AN INVERTEBRATE SURVEY OF MICHELDEVER STATION.

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1 Summary

- This single day scoping survey identified 127 invertebrate species, a good diversity.
- Of these 14 species (11%) are treated as key species for their conservation value.
- Most of these species are of minimal to moderate conservation concern because they are known to be doing well at the moment.
- Two to four species are sufficiently scarce that their elimination from this location might represent a loss of local biodiversity.

- The site is very likely of local conservation value, so meriting relatively simple mitigation depending on the extent of any disruption of the habitat.
- A three day EIA covering a full season would be very useful.
- Data from adjacent sites to assess the relative importance of this site and any potential mitigation locations is highly desirable.

2 Introduction

This small area of scrub, grassland and flowery ruderal habitat was surveyed on just one day 13 June 2012. Although the area is of such a size that it can easily be covered in a single day of survey, such a brief visit can only generate results that indicate the quality of the site. In order to draw robust conclusions of the conservation value of a site then at least tree visits spread through the season would be needed.

3 Survey Methodology

3.1 SAMPLING TECHNIQUES

Surveying involved searching flowers for larger species, notably hoverflies, bees and wasps and examining plants for signs of larvae. Most specimens were taken by sweeping with a 14 inch diameter white-bag net through the, grass, herbage, and from flowering shrubs and lower tree foliage. Specimens were extracted from the net with a pooter or, in the case of larger specimens, individually potted in 30ml soda glass tubes. When sampling was completed or the pooter became too full the contents were killed with ethyl acetate then transferred to 30ml soda glass tubes together with a data label. Samples were preserved in a deep freeze until time was available to identify them.

In open stony and chalky areas where there were many areas of short vegetation and bare substrate, a limited amount of ground searching was done to supplement the sweep-netting.

For the purposes of invertebrate sampling the site was divided into three areas the northern two falling within the “red-line” boundary on maps provided. The upper compartment to the east of the slope that divides these two compartments is scrub dominated while the lower compartment is much more open with areas of very short vegetation and bare stony substrate. The southern compartment is that part outside the “red-line” boundary (see map Figure 1).

3.2 SAMPLE TIMING

The timing of this scoping survey was contingent upon deadlines and done as soon as the weather allowed. For this type of habitat mid-June is an important time to visit and perhaps provides the best data set for an assessment if only one day is possible.

3.3 CONSTRAINTS

After a very wet period the weather on the day of sampling was relatively good. It is possible that insect diversity and abundance had been reduced by the preceding long cool period, but the conditions on the day would not have compromised the results. As mentioned before, the main constraint comes in interpretation of results from a single day which requires a degree of extrapolation based on long experience of similar habitats. Given the infinite variety of invertebrate communities this can never be a wholly reliable exercise.

