiglossa malaris*, *Tephritis matricariae* and *Homoneura thalhammeri*). Of the remaining six only one falls into the category of clearly being of both national and local importance (*Bombus sylvarum*). However, several are very rare or newly arrived in Wales so are important in a local context (*Calophasia lunula*, *Meligethes rotundicollis* and *Pherbellia griseola*).

4.2.4 Compartment D

The greater part of this compartment is densely covered with Buddleia scrub, so the only available habitat to sample was along the railway line. This has very short, droughted vegetation, exposed substrate and bryophytes. It was sampled with a sweep-net and by ground searching on 15 July and with a single vacuum sample on 28 August (ST3133185613). This limited sampling of a very small area of rather uniform habitat produced only 24 species. A low diversity but two of them proved to be Key Species, a proportion of 8.3%, a very high percentage. Of course the very small sample size means that not too much can be concluded from this as chance finds can have a big effect. Of these two key species, one is the Ladybird *Hippodamia variegata*, which was common across the site and is an increasing species of low conservation concern. The other is the scarce ground beetle *Elaphropus parvulus*, which is very local and scattered in Britain as a whole and until recently was known by a single record in Wales. However, it has now been found widely in Wales, both on its classic river shingle sites and on "brownfield" sites.

So despite the high proportion of scarce species found, the combination of small sample size and increasing frequency of the two Key Species found, places this small compartment into the least concern bracket.

4.2.5 Compartment E

This is a small area of coarse, flower-rich grassland with surrounding scrub and a small area of temporary wetland. It was sampled with a sweep-net at the end of the 15 July visit and two vacuum samples were taken on 28 August (ST3197385438 & 3190585412). This relatively limited sampling effort produced 71 species, an excellent diversity for so small an area sampled on just two visits. Of these, five (7%) are treated here as key species, a reasonably high proportion suggestive of conservation value. However, a closer look at the species involved shows that three of them, *Bembecia ichneumoniformis*, *Pipizella virens* and *Campiglossa malaris* are no longer of much conservation concern because they are increasing and spreading nationally. Likewise, *Cistogaster globosa* is increasing nationally but is still rare in Wales and deserves some consideration until more is known. The weevil *Sitona waterhousei* really does seem to be scarce nationally and very local in South Wales.

4.2.6 Compartment F

The narrow fringe of *Phragmites* and saltmarsh along the east bank of the River Ebbw was rather difficult to access so was only visited once and sampled with a sweep-net on 30 July. This very limited sampling produced a diversity of 63 species, which is really quite impressive. Nine of these species are treated here as Key Species, a proportion of 14.3%, a very high percentage and better than any other compartment on this survey. Unfortunately the sample size is not as large as would be ideal, but it is reasonable to be fairly confident from this figure that this compartment has significant conservation value. Of the nine key species, only two (*Micromorphus albipes s.l.* and *Tephritis matricariae*) are clearly species that are increasing and do not raise much concern. Additionally *Meligethes fulvipes* possibly falls into this category as it is likely to be very under recorded. This still leaves six species that are genuinely still scarce in Britain or at least in South Wales. Of particular interest is the gallfly *Ensina sonchi* which could possibly be the first record for Wales and the RDB3 click beetle *Agriotes sordidus* with only three records in Wales.

This compartment appears to be the most important found on the survey, its loss or disruption could be detrimental to local biodiversity.

4.2.7 Compartment G

This linear compartment either side of a rail line squeezed between the road and the saltmarsh was sampled with a sweep-net on 30 July and two vacuum samples were taken on 28 August (ST3194485528 & 3212785374). It is primarily flower rich grassland with ruderal and sparsely vegetated areas, some exposed substrate and some Buddleia and sallow along the eastern side. This rather limited sampling effort produced 55 species, not a very high diversity, but given the size of the compartment and habitat available it is rather good. Of these, just 3 (5.5%) are treated here as key species, so at the lower end of quality compared to other sites but still indicative of an area with some conservation value. Of the three species of conservation significance found, one is *Bombus sylvarum*, an important species here and across the Gwent Levels, but well recorded in other compartments. The second is the lauxanid fly *Homoneura patelliformis* which, while not infrequent nationally, seems to be rare in Wales with this possibly being the first record. Although this relatively recently recognised species is very likely over looked, it is still an important find in a local context. The final species is the tiny Agromyzid fly *Liriomyza intonsa*, a species not previously recorded in Britain. Although this is a very under recorded family of flies, and this species will certainly be found elsewhere if looked for, it is still a significant find and consideration of its conservation needs will be essential.

5 Key Species

5.1 RED DATA BOOK

5.1.1 *Calophasia lunula* Toadflax Brocade RDB3

This very attractive moth and its even more striking larvae arrived in Britain around 1950 and was initially restricted to the south-east and central southern coasts of England. Since then it has spread north and inland but there is some suggestion that it is now in decline again (UK Moths http://ukmoths.org.uk/species/calophasia-lunula/). In South Wales it was recorded for the first time earlier this year as light-trapped adults. This is the first evidence that it is breeding in the region. It mainly frequents shingle beaches and grassy waysides. It has two generations, sometimes overlapping, from May to August, and migrants sometimes appear away from the main stronghold in July and August. The larvae, which feed on toadflax (*Linaria* sp), can be found from late June to October. Two larvae were swept from the foodplant in compartment C.

5.1.2 *Agriotes sordidus* RDB3

This greyish click beetle is distributed from south Devon to Kent and north to Lancashire, but recent records are few, nearly all southern and coastal. In South Wales there are three records in National Biodiversity Network (NBN): Pembrokeshire, near Bridgend and the Gwent Levels. It mainly frequents the banks of tidal rivers, coastal and estuarine habitats. Its biology is unknown but larvae probably develop underground at the roots of plants. Adults are recorded from April to July (Hyman, 1992). A single male was swept in compartment F beside the River Ebbw.

5.1.3 *Campiglossa malaris* RDB1 (RDBK)

This attractive gallfly with patterned wings was not long ago a great rarity in Britain only known from the far east of Kent having been added to the British list in 1974 (Clemons, 1996). Over the next 8 years it reached the eastern outskirts of London (Clemons, 2004), and it was first noted in Bristol in 2008 so it presence in South Wales was to be expected. To date it has usually been found in coastal grassland where its foodplant, ragwort, is abundant. Adults are found in July and August. It was found in compartments C and E.

5.1.4 *Tephritis matricariae* (RDBK)

This gallfly with patterned wings was only added to the British list in 2000 based on specimens found in April of that year at Sandwich Bay (Clemons, 2000). Since then it has spread rapidly around the Kent coast and with a few records inland (Clemons, 2004), and it is now recorded in London (NBN) and west to Warwickshire and Gwent (pers obs). It is clearly colonising this country fast but to the author's knowledge this is the first year it has been recorded in Wales. This species no longer deserves its provisional status and is probably not even Nationally Scarce any more. The original records were from the dunes at Sandwich and since then it has been found on grassy areas in Canterbury and chalk downland between Folkestone and Dover. The larvae develop in the capitula of *Crepis* with *vesicaria*, *taraxacifolia* and *capillaris* the most likely species to be favoured (Clemons, 2000). Adults seem to be active from April to September. It was found in compartments A, B, C and F.

5.1.5 *Homoneura interstincta* RDB3

This species was originally placed on the British list on the basis of specimens identified by Collin (1948). However, it has recently been shown that Collin misidentified his specimens and in fact they belong with a newly described species *H. mediospinosa*. The true *interstincta* was only discovered to be British when three specimens were caught in south Somerset in 2003 (Gibbs, 2004). Since then the species has been found at many other sites in southern England, including a few from South Wales (pers. obs.). It is probably too frequent to justify this status. Nothing is known of its habitat requirements or life history but there seems to be an association with poplar and sallow. Larvae of this genus are generally believed to develop in decaying vegetable matter including fallen leaves (Falk & Ismay in prep.). Adults are recorded from June to August (pers. obs.). It was found in compartment B.

5.1.6 *Liriomyza intonsa* New for Britain

This tiny black and yellow agromyzid fly has not been recorded in Britain before. It was first described from a single male found in Denmark in 1960 (Spencer, 1976) and has subsequently been recorded from the Czech Republic, France, Germany, Lithuania and Spain (Fauna europea.com). Nothing is known of its biology or habitat preferences. A single male was found in a vacuum sample in compartment G on 28 August 2015.

5.1.7 *Cistogaster globosa* RDB1 (RDB2)

This attractive little parasite fly is known from a few localities in southern England: Wilts; Hants; Surrey; Berks (Falk & Pont in prep.). Just recently it has been found at many more sites and at one site in Wales (Howe & Woodman, 2001) so it seems to be doing well at the moment, hence the proposal in a forthcoming review to downgrade its status from RDB1 to RDB2. It seems probable that it will eventually lose its RDB status and be graded as Nationally Scarce. It frequents calcareous downland and grassland where it parasitises the hemipteran bug *Aelia acuminata* the Bishops Mitre. Adults are recorded from June to September. It was swept in compartment E.

5.2 NATIONALLY SCARCE

5.2.1 *Conocephalus discolor* Long-winged Conehead Nationally Scarce a

The Long-winged cone-head, once an uncommon species of the south coast west to the New Forest, has shown a remarkable spread in recent years. In South Wales it is a fairly recent arrival following the M4 (NBN), and it is clear that this species is no longer of national conservation concern. It occurs in coarse, mainly ungrazed vegetation in warm places such as downland, coastal reedbeds, heath, bogs and disturbed areas. Nymphs emerge in May maturing in August sometimes surviving until November (Haes & Harding 1997). It was noted in compartment C.

5.2.2 *Forficula lesnei* Lesne's Earwig Nationally Scarce b

Lesne's Earwig is very similar to its much commoner congener Common Earwig *Forficula auricularia* but lacks functional wings and is a little smaller and paler. In Britain this species is on the northern edge of its range, being largely confined to southern counties favouring base-rich soils. In South Wales records are relatively few (NBN). Although it is likely to have been under recorded due to its superficial resemblance to the Common Earwig, it appears to be restricted to particularly favourable locations which have not yet been characterised (Haes & Harding op.cit.). It is frequently found in scrub and amongst common weeds, habitats which are ubiquitous in the country, so its absence from most areas suggests that very subtle habitat and environmental conditions, no doubt readily disturbed, are essential for its survival. Adult insects can be found from May to October. It was swept in compartment C.

5.2.3 *Paralimnus phragmitis* Nationally Scarce b

This distinctive leaf-hopper is found in southern Britain north to Norfolk and west to Hampshire and in South Wales where it is recorded in Glamorgan and Carmarthen. Most records are from East Anglia where it frequents fens, broads and estuaries and other coastal sites. It is usually associated with common reed *Phragmites australis*, but also with sea club rush *Bolboschoenus maritimus* and possibly other plants. Adults are recorded from May to September (Kirby 1992). It was swept from *Phragmites* in compartment F.

5.2.4 *Pentastiridius leporinus* Nationally Scarce b

This Cixiid leaf hopper occurs around the coast of southern England from Suffolk to Gloucestershire and South Wales but is very local. It is a saltmarsh species, usually found in the grassy areas in the upper marsh sometimes extending some way up estuaries. There are also records from bogs in the New Forest and it is not a saltmarsh associated species on the continent. The nymphs are thought to be root feeders on various wetland grasses. Can be abundant where found but colonies can be confined to a relatively limited area of saltmarsh. Adults are found from May to August (Kirby, 1992). It was swept from saltmarsh in compartment F.

5.2.5 *Bembecia ichneumoniformis* Six-belted Clearwing Nationally Scarce b

The Six-belted Clearwing is, like all clearwings, an elusive species in the field looking more like a wasp than a moth. It is well distributed across southern England north to Cambridgeshire with records from Yorkshire and South Wales (Heath & Emmet, 1985; NBN). It has recently been found much more widely in southern Britain; possibly no longer meriting its national status. It occurs on calcareous downland, cliffs, and quarries which offer a south facing aspect and a warm microclimate. The eggs are laid on *Lotus* or *Anthyllis*, the larvae feeding in a silken tunnel within the root. Adults are on the wing from the end of June to mid-August. It was swept in compartment E.

5.2.6 *Elaphropus parvulus* Nationally Scarce b

This small ground beetle is widely scattered across the southern half of England north to near Manchester but very local. Uncommon in Wales with records scattered across the county, nearly all of them recent (NBN). It frequents coastal sites, river shingle and lake margins and in urban areas, rubbish tips, paths and old walls. It has been noted from shingle with hardly any vegetation and beside tiny trickles. It isncreasingly found on “brown-field” sites but these specimens could possibly be a separate species (M. Telfer pers. comm.). Adults have been found from March to September (Hyman, 1992). It was found in vacuum samples in compartment D.

5.2.7 *Silis ruficollis* Nationally Scarce b

This red and blackish soldier beetle was once a considerable rarity but has increased in the last 40 years and is now not uncommon in some parts of southern England and Wales

(Hyman, 1992). It is fairly well established in South Wales, especially near Swansea, but also seems to be fairly frequent in Gwent (NBN). It frequents river and lake margins, fens, marshes and other wetlands. The larvae are thought to be predatory, living free on the ground or foliage. Adults can be found on lush vegetation from June to August. It probably over winters as a full-grown larvae (Hyman op.cit.). It was found in small reed bed amongst scrub in compartment B.

5.2.8 *Meligethes fulvipes* Nationally Scarce

This tiny black pollen beetle with reddish legs is widespread in England and South Wales but very local and scattered. It is usually found near the coast and in marshy places inland. It is associated with white mustard *Sinapis arvensis* (Hyman, 1994). It was fairly frequent here being found in compartments B, C and F.

5.2.9 *Meligethes rotundicollis* Nationally Scarce

Another tiny black pollen beetle, also associated with crucifers, recorded from southeast England and the Midlands. The author is not aware of any records from Wales, although it was found just east of the River Usk this year (pers. obs.). It occurs along field margins, roadsides, waste places where it can be found on *Sinapis arvensis* and *Sisybrium officinale*. Adults are recorded in April, June to August (Hyman 1994). It was found in compartment C.

5.2.10 *Hippodamia variegata* Adonis' Ladybird Nationally Scarce b

The Adonis Ladybird is a black and red species with a very variable number of spots on the elytra. It is mainly found in southern and eastern England, and is very local elsewhere (Hyman, 1992) but in recent years it has shown a very rapid increase and northward spread. It seems to be well established in South Wales, especially on ex-industrial sites (pers. obs.; NBN), and is probably widespread now. Although it is mainly coastal it occurs on a variety of dry weedy habitats. Adults are active from June to September, probably over wintering as adults in dry situations (Hyman, 1992). It was found in compartments A, C and D.

5.2.11 *Sitona waterhousei Nationally Scarce b*

This species is widespread but local in England (except East Anglia) and Wales and can be common where found (Hyman, 1992). There are scattered records in South Wales along the south coast and north west, including one in Gwent (NBN). It is found on cliffs, calcareous grasslands and possibly coastal shingle and quarries. This weevil is phytophagous probably on the roots of plants often associated with *Lotus*. Adults are active from February to September. It was found in compartment E.

5.2.12 *Sibinia primita* Nationally Scarce b

This tiny and very attractively marked weevil is widespread but local in England and Wales. In South Wales it is fairly well distributed, mainly coastally, from Cardiff west to Pembrokeshire (NBN). It frequents disturbed ground, sand pits, coastal shingle, heathland, downland and gardens. It is associated with pearlwort, sea-spurry and possibly chickweed and mouse-ear. Adults are recorded from May to August (Hyman, 1992). It was found in compartment A.

5.2.13 *Platypalpus ruficornis* (Nationally Scarce) None

A small hybotid fly, widely distributed across central England and South Wales (NBN). In South Wales there are a couple of records along the south coast so either rare or overlooked in the country (NBN; MapMate data). Now known from at least 16 counties so recently this species has had its national status removed (Falk and Crossley, 2005) but this is possibly premature. Most records appear to be from sites with a wetland component. Adults have been recorded from June to August. It was swept in compartment B.

5.2.14 *Platypalpus stabilis* (Nationally Scarce) None

A small empid fly once only known from scattered sites in south England but now much more frequently recorded. When the updated review covering this species was published its Nationally Scarce status was removed (Falk and Crossley, 2005). In South Wales it appears to be relatively frequent, especially in the Gwent Levels (pers.obs.). Many records are from wetlands, perhaps in association with sallows. It was swept in compartment B.

5.2.15 *Micromorphus albipes s.l.* (Nationally Scarce) None

One of the smallest Dolichopodid flies, widespread in Britain but local, and no doubt much overlooked due to its small size. In Britain it has long been known that this genus includes at least two species although only one is listed. It is not known what names should be applied to these species. If records of all species are combined then it is too frequent to merit its official status so on this basis it was excluded from the latest review of scarce insects. However, when the true identity of the British species is resolved this may change. The genus is known to occur in 23 counties in Britain and these include numerous records in South Wales (Falk & Crossley 2005; pers.obs.). It frequents a variety of wetland habitats with records from June to August (Fonseca 1978). It was found in compartment F. Only females were found so species uncertain but saltmarsh habitats are usually occupied by species B.

5.2.16 *Pipizella virens* Nationally Scarce

This small black hoverfly is widespread in southern England with the odd record north to Yorkshire. In South Wales it is fairly well established along the south coast with a scatter of records further north (Ball *et al.,* 2011). Its habitat preferences are uncertain and it occurs in woods, fens, coastal marshes and commons. The larvae are reported to feed on aphids on the roots of umbellifers. Adults are recorded from May to July (Falk 1991b). It was swept in compartment E.

5.2.17 *Melieria picta* Nationally Scarce

This small picture-winged fly is mainly found in south eastern England extending west to the Isle of Wight and north to Yorkshire with the vast majority of records from the Thames Estuary. In South Wales there is a scatter of records along the south coast west to the Gower (NBN). It frequents saltmarsh and brackish ditches and fleets of coastal levels. Its life history is unknown but larvae possibly develop in decaying vegetable matter. Adults are recorded from May to August (Falk & Ismay in prep.). It was swept in compartment F.

5.2.18 *Ensina sonchi* None (Nationally Scarce b)

This gallfly with almost clear wings is widespread in England but with a decidedly southeast bias, with a concentration of records in Kent and near London. In South Wales it appears to be very rare with no records mapped in Clemons (1996, 2004) but records from Anglesey and Pembrokeshire in NBN (of unknown reliability). The larvae develop in the capitula of a wide range of composites including *Aster* and *Sonchus* (White, 1988) that were present where the species was found on this survey. Adults are recorded July to October, occasionally May (Clemons, 1996). A single female was swept in compartment F.

5.2.19 *Acanthiophilus helianthi* Nationally Scarce b

This gallfly with very limited wing patterning has a decidedly scattered distribution across the southern half of England and a scatter of records in Wales, mainly along the south coast (NBN). It is probably getting more frequent with the only records in the region being recent. It frequents dry grassland, meadows and occasionally gardens where the larvae develop in the flower heads of knapweed. Adults are recorded from July to September (Clemons, 1996; Falk, 1991b). It was swept in compartment B.

5.2.20 *Homoneura patelliformis* Nationally Scarce

This small, yellow lauxanid fly has a scattered distribution over the southern half of England predominantly in the Midlands. Records are scattered widely in England as far north as Warwickshire and Northamptonshire but the author knows of no records for Wales. It does not have official national status because it was not known in Britain when the relevant review was published; at the time it was confused with another species which was given Nb status. It is commonly found by sweeping scrub, isolated shrubs, trees and adjacent tall herbage or coarse grasses and shows a preference for sallow on post-industrial sites such as old tips, and disused railway lines. Its biology is unknown; larvae of this genus are generally believed to develop in decaying vegetable matter including fallen leaves. Adults are recorded from June to September (Falk & Ismay in prep.). One was swept in compartment G.

5.2.21 *Homoneura thalhammeri* Nationally Scarce

This small yellowish fly has a scattered distribution over southern England north to Yorkshire and in South Wales. It does not have official national status because it was not known in Britain when the relevant review was published; at the time it was confused with another species which was given Nb status. There are about 20 post-1960 records, including Gwent Levels (NBN) and near Swansea (pers. obs.). Where recording has been intensive this species has been found more frequently so is no doubt overlooked and perhaps no longer deserving its national status. It is most often found by sweeping scrub, isolated shrubs, trees and adjacent tall herbage or coarse grasses. Its biology is unknown but larvae of this genus are generally believed to develop in decaying vegetable matter including fallen leaves. Adults are recorded from June to September (Falk & Ismay in prep.). It was swept in compartments B & C.

5.2.22 *Pherbellia griseola* Nationally Scarce

This snail-killing fly is widespread in Britain but very local with about 30 known post 1960 sites. In Wales it is rather frequent, especially common in Anglesey, but also with several records from South Wales (NBN). It is recorded from a wide variety of habitats, mainly fens and bogs but also wet woodlands, there is apparently a requirement for standing water. The larvae develop as parasitoides of aquatic snails. Adults are recorded from May to September (Falk, 1991b). It was found in compartment C.

5.2.23 *Trachysiphonella scutellata* Nationally Scarce (None)

A tiny black and yellow frit fly which is known to be widespread in southern England. This species is now considered to be too frequent to merit nationally scarce status so will be deleted from the list in a forthcoming review. In South Wales it seems to be rather rare with one record in NBN, but probably much under recorded. It frequents short dry grassland, both calcareous and acid. Its biology is unknown. Adults are recorded from June to August (Falk & Ismay in prep.). It was swept in compartment A.