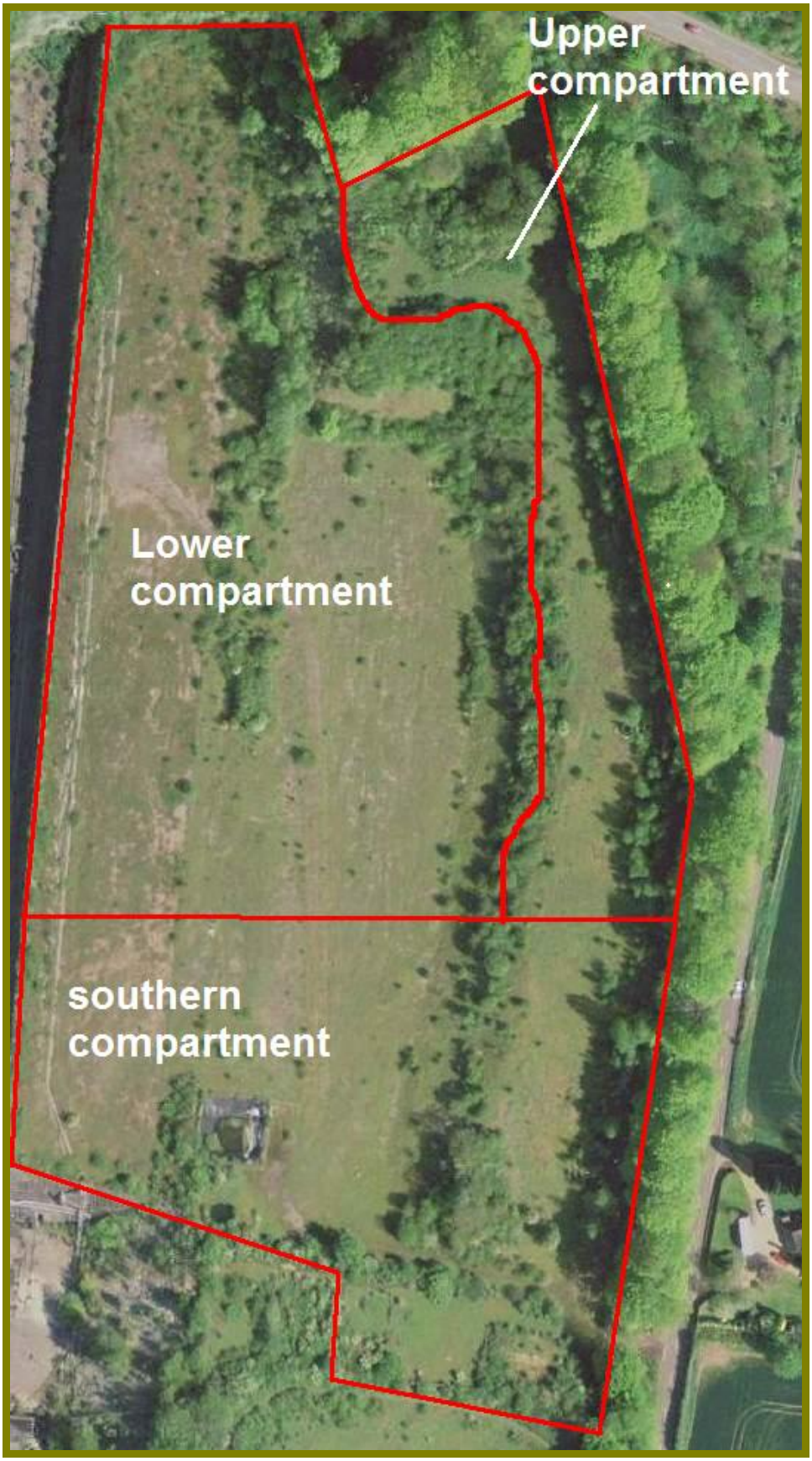

Figure 1 Site plan showing sampling compartments.

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 by one or other of the authors. To achieve rigorously accurate identifications, specimens were identified using the authors' own libraries and entomological collections. Where these proved insufficient, specimens were submitted to relevant experts. Selected specimens have been retained in the authors' personal collections as vouchers.

3.5 ANALYSIS

A system of British conservation statuses has been in use since 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 Appendix 1.

'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.
- Species proposed for national status by Butterfly Conservation (Davis 2012).

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 to 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 author regards the official conservation status to be out of date, this will be indicated in the Key Species accounts (section 5).

4 Results

4.1 OVERALL RESULTS

The survey identified 127 species of invertebrate (Appendix 2). 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, spiders, crickets, grasshoppers, true bugs, leafhoppers, moths, butterflies, beetles, true flies, ants, wasps and bees. The sampling techniques were most efficient at catching Diptera, and the greatest identification effort was concentrated on flies (46 species, 36.2%). The second largest group found was Hymenoptera (31 species, 24.4%), as expected, the warm habitat being very attractive to these helophilous insects. Coleoptera were also well represented (19 species, 15%) most of them phytophagous flower-frequenting species most readily found with a sweep-net

The diversity found is fairly high for so small an area sampled on just one day. Of the 127 species identified by this survey, a very high 14 (11%) are considered here as Key Species (defined in section 3.5). 11% is a very high percentage of Key Species, especially considering the brevity of this survey. However, these results, at first sight so impressive need careful interpretation. Of the two RDB species found *Campiglossa malaris*, formerly so rare, has

undergone a remarkable range expansion and is no longer of conservation concern. *Cnemacantha muscaria* is still a local species but seems to have become more frequent over the last decade so probably needs to have its conservation status downgraded. Of the 12 Nationally Scarce species found, half of them do not have official JNCC status. In two cases (*Platypalpus incertus* & *Trachysiphonella scutellata*) this has been removed so they are no longer of conservation concern. In another two cases (*Micromorphus* species C & *Homoneura thalhammeri*) taxonomic changes have made the situation complex but both of the taxa found on this survey are still of some conservation concern. Two more (*Stephensia brunnichella* & *Scythris picaepennis*) have recently been proposed for such status but this has yet to be translated into an official status. Of the remaining 6 Nationally Scarce species, all with current official JNCC status, most are at the lower end of concern, especially *Sapromyza albiceps* & *Sphecodes crassus* are now commoner than formerly and probably no longer deserving of their national status. *Pipizella virens* and *Longitarsus dorsalis* possibly also falls into this latter category.

This leaves the chafer *Omaloplia ruricola* and the weevil *Mogulones geographicus* which are genuinely uncommon, perhaps especially in north Hampshire where there are few other records. Although not having official status, the two micromoths *Stephensia brunnichella* & *Scythris picaepennis* cannot be dismissed because their proposal for conservation status is so recent and Butterfly Conservation is a reliable authority. As well as the presence of these four species and the good assemblage of other scarce and local species of lesser conservation concern, the UK BAP Small Heath and Cinnabar and the Glow-worm all add to the potential conservation importance of this small site.

4.2 IMPORTANT HABITAT FEATURES

4.2.1 Scrub dominated flower rich grassland

This habitat occupies much of the Upper compartment as well as some of the Southern compartment (Figure 2)

Figure 2 Upper compartment looking north.

The open areas here comprise of flower-rich herbs, especially birds-foot-trefoil, often with encroaching brambles and well sheltered by surrounding trees and shrubs. The flora includes many species of value to invertebrates, notably ragwort and birds-foot-trefoil. Houndstongue is also present; the rare specialists of this plant were looked for but not found. Particularly productive was the flowering dogwood from which several of the scarcer species were swept.

4.2.2 Flower rich ruderal

This habitat is most abundant in the Southern compartment (Figure 3) and occupied a fairly large area. It is characterised by relatively recently disturbed ground and taller flowering herbs.

Figure 3 Southern compartment looking west

This area had a large population of ox-eye daisy and wild mignonette which proved very attractive for numerous insects. This area also had a few plants of vipers bugloss which harboured one of the more interesting species found *Mogulones geographicus*. Also of potential value are the areas of bare substrate which provide valuable nesting opportunities for fossorial Hymenoptera.

4.2.3 Calcareous grassland

Occupying the southern parts of the slope and the Lower compartment and parts of the southern compartment, this is an area of short turf and low-growing herbs with some areas of scattered flints and limited scrub encroachment (Figure 4).

Figure 4 Calcareous grassland in northern part of Southern compartment.

Although not as diverse as the foregoing habitats because of the limited number of flowers and difficulty sampling such short turf, this habitat has the potential to harbours some very scarce species. The scatter of flints in Figure 4 is the area where the glow-worms were found, although these are likely to be widespread across the more open areas.

4.2.4 Sparsely vegetated stony areas

Some parts of the Lower compartment are very sparsely vegetated due to the thin soil and stony nature of the substrate making it highly drought-prone (Figure 5).

Figure 5 Northern part of Lower compartment looking west

Even more so than the last (4.2.3), this habitat is relatively flower poor and often has low invertebrate diversity. This is made up for by the specialist nature of the invertebrate community that can often be found. Of particular importance are those pioneer species of ruderal sites that can persist in this type of habitat longer than many areas. Also helophilous insects that need high insolation to successfully complete their lifecycle, favour such sites. Many of these species emerge early in the year so such open habitats allow them make the most of the limited sunshine in spring.

5 Key Species

5.1 RED DATA BOOK

5.1.1 *Campiglossa malaris* RDB1 (RDBK)

This attractive fruit-fly 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 recently it has become frequent around Bristol (pers. obs.). To date usually found in coastal grassland and open ruderal sites where its food plant, Ragwort, is abundant. Adults usually found from late June to August. A single female swept in Lower compartment.