5.2.24 *Bombus sylvarum* Shrill Carder Bee Nationally Scarce b

The Shrill Carder Bee is included as a national BAP species because of major declines across Britain, with only four or five remaining metapopulations in England and South Wales, and the East Thames Corridor. It seems to be doing very well in South Wales with strong populations from Pembrokeshire to the Gwent Levels (NBN). Bumblebee populations appear to operate at a landscape scale and it is probable that viable individual populations require minimum ranges of between ten to twenty sq. km of good matrix habitat within farmland, and *B. sylvarum* seems to require much larger areas of good habitat than Brown-banded Carder Bee *B. humilis*. It is found on a variety of open, flower-rich situations, dunes, salt-marsh edges, shingle beaches, chalk downland and heathland. Pollen collected from a wide variety of flowers, Fabaceae, Lamiaceae and Scrophulariaceae preferred (Edwards & Telfer, 2001). A very strong population was found with workers noted in compartments A, B, C, F & G, with multiple observations in some compartments, especially compartment A.

5.2.25 *Hylaeus signatus* Large Yellow-faced Bee Nationally Scarce b

This is the largest of the yellow-faced bees and is widespread in southern England north to Norfolk and Warwickshire with about 30 post-1970 sites (Falk 1991a). There was evidence that this bee was becoming commoner, with many more sites found in the 1990's (M. Edwards pers.comm.) but over the last few years it has become scarce again. There are a few scattered records in Wales, all in the south between Swansea and Cardiff (NBN) and it was recorded in Newport this year (pers. obs.). It occurs on downland, heathland, disturbed situations, gardens and open woodlands. It is closely associated with *Reseda* from which the adults collect all their pollen. Nests are known from banks with bare soil, the mortar in walls or in the dead stems of *Rubus* or *Rosa*. It is single brooded with adults found from June to September (Falk op.cit.). It was noted in compartment C.

5.3BAP/S42, LOCALLY SIGNIFICANT

5.3.1 *Scotopteryx chenopodiata* Shaded Broad-bar BAP

A geometrid moth of a wide range of habitats including sandhills, downland, waste ground and grassland. The larvae feed on vetches and clovers. It was described by Skinner (1984) as 'widespread and moderately common throughout the British Isles including Orkney and the Inner Hebrides' and as 'common' by Waring & Townsend (2003). However, Fox *et al*. (2006) reported a decline of 73% over 35 years for this species leading to its BAP status. The indications are that action for this species will cover national monitoring and research programmes, and action through national agricultural and forestry policy measures. In South Wales it is still fairly well distributed in suitable habitat (NBN). It was found in compartment B.

5.3.2 *Chiasmia clathrata* Latticed Heath BAP

A geometrid moth of a wide range of open habitats: grasslands, heathland, open woodland, cliffs, etc. The larvae feed on various species of clover. It was described by Skinner (1984) as 'widespread and locally common in England, Wales and southern Scotland' and as 'common' by Waring & Townsend (2003). However, Fox *et al*. (2006) reported a decline of 87% over 35 years for this species. It is still widespread and not uncommon in Wales, mainly in the lowlands (NBN). The indications are that action for this species will cover national monitoring and research programmes, and action through national agricultural and forestry policy measures. It was seen in compartments A & E.

5.3.3 *Tyria jacobaeae* Cinnabar BAP

This very attractive and well known day-flying moth has recently been added to the Priority List of UK Biodiversity Action Plan Species. In South Wales it is still quite common and well recorded (NBN). Its addition is due to concern that the species is suffering a significant decline and probably that its food plant is in jeopardy due to legislation. The larvae feed on Ragwort, a plant subject to stringent control by many landowners. Ragwort supports many insect species other than Cinnabar so this moth acts as a flagship for the whole Ragwort dependant fauna. It was noted, mostly as larvae, in compartments A. C, E & G.

5.3.4 *Bombus humilis* Brown-banded Carder Bee BAP

The Brown-banded Carder Bee has declined dramatically in recent decades. Although not included in Falk (1991a) it should now be viewed as Nationally Scarce. Historically widespread in England and Wales, it is now largely confined to local populations in the south and west. In Wales it has some very strong populations in the south, including across the Gwent Levels, and a scatter of records further north (NBN). Bumblebee populations appear to operate at a landscape scale and it is probable that viable individual populations require minimum ranges of from ten to twenty sq. km of good matrix habitat within farmland. Found on a variety of open, flower-rich situations, dunes, salt-marsh edges, shingle beaches, chalk downland and heathland. Important plant species used in early summer by queens include

Fodder Vetch *Vicia villosa*, Red Clover *Trifolium pratense* and Broad-leaved Everlasting-pea *Lathyrus latifolius*. Workers forage on the flowers of species such as bird's-foot trefoils *Lotus* spp., clovers, Black Horehound *Ballota nigra*, Lucerne *Medicago sativa* and Red Bartsia *Odondites verna*. It was frequent on this site, noted in all compartments except D.

6 Site Evaluation

It is clear from the results of this survey set out above that this large site includes some very interesting habitats and microhabitats that harbour some scarce and rare insects. The overall proportion of 9.7% of key species places it well within the same quality for invertebrates as many nature reserves. Also of note is the number of very high quality (RDB) species found that further suggests a site of regional or even national importance. Seven species have RDB status or equivalent (including one first for Britain), a high proportion of 2.1%. Of these seven species, several are being recorded with increasing frequency and will be downgraded to Nationally Scarce or even lose their status altogether when next reviewed, but some are important nationally. Further, the presence of several BAP species adds to the conclusion that, while this site might not be of national importance, it is certainly a site with significant value for regional conservation and its loss might be detrimental for local biodiversity.

It is also clear that some areas are much more important than others. It is apparent that compartment F along the River Ebbw is the most important based on the findings of this survey. Of course the habitat that the scarce invertebrates are using stretches much further than the section within the 250 metre buffer sampled. Nevertheless, given the location of the new section of motorway , it will be essential to put mitigation into effect to minimise loss of biodiversity in this compartment. The remaining compartments are all rather similar, differing largely in the degree to which scrub has encroached. Their value really comes in their size, providing an extensive mosaic of unusual habitats that are rarely found in protected areas. The road itself, other than bisecting the area, is unlikely to be detrimental, however, development of the compartments surveyed wholesale will certainly have a negative effect on local biodiversity. Indeed if all the areas surveyed were eliminated without suitable mitigation, then this could potentially be detrimental even to national biodiversity.

7 Recommendations

This three day survey clearly shows that the site overall has an invertebrate biodiversity as good as found on many nature reserves so requires some care and mitigation if development of the new section of motorway proceeds. The road itself probably will not be too damaging, being fairly narrow in the context of the size of the compartments surveyed. Indeed wide, well managed verges might compensate for loss of the road alone (except for compartment F, which is discussed below). Damage to habitat during construction might also be an issue, but because disturbance is an important element of the open, ruderal habitats present, careful avoidance of the most critical areas will probably permit the invertebrate communities to persist. The greatest potential for damage will come if the compartments surveyed are developed wholesale once the road provides the transport links. This would very likely lead to notable loss of local biodiversity and damage the viability of species such as the two important bumblebees in the wider Gwent Levels by reducing the connectivity through Newport. Should this happen then survey specifically to address such development will be required.

The one area where the road footprint itself might be significantly damaging is compartment F, the saltmarsh and riverside reed beds along the Ebbw. This compartment produced the highest proportion of key species, some of them still as scarce as they were when originally given their status. This impressive result comes despite just a single visit and the small extent of the habitat. It is possible that the habitat surveyed within the 250 metre buffer zone is much more extensive and all the species found in this small area are more widespread along the banks of the River Ebbw. However, in the absence of further survey to show this, a mitigation plan is required. It will not be possible to create such habitat elsewhere, but it will

be feasible to manage less favourable areas that are becoming overgrown or over shaded to ensure the area of saltmarsh and riparian reed bed is not reduced in extent.

Mitigation for the other compartments with respect to the road should be relatively simple. If the large areas of compartment C and A are in large part retained and managed as grassland and ruderal ecosystems this will almost certainly allow all the species found and their associated invertebrate communities to persist. Additionally verges and embankments of the road should be allowed to naturally regenerate, perhaps using soil from any parts damaged to act as a seed bank, and then managed as open, flower-rich grassland. Tree planting along such verges or embankments should be avoided.

In order to maintain the open nature of the important habitats here, control of invasive Buddleia will be required. Sallow scrub will need some managing to prevent succession to woodland, but some sallow should be retained so that the habitat mosaic currently present is maintained. Management of the open areas will require an annual partial cut i.e. some areas cut one year, another area within the same compartment the following year, so that some tall grass and flower heads are allowed to stand through the winter, but scrub encroachment is prevented. Additionally some areas, particularly in compartment A should be intermittently scarified to create exposed substrate to encourage the ruderal communities.

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9 Annex A: British conservation status categories – definitions.

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)).

Red Data Book category EXTINCT

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

Red Data Book category 1, Endangered

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

Red Data Book category 2, Vulnerable

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

Red Data Book category 3, Rare

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

Red Data Book category I, Indeterminate

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

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

Red Data Book category K, Insufficiently Known

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

Nationally Scarce Category A, Na.

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

Nationally Scarce Category B, Nb.

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

Nationally Scarce, N.

Definition Species which do not fall within Red Data Book categories but which are nonetheless uncommon in Great Britain. This status category has been used where

information has not been sufficient to allocate a species to either Na or Nb. These species are thought to occur in between 16 and 100 10-km squares of the National Grid.

10 Annex B: Species list.

Order: Family	Species	Vernacular	National Status	A	B	C	D	E	F	G
Mollusca: Vertiginidae	*Vertigo pygmaea*	Common Whorl Snail		**X**						
Mollusca: Valloniidae	*Vallonia excentrica*	Eccentric Grass Snail						**X**		
Mollusca: Helicidae	*Trichia striolata*	Strawberry Snail		**X**						
Mollusca: Helicidae	*Trichia hispida*	Hairy Snail					**X**			**X**
Mollusca: Helicidae	*Cepaea nemoralis*	Grove or Brown-lipped Snail		**X**						
Mollusca: Helicidae	*Cepaea hortensis*	White-lipped Snail		**X**						
Mollusca: Helicidae	*Helix aspersa*	Garden or Common Snail								**X**
Isopoda: Philosciidae	*Philoscia muscorum*	Common Striped Woodlouse						**X**		
Isopoda: Armadillidiidae	*Armadillidium nasatum*	a pill woodlouse			**X**	**X**				
Isopoda: Armadillidiidae	*Armadillidium vulgare*	Common Pill Woodlouse		**X**	**X**	**X**		**X**		**X**
Isopoda: Porcellionidae	*Porcellio scaber*	Common Rough Woodlouse						**X**		**X**
Opiliones: Phalangiidae	*Phalangium opilio*			**X**			**X**			**X**
Opiliones: Leiobunidae	*Dicranopalpus ramosus*				**X**					
Araneae: Mimetidae	*Ero furcata*					**X**				
Araneae: Linyphiidae	*Pelecopsis parallela*									**X**
Araneae: Linyphiidae	*Cnephalocotes obscurus*							**X**		
Araneae: Tetragnathidae	*Pachygnatha degeeri*					**X**		**X**		
Araneae: Araneidae	*Hypsosinga pygmaea*			**X**						
Araneae: Lycosidae	*Pardosa pullata*				**X**					
Araneae: Pisauridae	*Pisaura mirabilis*							**X**		
Araneae: Clubionidae	*Clubiona stagnatilis*					**X**				
Araneae: Thomisidae	*Ozyptila sanctuaria*				**X**					
Araneae: Salticidae	*Heliophanus flavipes*			**X**				**X**		
Neuroptera: Hemerobiidae	*Hemerobius stigma*					**X**				
Odonata: Lestidae	*Lestes sponsa*	Emerald Damselfly							**X**	
Odonata: Coenagriidae	*Ischnura elegans*	Blue-tailed Damselfly		**X**	**X**					
Odonata: Coenagriidae	*Enallagma cyathigerum*	Common Blue Damselfly		**X**	**X**					
Odonata: Coenagriidae	*Erythromma viridulum*	Small Red-eyed Damselfly				**X**				

Order: Family	Species	Vernacular	National Status	A	B	C	D	E	F	G
Orthoptera: Tettigoniidae	*Pholidoptera griseoaptera*	Dark Bush Cricket							X	
Orthoptera: Conocephalidae	*Conocephalus discolor*	Long-winged Conehead	**Nationally Scarce a**			X				
Orthoptera: Phaneropteridae	*Leptophyes punctatissima*	Speckled Bush Cricket		X						
Orthoptera: Acrididae	*Chorthippus albomarginatus*	Lesser Marsh Grasshopper		X					X	
Orthoptera: Acrididae	*Chorthippus brunneus*	Common Field Grasshopper			X	X	X	X		
Orthoptera: Acrididae	*Chorthippus parallelus*	Meadow Grasshopper		X	X	X		X		
Dermaptera: Forficulidae	*Forficula auricularia*	Common Earwig			X	X				
Dermaptera: Forficulidae	*Forficula lesnei*		**Nationally Scarce b**			X				
Hemiptera: Lygaeidae	*Drymus sylvaticus*				X					
Hemiptera: Lygaeidae	*Kleidocerys resedae*				X					
Hemiptera: Lygaeidae	*Megalonotus chiragra*			X						
Hemiptera: Lygaeidae	*Peritrechus geniculatus*					X				
Hemiptera: Lygaeidae	*Stygnocoris sabulosus*			X	X			X		
Hemiptera: Miridae	*Phytocoris varipes*			X		X				
Hemiptera: Miridae	*Stenodema laevigata*							X		
Hemiptera: Miridae	*Teratocoris antennatus*								X	
Hemiptera: Nabidae	*Himacerus major*							X		
Hemiptera: Nabidae	*Himacerus mirmicoides*			X	X	X		X		X
Hemiptera: Nabidae	*Nabis flavomarginatus*					X				
Hemiptera: Tingidae	*Acalypta parvula*			X	X			X		X
Hemiptera: Tingidae	*Kalama tricornis*			X						
Hemiptera: Tingidae	*Tingis cardui*					X				
Hemiptera: Coreidae	*Coreus marginatus*	Dock Bug		X		X				
Hemiptera: Cydnidae	*Sehirus luctuosus*	Forget-me-not Shieldbug		X						
Hemiptera: Pentatomidae	*Aelia acuminata*	Bishop's Mitre Shieldbug				X		X		
Hemiptera: Pentatomidae	*Podops inuncta*	Turtle Shieldbug				X			X	
Hemiptera: Pentatomidae	*Zicrona caerulea*	Blue Shieldbug		X						
Hemiptera: Rhopalidae	*Corizus hyoscyami*					X	X			
Hemiptera: Rhopalidae	*Rhopalus subrufus*						X			
Hemiptera: Aphrophoridae	*Aphrophora alni*			X	X					
Hemiptera: Aphrophoridae	*Philaenus spumarius*			X		X	X	X	X	
Hemiptera: Cicadellidae	*Megophthalmus scabripennis*			X	X	X	X	X		

Order: Family	Species	Vernacular	National Status	A	B	C	D	E	F	G
Hemiptera: Cicadellidae	*Cicadella viridis*				X	X				
Hemiptera: Cicadellidae	*Evacanthus interruptus*			X	X					
Hemiptera: Cicadellidae	*Anaceratagallia ribauti*			X		X	X	X		X
Hemiptera: Cicadellidae	*Psammotettix confinis*			X				X		
Hemiptera: Cicadellidae	*Paralimnus phragmitis*		**Nationally Scarce b**						X	
Hemiptera: Cicadellidae	*Mocydiopsis attenuata*							X		
Hemiptera: Cixiidae	*Pentastiridius leporinus*		**Nationally Scarce b**						X	
Hemiptera: Delphacidae	*Stenocranus major*							X		
Hemiptera: Delphacidae	*Chloriona glaucescens*								X	
Lepidoptera: Zygaenidae	*Zygaena filipendulae*	Six-spot Burnet		X	X	X		X	X	
Lepidoptera: Sesiidae	*Bembecia ichneumoniformis*	Six-belted Clearwing	**Nationally Scarce b**					X		
Lepidoptera: Oecophoridae	*Depressaria heraclei*	Parsnip Moth			X	X				
Lepidoptera: Gelechiidae	*Apodia bifractella*					X				
Lepidoptera: Momphidae	*Mompha raschkiella*				X	X				
Lepidoptera: Momphidae	*Mompha propinquella*			X	X					
Lepidoptera: Tortricidae	*Cochylis hybridella*			X						
Lepidoptera: Tortricidae	*Endothenia gentianaeana*			X						
Lepidoptera: Tortricidae	*Grapholita compositella*					X				
Lepidoptera: Tortricidae	*Grapholita janthinana*				X					
Lepidoptera: Pyralidae	*Calamotropha paludella*			X						
Lepidoptera: Pyralidae	*Crambus pascuella*			X	X					
Lepidoptera: Pyralidae	*Agriphila geniculea*			X						
Lepidoptera: Pterophoridae	*Marasmarcha lunaedactyla*					X				
Lepidoptera: Pterophoridae	*Stenoptilia zophodactylus*			X						
Lepidoptera: Hesperiidae	*Thymelicus lineola*	Essex Skipper		X		X		X		X
Lepidoptera: Hesperiidae	*Thymelicus sylvestris*	Small Skipper		X						
Lepidoptera: Pieridae	*Pieris brassicae*	Large White								X
Lepidoptera: Pieridae	*Pieris rapae*	Small White						X	X	
Lepidoptera: Pieridae	*Pieris napi*	Green-veined White		X		X				
Lepidoptera: Nymphalidae	*Maniola jurtina*	Meadow Brown		X		X		X		X
Lepidoptera: Nymphalidae	*Pyronia tithonus*	Gatekeeper		X	X	X			X	
Lepidoptera: Nymphalidae	*Vanessa atalanta*	Red Admiral				X				

Order: Family	Species	Vernacular	National Status	A	B	C	D	E	F	G
Lepidoptera: Nymphalidae	*Aglais io*	Peacock			X				X	
Lepidoptera: Nymphalidae	*Aglais urticae*	Small Tortoiseshell		X		X				
Lepidoptera: Nymphalidae	*Polygonia c-album*	Comma							X	
Lepidoptera: Lycaenidae	*Aricia agestis*	Brown Argus		X						
Lepidoptera: Lycaenidae	*Polyommatus icarus*	Common Blue			X	X				
Lepidoptera: Geometridae	*Scotopteryx chenopodiata*	Shaded Broad-bar	**BAP**		X					
Lepidoptera: Geometridae	*Eupithecia linariata*	Toadflax Pug				X				
Lepidoptera: Geometridae	*Aplocera plagiata*	Treble-bar		X						
Lepidoptera: Geometridae	*Chiasmia clathrata*	Latticed Heath	**BAP**	X				X		
Lepidoptera: Arctiidae	*Callimorpha dominula*	Scarlet Tiger			X					
Lepidoptera: Arctiidae	*Tyria jacobaeae*	Cinnabar	**BAP**	X		X		X		X
Lepidoptera: Noctuidae	*Shargacucullia verbasci*	Mullein		X						
Lepidoptera: Noctuidae	*Calophasia lunula*	Toadflax Brocade	**RDB3**			X				
Lepidoptera: Noctuidae	*Autographa gamma*	Silver Y						X		
Coleoptera: Carabidae	*Notiophilus biguttatus*									X
Coleoptera: Carabidae	*Bembidion lunulatum*					X				
Coleoptera: Carabidae	*Bembidion properans*			X	X					
Coleoptera: Carabidae	*Elaphropus parvulus*		**Nationally Scarce b**				X			
Coleoptera: Carabidae	*Amara aenea*				X		X			X
Coleoptera: Carabidae	*Amara communis*					X				
Coleoptera: Carabidae	*Amara tibialis*						X			
Coleoptera: Carabidae	*Bradycellus verbasci*					X				
Coleoptera: Carabidae	*Acupalpus dubius*							X		
Coleoptera: Carabidae	*Paradromius linearis*					X				
Coleoptera: Carabidae	*Syntomus foveatus*			X	X					X
Coleoptera: Hydrophilidae	*Megasternum concinnum*				X					
Coleoptera: Staphylinidae	*Stenus nanus*				X		X			
Coleoptera: Staphylinidae	*Stenus fulvicornis*					X				
Coleoptera: Staphylinidae	*Stenus latifrons*							X		
Coleoptera: Staphylinidae	*Stenus aceris*							X		
Coleoptera: Staphylinidae	*Stenus ossium*					X		X		
Coleoptera: Staphylinidae	*Philonthus varians*					X				X