5.1.2 *Cnemacantha muscaria* RDB3

This small black Lauxanid fly with smoky wings has a very scattered distribution across the whole of Britain. Its habitat requirements are unclear; it has been swept from riverside vegetation, from scrub on limestone, from upland grassland and ancient broad-leaved woodland. Nothing is known of its larval biology but other members of this family are generally believed to develop in decaying vegetable matter, including fallen leaves. Adults are recorded from May to August (Falk & Ismay in prep.). A singleton swept from dogwood flowers in Upper compartment.

5.2 NATIONALLY SCARCE

5.2.1 *Stephensia brunnichella* None (Nationally Scarce b)

This tiny and very attractive moth is widespread in southern England and locally in northern England and South Wales (Emmet 1996). This moth has no official JNCC status but has recently been proposed for such by Davis (2012). Frequents woodland margins on calcareous soils where its food plant, Wild Basil, is frequent and where the larvae feeds as a leaf-miner. Adults can be found from May-June and August September. Swept from flowers in both Upper and Lower compartments.

5.2.2 *Scythris picaepennis* None (Nationally Scarce b)

This small, all dark moth is widespread in Britain north to Sutherland but local and scattered (Emmet & Langmaid 2002). It has no official JNCC status but has recently been proposed for such by Davis (2012). Frequents open grassy areas, both calcareous and sandy, the larvae developing on birds-foot trefoil or wild thyme. Adults on the wing in a single generation peak in July. A single male swept from flowers in the Southern compartment.

5.2.3 *Omaloplia ruricola* Nationally Scarce b

This chafer is a calcareous grassland species. Its larvae probably feed on the roots of plants, and may be associated with ants. In common with other grassland chafers, adults seem to have rather short lives and synchronised emergences; they can easily be missed by surveys which fail to coincide with those emergences. The species occurs in southern England northwards to the Midlands but is of very restricted distribution within this range (Hyman & Parsons 1992). A single individual found in the Southern compartment.

5.2.4 *Longitarsus dorsalis* Nationally Scarce b

This flea beetle is widespread but local in the southern half of England. Mainly found on calcareous or sandy soils, grassland, coastal cliff, limestone quarries and woodland rides. It is phytophagous associated with ragwort, adults recorded March to June and in September and December (Hyman 1992 & Parsons 1992). Several on ragwort in the Upper compartment

5.2.5 *Mogulones geographicus* Nationally Scarce b

This relatively robust and distinctively marked weevil is widespread in England and also known from South Wales and southeast Scotland. Frequents disturbed ground, grassland and coastal areas where it is phytophagous on viper's bugloss. The larvae develop in the root of the plant pupating in the soil. Adults recorded from April to October (Hyman 1992 & Parsons 1992). One swept from vipers bugloss in the Southern compartment.

5.2.6 *Platypalpus incertus* (Nationally Scarce) None

This small Hybotid fly is widely distributed across southern England but information of its limits are not available. Now considered to be too frequent to merit national status so this was recently removed (Falk & Crossley 2005). Most records are from chalk or limestone grassland with scrub, and it has been recorded on oxeye daises (Collin 1961). Adults recorded in May and June (MapMate data). Very common on site in flowery areas of the Upper and Southern compartments.

5.2.7 *Micromorphus* species C (Nationally Scarce) None

One of the smallest Dolichopodid flies, widespread in Britain but local, no doubt much overlooked due to its small size. In Britain it has long been known that this genus includes two species in Britain although only one is listed. My research as concluded that there are in fact 4 species in Britain. 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 sorted out this may change. The genus is known to occur in 23

counties in Britain and these include numerous local records (Falk & Crossley 2005). Frequents a variety of wetland habitats with records from June to August (Fonseca 1978). This species is currently only known from Glamorgan, Huntingdonshire and Surrey but is no doubt much overlooked. Numerous specimens found where bare damp ground occurred amongst scrub in the Lower compartment.

5.2.8 *Pipizella virens* Nationally Scarce

This small black hoverfly is widespread in southern England with the odd record north to Yorkshire. Its habitat preferences are uncertain, 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 1991a). A single male swept in the Upper compartment.

5.2.9 *Homoneura thalhammeri* None (Nationally Scarce)

This small yellowish fly has a scattered distribution over south 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. 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. 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 recorded from June to September (Falk & Ismay in prep.). Swept from flowers in Upper and Southern compartments.

5.2.10 *Sapromyza albiceps* Nationally Scarce

This is a small yellowish lauxanid fly with a widely scattered distribution in southern England north to Cumbria and Norfolk; also some records from Wales and Scotland. Known from damp broad-leaved woodland with several records referring specifically to that of mature oak (*Quercus*); also hedgerows and one to limestone scrub. Its biology is unknown but larvae of this family are generally believed to develop in decaying vegetable matter including fallen leaves. Adults are recorded from May to September (Falk & Ismay in press). Swept in both Upper and Lower compartments.

5.2.11 *Trachysiphonella scutellata* (Nationally Scarce) None

A tiny black and yellow frit fly 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. Frequents short dry grassland, both calcareous and acid. Biology unknown. Adults recorded from June to August (Falk & Ismay in prep.). Abundant in areas of very short turf in the Lower compartment.

5.2.12 *Sphecodes crassus* Nationally Scarce b

This small black and red cuckoo-bee is very widely distributed in England and Wales as far north as Yorkshire. It is a very difficult species to identify so its true status is not easy to assess but it is certainly very local. Lives in a variety of habitats including heathland, calcareous grassland, soft rock cliffs, landslips and abandoned quarries. It is a cleptoparasite of the mining bee genus *Lasioglossum*. Suspected hosts include *L. nitidiusculum*, *L. parvulum*, *L. morio*, *L. pauxillum* and *L. fulvicorne*, none of which were recorded during this survey but *L. parvulum* does occur. Whatever the host is, it will almost certainly have a requirement for areas of bare soil or sparse vegetation in sunny spots where they can dig their nests. Adult females are on the wing from May to August, males from July to September; frequenting flowers such as *Calluna*, *Heracleum*, *Jasione*, *Achillea*, *Tripleurospermum*, *Angelica* and *Cirsium* (Falk 1991a). A single female found in the Southern compartment.

5.3 OTHER SPECIES

5.3.1 *Coenonympha pamphilus* Small Heath UK BAP

This is a widespread butterfly and can be found over most of the British Isles with the exception of the Shetlands and Orkneys and mountainous regions (NBN). It lives in discrete colonies and adults rarely venture far from the colony. Not confined to heathland and can be found in a wide variety of habitats. Populations found in the north have one generation each year, while populations in the south have two generations each year and possibly three in exceptional years. Both population and range declining, hence its addition to the Priority List of UK Biodiversity Action Plan Species. Adults can be found continuously from late May until mid-September as a result (UK Butterflies). A colony present on the Lower compartment.

5.3.2 *Tyria jacobaeae* Cinnabar UK BAP

This very attractive and well known day-flying moth that has recently been added to the Priority List of UK Biodiversity Action Plan Species. 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 new legislation or potential legislation. The larvae feed on Ragwort, a plant 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. Noted in all areas.

5.3.3 *Lampyris noctiluca* Glow-worm

Although very widespread, and especially frequent in southern England, the Glow-worm is local on open sunny sites on well drained soil with plenty of snails on which the larvae feed. It has no national status but is an indicator of a healthy invertebrate community in the habitat it prefers. It is also one of the more charismatic elements of any invertebrate fauna so worthy of comment. Two larvae found under flints amongst very short grass in the lower part of the Southern compartment (Figure 6), i.e. the same habitat that comprises much of the Lower compartment. Very likely that this colony of Glow-worms extends across the Lower compartment as well.

Figure 6 Glow-worm larvae.

6 Site Evaluation

Firstly it is important to state that it is not possible to make a robust assessment of this site's conservation importance based on a single visit. To some extent it is necessary to make assumptions about what might have been found if a spring and late summer visit had been possible. Such and exercise will obviously be less reliable that if data from these times of the year were available.

This survey produced a high invertebrate diversity and a very high proportion of key species (11%). While most of the 14 key species are no longer of great conservation concern, at least two really are still scarce and have few if any other known sites locally and the two micromoths have been assessed very recently so their status as proposed Nationally Scarce needs to be taken seriously. The species that have recently expanded their range so are now of lesser conservation concern in themselves, nevertheless are useful indicators of habitat quality and suggest that many scarce species are likely to occur. For example the habitat and abundance of wild mignonette suggest that this site would be ideal for the scarce bee *Hylaeus signatus*, a species which is only just starting its flight period. Also some of the bramble scrub in the Lower compartment looks ideal for nesting *Ceratina cyanea*, a rare carpenter bee that can often be found associated with railway lines. The very open nature of much of the habitat in the Lower compartment looks ideal for early species than require sites that warm up quickly in the spring. Most of these species will have completed their period of adult activity by the time of this survey.