Order: Family	Species	Vernacular	National Status	A	B	C	D	E	F	G
Coleoptera: Staphylinidae	*Xantholinus linearis*				X					
Coleoptera: Staphylinidae	*Xantholinus longiventris*						X			
Coleoptera: Byrrhidae	*Cytilus sericeus*						X			
Coleoptera: Throscidae	*Trixagus carinifrons*									X
Coleoptera: Elateridae	*Agriotes sordidus*		**RDB3**						X	
Coleoptera: Cantharidae	*Rhagonycha fulva*			X	X				X	
Coleoptera: Cantharidae	*Silis ruficollis*		**Nationally Scarce b**		X					
Coleoptera: Malachiidae	*Anthocomus rufus*								X	
Coleoptera: Kateretidae	*Brachypterolus pulicarius*					X				X
Coleoptera: Kateretidae	*Brachypterus glaber*				X	X				
Coleoptera: Nitidulidae	*Meligethes aeneus*	Common Pollen Beetle				X				
Coleoptera: Nitidulidae	*Meligethes carinulatus*									X
Coleoptera: Nitidulidae	*Meligethes fulvipes*		**Nationally Scarce**		X	X			X	
Coleoptera: Nitidulidae	*Meligethes rotundicollis*		**Nationally Scarce**			X				
Coleoptera: Phalacridae	*Olibrus aeneus*					X	X			X
Coleoptera: Phalacridae	*Olibrus liquidus*									X
Coleoptera: Coccinellidae	*Rhyzobius litura*			X		X				X
Coleoptera: Coccinellidae	*Nephus redtenbacheri*			X						
Coleoptera: Coccinellidae	*Scymnus frontalis*			X						
Coleoptera: Coccinellidae	*Propylea quattuordecimpunctata*	14-spot Ladybird				X		X	X	
Coleoptera: Coccinellidae	*Harmonia axyridis*	Harlequin Ladybird			X	X			X	
Coleoptera: Coccinellidae	*Coccinella septempunctata*	7-spot Ladybird		X	X	X		X		
Coleoptera: Coccinellidae	*Coccinella undecimpunctata*	11-spot Ladybird					X		X	X
Coleoptera: Coccinellidae	*Hippodamia variegata*	Adonis' Ladybird	**Nationally Scarce b**	X		X	X			
Coleoptera: Oedemeridae	*Oedemera nobilis*	Swollen-thighed Beetle		X	X	X			X	
Coleoptera: Oedemeridae	*Oedemera lurida*			X		X		X		
Coleoptera: Anthicidae	*Omonadus floralis*					X				
Coleoptera: Scraptiidae	*Anaspis regimbarti*									X
Coleoptera: Chrysomelidae	*Chrysolina hyperici*			X						
Coleoptera: Chrysomelidae	*Gastrophysa viridula*	Green Dock Beetle				X				
Coleoptera: Chrysomelidae	*Phaedon cochleariae*								X	
Coleoptera: Chrysomelidae	*Chaetocnema hortensis*							X		

Order: Family	Species	Vernacular	National Status	A	B	C	D	E	F	G
Coleoptera: Chrysomelidae	*Cryptocephalus fulvus*			X	X		X			
Coleoptera: Chrysomelidae	*Cryptocephalus moraei*						X			
Coleoptera: Apionidae	*Omphalapion hookerorum*						X		X	X
Coleoptera: Apionidae	*Ceratapion onopordi*			X						
Coleoptera: Apionidae	*Ceratapion carduorum*							X		
Coleoptera: Apionidae	*Aspidapion radiolus*									X
Coleoptera: Apionidae	*Malvapion malvae*									X
Coleoptera: Apionidae	*Protapion apricans*							X		
Coleoptera: Apionidae	*Protapion assimile*							X		
Coleoptera: Apionidae	*Protapion nigritarse*					X				
Coleoptera: Apionidae	*Ischnopterapion loti*					X		X		
Coleoptera: Apionidae	*Eutrichapion viciae*				X					
Coleoptera: Erirhinidae	*Stenopelmus rufinasus*					X				
Coleoptera: Curculionidae	*Sitona hispidulus*					X	X	X		
Coleoptera: Curculionidae	*Sitona humeralis*							X		X
Coleoptera: Curculionidae	*Sitona lepidus*					X		X		X
Coleoptera: Curculionidae	*Sitona lineatus*			X		X		X		
Coleoptera: Curculionidae	*Sitona waterhousei*		**Nationally Scarce b**					X		
Coleoptera: Curculionidae	*Hypera postica*	Clover Leaf Weevil				X				
Coleoptera: Curculionidae	*Hypera zoilus*							X		
Coleoptera: Curculionidae	*Cionus scrophulariae*	Figwort Weevil		X	X	X				X
Coleoptera: Curculionidae	*Rhinoncus inconspectus*				X					
Coleoptera: Curculionidae	*Rhinoncus pericarpius*				X					
Coleoptera: Curculionidae	*Trichosirocalus troglodytes*					X		X		
Coleoptera: Curculionidae	*Tychius meliloti*					X				
Coleoptera: Curculionidae	*Sibinia primita*		**Nationally Scarce b**	X						
Coleoptera: Curculionidae	*Gymnetron pascuorum*							X		
Coleoptera: Curculionidae	*Rhinusa antirrhini*					X				X
Diptera: Limoniidae	*Dicranomyia chorea*				X					
Diptera: Scatopsidae	*Reichertella geniculata*								X	
Diptera: Stratiomyidae	*Chorisops tibialis*				X	X				
Diptera: Stratiomyidae	*Nemotelus notatus*					X		X	X	

Order: Family	Species	Vernacular	National Status	A	B	C	D	E	F	G
Diptera: Stratiomyidae	*Chloromyia formosa*			X		X				
Diptera: Acroceridae	*Acrocera orbiculus*							X		
Diptera: Asilidae	*Leptogaster cylindrica*			X						
Diptera: Hybotidae	*Platypalpus calceatus*				X					
Diptera: Hybotidae	*Platypalpus longiseta*				X	X				
Diptera: Hybotidae	*Platypalpus pallidiventris*				X					
Diptera: Hybotidae	*Platypalpus ruficornis*		**(Nationally Scarce) None**		X					
Diptera: Hybotidae	*Platypalpus stabilis*		**(Nationally Scarce) None**		X					
Diptera: Empididae	*Empis livida*			X						
Diptera: Dolichopodidae	*Argyra vestita*								X	X
Diptera: Dolichopodidae	*Chrysotus cilipes*					X				
Diptera: Dolichopodidae	*Chrysotus gramineus*				X					
Diptera: Dolichopodidae	*Dolichopus griseipennis*			X		X			X	
Diptera: Dolichopodidae	*Dolichopus nubilus*								X	X
Diptera: Dolichopodidae	*Machaerium maritimae*									X
Diptera: Dolichopodidae	*Rhaphium consobrinum*								X	
Diptera: Dolichopodidae	*Campsicnemus loripes*								X	
Diptera: Dolichopodidae	*Micromorphus albipes s.l.*		**(Nationally Scarce) None**						X	
Diptera: Dolichopodidae	*Teuchophorus monacanthus*								X	
Diptera: Lonchopteridae	*Lonchoptera bifurcata*			X		X			X	X
Diptera: Lonchopteridae	*Lonchoptera lutea*								X	
Diptera: Syrphidae	*Melanostoma mellinum*	a hoverfly							X	
Diptera: Syrphidae	*Platycheirus angustatus*	a hoverfly		X				X		
Diptera: Syrphidae	*Platycheirus fulviventris*	a hoverfly							X	
Diptera: Syrphidae	*Platycheirus granditarsus*	a hoverfly				X				
Diptera: Syrphidae	*Paragus haemorrhous*	a hoverfly		X		X				
Diptera: Syrphidae	*Chrysotoxum bicinctum*	a hoverfly				X				
Diptera: Syrphidae	*Episyrphus balteatus*	a hoverfly			X	X			X	
Diptera: Syrphidae	*Eupeodes corollae*	a hoverfly				X				
Diptera: Syrphidae	*Scaeva pyrastri*	a hoverfly			X	X			X	X
Diptera: Syrphidae	*Sphaerophoria rueppellii*	a hoverfly				X				
Diptera: Syrphidae	*Sphaerophoria scripta*	a hoverfly		X		X				

Order: Family	Species	Vernacular	National Status	A	B	C	D	E	F	G
Diptera: Syrphidae	*Neoascia tenur*	a hoverfly			X					
Diptera: Syrphidae	*Helophilus hybridus*	a hoverfly			X					
Diptera: Syrphidae	*Helophilus trivittatus*	a hoverfly		X						
Diptera: Syrphidae	*Pipizella virens*	a hoverfly	**Nationally Scarce**					X		
Diptera: Syrphidae	*Volucella bombylans*	a hoverfly			X					
Diptera: Syrphidae	*Syritta pipiens*	a hoverfly		X		X			X	
Diptera: Pipunculidae	*Tomosvaryella geniculata*					X				
Diptera: Pipunculidae	*Tomosvaryella sylvatica*				X					
Diptera: Conopidae	*Physocephala rufipes*				X	X				
Diptera: Lonchaeidae	*Lonchaea chorea*				X					
Diptera: Piophilidae	*Prochyliza nigrimana*								X	
Diptera: Ulidiidae	*Herina lugubris*			X	X					
Diptera: Ulidiidae	*Melieria picta*		**Nationally Scarce**						X	
Diptera: Platystomatidae	*Rivellia syngenesiae*					X		X		
Diptera: Tephritidae	*Ensina sonchi*		**None (Nationally Scarce b)**						X	
Diptera: Tephritidae	*Acanthiophilus helianthi*		**Nationally Scarce b**		X					
Diptera: Tephritidae	*Campiglossa malaris*		**RDB1 (RDBK)**			X		X		
Diptera: Tephritidae	*Campiglossa plantaginis*								X	X
Diptera: Tephritidae	*Sphenella marginata*					X				
Diptera: Tephritidae	*Tephritis cometa*								X	
Diptera: Tephritidae	*Tephritis formosa*					X				
Diptera: Tephritidae	*Tephritis matricariae*		**(RDBK)**	X	X	X			X	
Diptera: Tephritidae	*Terellia serratulae*			X		X				
Diptera: Lauxaniidae	*Homoneura interstincta*		**RDB3**		X					
Diptera: Lauxaniidae	*Homoneura patelliformis*		**Nationally Scarce**							X
Diptera: Lauxaniidae	*Homoneura thalhammeri*		**Nationally Scarce**		X	X				
Diptera: Lauxaniidae	*Calliopum aeneum*				X					
Diptera: Lauxaniidae	*Calliopum elisae*				X					
Diptera: Lauxaniidae	*Minettia tabidiventris*			X	X		X	X		
Diptera: Lauxaniidae	*Minettia fasciata*					X		X		
Diptera: Lauxaniidae	*Minettia tubifer*				X					
Diptera: Lauxaniidae	*Sapromyza quadripunctata*			X	X	X		X		

Order: Family	Species	Vernacular	National Status	A	B	C	D	E	F	G
Diptera: Chamaemyiidae	*Chamaemyia aridella*					X		X		X
Diptera: Chamaemyiidae	*Chamaemyia herbarum*					X				
Diptera: Chamaemyiidae	*Chamaemyia polystigma*								X	
Diptera: Sciomyzidae	*Pherbellia cinerella*			X						
Diptera: Sciomyzidae	*Pherbellia griseola*		**Nationally Scarce**			X				
Diptera: Sciomyzidae	*Dichetophora obliterata*					X				
Diptera: Sciomyzidae	*Ilione albiseta*			X						
Diptera: Sciomyzidae	*Limnia unguicornis*				X	X				
Diptera: Sciomyzidae	*Pherbina coryleti*								X	
Diptera: Sepsidae	*Sepsis fulgens*					X				
Diptera: Agromyzidae	*Cerodontha fulvipes*									X
Diptera: Agromyzidae	*Liriomyza intonsa*		**New for Britain**							X
Diptera: Agromyzidae	*Napomyza lateralis*									X
Diptera: Opomyzidae	*Geomyza balachowskyi*							X		
Diptera: Opomyzidae	*Opomyza petrei*					X				
Diptera: Anthomyzidae	*Anthomyza gracilis*				X					
Diptera: Chloropidae	*Cryptonevra flavitarsis*								X	
Diptera: Chloropidae	*Platycephala planifrons*								X	
Diptera: Chloropidae	*Thaumatomyia glabra*			X	X					
Diptera: Chloropidae	*Thaumatomyia hallandica*			X				X		X
Diptera: Chloropidae	*Thaumatomyia notata*				X					
Diptera: Chloropidae	*Oscinella frit*			X			X	X		X
Diptera: Chloropidae	*Oscinella nitidissima*					X				
Diptera: Chloropidae	*Trachysiphonella scutellata*		**Nationally Scarce (None)**	X						
Diptera: Drosophilidae	*Scaptomyza pallida*					X			X	X
Diptera: Ephydridae	*Discocerina obscurella*				X					
Diptera: Ephydridae	*Hydrellia griseola*								X	
Diptera: Scathophagidae	*Cordilurina albipes*					X				
Diptera: Scathophagidae	*Scathophaga litorea*								X	
Diptera: Anthomyiidae	*Pegoplata aestiva*					X			X	
Diptera: Anthomyiidae	*Pegoplata infirma*									X
Diptera: Fanniidae	*Fannia fuscula*								X	

Order: Family	Species	Vernacular	National Status	A	B	C	D	E	F	G
Diptera: Fanniidae	*Fannia polychaeta*				X					
Diptera: Muscidae	*Schoenomyza litorella*			X					X	
Diptera: Muscidae	*Helina evecta*					X				
Diptera: Rhinophoridae	*Phyto melanocephala*				X					
Diptera: Rhinophoridae	*Rhinophora lepida*			X		X		X		
Diptera: Sarcophagidae	*Sarcophaga haemorrhoa*					X				
Diptera: Sarcophagidae	*Sarcophaga nigriventris*					X				
Diptera: Tachinidae	*Dinera grisescens*				X					
Diptera: Tachinidae	*Eriothrix rufomaculata*			X						
Diptera: Tachinidae	*Lydella stabulans*					X				
Diptera: Tachinidae	*Phania funesta*					X				
Diptera: Tachinidae	*Cistogaster globosa*		**RDB1 (RDB2)**					X		
Hymenoptera: Formicidae	*Lasius flavus*	an ant			X			X		
Hymenoptera: Formicidae	*Lasius niger*	an ant		X	X			X		
Hymenoptera: Formicidae	*Myrmecina graminicola*	an ant						X		
Hymenoptera: Eumenidae	*Ancistrocerus gazella*	a mason wasp				X				
Hymenoptera: Crabronidae	*Ectemnius rubicola*	a digger wasp				X				
Hymenoptera: Crabronidae	*Entomognathus brevis*	a digger wasp				X				
Hymenoptera: Crabronidae	*Lindenius albilabris*	a digger wasp						X		
Hymenoptera: Crabronidae	*Pemphredon lethifera*	a digger wasp			X				X	X
Hymenoptera: Crabronidae	*Spilomena troglodytes*	a digger wasp								X
Hymenoptera: Crabronidae	*Trypoxylon attenuatum*	Slender Wood Borer Wasp				X				
Hymenoptera: Apidae	*Andrena dorsata*	a mining bee			X	X				
Hymenoptera: Apidae	*Andrena flavipes*	Yellow Legged Mining Bee				X				
Hymenoptera: Apidae	*Andrena nigroaenea*	a mining bee				X				
Hymenoptera: Apidae	*Apis mellifera*	Honey Bee			X	X			X	X
Hymenoptera: Apidae	*Bombus hortorum*	Small Garden Bumble Bee		X	X	X				
Hymenoptera: Apidae	*Bombus humilis*	Brown-banded Carder Bee	**BAP**	X	X	X		X	X	X
Hymenoptera: Apidae	*Bombus lapidarius*	Large Red Tailed Bumble Bee				X				
Hymenoptera: Apidae	*Bombus lucorum sens. lat.*	White-tailed Bumble Bee		X	X					
Hymenoptera: Apidae	*Bombus pascuorum*	Common Carder Bee		X	X	X			X	X
Hymenoptera: Apidae	*Bombus pratorum*	Early Bumble Bee			X	X			X	X

Order: Family	Species	Vernacular	National Status	A	B	C	D	E	F	G
Hymenoptera: Apidae	*Bombus sylvarum*	Shrill Carder Bee	**Nationally Scarce b**	**X**	**X**	**X**			**X**	**X**
Hymenoptera: Apidae	*Bombus terrestris*	Buff-tailed Bumble Bee		**X**	**X**					
Hymenoptera: Apidae	*Bombus vestalis*	a bumblebee			**X**					
Hymenoptera: Apidae	*Colletes similis*	a mining bee				**X**				**X**
Hymenoptera: Apidae	*Halictus tumulorum*	a mining bee			**X**					
Hymenoptera: Apidae	*Hoplitis spinulosa*	a solitary bee		**X**	**X**	**X**				
Hymenoptera: Apidae	*Hylaeus annularis*	a solitary bee			**X**	**X**				
Hymenoptera: Apidae	*Hylaeus signatus*	Large Yellow-faced Bee	**Nationally Scarce b**			**X**				
Hymenoptera: Apidae	*Lasioglossum leucopus*	a mining bee			**X**					
Hymenoptera: Apidae	*Lasioglossum leucozonium*	a mining bee						**X**		
Hymenoptera: Apidae	*Lasioglossum morio*	Brassy Mining Bee							**X**	
Hymenoptera: Apidae	*Melitta leporina*	a mining bee				**X**				
Hymenoptera: Apidae	*Nomada flavoguttata*	a cuckoo bee					**X**			
		total diversity	**329**	**95**	**99**	**137**	**24**	**71**	**63**	**55**
		all scarce/RDB	**32**	**5**	**9**	**12**	**2**	**5**	**9**	**3**
		% scarce/RDB	**9.7**	**5.3**	**9.1**	**8.8**	**8.3**	**7**	**14.3**	**5.5**
		no RDB	**7**	**1**	**2**	**3**	**0**	**2**	**2**	**1**
		% RDB	**2.1**	**1.1**	**2**	**2.2**	**0**	**2.8**	**3.2**	**1.8**

A SURVEY OF BUMBLEBEES ON THE GWENT LEVELS SSSIS – WITH PARTICULAR REFERENCE TO *BOMBUS SYLVARUM* AND *B. HUMILIS*

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This report was produced for RPS.

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Cover photograph: ♂ *Bombus sylvarum* (Shrill Carder Bee).

Contents

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Tables

1 Summary

- Three days of survey across the Gwent Levels SSSIs within the 250 metre buffer zone of the proposed new section of motorway recorded 56 *Bombus sylvarum* from 16 fields/compartments and 67 *B. humilis* from 18 fields/compartments.
- An additional 10 species of bumblebee were recorded.
- This confirms the continuing importance of the Gwent Levels for these two Biodiversity Action Plan (BAP) bumblebees.
- Although found across the whole of the survey area, records are noticeably clumped in areas of floral diversity and abundance.
- Ungrazed open areas such as the Tata Steel land seem to be important in providing a greater diversity of floral resources.
- The great majority of the populations of both species occur on or south of the proposed route of the new section of motorway.
- Hedgerows and reens are important where pasture is improved or semi-improved so should be managed to enhance floral diversity.
- Mitigation for bumblebee habitat lost to the Scheme should include management of other land as a combination or meadows rich in Red clover and other native plants and permanent flower-rich grassland with good populations of species such as Bird's-foot Trefoil *Lotus*, Clovers *Trifolium*, Knapweed *Centaurea*, Thistles *Cirsium*, Comfrey *Symphytum*, Woundwort *Stachys,* Horehound *Ballota*, Scabious *Knautia* and Melilot *Melilotus*.

2 Introduction

The Gwent Levels SSSIs stretch from Caldicot in the east almost to Cardiff in the west and encompass a large area of grazing marsh and associated habitats. The wider area has long been known as an important stronghold for two UK BAP species of bumblebee, *Bombus humilis* the Brown-banded Carder Bee and particularly *B. sylvarum* the Shrill Carder Bee. Although formerly widespread in England and Wales, these two bumblebees have declined drastically since the intensification of farming after WW2. Substantial populations of *Bombus sylvarum* are now confined to Dungeness and Romney Marsh, the Thames Estuary, grazing levels on the Sussex coast, Salisbury Plain, smaller populations on the Somerset levels, the Gwent Levels, Glamorgan from Margam to Kenfig and Castlemartin in Pembrokeshire. *Bombus humilis* remains more common, especially in the southwest of England, and is often found in the same places as *B. sylvarum* (Edwards & Telfer, 2001 & 2002).

3 Survey Methodology

3.1 Survey Techniques

The survey area was large and in multiple ownerships and many areas could only be surveyed with the land owner's permission. With the exception of a small area in the east of the survey area, all fields where permission was obtained and within the 250 metre buffer zone were walked over once in conditions suitable for recording bumblebees. The area that was not sampled could be seen to be improved pasture of low floral diversity, very unlikely to be different from the adjacent fields that were searched.

Each field that was accessed was walked, usually keeping to the boundaries, either hedgerows or reens. Where flowering plants were present within the pasture itself, these were also searched. A 40 cm diameter white-bag sweep-net was carried to capture bees so that they could be examined more closely if necessary, but most bees could be readily identified as they foraged on flowers. At each field the approximate habitat type and floral diversity was recorded. All bumblebee species found were recorded, and for the two rare species, *B. humilis* and *B. sylvarum* each individual was counted.

Although *Bombus sylvarum* and most other bumblebees are readily identified in the field, even if they need to be captured and examined with a lens, some specimens, especially when worn and faded, need to be closely examined under a microscope. For this reason occasional specimens were taken to double check their identity.