From the data available it seems reasonable to conclude that this small site is has a healthy community of invertebrates and is likely to harbour many more scarce species than found on this survey. While it falls short of national or regional importance, it almost certainly harbours species that are otherwise rare or unknown locally. If it were to be wholly lost this is likely to represent a negative impact on the fauna of North Hampshire.

7 Recommendations

It is quite clear from this survey that numerous scarce species could occur here. Ideally a full Environmental Impact Assessment of at least three days should be completed, starting in early May and spread through the season. This should include the larger area to the south of the survey site to discover if it holds an equivalent invertebrate fauna and could be used as a mitigation site. If it does and is in favourable condition then loss of the survey site might have no measurable impact on local biodiversity.

If further invertebrate survey is not possible then thought need to be given to mitigation by maintaining or improving habitat in any part of the site not developed or by bringing in areas outside the survey area to substitute.

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9 Appendix 1: 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 Appendix 2: Species list by compartment.

Order: Family	**Species**	**Vernacular**	**National Status**	**Upper compt**	**Lower compt**	**Southern compt**
Mollusca: Vertiginidae	*Columella aspera*				X	
Isopoda: Armadillidiidae	*Armadillidium vulgare*	Common pill woodlouse			X	
Isopoda: Platyarthridae	*Platyarthrus hoffmannseggi*	Ant woodlouse				X
Araneae: Theridiidae	*Neottiura bimaculata*					X
Araneae: Linyphiidae	*Erigone atra*					X
Araneae: Linyphiidae	*Lepthyphantes tenuis*					X
Araneae: Araneidae	*Araniella cucurbitina*					X
Araneae: Salticidae	*Heliophanus flavipes*					X
Orthoptera: Tettigoniidae	*Pholidoptera griseoaptera*	Dark Bush Cricket		X		X
Orthoptera: Phaneropteridae	*Leptophyes punctatissima*	Speckled Bush Cricket		X		X
Orthoptera: Tetrigidae	*Tetrix undulata*	Common Ground Hopper			X	
Orthoptera: Acrididae	*Omocestus viridulus*	Common Green Grasshopper		X		X
Hemiptera: Cicadellidae	*Eupelix cuspidata*					X
Hemiptera: Cicadellidae	*Eupteryx urticae*					X
Hemiptera: Coreidae	*Coreus marginatus*					X
Hemiptera: Pentatomidae	*Dolycoris baccarum*				X	X
Lepidoptera: Incurvariidae	*Adela croesella*			X		X
Lepidoptera: Elachistidae	*Stephensia brunnichella*		**Nationally Scarce B**	X	X	