3.2 SAMPLE TIMING

Survey visits were largely timed to fit in with weather conditions and access permissions, the latter only being granted from July onwards. However, these timings work well for bumblebees, most species having had time to build up their colonies so there are plenty of workers about by July. Once into August and September the new generation emerge so there are plenty of fresh males readily found nectaring on various flowers. The first specific survey of the SSSIs was on the 16 July covering the eastern portion of the area; on the 10 September the central part was covered and on 11 September the western part covered. Additionally, areas on Tata Steel land that are within the SSSIs were visited as part of a general invertebrate survey on 22-23 July and on 18 August when bumblebees were also recorded.

3.3 CONSTRAINTS

Every attempt was made to visit in sunny, dry conditions, but this summer the weather conditions were unreliable and somewhat variable. On 16 July it was overcast and warm, with a light breeze and dry, with light rain midday and some warm sun in the afternoon. These conditions were not ideal for flying insects, but as bees are relatively cold tolerant no effect on the results is expected. The 10-11 September was warm, sunny, breezy, very good conditions for recording bumblebees. On 22-23 July during the Tata survey it was cool and overcast, with some sunny intervals, again less than ideal but warm enough not to affect the results. On 18 August during the Tata survey the conditions were warm and sunny with a light breeze, close to ideal.

4 Results

The two target species, *Bombus sylvarum* and *B. humilis*, were recorded on each of the days of survey, although the numbers recorded varied widely. On the first day 16 July when the eastern third was covered, only two individuals of the former were found, despite some very flower-rich meadows being visited. However, on the final day 11 September, 28 individuals of *B. sylvarum* were counted in the more flowery sites. This difference is not entirely down to the quality of the habitat or weather conditions but is influenced by the life-cycle of the bumblebee colonies. Towards the end of the season the new generation of bees emerges and the males particularly become very conspicuous. While the queens seem to disappear into hibernation fairly quickly, or at least are relatively inconspicuous, the males spend their remaining life on flowers so are readily recorded. The results per field or compartment are summarised in Table 1.

Table 1 Summary of bumblebee abundance across the SSSIs.

Field code	date	floral diversity	*Bombus sylvarum*	*Bombus humilis*	number of other species
1co	16/07/2015	low			
462a	16/07/2015	?			
429c	16/07/2015	low			
999ax	16/07/2015	good	1	3	
455b	16/07/2015	low			
449a	16/07/2015	low			

Field code	**date**	**floral diversity**	***Bombus sylvarum***	***Bombus humilis***	**number of other species**
422h	16/07/2015	low	1		5
422f	16/07/2015	low			3
422e	16/07/2015	low			
437a	16/07/2015	good			1
435a	16/07/2015	medium			3
432a	16/07/2015	low			
431b	16/07/2015	low			1
416a	16/07/2015	low		1	1
413a	16/07/2015	low			
418a	16/07/2015	good			
409a	10/09/2015	medium	3	4	2
374b	10/09/2015	low	1	3	1
388b	10/09/2015	medium to good along ditch margins	11	6	1
1cd	10/09/2015	low, thistles	1		
1cf	10/09/2015	low			1
215at	11/09/2015	med, especially E field with some clover and Knapweed	4	1	1
215v	11/09/2015	med to good, E field with abundant knapweed	18	9	3
215p	11/09/2015	v low	3	1	2
213o	11/09/2015	very very low			
area A	11/09/2015	high		2	
217b&c	11/09/2015	low			
217e	11/09/2015	med			1
215b	11/09/2015	low-med, some knapweed, clover, *Lotus*		1	2
214a	11/09/2015	low-med, some clover, *Lotus*		1	1
215j	11/09/2015	low-med, some clover & thistles	3	1	1
TATA A	23/07/2015	low-med, some clover & thistles	1	2	6
TATA B	22-23/7/2015	high	1	2	4
TATA E	23/07/2015	medium	1	3	6
TATA G	18/08/2015	poor	1	4	2
TATA G1	18/08/2015	good	4	20	3
TATA H	18/08/2015	high	1	4	1

Although it can be seen from Table 1 that there is a lot of variability in the correspondence between floral diversity/abundance and the number of bumblebees recorded, the correlation is clear, especially regarding the two rare species. Most of the fields where neither of the two rare bees were recorded are of low floral diversity, i.e. improved or semi-improved pasture with a few thistle and brambles. On the other hand the fields with multiple observations have good floral diversity and, perhaps more important, excellent abundance of good pollen and nectar sources, notably Red clover *Trifolium pratense* and/or Knapweed *Centaurea nigra*.

A better way to appreciate the distribution of the bees as found on this survey is to map them. On the three maps below, *Bombus sylvarum* is indicated in red and *B. humilis* in blue. While in general each dot on the map refers to a single individual, in those fields with multiple

records, often within a few feet of each other, it was not possible to map each individual at this scale, so one dot may represent 2-5 individuals (fields 388b, 215at, 215v & 215j). The SSSIs are indicated by the hatched areas and the 250 metre buffer zone by the orange line. Areas shaded green are those where access permission was given, red areas could not be accessed due to lack of permission and blue areas were accessible for short periods but not for the whole of the survey period.

Figure 1 Bumblebee distribution - West.

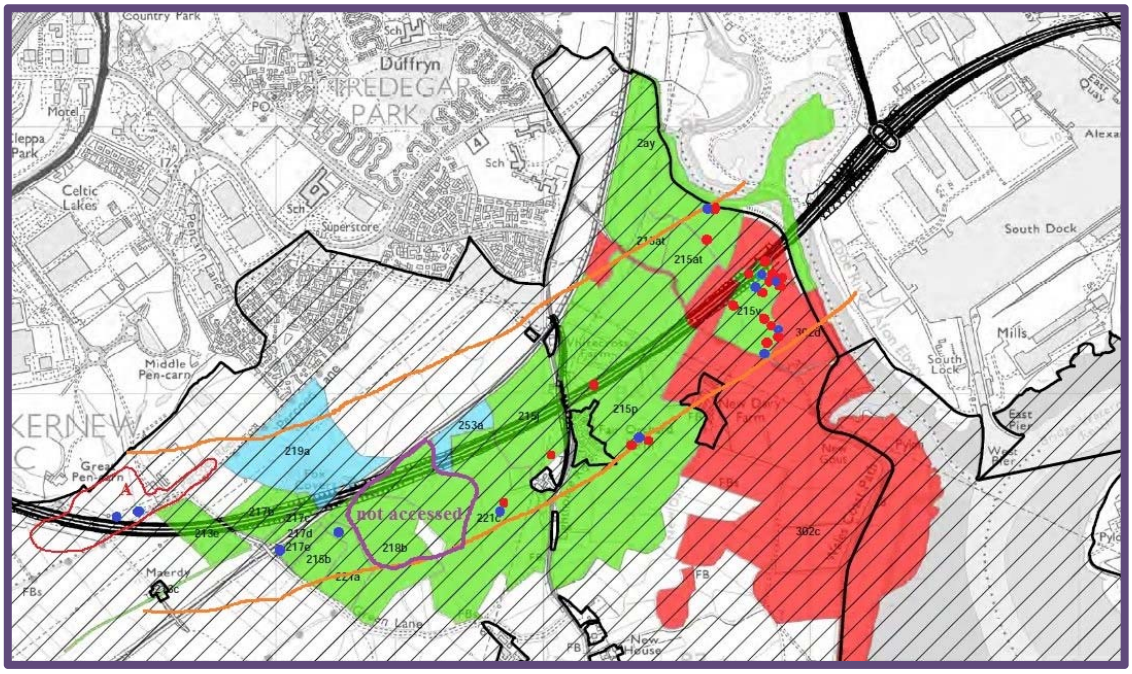

Figure 2 Bumblebee distribution - Central.

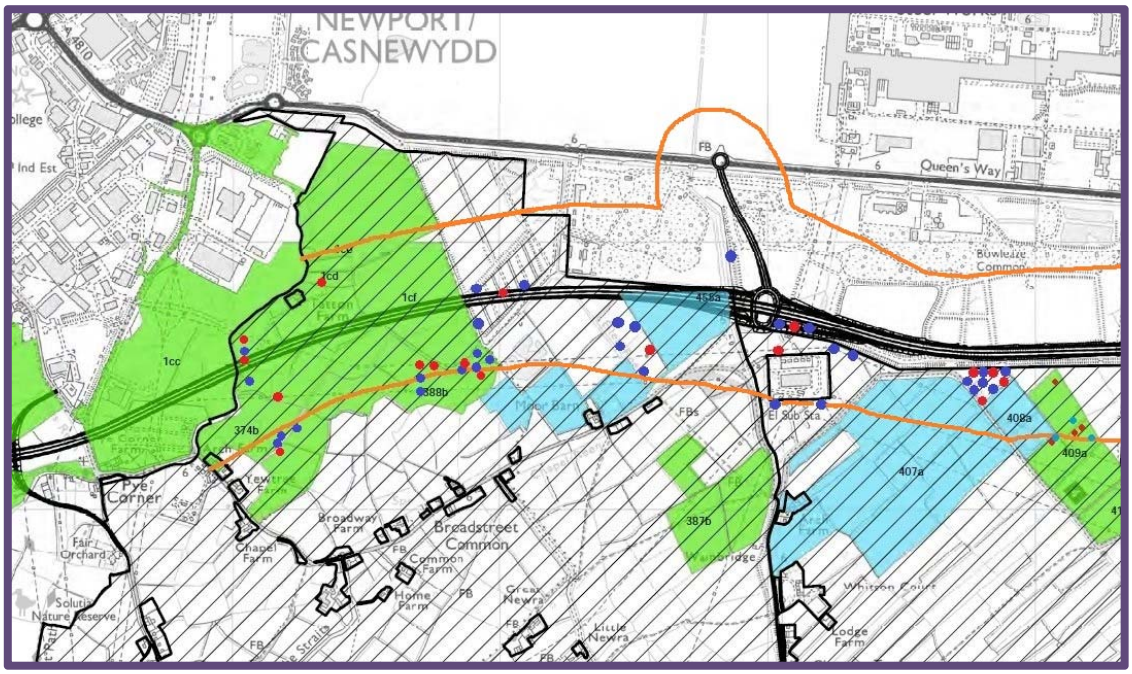

Figure 3 Bumblebee distribution - East.

In addition to the two UK Biodiversity Action Plan (BAP) bumblebees, another 10 species were recorded. These include the six typical common garden social bees *Bombus terrestris*, *lucorum sensu latu* (almost certainly *lucorum sensu stricto* but a series of fresh queens need to be examined to rule out *cryptarum*), *B. pratorum*, *B. pascuorum*, *B. lapidarius* and *B. hortorum*, although these latter two are increasingly less frequent in gardens. Added to this is the recently arrived, and now very frequent, *B. hypnorum* recorded at two places. Two species of cuckoo-bees were recorded, *B. vestalis* and *B. campestris*, both of them common, although the latter rather local. The tenth species recorded was *B. jonellus*, which, while still widespread is far from common and one that is only found on extensive areas of good habitat.

One result that was not predicted is that the two BAP species are more frequent across the survey area than any of the other *Bombus*. *B. humilis* was recorded from 18 fields/ compartments while *B. sylvarum* was recorded from 16, so marginally more frequent that the most abundant of the "common" species, *B. pascuorum* from 15 fields. It is perhaps notable that all three of these species are carder bees, adapted to open grassland habitats, although *pascuorum* is much more adaptable than the other two species. The next most frequent was *B. lapidarius*, noted in 12 fields, also a species preferring open grassland and other open habitats. The other typical garden species, *B. terrestris*, *B. lucorum*, *B. pratorum*, *B. hortorum* and these days *B. hypnorum*, are more species of woodland edge, scrub, hedgerows and of course grasslands. The relatively uncommon *B. jonellus* is typically a heathland species, but also likes the open habitats on the levels, but is much more dependent on extensive ungrazed areas than are the two BAP species.

5 Evaluation

This survey confirms the importance of the Gwent Levels SSSIs for *Bombus sylvarum* and *B. humilis*, with observations from the east near Magor to the west at Maerdy. This survey cannot answer definitively the question of whether this particular part of the Gwent Levels is any more important than other parts, as no equivalent survey is available for comparison. However, some of the concentrations of both species seen during this survey were significantly greater than numbers seen elsewhere on the levels during general surveys. From previous experience from across the levels the author would judge that the areas surveyed in 2015 are as good for these two BAP bumblebees as anywhere else on the Levels.

When the results are mapped three features stand out.

1) There is clear clumping of observations.
2) Most records are adjacent to the ungrazed areas near the Ebbw River and near the Tata Steel land.
3) Most records are on or south of the proposed route of the new section of motorway (48 *B. sylvarum* and 57 *B. humilis*, compared to 8 *B. sylvarum* and 10 *B. humilis* to the north).

The first point is probably entirely down to local floral diversity and abundance, and will not necessarily be consistent from year to year or even through the season as different plants flower. Three fields show this local abundance of bees, 388b with 11 *B. sylvarum* and 6 *B. humilis* has an abundance of Marsh/Welted thistle *Cirsium palustre*/*Carduus crispus* in the fields and quite a good diversity of plants such as Water mint *Mentha aquatica* along the ditches which proved very attractive to these species. Field 215v had an abundance of flowering Knapweed *Centaurea nigra* which was particularly attractive for *B. sylvarum* with 18 individuals recorded plus 9 *B. humilis*. In both these fields the plants attracting the bees are perennial so it is likely that these locations will prove attractive every year when these plants flower. Field Tata G1 held 4 *B. sylvarum* and no less than 20 *B. humilis* foraging on the abundant Red clover *Trifolium pratense* and Knapweed *Centaurea nigra* in the field. It is possible that this field has been made more attractive by seeding with Red clover so may not always be as productive in the future.

Point two is an interesting finding and is likely to have relevance to the road development. While the carder bees are specialists of open grassland, and hence their dominance on the pastureland of the Gwent Levels, like all bees they need abundant pollen and nectar sources. Much of the pasture is improved or semi-improved so floristic diversity and abundance within the body of most fields is very limited. Across much of the Gwent Levels foraging resources are confined to the sloping banks of reens or along hedgerows. Some semi-improved fields do have thistles of several species dotted around, and occasionally abundant, probably due to historical over grazing. So across much of the SSSIs the flowering plants needed are limited and not very diverse. However, the open areas of the Tata land, ABP land in Newport Docks and the banks of the River Ebbw have developed a rich and diverse flora that can provide forage for bees throughout the season. Without such areas to provide a greater diversity of flowers, it is likely that the Gwent Levels would not be able to sustain such a large population of the rarer bumblebees.

Thirdly, as well as direct habitat loss the effects of the new section of motorway in bisecting the habitat could render the populations north or south of the road less sustainable in the long term. Of course it is feasible that bumblebees will cross roads, and this is likely to be the case with dispersing queens, so any smaller population cut off north of the road will probably not be completely genetically isolated. However, a wide carriageway is likely to be a barrier to some extent, especially if planted and allowed to become a linear woodland barrier. Certainly foraging workers are most likely to use such large roads to delimit their range so colonies north of the proposed road will find suitable habitat more limited.

6 Recommendations

The new section of motorway will have the potential to damage the viability of populations of *Bombus sylvarum* and *B. humilis*. While the road itself will not take up much land, a couple of areas directly on the proposed route are areas which proved particularly productive, especially field 215v.

Such loss of land can be mitigated for relatively easily by providing flower-rich meadows or grassland. Of particular value will be Red clover *Trifolium pratense* meadows of the type seen at ata G1, so some such areas would be beneficial, although not necessarily the same fields every year. These two bumblebees were common and widespread in England and Wales when crop rotation was normal practice as the clover leys are particularly favourable for these long-tongued carder-bees.

Bisecting of the habitat would not only separate the bee populations north of the road from the larger population, but would also inhibit colonies on either side accessing different flower resources that might become important at different times of the year. To mitigate for this the verge and embankments of the road should be allowed to develop a flower-rich habitat with native species offering nectar and pollen resources throughout the season. Both *Bombus sylvarum* and *B. humilis* particularly favour plants from the Fabaceae, Lamiaceae and Scrophulariaceae as pollen sources (Edwards & Telfer, 2001 & 2002), Asteraceae also seem to be important nectar sources. These verges/embankments will need to be managed to maintain their open nature and not planted with trees although an element of scrub and taller herbage will benefit a range of invertebrates.

Mitigation for bumblebee habitat lost to the road should be management of other land as a combination of meadows rich in Red clover *Trifolium pratense* and other native plants and permanent flower-rich grassland with good populations of species such as Bird's-foot Trefoil *Lotus*, Clovers *Trifolium*, Knapweed *Centaurea*, Thistles *Cirsium*, Comfrey *Symphytum*, Woundwort *Stachys,* Horehound *Ballota*, Scabious *Knautia* and Melilot *Melilotus* (Falk 1991).

7 References

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8 Annex A: Field data.

Field code	date	weather conditions	habitat notes	floral diversity	sylvarum	humilis	terrestris	lucorum s.l.	pratorum	pascuorum	lapidarius	hypnorum	hortorum	vestalis	jonellus	campestris
1co	16/07/2015	Overcast, warm, light breeze, dry, light rain midday, some warm sun in afternoon.	overgrazed pasture	low												
462a	16/07/2015	Overcast, warm, light breeze, dry, light rain midday, some warm sun in afternoon.	tip, not accessed	?												
429c	16/07/2015	Overcast, warm, light breeze, dry, light rain midday, some warm sun in afternoon.	grazed, *Juncus* dominated	low												
999ax	16/07/2015	Overcast, warm, light breeze, dry, light rain midday, some warm sun in afternoon.	V good lightly grazed meadow, some red clover, spear & marsh/welted thistles	good	1	3										
455b	16/07/2015	Overcast, warm, light breeze, dry, light rain midday, some warm sun in afternoon.	overgrazed pasture	low												

Field code	date	weather conditions	habitat notes	floral diversity	sylvarum	humilis	terrestris	lucorum s.l.	pratorum	pascuorum	lapidarius	hypnorum	hortorum	vestalis	jonellus	campestris
449a	16/07/2015	Overcast, warm, light breeze, dry, light rain midday, some warm sun in afternoon.	overgrazed pasture	low												
422h	16/07/2015	Overcast, warm, light breeze, dry, light rain midday, some warm sun in afternoon.	pasture, some thistles around margins. Western third recently sown prg	low	1		X	X	X	X	X					
422f	16/07/2015	Overcast, warm, light breeze, dry, light rain midday, some warm sun in afternoon.	prg improved pasture, cattle grazed	low			X		X		X					
422e	16/07/2015	Overcast, warm, light breeze, dry, light rain midday, some warm sun in afternoon.	Mown grass, improved	low												
437a	16/07/2015	Overcast, warm, light breeze, dry, light rain midday, some warm sun in afternoon.	good but grazed, red clover, knapweed	good							X					
435a	16/07/2015	Overcast, warm, light breeze, dry, light rain midday, some warm sun in afternoon.	abandoned pasture, v overgrown	medium				X			X	X				

Field code	date	weather conditions	habitat notes	floral diversity	sylvarum	humilis	terrestris	lucorum s.l.	pratorum	pascuorum	lapidarius	hypnorum	hortorum	vestalis	jonellus	campestris
432a	16/07/2015	Overcast, warm, light breeze, dry, light rain midday, some warm sun in afternoon.	mown grass, improved	low												
431b	16/07/2015	Overcast, warm, light breeze, dry, light rain midday, some warm sun in afternoon.	mown grass, improved	low			X									
416a	16/07/2015	Overcast, warm, light breeze, dry, light rain midday, some warm sun in afternoon.	grazed, pasture	low		1	X									
413a	16/07/2015	Overcast, warm, light breeze, dry, light rain midday, some warm sun in afternoon.	grazed, pasture	low												
418a	16/07/2015	Overcast, warm, light breeze, dry, light rain midday, some warm sun in afternoon.	looks good, not accessed	good												
409a	10/09/2015	warm, sunny, breezy	grazed, Juncus pasture	medium	4	3				X	X					
374b	10/09/2015	warm, sunny, breezy	pasture, improved, some recently mown	low	1	3				X						

Field code	**date**	**weather conditions**	**habitat notes**	**floral diversity**	**sylvarum**	**humilis**	**terrestris**	**lucorum s.l.**	**pratorum**	**pascuorum**	**lapidarius**	**hypnorum**	**hortorum**	**vestalis**	**jonellus**	**campestris**
388b	10/09/2015	warm, sunny, breezy	pasture, semi-improved	medium to good along ditch margins	11	6				X						
1cd	10/09/2015	warm, sunny, breezy	*Juncus* pasture	low, thistles	1											
1cf	10/09/2015	warm, sunny, breezy	*Juncus* pasture	low						X						
215at	11/09/2015	warm, some sun, cloudy later, breezy	semi-improved pasture, east field more diverse	med, especially east field with some clover and Knapweed	4	1				X						
215v	11/09/2015	warm, some sun, cloudy later, breezy	semi-improved pasture, E field more diverse	med to good, E field with abundant knapweed	18	9	X			X	X					
215p	11/09/2015	warm, some sun, cloudy later, breezy	semi-improved pasture	v low	3	1	X			X						
213o	11/09/2015	warm, some sun, cloudy later, breezy	flax field, not walked	Very very low												
area A	11/09/2015	warm, some sun, cloudy later, breezy	scrub, flower rich grassland	high		2										
217b&c	11/09/2015	warm, some sun, cloudy later, breezy	semi-improved pasture	low												
217e	11/09/2015	warm, some sun, cloudy later, breezy	Hardstanding, scrub, ruderal	med						X						
215b	11/09/2015	warm, some sun, cloudy later, breezy	semi-improved pasture	low-med, some knapweed, clover, *Lotus*		1				X	X					
221a	11/09/2015	warm, some sun, cloudy later, breezy	semi-improved pasture	low-med, some clover, *Lotus*		1				X						

Field code	date	weather conditions	habitat notes	floral diversity	sylvarum	humilis	terrestris	lucorum s.l.	pratorum	pascuorum	lapidarius	hypnorum	hortorum	vestalis	jonellus	campestris
215j	11/09/2015	warm, some sun, cloudy later, breezy	mown pasture & semi-improved pasture	low-med, some clover & thistles	3	1				X						
TATA A	23/07/2015	cool and overcast, with some sunny intervals	pasture, semi-improved	low-med, some clover & thistles	1	2	X	X			X	X	X	X		
TATA B	22-23/7/2015	cool and overcast, with some sunny intervals	Sallow, fen, tall herbage	high	1	2	X		X		X		X			
TATA E	23/07/2015	cool and overcast, with some sunny intervals	reedbeds, ruderal	medium	1	3	X	X	X	X	X				X	
TATA G	18/08/2015	warm and sunny with a light breeze	pasture, semi-improved	poor	1	4					X					X
TATA G1	18/08/2015	warm and sunny with a light breeze	clover meadow	good	4	20				X	X		X			
TATA H	18/08/2015	warm and sunny with a light breeze	fen	high	1	4				X						

AN INVERTEBRATE SURVEY OF TATA STEEL LAND, LLANWERN.