Lepidoptera: Gelechiidae	*Bryotropha terrella*					X
Lepidoptera: Scythrididae	*Scythris picaepennis*		**Nationally Scarce B**			X
Lepidoptera: Tortricidae	*Aethes tesserana*				X	X
Lepidoptera: Tortricidae	*Celypha lacunana*			X		
Lepidoptera: Pieridae	*Pieris rapae*	Small White				X
Lepidoptera: Lycaenidae	*Callophrys rubi*	Green Hairstreak				X
Lepidoptera: Lycaenidae	*Polyommatus icarus*	Common Blue		X		X
Lepidoptera: Lycaenidae	*Celastrina argiolus*	Holly Blue			X	
Lepidoptera: Nymphalidae	*Vanessa atalanta*	Red Admiral		X		
Lepidoptera: Satyridae	*Coenonympha pamphilus*	Small Heath	**UK BAP**		X	
Lepidoptera: Geometridae	*Camptogramma bilineata*	Yellow Shell				X
Lepidoptera: Geometridae	*Aplocera efformata*	Lesser Treble-bar			X	
Lepidoptera: Arctiidae	*Tyria jacobaeae*	Cinnabar	**UK BAP**	X	X	X
Coleoptera: Scarabaeidae	*Onthophagus joannae*					X
Coleoptera: Scarabaeidae	*Omaloplia ruricola*		**Nationally Scarce B**			X
Coleoptera: Elateridae	*Athous bicolor*				X	X
Coleoptera: Lampyridae	*Lampyris noctiluca*	Glow-worm				X
Coleoptera: Cantharidae	*Rhagonycha lignosa*			X		
Coleoptera: Dasytidae	*Dasytes aeratus*			X		X
Coleoptera: Nitidulidae	*Meligethes planiusculus*				X	X
Coleoptera: Coccinellidae	*Harmonia axyridis*	Harlequin Ladybird		X	X	
Coleoptera: Coccinellidae	*Coccinella septempunctata*	7-spot Ladybird			X	X
Coleoptera: Tenebrionidae	*Isomira murina*				X	
Coleoptera: Oedemeridae	*Oedemera nobilis*	Swollen-thighed Beetle				X
Coleoptera: Oedemeridae	*Oedemera lurida*			X		X
Coleoptera: Chrysomelidae	*Chrysolina hyperici*					X
Coleoptera: Chrysomelidae	*Aphthona euphorbiae*				X	X
Coleoptera: Chrysomelidae	*Longitarsus dorsalis*		**Nationally Scarce B**	X		
Coleoptera: Chrysomelidae	*Longitarsus exoletus*			X	X	X
Coleoptera: Chrysomelidae	*Cryptocephalus moraei*					X
Coleoptera: Curculionidae	*Hypera plantaginis*					X
Coleoptera: Curculionidae	*Mogulones geographicus*		**Nationally Scarce B**			X
Diptera: Tipulidae	*Nephrotoma flavescens*				X	X
Diptera: Stratiomyidae	*Pachygaster atra*					X
Diptera: Stratiomyidae	*Chloromyia formosa*					X
Diptera: Asilidae	*Dioctria baumhaueri*					X
Diptera: Hybotidae	*Platypalpus incertus*		**Nationally Scarce**	X		X

Diptera: Hybotidae	*Platypalpus longiseta*			X	X	
Diptera: Dolichopodidae	*Chrysotus gramineus*					X
Diptera: Dolichopodidae	*Chrysotus neglectus*					X
Diptera: Dolichopodidae	*Dolichopus trivialis*				X	
Diptera: Dolichopodidae	*Medetera saxatilis*					X
Diptera: Dolichopodidae	*Medetera truncorum*				X	X
Diptera: Dolichopodidae	*Micromorphus albipes*		**Nationally Scarce**		X	
Diptera: Syrphidae	*Episyrphus balteatus*	a hoverfly		X	X	
Diptera: Syrphidae	*Myathropa florea*	a hoverfly		X	X	
Diptera: Syrphidae	*Pipizella viduata*	a hoverfly				X
Diptera: Syrphidae	*Pipizella virens*	a hoverfly	**Nationally Scarce**	X		
Diptera: Syrphidae	*Criorhina berberina*	a hoverfly		X		
Diptera: Conopidae	*Thecophora atra*					X
Diptera: Platystomatidae	*Platystoma seminationis*				X	
Diptera: Tephritidae	*Campiglossa malaris*		**RDBK**		X	
Diptera: Tephritidae	*Tephritis neesii*					X
Diptera: Lauxaniidae	*Homoneura thalhammeri*		**Nationally Scarce**	X		X
Diptera: Lauxaniidae	*Calliopum simillimum*			X		
Diptera: Lauxaniidae	*Cnemacantha muscaria*		**RDB3**	X		
Diptera: Lauxaniidae	*Minettia longipennis*			X		
Diptera: Lauxaniidae	*Minettia fasciata*				X	X
Diptera: Lauxaniidae	*Poecilolycia vittata*			X		X
Diptera: Lauxaniidae	*Sapromyza albiceps*		**Nationally Scarce**	X	X	
Diptera: Lauxaniidae	*Sapromyza hyalinata*			X		
Diptera: Sciomyzidae	*Pherbellia cinerella*				X	X
Diptera: Sciomyzidae	*Dichetophora obliterata*				X	
Diptera: Agromyzidae	*Phytomyza albipennis*			X		
Diptera: Chloropidae	*Thaumatomyia hallandica*					X
Diptera: Chloropidae	*Trachysiphonella scutellata*		**Nationally Scarce**		X	
Diptera: Camillidae	*Camilla atrimana*					X
Diptera: Ephydridae	*Psilopa leucostoma*				X	
Diptera: Ephydridae	*Philygria interstincta*				X	
Diptera: Ephydridae	*Philygria picta*				X	
Diptera: Ephydridae	*Philygria vittipennis*					X
Diptera: Scathophagidae	*Scathophaga stercoraria*			X	X	
Diptera: Fanniidae	*Fannia armata*			X	X	
Diptera: Muscidae	*Schoenomyza litorella*				X	X