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This report was produced for RPS.

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Cover photograph: *Leptura quadrifasciata*.

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1 Summary

- Three days of terrestrial sampling produced a diversity of 378 species.
- Of these 31 (8.2%) are considered here as Key Species, nine of them of Red Data Book (RDB) or equivalent status (2.4%).
- This is a good diversity for the habitat types present, especially given the absence of spring/early summer sampling.
- The proportion of Key Species is good, indicating an area of significant invertebrate conservation value.
- While many key species are known to be doing well nationally, and some have good populations in the region, others are rarely recorded or unknown in South Wales.
- Of particular interest are *Hydrophorus viridis* and *Sphaerophoria loewi*, both very rare nationally.
- Four Biodiversity Action Plan (BAP)/Section 42 species were recorded, including two important bumblebees *Bombus humilis* and *B. sylvarum* for which this part of South Wales is an important stronghold.
- Both these bumblebees require a larger landscape scale habitat mosaic in order to maintain viable populations and many open habitats in and around the survey site will be important for the viability of these populations.
- The reens in compartment A and ephemeral pools in compartment D are particularly important for the rarest species found.
- Reed beds and sedge beds also important for a number of scarce species and general biodiversity.
- Old poplar trees in compartment A are also of interest.
- Mitigation measures to conserve the invertebrate importance of the site will be important in the design of the new section of motorway.

2 Introduction

This area of land owned by Tata Steel covers a huge expanse nearly 4.5 km east to west south of the Queens Way at Llanwern. There is so much potentially interesting habitat here of many types that it would be impractical to complete a comprehensive survey of the whole area. Therefore, representative areas were selected to cover the greatest range of habitats types possible and each of these was sampled once. The present survey follows on from a previous survey done in 2014. This mainly concentrated on aquatic habitats but did include some terrestrial sampling (Hacking, 2014) whereas the present survey only deals with terrestrial habitats.

3 Survey Methodology

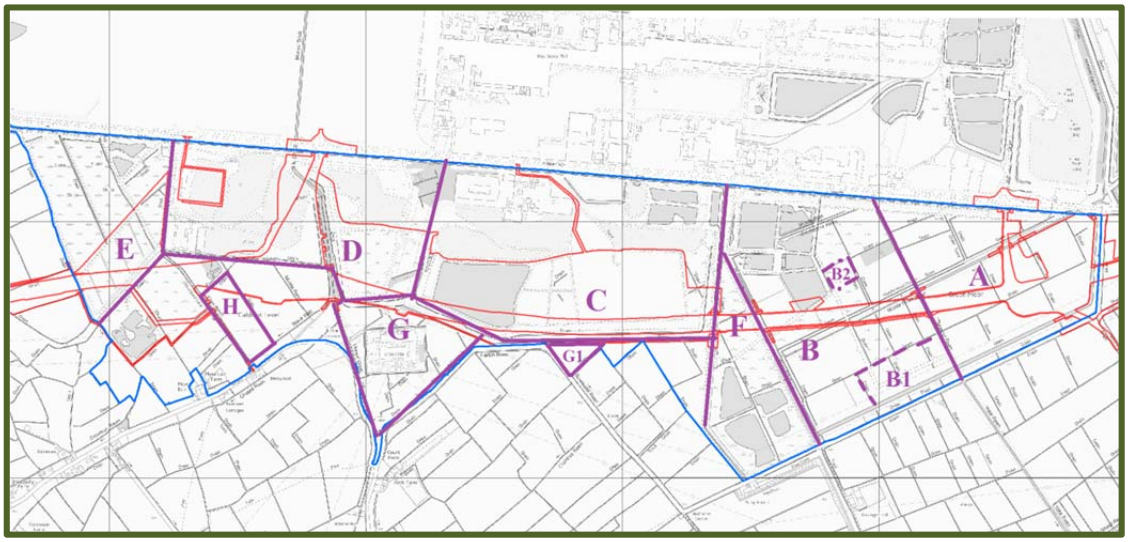
3.1 Sampling Techniques

This large area of ex-industrial land is a very varied and complex mosaic consisting of open habitats where various substrates have been tipped and are developing ruderal vegetation, trackways, semi-improved grazing pasture, developing flower-rich grassland, well developed *Carex* fen, *Phragmites* beds and much scrub dominated by sallow and birch. Additionally there are some riparian features beside reens and scattered mature trees which further contribute towards the invertebrate assemblages found. Areas of potential habitat within 250 metres of the proposed new section of motorway were initially selected from aerial photographs. These sampling compartments were very large so further selection had to be made. In compartments A, C, D and G, good habitats are relatively confined, these compartments being largely grass (A & G) or bare substrate (C & D) so these areas could be walked over sampling potential features. Compartments B and F had very large expanses of potentially important habitat so only limited representative areas could be sampled. Compartment H is a smaller compartment so it could be reasonably well covered despite

being almost entirely good habitat. Eight survey compartments were selected over the site based on their habitat type with compartment B having two sub-compartments. The large size of the site meant that each compartment could only be visited to take a sample once. Compartments A, B2 & E were surveyed on 23 July, compartment B1 on 22 July, compartments C & D on 11 August and compartments F, G & H on 18 August. Most sampling was done with a 40 cm diameter white-bag sweep-net combined with spot searching of particular features and some limited ground searching. The net was swept steadily from side to side while pacing steadily through the grass, herbage or scrub foliage, or in scrubby areas specimens were knocked from the foliage. Specimens were extracted from the net with a pooter or, in the case of larger specimens, individually potted in 30 ml soda glass tubes. When sampling was completed or the pooter became too full the contents were killed with ethyl acetate then transferred to 30 ml soda glass tubes together with a data label.

The sample compartments are marked on the map (Fig 1).

Figure 1 Map showing sample compartments sampling points.



3.2 Sample Timing

The site was visited on three occasions in the latter part of the summer. Delays in access arrangements meant that the first sampling date on 22 July 2015 was later than hoped. Each compartment was sampled once.

3.3 Constraints

Every attempt was made to visit in sunny, dry conditions, but this summer the weather conditions were unreliable and somewhat variable. On 22 & 23 July it was cool and overcast, with some sunny intervals and a cool NW breeze. These conditions were not ideal for flying, sun-loving insects, but the sweep-netting was unlikely to have been much affected once the vegetation dried out. The 11 August was calm, dry and cool with a thin overcast, becoming warmer and sunny in the afternoon. On 18 August it was warm and sunny with a light breeze, and 10% cloud cover so close to ideal conditions.

The late start of the survey meant that potentially important invertebrates with flight periods between April and June will have been missed. The nature of this site, with many bare and sparsely vegetated areas, that will warm up quickly in the early part of the year, is likely to be favourable for such early flying species. To a limited extent the likely value of such communities can be extrapolated from the sample obtained in July and August, but it is not possible to estimate what spring species of conservation importance might be present without surveying at that time of the year.

Ideally each compartment would have been visited a minimum of three times from spring to late summer. As such this survey should be considered as a reconnaissance survey, although large samples were taken so useful analysis can be made.

3.4IDENTIFICATION

Where practical, invertebrates were identified in the field but wherever the slightest doubt existed, one or more specimens were collected for more detailed scrutiny. To achieve rigorously accurate identifications, specimens were identified using the author's own library and entomological collection. Where these proved insufficient, specimens were submitted to relevant experts. Selected specimens have been retained in the author's personal collection as vouchers.

3.5TAXONOMIC COVERAGE

It is desirable that as wide a taxonomic range as possible is identified, in order to sample numerous ecological types, i.e. invertebrates with widely differing natural histories. In order to make the best use of the time available for identification, it was important to name the more readily identified groups which do not require very time consuming techniques and are within the experience of the worker.

The following orders and families of invertebrates were sampled and named to species.

Mollusca – slugs and snails

Isopoda - woodlice

Diplopoda – millipedes

Chilopoda - centipedes

Araneae – Spiders

Neuroptera - lacewings

Odonata - Dragonflies and Damselflies

Orthoptera – Grasshoppers and crickets

Dermaptera - earwigs

Hemiptera, Auchenorrhyncha - Froghoppers, Leafhoppers and Planthoppers (excluding females of difficult genera)

Hemiptera, **Heteroptera - True Bugs** (excluding smaller Miridae)

Trichoptera – Caddisflies

Lepidoptera – Butterflies and Moths

Trichoptera - caddisflies

Coleoptera – **Beetles** (all except small Aleocharine rove beetles and other very small obscure families)

Diptera - True Flies (except, Cecidomyiidae, Chironomidae, Ceratopogonidae, Simulidae, Phoridae, Sphaeroceridae, and females of some groups which are not identifiable).

Hymenoptera, Symphyta - sawflies

Hymenoptera, Aculeata - Ants, wasps and bees

3.6ANALYSIS

A system of British conservation status for invertebrates has been in use since publication of the Red Data Book for insects (Shirt, 1987), amended and supplemented by a series of JNCC Nature Conservation reviews (e.g. Falk, 1991a; Falk, 1991b). By this system, the rarest and

most threatened species are given one of the Red Data Book (RDB) statuses. Species which do not qualify as RDB but are nonetheless uncommon are given one of the Nationally Scarce statuses. The status categories and criteria relevant to this report are defined in Annex A.

'Key Species' are here defined by the following categories:

- British Red Data Book (RDB) and Nationally Scarce species (including statuses from JNCC texts which are published, 'in press' or 'in prep.').
- Species formerly regarded as either RDB or Nationally Scarce but recently downgraded.

For site assessment, the percentage of Key Species is a useful guide to the overall quality of the site for invertebrates, in comparison to other sites surveyed by the author using similar techniques. Higher quality sites support higher percentages of Key Species. To enable a fair comparison with survey data accumulated by the author over many years, species formerly regarded as either RDB or Nationally Scarce but recently downgraded are still treated as Key Species.

There are numerous examples of invertebrates which have been listed as either RDB or Nationally Scarce and have subsequently been found to be more widespread and abundant, either as a result of actual increase in range size or population size, or as a result of improved understanding by entomologists of how to find or identify them. Where the authors regard the official conservation status to be out of date, this is indicated in the Key Species accounts (Section 5).

4 Results

4.1 Overall Results

The survey identified 378 species of invertebrate (Annex A), a good diversity for three days of survey, especially as conditions were not always ideal and all samples were taken over barely more than a three week period, and lacking the spring and early summer species. To some extent the lack of species from the first half of the year can be compensated for by extrapolating from the species found, but this is a poor substitute for actual sampling in the spring. A broad range of invertebrate groups was covered to a greater or lesser extent and the species list includes representatives of the following groups: harvestmen, spiders, lacewings, dragonflies & damselflies, grasshoppers & crickets, earwigs, true bugs, froghoppers, planthoppers & leafhoppers, moths, butterflies, caddisflies, beetles, true flies, sawflies, wasps and bees. The main technique of sweep-netting was most efficient at sampling flying insects with Diptera found in by far the greatest number (170 species, 45%). The second largest group found was Coleoptera (59 species, 15. 6%), comprising predominantly phytophagous species swept from herbage, but also a few terrestrial species pooted from beside muddy puddles. Third in diversity was Lepidoptera, (48 species 12.7%), largely butterflies, day flying moths and micromoths. The Hymenoptera are next with 41 species (10.8%), which is a reasonable diversity for the habitats present but would have been much better with spring and early summer visits.

Of the 378 species identified by this survey, 31 (8.2%) are considered here as Key Species (defined in Section 3.6). 8.2% is a good proportion of Key Species, and indicates an area of some significant conservation value. Nine of these species have RDB status (2.4%), a very high proportion and a further indication of the quality of the site for invertebrates of conservation concern and seen at few sites surveyed in a similar way. This invertebrate diversity and quality is not atypical of large ex-industrial sites; compared to all the sites the author has surveyed over the last 15+ years, this site comes well within the upper third for quality based on proportion of Key Species, exceeding many protected sites.

An analysis of the Key Species found reveals that several are not of great conservation concern. In Table 1 below 14 species have been highlighted in grey as no longer of national conservation status despite still having this status officially. However, at least three of these

species are still of local significance, being rare in South Wales or at least with very few records in the country; these are highlighted in yellow in the Regional status column. The seven species highlighted in yellow in the species column really do merit attention as they are judged still to be of national conservation significance. One of these, *Bombus sylvarum*, is known from nearby sites, so the colonies found on the Tata Steel land are an important part of a meta-population that adds to the viability and significance of this species locally, especially as this bumblebee seems to occur at a higher density here than in most places across the nearby grazed pasture of the Gwent Levels. Other species such as *Gnophomyia viridipennis*, *Dolichopus signifer, Hydrophorus viridis*, *Sphaerophoria loewi*, *Cephalops straminipes* and *Herina palustris* all appear to be as rare in Britain as their status suggests and equally rare in South Wales. Of particular note is the hoverfly *Sphaerophoria loewi* which is from a group than is well recorded so most unlikely to be overlooked, and the dolichopodid *Hydrophorus viridis* with very few recent records suggesting that it is a declining species. Species in Table 1 not highlighted in the species column are either showing signs of increasing nationally but are still very scarce, or are data deficient. *Sarcophaga sinuata* is a little different in being rather scarce nationally but more frequent in Wales so although it can be seen of lower conservation importance locally than nationally, the Welsh populations are particularly important for its national conservation.

Table 1 Summary of key species.

Species	English name	Key species designation	Current national status	Regional status
Conocephalus discolor	Long-winged Conehead	Nationally Scarce a	no longer of conservation concern	rapidly increasing
Hecatera dysodea	Small Ranunculus (moth)	RDBK	Rapidly spread, now common in south	Recent arrival, spreading west
Paederus fuscipes	A rove beetle	Nationally Scarce b	Very local but common in places	scattered
Silis ruficollis	A soldier beetle	Nationally Scarce b	Increasingly frequent	Increasingly frequent
Meligethes fulvipes	A pollen beetle	Nationally Scarce	probably overlooked	probably overlooked
Meligethes rotundicollis	A pollen beetle	Nationally Scarce	probably overlooked	rare but probably under recorded
Hippodamia variegata	Adonis Ladybird	Nationally Scarce b	Increasingly frequent	Increasingly frequent
Oxystoma cerdo	A weevil	Nationally Scarce b	Spreading south	still v few Welsh records
Gnophomyia viridipennis	A cranefly	Nationally Scarce	Very local but overlooked	rare but probably under recorded
Trichina opaca	A hybotid fly	Nationally Scarce	Local are rarely found	confined to south
Platypalpus stabilis	An empid fly	(Nationally Scarce) None	Increasingly frequent	frequent
Chrysotus suavis	A dolichopodid fly	(Nationally Scarce) None	Increasingly frequent	frequent
Dolichopus signifer	A dolichopodid fly	(RDB2) Nationally Scarce	Rare	local but well recorded
Hydrophorus viridis	A dolichopodid fly	RDB3	very rare and elusive	Probably new for Wales
Sphaerophoria loewi	A hoverfly	RDB2	very rare and elusive	Probably second Welsh record
Cephalops straminipes	A big-headed fly	Nationally Scarce	rare but probably overlooked	First Welsh record
Eudorylas montium	A big-headed fly	(Nationally Scarce) None	Spreading south though England	Probably new for Wales

Species	**English name**	**Key species designation**	**Current national status**	**Regional status**
Eudorylas zermattensis	A big-headed fly	Nationally Scarce	Increasingly recorded but v local	confined to south
Dorylomorpha hungarica	A big-headed fly	(Nationally Scarce) None	Frequent in good fens	Frequent in good fens
Herina palustris	A picture-winged fly	Nationally Scarce	Rare and local	confined to southwest
Myopites inulaedyssentericae	A gallfly	RDB3 (Nationally Scarce b)	Spreading west	still rare in Wales, recently arrived
Campiglossa malaris	A gallfly	RDB1 (RDBK)	increasing rapidly	recent arrival and increasing
Homoneura interstincta	A lauxanid fly	RDB3	Increasingly frequent	few records, overlooked?
Homoneura thalhammeri	A lauxanid fly	Nationally Scarce	Frequent and under recorded	local but under recorded
Sapromyza opaca	A lauxanid fly	Nationally Scarce	Rather frequent	still rare but probably overlooked
Tetanocera punctifrons	A snail-killing fly	Nationally Scarce	Much more common than formerly	Frequent
Coenosia atra	A house fly	Nationally Scarce	perhaps becoming commoner	Still very scarce
Sarcophaga sinuata	A flesh fly	None (Nationally Scarce)	Local but can be frequent in suitable habitat	Commoner than in UK as a whole
Cistogaster globosa	A parasite fly	RDB1 (RDB2)	Spreading and becoming more frequent	Recent arrival but increasing
Philanthus triangulum	Bee-wolf	RDB2	Massively increased and nor frequent	frequent in the south of country
Bombus sylvarum	Shrill Carder Bee	Nationally Scarce b	Very local but common in places	very important colony locally

4.2 ASSESSMENT OF COMPARTMENTS

4.2.1 Compartment A

Green Moor is a rather different compartment to the others on this survey, being largely cattle grazed pasture surrounded by reens. Most fields are improved to some extent with low floral diversity except along the reens, although one field was *Juncus* dominated with more flowering plants. Apart from the reens, hedgerows provide some potentially important habitat, particularly where they include large poplar trees.

The single sample taken on 23 July produced 63 species, a surprisingly high diversity given the brief nature of the survey and the relatively limited habitat. Of these five are treated here as Key Species, a proportion of 7.9% indicative of an area with significant conservation value. Of these two have RDB or equivalent status (3.2%) and while one of these (*Homoneura interstincta*) is a species now known to be more frequent than formerly, the hoverfly *Sphaerophoria loewi* is a very important find. The finding of the saproxylic cranefly *Gnophomyia viridipennis* associated with the large poplar trees indicates the potential importance of these features.

4.2.2 Compartment B

A large and very complex compartment, the area within the 250 metre buffer zone included gravel pits, reed-beds, *Carex* fens, tall herbage, sallow scrub and bare trackways with a ruderal flora. Almost the entire area has the potential to produce rare invertebrates but it was not possible to sample all of it. Two representative samples were taken from more open areas dominated by *Carex* and *Phragmites* with surrounding sallow and adjacent trackways (areas B1 & B2).

The two samples together produced 136 species, the highest diversity of all the compartments on this survey. This will in part be due to the slightly greater effort to take the two samples, but is mainly due to the complex mosaic of habitats providing niches for many species. Of these, eight are treated here as key species, a proportion of 5.9%, which is lower than many compartments and rather surprising given the apparent quality of the habitat. A closer look at the species involved suggests that this compartment is lower quality than the habitat would indicate. Five of them are in the category of increasing so of lower conservation concern than their national status suggests. A further species *Sapromyza opaca* could also be put in this category as, while probably not increasing, its former scarcity could well be because it was overlooked. So only two species *Myopites inulaedyssentericae* and *Bombus sylvarum* are really of conservation concern, the former only regionally, the latter widely recorded across the site. So it is probable that this superficially rich site has developed its flora very recently and few scarce insects have had the chance to colonise in contrast to compartment A where the habitat is long established.

4.2.3 Compartment C

This is a very open area with much bare substrate and recent evidence of activity related to local industry. Dominated by ruderal communities and early succession scrub with some reed beds around the margins. Wetland areas were limited in extent and those present too dangerous to access.

A total of 113 species was found, which is rather high for an area with so little vegetation. Of these, eleven species (9.7%) are here treated as key species, a very impressive proportion, two of them with RDB status (1.8%). An analysis of the species involved, however, suggests that most of these key species are of lower concern. Six of the eleven are known to be increasing at a national level, a further one *Sapromyza opaca*, probably falls into this category and *Trichina opaca* is uncertain. This leaves just three species that are clearly important, at least regionally, although even these are not in the first rank of species of conservation importance. So although being rapidly colonised by the more frequent scarce species, the rarer ones were not yet present.

4.2.4 Compartment D

This was another very open area with much bare substrate with a ruderal flora and tall herbage around the margins in places. It also includes an area of fairly well developed scrub of sallow and birch but with several other tree species as well. The large Monk's Drain runs through the compartment providing some riparian habitat but the only other wetland was shallow muddy lagoons of surface water on the almost entirely bare substrate in places.

93 species were recorded, a fairly good result for so bare a habitat sampled just once. Of these, ten are treated here as key species, a proportion of 10.8% which at first sight is impressive, exceeded by just one other compartment on this survey. This is further enhanced by the four RDB species, a very high proportion of 4%, the highest percentage of RDB species of any compartment. A closer look at the species involved reveals that half of them are of lower concern, having shown significant increase and spread at a national level. A further two *Meligethes fulvipes* and *Eudorylas zermattensis*, while not obviously increasing, probably owe much of their former scarcity to under recording. This leaves three species of real conservation concern, *Bombus sylvarum* which was recorded widely on the site, *Cistogaster globosa* which is increasing but still very rare locally and most important the dolichopodid *Hydrophorus viridis* which really is rare and new for Wales. This fly was swept from the entirely bare, wet mud beside surface water on an area where industrial waste has been tipped just west of the Monk's Drain. Although usually found on coastal habitats, this artificial and recently created habitat clearly provides a suitable biotope for this fly.

4.2.5 Compartment E

This area at the western end of the site is better vegetated than the central part of the Tata land, with an extensive reed bed surrounded by gravel tracks with sparse ruderal flora and some exposed substrate.

86 species were recorded, rather low compared to other compartments, probably due to the less diverse range of habitats present. Of these 86 species, ten are here treated as key species, a proportion of 11.6%, the best total for any compartment on this survey. Two of these have RDB status (2.3%), also rather good. Of these four are now known to be increasing nationally so are no longer of great conservation concern. A further two *Paederus fuscipes* and *Meligethes fulvipes* are in fact likely to be under recorded so probably not as important as their national status suggests. *Meligethes rotundicollis* is also from a very under recorded group, but even so there are so few records in Wales that it is at least of local conservation concern. This leaves three species that really are of concern, *Bombus sylvarum* for which the region is very important, *Dolichopus signifer* which is rare nationally (and Wales seems to harbour some significant populations) and *Cephalops straminipes*, which is both nationally rare and new for Wales.

4.2.6 Compartment F

This relatively small triangular area between compartments B and C appears to have been allowed to develop undisturbed for longer than most areas. Much of it is very dense sallow scrub, limiting access. One area of *Carex* fen remains with some reed bed, otherwise sampling was confined to tracks which were grassy with tall herbage or gravelly with ruderal plants.

The total of 89 species is rather good for a single visit where access to habitat was difficult. Of these just three are key species (3.4%) so even lower than the adjacent compartment B. One species has RDB status (1.1%) a rather poor result. Further, two of the key species are now known to be very widespread and still increasing so not any longer of much concern. Only *Bombus sylvarum*, which is widespread in the area, is of national and regional conservation concern.

4.2.7 Compartment G

This area on the southern side of the site is cattle grazed pasture with reens, the pasture is overgrazed with numerous thistles but not otherwise very flower rich except along the reen margins. Some blackthorn scrub and a few larger trees are present, mainly willow. Also, rather separated from the main area, a sub-compartment (G1) was looked at. This was seeded grass with a very good proportion of Red clover *Trifolium pratense* attractive to bees. A reen along one side is well vegetated including Yellow Loosestrife *Lysimachia vulgaris*.

Just 53 species were found, but this is a small area sampled for little over one hour so this is a reasonable species list. Only one key species, the bumblebee *Bombus sylvarum*, was recorded in both parts of the compartment and was rather frequent in G1 where 7 individuals were noted in a small area together with 20+ *Bombus humilis*.

4.2.8 Compartment H

This area is a long, rectangular field that has been allowed to develop fen habitat. At the time of the visit it was dry across the whole field although rather damp in the northeast corner where *Typha* was present. Sallow scrub is beginning to encroach in parts but the area is mostly very open with *Carex* and *Juncus* dominated areas, good stands of Yellow Loosestrife *Lysimachia vulgaris* and numerous other flowering plants.

The relatively brief survey at the end of the day in less than perfect conditions produced 61 species, a good diversity for a brief survey of a relatively small area. Of these 61, four are here treated as key species, a proportion of 6.6% which is reasonable although well down on some compartments at this site. One of these is the now frequent *Conocephalus discolor* and another, *Sarcophaga sinuata* does not have official status yet and is commoner in Wales than nationally but, as such, the Welsh populations can be seen as important. *Sapromyza opaca* is perhaps commoner than its status suggests, probably having been overlooked in the past. So only *Bombus sylvarum* is of real conservation concern. Having said that the habitat here looked particularly interesting and the area would benefit from further survey.

5 Key Species

5.1 RED DATA BOOK

5.1.1 *Hecatera dysodea* Small Ranunculus RDBK

This attractively patterned grey and white moth was frequent in parts of East Anglia and London up to 1895. It then declined rapidly and had all but disappeared by 1912, subsequent records in the early 20th century probably referring to migrants. It was absent from Britain as a breeding species from before WW2 to the late 1990's when small colonies became established in Essex and Kent. Over the last 20 years it has slowly consolidated its presence, and in the last 10 years has rapidly spread across England, arriving in the Bristol area in 2007. Records in Wales are still confined to the south as far west as Swansea and seem to be well established around Newport (National Biodiversity Network - NBN). The remarkable reverse in fortunes of this species means that it is no longer of conservation concern. However, the reasons for its extinction in Britain in the early 20th century are unexplained so this moth is still of interest until it is certain that its current success is permanent. Larvae were noted on *Lactuca virosa* (a relatively unusual foodplant) in compartments D & F.

5.1.2 *Dolichopus signifer* (RDB2) Nationally Scarce

This metallic green dolichopodid fly was formerly thought to be very rare but is now known by about 15 post-1960 records scattered across England and Wales south of Yorkshire. These extra records have led to its conservation status being downgraded (Falk & Crossley, 2005). In Wales it is recorded around the coast from Glamorgan to Anglesey, especially from dunes (NBN). It is usually found around freshwater seepages on coastal dunes and sea shores, but

there are also inland records. Its biology is unknown. Adults are recorded from May to August. It was found in compartment E.

5.1.3 *Hydrophorus viridis* RDB3

This species is widespread in England north to Norfolk but there are very few records, most of them old. Since 1978 there have only been four records, Dorset, Kent, Huntingdonshire and Norfolk. This would appear to be the first record for Wales. The species is possibly under recorded, as it is very difficult to catch, but appears to be genuinely rare. In Norfolk and Dorset this species was recorded at coastal sites with soft-rock-cliffs, seepages and soft mud, and in Huntingdonshire from a partially vegetated scrape beside a gravel pit. Nothing is known of the biology of this species (Falk & Crossley, 2005). A single female was swept from soft, wet mud in a very exposed, barren area in compartment D.

5.1.4 *Sphaerophoria loewi* RDB2

This small black and yellow hoverfly has a very scattered distribution in Britain with records from Sussex north to Sutherland but is very rarely seen, with only eight records since 1980. In South Wales there is a single record from a coastal wetland west of Barry. Adults have been found in brackish reed-beds, usually *Phragmites* but also *Bolboschoenus*, at some localities. They fly amongst stands of tall vegetation, usually over water, occasionally visiting flowers. It has been suggested that they are active very early in the morning and so are often overlooked, but there are recent records from the middle of the day. The larvae are unknown but probably feed on aphids or other soft bodied Homoptera. Adults are recorded from June to September (Ball & Morris, 2000). A single female was swept along a reen in compartment A.

5.1.5 *Myopites inulaedyssentericae* RDB3 (Nationally Scarce b)

This small and elusive gallfly is a predominantly south-eastern species, especially in north Kent, extending west to Dorset. There are also a few records in Norfolk and even inland in Warwickshire (Clemons, 2004). It is very recently arrived in Wales with just one record south of Cardiff in NBN. The larvae develop in the flower heads of *Pulicaria dysenterica* forming a hard gall. Apparently associated with chalk grassland but, as the host plant is found in damp areas, this may need confirming. The adults are recorded from June to October with a peak in July when they can be swept from their host plant but are easily overlooked (Falk, 1992b). This species was swept in compartment B1.

5.1.6 *Campiglossa malaris* RDB1 (RDBK)

This attractive gallfly with patterned wings was not long ago a great rarity in Britain only known from the far east of Kent having been added to the British list in 1974 (Clemons, 1996). Over the next eight years it reached the eastern outskirts of London (Clemons, 2004), and it was first noted in Bristol in 2008 so its presence in South Wales was to be expected. To date it has usually been found in coastal grassland where its foodplant, Ragwort, is abundant. Adults are found in July and August. It was found in compartments B1, C and E.

5.1.7 *Homoneura interstincta* RDB3

This species was originally placed on the British list on the basis of specimens identified by Collin (1948). However, it has recently been shown that Collin misidentified his specimens and in fact they belong with a newly described species *H. mediospinosa*. The true *interstincta* was only discovered to be British when three specimens were caught in south Somerset in 2003 (Gibbs, 2004). Since then the species has been found at many other sites in southern England including a few from South Wales (pers. obs.). It is probably too frequent to justify this status. Nothing is known of its habitat requirements or life history but there seems to be an association with poplar and sallow. Larvae of this genus are generally believed to develop in decaying vegetable matter, including fallen leaves (Falk & Ismay in

prep.). Adults are recorded from June to August (pers. obs.). It was swept from poplars in compartment A.

5.1.8 *Cistogaster globosa* RDB1 (RDB2)

This attractive little parasite fly is known from a few localities in southern England: Wilts; Hants; Surrey; Berks (Falk & Pont in prep.). Just recently it has been found at many more sites and at one site in Wales (Howe & Woodman, 2001) so it seems to be doing well and hence the proposal in a forthcoming review to downgrade its status from RDB1 to RDB2. It seems probable that it will eventually lose its RDB status and be graded at Nationally Scarce. It frequents calcareous downland and grassland where it parasitises the hemipteran bug *Aelia acuminata* the Bishops Mitre. Adults are recorded from June to September. It was swept in compartment D.

5.1.9 *Philanthus triangulum* RDB2

The Bee-wolf is a large, spectacular black and yellow wasp, which not long ago was a great rarity in this country. Once confined to just a couple of sites on the Isle of White (Richards, 1980) it is now widespread over southern England and expanding rapidly northwards and west along the south coast of Wales (Edwards, 1997; NBN). In the light of this great increase in range its status will have to be downgraded to Nb or probably removed altogether. It frequents warm sunny areas on light, well-drained soil where it digs nests up to 1 metre in length with 3-34 lateral chambers. These are stocked with worker honeybees *Apis mellifera* (Edwards op.cit.). It was noted in compartments C & D.

5.2 NATIONALLY SCARCE

5.2.1 *Conocephalus discolor* Long-winged Conehead Nationally Scarce a

The Long-winged cone-head, once such an uncommon species of the south coast west to the New Forest, has shown a remarkable spread in recent years. In South Wales it is a fairly recent arrival following the M4 (NBN) and it is clear that this species is no longer of national conservation concern. It occurs in coarse, mainly ungrazed vegetation in warm places such as downland, coastal reedbeds, heath, bogs and disturbed areas. Nymphs emerge in May, maturing in August and sometimes surviving until November (Haes & Harding, 1997). It was noted in compartments D, F & H.

5.2.2 *Paederus fuscipes* Nationally Scarce b

This attractive black and red rove beetle is widespread in Britain as far north as south west Scotland but is local and mainly occurs in the south. In Wales, it is recorded from the south east and around Snowdonia (NBN). It frequents marshes, bogs and the margins of ponds and dykes, less often on salt marshes. Found in tussocks, moss and in plant debris. Adults have been recorded from April to October (Hyman, 1994). It was found in compartment E.

5.2.3 *Silis ruficollis* Nationally Scarce b

This red and blackish soldier beetle was once a considerable rarity but has increased in the last 40 years and is now not uncommon in some parts of southern England and Wales (Hyman, 1992). It is fairly well established in South Wales, especially near Swansea, but also seems to be fairly frequent in Gwent (NBN). It frequents river and lake margins, fens, marshes and other wetlands. The larvae are thought to be predatory, living free on the ground or foliage. Adults can be found on lush vegetation from June to August. It probably over winters as full-grown larvae (Hyman op. cit.). It was found in compartments A, B2 & E.

5.2.4 *Meligethes fulvipes* Nationally Scarce

This tiny black pollen beetle with reddish legs is widespread in England and South Wales but very local and scattered. It is usually found near the coast and in marshy places inland. It is associated with white mustard *Sinapis arvensis* (Hyman, 1994). It was fairly frequent here being found in compartments D & E.

5.2.5 *Meligethes rotundicollis* Nationally Scarce

This is another tiny black pollen beetle, also associated with crucifers, recorded from southeast England and the midlands. The author is not aware of any records from Wales although it was found in Newport this year (pers. obs.). It occurs along field margins, roadsides and waste places where it can be found on *Sinapis arvensis* and *Sisybrium officinale*. Adults are recorded in April, June to August (Hyman, 1994). It was found in compartment E.

5.2.6 *Hippodamia variegata* Adonis' Ladybird Nationally Scarce b

The Adonis Ladybird is a black and red species with a very variable number of spots on the elytra. It is mainly found in southern and eastern England and is very local elsewhere (Hyman, 1992) but in recent years it has shown a very rapid increase and northward spread. It seems to be well established in South Wales, especially on ex-industrial sites (pers. obs.; NBN), and is probably widespread now. Although it is mainly coastal, it occurs on a variety of dry weedy habitats. Adults are active from June to September. It probably over winters as an adult in dry situations (Hyman, 1992). It was found in compartments C, D & E.

5.2.7 *Oxystoma cerdo* Nationally Scarce b

This small black weevil is widespread in Britain as far north as south Scotland, with most records from the Midlands and northern England. In South Wales, it seems to be rare with few records on NBN so is probably a very recent arrival in the country. The species occurs in woodland rides, grassland, fens and road verges. It is associated with Vetch spp., particularly tufted vetch. Adults are found from May to July (Hyman, 1992). It was found in compartments B1 & B2.

5.2.8 *Gnophomyia viridipennis* Nationally Scarce

This largely black cranefly is widespread in England as far north as Durham but very scattered with most records in the south. In South Wales, there is a single record near Abergavenny according to NBN so it is either very rare or under-recorded in the county. It frequents fens and carr. Recent local records have come from woodland beside streams and rivers. The larvae develop in the layer beneath the bark of recently fallen trees, especially poplars. Adults are recorded from May to August (Falk, 1991b). It was swept from the foliage of poplar trees in compartment A.

5.2.9 *Trichina opaca* Nationally Scarce

This small hybotid fly is widespread in Britain as far north as Yorkshire and with a couple of locations in Scotland. In South Wales there are records from Glamorgan and Cardigan. Most records are recent so perhaps this is a species that is becoming commoner (Falk and Crossley, 2005). It frequents broadleaved woodland and fens. Nothing is known of its biology but adults are predacious, inhabiting moist, shaded locations. It was swept in compartment C.

5.2.10 *Platypalpus stabilis* (Nationally Scarce) None

This is a small empid fly once only known from scattered sites in southern England but now much more frequently recorded. When the updated review covering this species was published, its Nationally Scarce status was removed (Falk and Crossley, 2005). In South Wales, it appears to be relatively frequent, especially in the Gwent Levels (pers. obs.). Many records are from wetlands, perhaps in association with sallows. It was swept in compartment B1.

5.2.11 *Chrysotus suavis* (Nationally Scarce) None

This tiny metallic green Dolichopodid fly is widespread in England as far north as Northumberland and South Wales but is now known from 12 counties so recently had its national status removed (Falk & Crossley, 2005). In South Wales, it is frequent on the Gwent Levels (pers. obs.). It is a coastal species usually found on dunes and with records from a

gravel pit and the sandy Brecks. Adults are active in June and July (Fonseca 1978). It was swept in compartment C.

5.2.12 *Cephalops straminipes* Nationally Scarce

This small black big-headed fly has a scattered distribution in southern England with an isolated record as far north as Derbyshire, mostly close to the coast. This is the first record for Wales. It is always found in association with *Phragmites* reed-beds, both extensive and small stands on coastal cliffs or sparsely vegetated areas. It is a parasitoid of the hopper *Chloriona glaucescens* and probably other members of this genus. It was only recognised in Britain relatively recently so its true status is probably yet to be fully understood and is still overlooked. Adults are recorded from June to August (Falk & Chandler, 2005). It was swept in compartment E.

5.2.13 *Eudorylas montium* (Nationally Scarce) None

This all black big-headed fly is very widespread in Britain but with a strong northern bias, and very scarce south of the Humber (MapMate data). Now known from at least 38 sites so recently its status has been removed (Falk & Chandler, 2005). Although predominantly a northern species, a few have recently been found near Bristol, but the author knows of no records from Wales (pers. obs.). Most records are from open marshy areas and lakesides and woodland edge. Flies of this genus are internal parasitoides of leafhoppers but the author has no specific data on this species. Adults are recorded in June and July. It was found in compartment C.

5.2.14 *Eudorylas zermattensis* Nationally Scarce

This small black big-headed fly is widespread in England and South Wales as far north as Nottinghamshire. There are only sixteen known British sites of which twelve are post-1960. In South Wales, it has been recorded at the dune complexes at Kenfig, and Oxwich and elsewhere on the Gower. It frequents chalk grassland, coastal sand dunes and the East Anglian Brecklands and very dry, sunny brownfield sites. A Berkshire site is an area of short grass with sandy and limestone banks, while Devil's Ditch, Cambridgeshire is chalk grassland. It is known from very dry open sites elsewhere in Europe. Its biology is unknown but members of the genus *Eudorylas* are parasitoides of leafhoppers of the family Cicadellidae as larvae. Adults are recorded from June to September (Falk & Chandler, 2005). It was swept in compartment D.

5.2.15 *Dorylomorpha hungarica* (Nationally Scarce) None

This shiny black big-headed fly with a distinctively club-shaped abdomen is widespread in England as far north as Yorkshire but is local with about 37 confirmed sites. In South Wales, it is not infrequent in suitable habitat with records from Magor Marsh and several sites in Glamorgan. Its known haunts are high quality fens and marshes, grazing meadows and the margins of ponds. As with all members of this family, this species is a parasitoid of froghoppers and leafhoppers, the female possessing a sharp ovipositor to lay the egg inside its host. Adults are recorded from May to August (Falk & Chandler, 2005). It was swept in compartment C.

5.2.16 *Herina palustris* Nationally Scarce

This small black picture-winged fly is scarce in Britain with just a few records scattered across England and Wales north to Yorkshire (NBN). In South Wales, there are several records from Glamorgan and Pembrokeshire (NBN). It is predominantly a species of coastal dunes and freshwater wetlands, with particularly strong populations noted on some calcareous coastal dunes, where it is associated with grassland of middle and hind dunes. Old records are much more frequent than recent suggesting that it is declining (Falk & Ismay in prep.). It was swept in compartment C.

5.2.17 *Homoneura thalhammeri* Nationally Scarce

This small yellowish fly has a scattered distribution over England as far north as Yorkshire and in South Wales. It does not have official national status because it was not known in Britain when the relevant review was published; at the time it was confused with another species which was given Nb status. There are about 20 post-1960 records, including the Gwent Levels (NBN) and near Swansea (pers. obs.). Where recording has been intensive this species has been found more frequently so is no doubt over looked and perhaps no longer deserving its national status. It is most often found by sweeping scrub, isolated shrubs, trees and adjacent tall herbage or coarse grasses. Its biology is unknown but larvae of this genus are generally believed to develop in decaying vegetable matter including fallen leaves. Adults are recorded from June to September (Falk & Ismay in prep.). It was swept in compartments B1 & C.

5.2.18 *Sapromyza opaca* Nationally Scarce

This all yellow lauxanid fly has a widely dispersed distribution in southern England north to Staffordshire, also Wales and one record from Scotland. In Wales it would appear to be very scarce with just a few records from the south of the country. Most records are associated with woodlands or established scrub; other records include wetland sites where it appears to be associated with ditches, also chalk scrub. Its biology is unknown. The larvae of this family are generally believed to develop in decaying vegetable matter including fallen leaves. Adults are recorded in June and July (Falk & Ismay in prep.). It was swept in compartments B1 & C.

5.2.19 *Tetanocera punctifrons* Nationally Scarce

This is one of the larger snail-killing flies, which is widely distributed but local in Britain with about 20 post 1960 sites (Falk, 1991b). In South Wales it is well established across the country, with good populations in Glamorgan and the Gwent Levels (NBN, pers. obs.). It is becoming increasingly frequent and perhaps no longer merits its national status. It inhabits damp woodland, riparian situations, damp heathland and coastal marshes. The larvae probably develop as predators or parasitoides of snails; adults are recorded from June to August (Falk op. cit.). It was found in compartment D.

5.2.20 *Coenosia atra* Nationally Scarce

Records are scattered widely in Central and Southern England but are very local. In South Wales it appears to be very scarce with a couple of records in Glamorgan on NBN and also recorded from Newport this year (pers. obs.) and on the TATA land during a previous survey (Hacking, 2014). The species seems to have been increasing over the last two decades. It is usually encountered in marshy areas on heaths, *Juncus* and *Carex* fens, and dune slacks. Its biology is unknown; adults are on the wing from June to September (Falk & Pont in prep.). It was swept in compartment E.