Diptera: Calliphoridae	*Melanomya nana*			X	X	X
Diptera: Tachinidae	*Phasia pusilla*				X	X
Diptera: Tachinidae	*Phasia obesa*					X
Diptera: Tachinidae	*Macquartia tenebricosa*					X
Hymenoptera: Formicidae	*Myrmecina graminicola*	an ant			X	
Hymenoptera: Pompilidae	*Arachnospila spissa*	a spider-hunter wasp			X	
Hymenoptera: Pompilidae	*Priocnemis parvula*	a spider-hunter wasp			X	
Hymenoptera: Eumenidae	*Ancistrocerus gazella*	a mason wasp		X		
Hymenoptera: Crabronidae	*Crossocerus wesmaeli*	Wesmael's Digger Wasp			X	
Hymenoptera: Crabronidae	*Tachysphex pompiliformis*	a digger wasp			X	
Hymenoptera: Apidae	*Andrena chrysosceles*	a mining bee				X
Hymenoptera: Apidae	*Andrena cineraria*	Grey Mining Bee		X	X	X
Hymenoptera: Apidae	*Andrena nitida*	a mining bee		X		
Hymenoptera: Apidae	*Andrena scotica*	a mining bee		X	X	
Hymenoptera: Apidae	*Andrena semilaevis*	a mining bee				X
Hymenoptera: Apidae	*Apis mellifera*	Honey Bee		X	X	X
Hymenoptera: Apidae	*Bombus hortorum*	Small Garden Bumble Bee		X	X	X
Hymenoptera: Apidae	*Bombus lapidarius*	Large Red Tailed Bumble Bee		X	X	X
Hymenoptera: Apidae	*Bombus lucorum sens. lat.*	White-tailed Bumble Bee		X		
Hymenoptera: Apidae	*Bombus pascuorum*	Common Carder Bee		X	X	X
Hymenoptera: Apidae	*Bombus pratorum*	Early Bumble Bee		X	X	X
Hymenoptera: Apidae	*Halictus rubicundus*	a mining bee			X	
Hymenoptera: Apidae	*Halictus tumulorum*	a mining bee				X
Hymenoptera: Apidae	*Hylaeus annularis*	a solitary bee				X
Hymenoptera: Apidae	*Hylaeus hyalinatus*	a solitary bee				X
Hymenoptera: Apidae	*Lasioglossum fulvicorne*	a mining bee		X	X	X
Hymenoptera: Apidae	*Lasioglossum morio*	Brassy Mining Bee				X
Hymenoptera: Apidae	*Nomada fabriciana*	a cuckoo bee			X	
Hymenoptera: Apidae	*Nomada flavoguttata*	a cuckoo bee				X
Hymenoptera: Apidae	*Nomada goodeniana*	a cuckoo bee				X
Hymenoptera: Apidae	*Nomada marshamella*	a cuckoo bee		X		
Hymenoptera: Apidae	*Sphecodes crassus*	a cuckoo bee	**Nationally Scarce B**			X
Hymenoptera: Apidae	*Sphecodes ephippius*	a cuckoo bee				X
Hymenoptera: Apidae	*Sphecodes geoffrellus*	a cuckoo bee				X
Hymenoptera: Apidae	*Sphecodes gibbus*	a cuckoo bee			X	
		compartment diversity	**127**	44	55	79
		No. Scarce & RDB sp	**14**	7	5	6
		No. Scarce sp	**12**	6	4	6
		No. RDB sp	**2**	1	1	0
		No. UK BAP sp	**2**	1	2	1