5.2.21 *Sarcophaga sinuata* None (Nationally Scarce)

This flesh fly has a very scattered distribution in southern and central England and Wales as far north as Anglesey and Chester and one county in Scotland. It does not have official JNCC status but it is proposed for Nationally Scarce status when the review covering this group is published. In South Wales it appears to be well established, perhaps more frequent here than elsewhere in Britain (NBN). This is a fly of coastal salt marshes, and inland fens with peat. The larvae develop as parasitoides. On mainland Europe, it has been reared from the Bulrush Wainscot *Nonagria typha* (Lepidoptera, Noctuidae); in North America it is a parasitoid of Grasshoppers (Orthoptera, Acrididae). Adults are recorded from May to September (Falk & Pont in prep.). It was swept in compartment H.

5.2.22 *Bombus sylvarum* Shrill Carder Bee Nationally Scarce b/ BAP

The Shrill Carder Bee is included as a national BAP species because of major declines across Britain, with only four or five remaining meta-populations in England and South Wales and

the East Thames Corridor. It seems to be doing very well in South Wales with strong populations from Pembrokeshire to the Gwent Levels (NBN). Bumblebee populations appear to operate at a landscape scale and it is probable that viable individual populations require minimum ranges of between ten to twenty sq. km of good matrix habitat within farmland, and *B. sylvarum* seems to require much larger areas of good habitat than Brown-banded Carder Bee *B. humilis*. It is found on a variety of open, flower-rich situations, dunes, salt-marsh edges, shingle beaches, chalk downland and heathland. Pollen is collected from a wide variety of flowers, with Fabaceae, Lamiaceae and Scrophulariaceae preferred (Edwards & Telfer, 2001). A reasonably good population was found with workers noted in every compartment except B2, with several observations in some compartments.

5.3BAP/S42, LOCALLY SIGNIFICANT

5.3.1 *Timandra comae* Blood-vein BAP

This attractive moth is fairly common in the southern counties of England and Wales, but scarcer further north and in Ireland. The adult rests with the wings held in such a position that the reddish cross-lines of the fore and hind wings form a continuous band. The fringes are also suffused with pink. It has two generations, from May to July and in August and September. The larvae feed on low-growing plants such as dock (*Rumex*). Although still relatively widespread and frequent, it has been given BAP status because of a dramatic decline in recent years. It was noted in compartment F.

5.3.2 *Tyria jacobaeae* Cinnabar BAP

This very attractive and well known day-flying moth has recently been added to the Priority List of UK Biodiversity Action Plan Species. In South Wales it is still quite common and well recorded (NBN). Its addition is due to concern that the species is suffering a significant decline and probably that its food plant is in jeopardy due to legislation. The larvae feed on Ragwort, a plant subject to stringent control much persecuted by many landowners. Ragwort supports many insect species other than Cinnabar so this moth acts as a flagship for the whole Ragwort dependant fauna. It was noted, mostly as larvae, in compartments B1, B2, C, D, E, F & G.

5.3.3 *Bombus humilis* Brown-banded Carder Bee BAP

The Brown-banded Carder Bee has declined dramatically in recent decades, and although not included in Falk (1991a) it should now be viewed as Nationally Scarce. Historically widespread in England and Wales, it is now largely confined to local populations in the south and west. In Wales it has some very strong populations in the south, including across the Gwent Levels, and a scatter of records further north (NBN). Bumblebee populations appear to operate at a landscape scale and it is probable that viable individual populations require minimum ranges of from ten to twenty sq. km of good matrix habitat within farmland. It is found on a variety of open, flower-rich situations, dunes, salt-marsh edges, shingle beaches, chalk downland and heathland. Important plant species used in early summer by queens include Fodder Vetch *Vicia villosa*, Red Clover *Trifolium pratense* and Broad-leaved Everlasting-pea *Lathyrus latifolius*. Workers forage on the flowers of species such as bird's-foot trefoils *Lotus* spp., clovers, Black Horehound *Ballota nigra*, Lucerne *Medicago sativa* and Red Bartsia *Odondites verna*. It was frequent on this site, being noted in all compartments except B2.

6 Site Evaluation

It is clear from the results of this survey set out above that this very extensive site includes some very interesting habitats and microhabitats that harbour some scarce and rare insects. The overall proportion of 8.2% of key species places it well within the same quality as many nature reserves and is of similar quality to the habitat surveyed in Newport Docks. Rather better than found at the docks is the number of very high quality (RDB) species found here

that further suggests a site of regional or even national importance. Nine species have RDB status or equivalent, a high proportion of 2.4%. Of these nine species, several are being recorded with increasing frequency and will be downgraded to Nationally Scarce or even lose their status altogether when next reviewed, but three really are important nationally. Further the presence of several BAP species adds to the conclusion that, while this site might not be of national importance, it is certainly a site with significant value for regional conservation and its loss might be detrimental for local biodiversity.

It is also clear that some areas are much more important than others. The reens and old poplar trees in compartment A seem to be particularly important (most notably for *Sphaerophoria loewi*) and, as a well-established habitat, the most difficult to mitigate for. The shallow muddy lagoon in compartment D is also of great significance for the population of *Hydrophorus viridis*, but as a transient habitat it will be a relatively simple matter to recreate such habitat if the precise location is destroyed. Also the reed-beds, especially in compartment E, are important and will need to be retained in approximately the same area as at present. Those compartments that did not yield such a high proportion of key species, such as B, F and H, and yet had interesting looking habitat cannot be assumed to be insignificant for conservation. Firstly these sites were very biodiverse and secondly the sample was brief. All these compartments are sufficiently interesting to think that a fuller survey, with a minimum of three samples taken spread though the season from spring to late summer, could well produce species of as much importance as found in compartments A and D.

7 Recommendations

This survey clearly shows that the site overall has an invertebrate biodiversity as good as found on many nature reserves so requires some care and mitigation if development of the new section of motorway proceeds. Despite the fact that many of the species found are not of the top quality, a few exceptional species were found. Because this site is so large, no one area was sampled more than once, so although the overall result is robust, at an individual compartment level a single sample is prone to random events that can produce a misleading result.

The very large size of the TATA land should mean that any mitigation should be straightforward as there is plenty of space to set aside and be managed for its biodiversity. Most of the habitats present are relatively recent in origin so, as such, can be recreated in areas that are not being affected. Ideally, such areas should be contiguous with such habitat already there, and then will have to be managed to maintain its open nature by preventing scrub encroachment. When it comes to open muddy lagoons then a regime or regular disturbance will be required.

The most difficult habitat to mitigate for will be the reens and grazing pasture in compartment A. It would appear that the old poplar trees at ST39768593 and ST39808585 are very close to the route and unlikely to survive. More important is the riparian habitats along the reens where the very rare hoverfly *Sphaerophoria loewi* was found. Although some loss of these reens will be inevitable, so long as the hydrology remains unaffected, it will be possible to enhance the structure of the banks along the remaining reens to provide more habitat suitable for this hoverfly.

As at Newport Docks, the greatest potential for damage will come if the compartments surveyed are developed wholesale once the new section of motorway is constructed. This would very likely lead to significant loss of local biodiversity and damage the viability of species such as the two important bumblebees in the wider Gwent Levels by eliminating large areas of flower-rich habitat.

The road might also affect Bumblebee populations because it will bisect the habitat, isolating habitat north of the road from the wider Gwent Levels. Wide, open flowery verges will compensate to some extent but tree planting along verges will exacerbate the isolating effect

of the road. Red clover meadows, such as the one at G1, can be sown to provide additional forage for bumblebees so compensate for loss elsewhere.

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9 Annex A: British conservation status categories – definitions.

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)).

Red Data Book category EXTINCT

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

Red Data Book category 1, Endangered

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

Red Data Book category 2, Vulnerable

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

Red Data Book category 3, Rare

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

Red Data Book category I, Indeterminate

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

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

Red Data Book category K, Insufficiently Known

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

Nationally Scarce Category A, Na.

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

Nationally Scarce Category B, Nb.

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

Nationally Scarce, N.

Definition Species which do not fall within Red Data Book categories but which are nonetheless uncommon in Great Britain. This status category has been used where

information has not been sufficient to allocate a species to either Na or Nb. These species are thought to occur in between 16 and 100 10-km squares of the National Grid.

10 Annex B: Species list.

Order: Family	Species	Vernacular	National Status	A	B1	B2	C	D	E	F	G	G1	H
Opiliones: Leiobunidae	*Dicranopalpus ramosus*							X					
Araneae: Gnaphosidae	*Zelotes latreillei*						X						
Araneae: Salticidae	*Heliophanus flavipes*						X						
Neuroptera: Hemerobiidae	*Micromus variegatus*						X						
Neuroptera: Hemerobiidae	*Hemerobius humulinus*			X									
Odonata: Lestidae	*Lestes sponsa*	Emerald Damselfly		X						X			
Odonata: Coenagriidae	*Ischnura elegans*	Blue-tailed Damselfly		X	X			X		X			
Odonata: Coenagriidae	*Enallagma cyathigerum*	Common Blue Damselfly						X					
Odonata: Aeshnidae	*Aeshna cyanea*	Southern Hawker					X			X		X	
Odonata: Aeshnidae	*Aeshna mixta*	Migrant Hawker					X				X		
Odonata: Aeshnidae	*Anax imperator*	Emperor Dragonfly		X		X		X	X		X		X
Odonata: Libellulidae	*Sympetrum striolatum*	Common Darter		X	X	X	X	X		X			
Odonata: Libellulidae	*Sympetrum sanguineum*	Ruddy Darter									X		
Orthoptera: Conocephalidae	*Conocephalus discolor*	Long-winged Conehead	**Nationally Scarce a**					X		X			X
Orthoptera: Conocephalidae	*Conocephalus dorsalis*	Short-winged Conehead			X	X	X			X			X
Orthoptera: Phaneropteridae	*Leptophyes punctatissima*	Speckled Bush Cricket					X				X		X
Orthoptera: Tetrigidae	*Tetrix subulata*	Slender Ground Hopper					X						
Orthoptera: Acrididae	*Chorthippus albomarginatus*	Lesser Marsh Grasshopper											X
Orthoptera: Acrididae	*Chorthippus brunneus*	Common Field Grasshopper				X	X	X		X	X		
Orthoptera: Acrididae	*Chorthippus parallelus*	Meadow Grasshopper		X				X			X		
Dermaptera: Forficulidae	*Forficula auricularia*	Common Earwig				X	X						
Hemiptera: Aphrophoridae	*Aphrophora alni*				X					X	X		
Hemiptera: Aphrophoridae	*Philaenus spumarius*			X	X	X	X	X		X	X		X
Hemiptera: Aphrophoridae	*Neophilaenus lineatus*				X	X	X						
Hemiptera: Cicadellidae	*Oncopsis appendiculata*						X						
Hemiptera: Cicadellidae	*Cicadella viridis*				X		X			X			
Hemiptera: Cicadellidae	*Idiocerus lituratus*						X						
Hemiptera: Cicadellidae	*Macropsis marginata*						X						

Order: Family	Species	Vernacular	National Status	A	B1	B2	C	D	E	F	G	G1	H
Hemiptera: Cicadellidae	*Limotettix striola*												X
Hemiptera: Cicadellidae	*Conosanus obsoletus*					X							
Hemiptera: Cicadellidae	*Cicadula aurantipes*					X							
Hemiptera: Cicadellidae	*Cicadula quadrinotata*								X				
Hemiptera: Cicadellidae	*Notus flavipennis*				X								
Hemiptera: Cicadellidae	*Eupteryx aurata*						X						
Hemiptera: Cicadellidae	*Eupterycyba jucunda*						X						
Hemiptera: Cixiidae	*Tachycixius pilosus*					X							
Hemiptera: Cixiidae	*Cixius nervosus*									X			
Hemiptera: Delphacidae	*Conomelus anceps*					X				X			
Hemiptera: Delphacidae	*Javesella pellucida*									X			
Hemiptera: Delphacidae	*Conomelus anceps*			X	X		X						X
Hemiptera: Lygaeidae	*Cymus glandicolor*						X						
Hemiptera: Lygaeidae	*Cymus melanocephalus*				X	X							
Hemiptera: Lygaeidae	*Ischnodemus sabuleti*				X								
Hemiptera: Lygaeidae	*Nysius ericae*						X						
Hemiptera: Lygaeidae	*Stygnocoris sabulosus*									X			
Hemiptera: Miridae	*Capsus ater*					X							
Hemiptera: Miridae	*Closterotomus norwegicus*								X				
Hemiptera: Miridae	*Heterotoma planicornis*								X				
Hemiptera: Miridae	*Pilophorus perplexus*						X						
Hemiptera: Miridae	*Stenodema calcarata*				X	X			X	X			X
Hemiptera: Miridae	*Teratocoris antennatus*									X			
Hemiptera: Coreidae	*Coreus marginatus*	Dock Bug			X					X			X
Hemiptera: Pentatomidae	*Dolycoris baccarum*	Hairy Shieldbug			X	X		X		X			X
Hemiptera: Pentatomidae	*Eurydema oleracea*	Crucifer Shieldbug					X	X	X				
Hemiptera: Pentatomidae	*Picromerus bidens*	Spiked Shieldbug											X
Hemiptera: Rhopalidae	*Corizus hyoscyami*							X					
Hemiptera: Rhopalidae	*Rhopalus subrufus*							X		X			
Hemiptera: Rhopalidae	*Stictopleurus punctatonervosus*					X	X						
Lepidoptera: Lyonetiidae	*Lyonetia clerkella*	Apple Leaf Miner						X					
Lepidoptera: Gracillariidae	*Phyllocnistis unipunctella*						X						

Order: Family	Species	Vernacular	National Status	A	B1	B2	C	D	E	F	G	G1	H
Lepidoptera: Choreutidae	*Anthophila fabriciana*								X				
Lepidoptera: Yponomeutidae	*Plutella xylostella*	Diamond-back Moth					X						
Lepidoptera: Oecophoridae	*Batia unitella*			X									
Lepidoptera: Gelechiidae	*Apodia bifractella*						X	X					X
Lepidoptera: Gelechiidae	*Bryotropha affinis*							X					
Lepidoptera: Momphidae	*Mompha raschkiella*						X						
Lepidoptera: Tortricidae	*Acleris emargana*						X						
Lepidoptera: Tortricidae	*Celypha lacunana*				X								
Lepidoptera: Tortricidae	*Epiblema costipunctana*				X								
Lepidoptera: Tortricidae	*Lathronympha strigana*			X									
Lepidoptera: Tortricidae	*Grapholita compositella*							X					
Lepidoptera: Tortricidae	*Pammene aurana*								X				
Lepidoptera: Pyralidae	*Chrysoteuchia culmella*	Garden Grass-veneer				X							
Lepidoptera: Pyralidae	*Agriphila geniculea*									X			
Lepidoptera: Pyralidae	*Catoptria pinella*								X				
Lepidoptera: Pyralidae	*Eudonia mercurella*							X					
Lepidoptera: Hesperiidae	*Thymelicus lineola*	Essex Skipper			X	X				X			
Lepidoptera: Hesperiidae	*Thymelicus sylvestris*	Small Skipper			X			X		X			
Lepidoptera: Pieridae	*Pieris rapae*	Small White						X					
Lepidoptera: Pieridae	*Pieris napi*	Green-veined White		X		X			X	X	X		
Lepidoptera: Nymphalidae	*Pararge aegeria*	Speckled Wood							X		X		
Lepidoptera: Nymphalidae	*Maniola jurtina*	Meadow Brown		X	X			X		X	X		
Lepidoptera: Nymphalidae	*Pyronia tithonus*	Gatekeeper		X	X			X	X	X	X		
Lepidoptera: Nymphalidae	*Vanessa atalanta*	Red Admiral				X							
Lepidoptera: Nymphalidae	*Vanessa cardui*	Painted Lady					X	X					
Lepidoptera: Nymphalidae	*Aglais io*	Peacock			X	X	X						
Lepidoptera: Nymphalidae	*Aglais urticae*	Small Tortoiseshell						X		X	X		
Lepidoptera: Nymphalidae	*Polygonia c-album*	Comma			X				X		X		
Lepidoptera: Lycaenidae	*Lycaena phlaeas*	Small Copper									X		
Lepidoptera: Lycaenidae	*Celastrina argiolus*	Holly Blue		X									
Lepidoptera: Lycaenidae	*Aricia agestis*	Brown Argus								X			

Order: Family	Species	Vernacular	National Status	A	B1	B2	C	D	E	F	G	G1	H
Lepidoptera: Lycaenidae	*Polyommatus icarus*	Common Blue				X	X	X		X	X		X
Lepidoptera: Lasiocampidae	*Euthrix potatoria*	Drinker							X				
Lepidoptera: Geometridae	*Timandra comae*	Blood-vein	**BAP**							X			
Lepidoptera: Geometridae	*Aplocera plagiata*	Treble-bar						X		X	X		
Lepidoptera: Geometridae	*Lomaspilis marginata*	Clouded Border							X				
Lepidoptera: Geometridae	*Opisthograptis luteolata*	Brimstone Moth								X			
Lepidoptera: Geometridae	*Epione repandaria*	Bordered Beauty					X						
Lepidoptera: Lymantriidae	*Orgyia antiqua*	Vapourer							X				
Lepidoptera: Arctiidae	*Eilema griseola*	Dingy Footman			X								
Lepidoptera: Arctiidae	*Tyria jacobaeae*	Cinnabar	**BAP**		X	X	X	X	X	X	X		
Lepidoptera: Noctuidae	*Agrotis puta*	Shuttle-shaped Dart					X						
Lepidoptera: Noctuidae	*Hecatera dysodea*	Small Ranunculus	**RDBK**					X		X			
Lepidoptera: Noctuidae	*Shargacucullia verbasci*	Mullein						X					
Lepidoptera: Noctuidae	*Autographa gamma*	Silver Y					X					X	X
Lepidoptera: Noctuidae	*Rivula sericealis*	Straw Dot								X		X	
Trichoptera: Limnephilidae	*Limnephilus marmoratus*	a caddisfly					X						
Trichoptera: Limnephilidae	*Limnephilus sparsus*	a caddisfly				X							
Coleoptera: Dytiscidae	*Hydroporus memnonius*								X				
Coleoptera: Carabidae	*Elaphrus riparius*							X					
Coleoptera: Carabidae	*Bembidion articulatum*							X					
Coleoptera: Carabidae	*Agonum emarginatum*				X								
Coleoptera: Carabidae	*Curtonotus aulicus*									X			
Coleoptera: Staphylinidae	*Hygronoma dimidiata*										X		
Coleoptera: Staphylinidae	*Stenus comma*							X					
Coleoptera: Staphylinidae	*Paederus fuscipes*		**Nationally Scarce b**						X				
Coleoptera: Scirtidae	*Cyphon coarctatus*			X					X				
Coleoptera: Scirtidae	*Cyphon hilaris*								X				
Coleoptera: Scirtidae	*Scirtes hemisphaericus*				X	X			X				
Coleoptera: Elateridae	*Stenagostus rhombeus*			X									
Coleoptera: Cantharidae	*Cantharis thoracica*				X		X						
Coleoptera: Cantharidae	*Rhagonycha fulva*			X	X	X			X	X	X		
Coleoptera: Cantharidae	*Silis ruficollis*		**Nationally Scarce b**	X		X			X				

Order: Family	Species	Vernacular	National Status	A	B1	B2	C	D	E	F	G	G1	H
Coleoptera: Cantharidae	*Malthodes pumilus*				X								
Coleoptera: Malachiidae	*Anthocomus rufus*				X	X	X		X	X			X
Coleoptera: Nitidulidae	*Meligethes aeneus*	Common Pollen Beetle							X				
Coleoptera: Nitidulidae	*Meligethes fulvipes*		**Nationally Scarce**					X	X				
Coleoptera: Nitidulidae	*Meligethes rotundicollis*		**Nationally Scarce**						X				
Coleoptera: Phalacridae	*Phalacrus caricis*					X			X				
Coleoptera: Cryptophagidae	*Telmatophilus caricis*			X									
Coleoptera: Coccinellidae	*Rhyzobius litura*									X			
Coleoptera: Coccinellidae	*Coccidula rufa*						X						
Coleoptera: Coccinellidae	*Propylea quattuordecimpunctata*	14-spot Ladybird		X	X	X	X		X				X
Coleoptera: Coccinellidae	*Harmonia axyridis*	Harlequin Ladybird			X			X	X	X			
Coleoptera: Coccinellidae	*Adalia bipunctata*	2-spot Ladybird			X		X			X			
Coleoptera: Coccinellidae	*Coccinella septempunctata*	7-spot Ladybird		X		X	X	X	X	X			X
Coleoptera: Coccinellidae	*Hippodamia variegata*	Adonis' Ladybird	**Nationally Scarce b**				X	X	X				
Coleoptera: Tenebrionidae	*Lagria hirta*					X							
Coleoptera: Oedemeridae	*Oedemera nobilis*	Swollen-thighed Beetle				X	X			X	X		
Coleoptera: Oedemeridae	*Oedemera lurida*								X	X			
Coleoptera: Cerambycidae	*Leptura quadrifasciata*									X			
Coleoptera: Cerambycidae	*Agapanthia villosoviridescens*					X							
Coleoptera: Chrysomelidae	*Donacia marginata*			X				X			X		
Coleoptera: Chrysomelidae	*Donacia vulgaris*				X								
Coleoptera: Chrysomelidae	*Oulema melanopus*												X
Coleoptera: Chrysomelidae	*Gastrophysa viridula*	Green Dock Beetle								X			
Coleoptera: Chrysomelidae	*Plagiodera versicolora*								X				
Coleoptera: Chrysomelidae	*Phratora laticollis*			X									
Coleoptera: Chrysomelidae	*Galerucella lineola*	Brown Willow Beetle				X							
Coleoptera: Chrysomelidae	*Epitrix pubescens*				X								
Coleoptera: Chrysomelidae	*Chaetocnema picipes*										X		
Coleoptera: Chrysomelidae	*Cryptocephalus fulvus*			X	X	X		X					
Coleoptera: Nanophyidae	*Nanophyes marmoratus*	Loosestrife Weevil		X		X		X			X		
Coleoptera: Apionidae	*Omphalapion hookerorum*								X				

Order: Family	Species	Vernacular	National Status	A	B1	B2	C	D	E	F	G	G1	H
Coleoptera: Apionidae	*Oxystoma cerdo*		**Nationally Scarce b**		**X**	**X**							
Coleoptera: Apionidae	*Eutrichapion ervi*					**X**							
Coleoptera: Apionidae	*Eutrichapion viciae*				**X**								
Coleoptera: Curculionidae	*Sitona hispidulus*												**X**
Coleoptera: Curculionidae	*Sitona lineatus*				**X**		**X**						**X**
Coleoptera: Curculionidae	*Cionus scrophulariae*	Figwort Weevil						**X**					
Coleoptera: Curculionidae	*Cionus tuberculosus*								**X**				**X**
Coleoptera: Curculionidae	*Rhinoncus inconspectus*						**X**			**X**			
Coleoptera: Curculionidae	*Rhinoncus perpendicularis*									**X**			
Coleoptera: Curculionidae	*Trichosirocalus troglodytes*							**X**					
Coleoptera: Curculionidae	*Archarius salicivorus*	Willow Gall Weevil						**X**					
Coleoptera: Curculionidae	*Tychius meliloti*								**X**				
Coleoptera: Curculionidae	*Tachyerges salicis*								**X**				
Diptera: Tipulidae	*Nephrotoma cornicina*						**X**						
Diptera: Tipulidae	*Nigrotipula nigra*								**X**				
Diptera: Tipulidae	*Tipula lateralis*										**X**		
Diptera: Limoniidae	*Gnophomyia viridipennis*		**Nationally Scarce**	**X**									
Diptera: Limoniidae	*Molophilus griseus*			**X**									
Diptera: Limoniidae	*Symplecta hybrida*								**X**				
Diptera: Limoniidae	*Phylidorea ferruginea*										**X**		
Diptera: Limoniidae	*Dicranomyia modesta*						**X**						
Diptera: Bibionidae	*Dilophus febrilis*									**X**			
Diptera: Anisopodidae	*Sylvicola punctatus*			**X**			**X**						
Diptera: Rhagionidae	*Chrysopilus asiliformis*			**X**	**X**			**X**					
Diptera: Tabanidae	*Chrysops relictus*												**X**
Diptera: Tabanidae	*Haematopota pluvialis*				**X**		**X**						**X**
Diptera: Stratiomyidae	*Beris vallata*				**X**								
Diptera: Stratiomyidae	*Chorisops tibialis*					**X**			**X**				
Diptera: Stratiomyidae	*Oxycera trilineata*								**X**				
Diptera: Stratiomyidae	*Microchrysa flavicornis*				**X**			**X**	**X**				
Diptera: Stratiomyidae	*Oplodontha viridula*				**X**								
Diptera: Hybotidae	*Hybos culiciformis*						**X**						

Order: Family	Species	Vernacular	National Status	A	B1	B2	C	D	E	F	G	G1	H
Diptera: Hybotidae	*Hybos femoratus*					X							
Diptera: Hybotidae	*Trichina opaca*		**Nationally Scarce**				X						
Diptera: Hybotidae	*Platypalpus calceatus*				X		X		X				
Diptera: Hybotidae	*Platypalpus longiseta*							X	X				
Diptera: Hybotidae	*Platypalpus pallidicornis*								X				
Diptera: Hybotidae	*Platypalpus pallidiventris*					X	X	X	X				
Diptera: Hybotidae	*Platypalpus stabilis*		**(Nationally Scarce) None**		X								
Diptera: Empididae	*Empis livida*				X	X							
Diptera: Dolichopodidae	*Chrysotus gramineus*			X	X				X				
Diptera: Dolichopodidae	*Chrysotus suavis*		**(Nationally Scarce) None**				X						
Diptera: Dolichopodidae	*Dolichopus festivus*				X		X		X				
Diptera: Dolichopodidae	*Dolichopus griseipennis*					X	X						
Diptera: Dolichopodidae	*Dolichopus latilimbatus*								X				X
Diptera: Dolichopodidae	*Dolichopus nubilus*								X				
Diptera: Dolichopodidae	*Dolichopus plumipes*						X		X	X			X
Diptera: Dolichopodidae	*Dolichopus signifer*		**(RDB2) Nationally Scarce**						X				
Diptera: Dolichopodidae	*Dolichopus simplex*			X									
Diptera: Dolichopodidae	*Dolichopus wahlbergi*				X	X							
Diptera: Dolichopodidae	*Poecilobothrus nobilitatus*			X									
Diptera: Dolichopodidae	*Hydrophorus praecox*							X					
Diptera: Dolichopodidae	*Hydrophorus viridis*		**RDB3**					X					
Diptera: Dolichopodidae	*Sympycnus desoutteri*								X				
Diptera: Opetiidae	*Opetia nigra*								X				
Diptera: Syrphidae	*Platycheirus clypeatus*	a hoverfly		X	X						X		X
Diptera: Syrphidae	*Platycheirus granditarsus*	a hoverfly			X	X		X		X	X		X
Diptera: Syrphidae	*Platycheirus rosarum*	a hoverfly		X							X		
Diptera: Syrphidae	*Paragus haemorrhous*	a hoverfly					X						X
Diptera: Syrphidae	*Episyrphus balteatus*	a hoverfly		X	X		X		X	X	X		
Diptera: Syrphidae	*Eupeodes corollae*	a hoverfly			X								
Diptera: Syrphidae	*Leucozona laternaria*	a hoverfly								X			
Diptera: Syrphidae	*Meliscaeva auricollis*	a hoverfly				X							
Diptera: Syrphidae	*Scaeva selenitica*	a hoverfly								X			

Order: Family	Species	Vernacular	National Status	A	B1	B2	C	D	E	F	G	G1	H
Diptera: Syrphidae	*Sphaerophoria interrupta*	a hoverfly			X		X	X		X			X
Diptera: Syrphidae	*Sphaerophoria loewi*	a hoverfly	**RDB2**	X									
Diptera: Syrphidae	*Sphaerophoria scripta*	a hoverfly			X	X	X	X		X	X		
Diptera: Syrphidae	*Syrphus ribesii*	a hoverfly				X							
Diptera: Syrphidae	*Cheilosia illustrata*	a hoverfly								X			
Diptera: Syrphidae	*Cheilosia impressa*	a hoverfly								X			X
Diptera: Syrphidae	*Cheilosia vernalis*	a hoverfly											X
Diptera: Syrphidae	*Neoascia podagrica*	a hoverfly						X					
Diptera: Syrphidae	*Neoascia tenur*	a hoverfly			X	X	X		X	X			X
Diptera: Syrphidae	*Anasimyia lineata*	a hoverfly											X
Diptera: Syrphidae	*Anasimyia transfuga*	a hoverfly		X									
Diptera: Syrphidae	*Eristalinus sepulchralis*	a hoverfly		X	X	X		X			X		
Diptera: Syrphidae	*Eristalis tenax*	a hoverfly			X		X			X			
Diptera: Syrphidae	*Helophilus hybridus*	a hoverfly			X								
Diptera: Syrphidae	*Helophilus pendulus*	a hoverfly				X	X			X	X		X
Diptera: Syrphidae	*Myathropa florea*	a hoverfly				X				X			
Diptera: Syrphidae	*Syritta pipiens*	a hoverfly		X			X			X			X
Diptera: Pipunculidae	*Cephalops straminipes*		**Nationally Scarce**						X				
Diptera: Pipunculidae	*Cephalops varipes*						X						
Diptera: Pipunculidae	*Eudorylas montium*		**(Nationally Scarce) None**				X						
Diptera: Pipunculidae	*Eudorylas zermattensis*		**Nationally Scarce**					X					
Diptera: Pipunculidae	*Pipunculus campestris*				X	X							
Diptera: Pipunculidae	*Dorylomorpha anderssoni*				X								
Diptera: Pipunculidae	*Dorylomorpha hungarica*		**(Nationally Scarce) None**				X						
Diptera: Pipunculidae	*Tomosvaryella kuthyi*					X							X
Diptera: Psilidae	*Loxocera albiseta*									X	X		
Diptera: Conopidae	*Sicus ferrugineus*										X		
Diptera: Pallopteridae	*Palloptera trimacula*									X			
Diptera: Ulidiidae	*Herina lugubris*						X						X
Diptera: Ulidiidae	*Herina palustris*		**Nationally Scarce**				X						
Diptera: Ulidiidae	*Melieria crassipennis*				X								
Diptera: Platystomatidae	*Rivellia syngenesiae*						X						

Order: Family	Species	Vernacular	National Status	A	B1	B2	C	D	E	F	G	G1	H
Diptera: Tephritidae	*Myopites inulaedyssentericae*		**RDB3 (Nationally Scarce b)**		**X**								
Diptera: Tephritidae	*Campiglossa malaris*		**RDB1 (RDBK)**		**X**		**X**		**X**				
Diptera: Tephritidae	*Sphenella marginata*						**X**	**X**	**X**				**X**
Diptera: Tephritidae	*Tephritis cometa*							**X**					
Diptera: Tephritidae	*Tephritis neesii*			**X**									
Diptera: Tephritidae	*Tephritis vespertina*			**X**									
Diptera: Tephritidae	*Trupanea stellata*							**X**					
Diptera: Tephritidae	*Chaetostomella cylindrica*									**X**			
Diptera: Tephritidae	*Terellia serratulae*			**X**	**X**				**X**				
Diptera: Lauxaniidae	*Homoneura interstincta*		**RDB3**	**X**									
Diptera: Lauxaniidae	*Homoneura notata*			**X**			**X**						
Diptera: Lauxaniidae	*Homoneura thalhammeri*		**Nationally Scarce**		**X**		**X**						
Diptera: Lauxaniidae	*Calliopum aeneum*						**X**						
Diptera: Lauxaniidae	*Meiosimyza decipiens*				**X**								
Diptera: Lauxaniidae	*Minettia tabidiventris*				**X**		**X**						
Diptera: Lauxaniidae	*Minettia fasciata*			**X**	**X**	**X**	**X**	**X**	**X**	**X**			
Diptera: Lauxaniidae	*Minettia tubifer*						**X**	**X**					
Diptera: Lauxaniidae	*Sapromyza opaca*		**Nationally Scarce**		**X**		**X**						**X**
Diptera: Lauxaniidae	*Sapromyza sexpunctata*							**X**		**X**			
Diptera: Lauxaniidae	*Trigonometopus frontalis*						**X**						
Diptera: Sciomyzidae	*Pherbellia cinerella*									**X**			
Diptera: Sciomyzidae	*Coremacera marginata*						**X**			**X**			
Diptera: Sciomyzidae	*Elgiva solicita*												**X**
Diptera: Sciomyzidae	*Ilione albiseta*				**X**	**X**				**X**			**X**
Diptera: Sciomyzidae	*Limnia paludicola*								**X**				
Diptera: Sciomyzidae	*Limnia unguicornis*					**X**	**X**						
Diptera: Sciomyzidae	*Pherbina coryleti*			**X**	**X**	**X**	**X**		**X**				
Diptera: Sciomyzidae	*Sepedon spinipes*			**X**			**X**			**X**			
Diptera: Sciomyzidae	*Tetanocera arrogans*									**X**			
Diptera: Sciomyzidae	*Tetanocera elata*												**X**
Diptera: Sciomyzidae	*Tetanocera hyalipennis*												**X**

Order: Family	Species	Vernacular	National Status	A	B1	B2	C	D	E	F	G	G1	H
Diptera: Sciomyzidae	*Tetanocera punctifrons*		**Nationally Scarce**					**X**					
Diptera: Sepsidae	*Sepsis cynipsea*								**X**				
Diptera: Sepsidae	*Sepsis punctum*						**X**						
Diptera: Agromyzidae	*Ophiomyia curvipalpis*							**X**					
Diptera: Opomyzidae	*Opomyza germinationis*										**X**		
Diptera: Anthomyzidae	*Anthomyza collini*					**X**	**X**	**X**	**X**				**X**
Diptera: Anthomyzidae	*Anthomyza gracilis*					**X**	**X**	**X**		**X**	**X**		**X**
Diptera: Chloropidae	*Cryptonevra flavitarsis*					**X**	**X**		**X**				**X**
Diptera: Chloropidae	*Meromyza femorata*							**X**					
Diptera: Chloropidae	*Meromyza zachvatkini*					**X**							
Diptera: Chloropidae	*Thaumatomyia glabra*								**X**				
Diptera: Chloropidae	*Thaumatomyia notata*								**X**	**X**			
Diptera: Chloropidae	*Calamoncosis glyceriae*				**X**					**X**	**X**		**X**
Diptera: Chloropidae	*Calamoncosis minima*				**X**	**X**							
Diptera: Chloropidae	*Dicraeus fennicus*					**X**							
Diptera: Chloropidae	*Dicraeus vagans*								**X**				
Diptera: Chloropidae	*Eribolus hungaricus*								**X**				
Diptera: Chloropidae	*Oscinella nitidissima*							**X**		**X**	**X**		
Diptera: Chloropidae	*Rhopalopterum anthracinum*				**X**		**X**						
Diptera: Chloropidae	*Tricimba cincta*									**X**			
Diptera: Heleomyzidae	*Suillia variegata*						**X**						
Diptera: Drosophilidae	*Scaptomyza pallida*							**X**					
Diptera: Drosophilidae	*Scaptomyza flava*									**X**			
Diptera: Campichoetidae	*Campichoeta punctum*						**X**						
Diptera: Campichoetidae	*Campichoeta obscuripennis*										**X**		
Diptera: Diastatidae	*Diastata adusta*						**X**						
Diptera: Diastatidae	*Diastata costata*						**X**						
Diptera: Ephydridae	*Scatella stagnalis*							**X**					
Diptera: Scathophagidae	*Cordilura ciliata*						**X**						
Diptera: Scathophagidae	*Scathophaga stercoraria*					**X**							
Diptera: Anthomyiidae	*Botanophila striolata*			**X**									
Diptera: Anthomyiidae	*Pegoplata aestiva*			**X**			**X**	**X**					

Order: Family	Species	Vernacular	National Status	A	B1	B2	C	D	E	F	G	G1	H
Diptera: Anthomyiidae	*Pegoplata infirma*			X									
Diptera: Fanniidae	*Fannia fuscula*				X								
Diptera: Muscidae	*Coenosia atra*		**Nationally Scarce**						X				
Diptera: Muscidae	*Lispocephala erythrocera*					X							
Diptera: Muscidae	*Pseudocoenosia solitaria*					X							
Diptera: Muscidae	*Schoenomyza litorella*							X					
Diptera: Muscidae	*Limnophora tigrina*			X									
Diptera: Muscidae	*Lispe tentaculata*							X					
Diptera: Muscidae	*Mesembrina meridiana*									X			
Diptera: Muscidae	*Helina obscurata*				X								
Diptera: Calliphoridae	*Melanomya nana*								X				
Diptera: Rhinophoridae	*Rhinophora lepida*						X						
Diptera: Sarcophagidae	*Sarcophaga filia*						X	X					
Diptera: Sarcophagidae	*Sarcophaga subvicina*					X							
Diptera: Sarcophagidae	*Sarcophaga sinuata*		**None (Nationally Scarce)**										X
Diptera: Tachinidae	*Eriothrix rufomaculata*				X	X				X			X
Diptera: Tachinidae	*Medina luctuosa*							X					
Diptera: Tachinidae	*Lydella stabulans*			X		X					X		
Diptera: Tachinidae	*Phryxe heraclei*					X							
Diptera: Tachinidae	*Phryxe vulgaris*				X								
Diptera: Tachinidae	*Exorista larvarum*				X								X
Diptera: Tachinidae	*Platymya fimbriata*								X				
Diptera: Tachinidae	*Cistogaster globosa*		**RDB1 (RDB2)**					X					
Diptera: Tachinidae	*Actia pilipennis*			X									
Hymenoptera: Tenthredinidae	*Allantus calceatus*	a sawfly											X
Hymenoptera: Cynipidae	*Diplolepis rosae*	Rose bedeguar causer								X			
Hymenoptera: Eumenidae	*Symmorphus gracilis*	a mason wasp											X
Hymenoptera: Crabronidae	*Cerceris rybyensis*	Ornate Tailed Digger Wasp						X					
Hymenoptera: Crabronidae	*Crossocerus annulipes*	a digger wasp					X						
Hymenoptera: Crabronidae	*Ectemnius cavifrons*	a digger wasp								X			
Hymenoptera: Crabronidae	*Ectemnius continuus*	a digger wasp											X

Order: Family	Species	Vernacular	National Status	A	B1	B2	C	D	E	F	G	G1	H
Hymenoptera: Crabronidae	*Mellinus arvensis*	Field Digger Wasp					X				X		
Hymenoptera: Crabronidae	*Passaloecus gracilis*	a digger wasp		X									
Hymenoptera: Crabronidae	*Passaloecus singularis*	a digger wasp						X					
Hymenoptera: Crabronidae	*Philanthus triangulum*	Bee Wolf	**RDB2**				X	X					
Hymenoptera: Crabronidae	*Rhopalum coarctatum*	a digger wasp						X					
Hymenoptera: Crabronidae	*Spilomena troglodytes*	a digger wasp						X					
Hymenoptera: Crabronidae	*Trypoxylon attenuatum*	Slender Wood Borer Wasp				X	X	X	X				
Hymenoptera: Crabronidae	*Trypoxylon medium*	a digger wasp				X							
Hymenoptera: Apidae	*Andrena denticulata*	a mining bee				X							
Hymenoptera: Apidae	*Andrena flavipes*	Yellow Legged Mining Bee						X					X
Hymenoptera: Apidae	*Apis mellifera*	Honey Bee		X	X	X		X	X	X	X		X
Hymenoptera: Apidae	*Bombus campestris*	a bumblebee								X	X		
Hymenoptera: Apidae	*Bombus hortorum*	Small Garden Bumble Bee		X	X		X					X	
Hymenoptera: Apidae	*Bombus humilis*	Brown-banded Carder Bee	**BAP**	X	X	X	X	X	X	X	X	X	X
Hymenoptera: Apidae	*Bombus hypnorum*	a bumblebee		X									
Hymenoptera: Apidae	*Bombus jonellus*	Heath Bumble Bee							X				
Hymenoptera: Apidae	*Bombus lapidarius*	Large Red Tailed Bumble Bee		X	X				X	X	X	X	
Hymenoptera: Apidae	*Bombus lucorum sens. lat.*	White-tailed Bumble Bee		X					X				
Hymenoptera: Apidae	*Bombus pascuorum*	Common Carder Bee					X	X	X	X		X	X
Hymenoptera: Apidae	*Bombus pratorum*	Early Bumble Bee			X				X				
Hymenoptera: Apidae	*Bombus sylvarum*	Shrill Carder Bee	**Nationally Scarce b**	X	X		X	X	X	X	X	X	X
Hymenoptera: Apidae	*Bombus terrestris*	Buff-tailed Bumble Bee		X	X	X	X	X	X				
Hymenoptera: Apidae	*Bombus vestalis*	a bumblebee		X									
Hymenoptera: Apidae	*Colletes daviesanus*	a mining bee						X					
Hymenoptera: Apidae	*Halictus tumulorum*	a mining bee						X					
Hymenoptera: Apidae	*Hoplitis spinulosa*	a solitary bee							X				
Hymenoptera: Apidae	*Hylaeus annularis*	a solitary bee						X					
Hymenoptera: Apidae	*Hylaeus hyalinatus*	a solitary bee					X	X					
Hymenoptera: Apidae	*Lasioglossum calceatum*	Slender Mining Bee			X								X
Hymenoptera: Apidae	*Lasioglossum leucopus*	a mining bee						X					
Hymenoptera: Apidae	*Lasioglossum minutissimum*	Least Mining Bee					X	X					

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Hymenoptera: Apidae	*Lasioglossum morio*	Brassy Mining Bee						X		X	X		
Hymenoptera: Apidae	*Lasioglossum zonulum*	a mining bee											X
Hymenoptera: Apidae	*Nomada rufipes*	a cuckoo bee					X						
		total diversity	**378**	63	89	78	113	93	86	89	48	8	61
		all scarce/RDB	**31**	5	7	2	11	10	10	3	1	1	4
		% scarce/RDB	**8.2**	7.9	7.9	2.6	9.7	11	12	3.4	2.1	13	6.6
		no RDB	**9**	2	2	0	2	4	2	1	0	0	0
		% RDB	**2.4**	3.2	2.2	0	1.8	4.3	2.3	1.1	0	0	0