M3 Junction 9 Improvement

Scheme Number: TR010055

6.3 Environmental Statement Appendix 8.1o - Terrestrial Invertebrate Survey and Southern Damselfly Habitat Assessment 2020

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6.3 ENVIRONMENTAL STATEMENT- APPENDIX 8.1o: TERRESTRIAL INVERTEBRATE SURVEY AND SOUTHERN DAMSELFLY HABITAT ASSESSMENT 2020

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M3 Junction 9 Improvements

Terrestrial Invertebrate Survey And Southern Damselfly Habitat Assessment

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Registered office Bridge House, 1 Walnut Tree Close, Guildford, GU1 4LZ

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Contents

1. Introduction

1.1 Proposed Scheme

M3 Junction 9 is a key transport interchange which connects South Hampshire and the wider sub-region, with London via the M3 and the Midlands/North via the A34. A significant volume of traffic currently uses the grade separated, partially signalised gyratory (approximately 6,000 vehicles per hour during the peak periods) which acts as a bottleneck on the local highway network and causes significant delay throughout the day. Northbound and southbound movements between the M3 and A34 are particularly intensive, with downstream queues on the northbound off-slip of the M3 often resulting in safety concerns during peak periods.

On 22nd August 2019, post Project Control Framework (PCF) Stage 3 consultation, the M3 Junction 9 Improvements scheme ('the Proposed Scheme') entered a design review period following concerns of risks significant enough to likely impact a successful outcome of a Development Consent Order (DCO) application. The key issues impacting the Proposed Scheme are local stakeholder safety perception concerns, traffic capacity, operational safety and the DCO process.

An integrated design workshop was held on 22nd October 2019 to discuss alternative design solutions for four keys areas, aimed at removing or reducing these risks and issues. The workshop identified various potential design solutions in each of the four key areas which require further investigation to determine:

- whether there is a permutation of those solutions that leads to a viable option which addresses the risks; and
- what is an adequate and acceptable permutation that leads to a successful DCO application, and also meets project objectives in relation to budget and programme as best as possible?

The recommendation for the Proposed Scheme was to proceed with PCF Stage 3 preliminary design in two further phases are detailed below and were endorsed at a Highways England Major Projects Investment Decision Committee on 16th December 2019.

Highways England commissioned Jacobs in February 2020 to undertake Stage 3A, which involves an assessment of the potential design solutions and a review of the viability of the design solutions, taking cognisance of the key issues identified during PCF Stage 3.

On the basis of the Stage 3A solutions assessment process, the outcome was that Solution 2 was the best performing solution overall and recommended that it be taken forward as the preferred solution for the Proposed Scheme.

1.2 Background

A terrestrial invertebrate walkover of the Proposed Scheme was undertaken in 2017 (Highways England, 2017) to evaluate the potential conservation value of the Survey Area for invertebrate assemblages. The walkover identified several areas of high potential for important invertebrate assemblages including: two wet meadows to the west of the A34; two areas of dry grassland associated with woodland; and scrub margins and the verges of Easton Lane. The walkover report recommended further surveys be conducted within these high potential areas where they were likely to be impacted by the Proposed Scheme.

Terrestrial invertebrate surveys were commissioned and undertaken between June and July 2020. Due to changes in the extent of the Proposed Scheme the surveys focused on the two areas of dry grassland associated with woodland, scrub margins within the area enclosed by the roundabout at Junction 9, and the verges of Easton Lane.

Solution 2 of the Proposed Scheme included a new Stage 3A Walking Cycling Horse-riding river crossing over the River Itchen Special Area of Conservation (SAC). The new proposed river crossing is not consistent with the Scoping Report and these surveys are therefore considered to be outside of the existing Scoping Opinion from the Planning Inspectorate.

It should be noted, the existing Scoping Report (Highways England, 2019) states the M3 Junction 9 Improvements scheme has been "specifically designed to avoid any impact on the River Itchen floodplain, thus avoiding the requirement for flood compensation and potential increased environmental mitigation". As such, a habitat assessment for southern damselfly (*Coenagrion mercuriale*), a qualifying feature of the River Itchen SAC, was also commissioned and undertaken in July 2020.

1.3 Purpose of this Report and Survey Objectives

The purpose of this report is to present the results of the terrestrial invertebrate surveys and southern damselfly habitat assessment undertaken for the Proposed Scheme.

The objective of the terrestrial invertebrate surveys was to identify protected, notable or priority terrestrial invertebrate species within the areas identified in the terrestrial invertebrate walkover.

The objective of the southern damselfly habitat assessment was to identify and map areas of low, moderate, or high habitat suitability potentially capable of supporting southern damselfly populations.

2. Methodology

2.1 Survey Timing

The terrestrial invertebrate surveys were carried out between 08:00 and 17:00 on the 23rd, 24th, and 25rd of June 2020, and on the 21st and 23rd July 2020. The southern damselfly habitat assessment was carried out on the 22nd July. All surveys were led by Senior Ecologist and invertebrate specialist Catherine Burton. Where identification in the field was not possible invertebrate samples were collected and sent for identification to an experienced entomologist, Scotty Dodd.

2.2 Survey Area

The terrestrial invertebrate survey area comprised habitats enclosed by the roundabout of Junction 9, the verges of Easton Lane, and grassland to the south-east of Easton Lane (see Figure 1).

The southern damselfly habitat assessment comprised river, riparian and adjacent habitats within parts of units 55-64, 107, 123 and 124 of River Itchen Site of Special Scientific Interest (SSSI) and Winnall Moors, a nature reserve owned by Hampshire and Isle of Wight Wildlife Trust. The central reservations and verges of the A34 and M3 were not accessed for safety reasons. Where available, these were viewed from bridges and other vantage points using binoculars.

2.3 Terrestrial Invertebrate Survey

The sampling methods for each habitat compartment followed those proposed by Drake et al. (2007) and included spot searching, sweep netting, beating, hand searching, and pan trapping. Each survey area was initially subject to a visual appraisal with one or more sampling areas selected for direct survey. The number of sampling areas was decided according to the size of the compartment, variety of habitats, and the likely species present.

All samples were timed to ensure that analysis by Natural England's Pantheon system could be undertaken if required, as outlined in Drake et al. (2007). The Pantheon system, a tool developed by Natural England and the Centre for Ecology and Hydrology to analyse invertebrate sample data, is used to allocate species to assemblage types and to allow a standardised comparison of the habitats of importance at sites.

Spot searching, beating, and hand searching were each undertaken for 30 minutes within each sampling area. Sweep-netting was undertaken for 20 minutes within each sampling area. Ten yellow twin-sets of pan traps (18cm diameter) were filled with water and a few drops of non-toxic detergent were installed, to at least 2m intervals, within each compartment and remained in place throughout the survey periods from 23rd to 25th June and 21st to 23rd July in line with Natural England guidelines: NERR005 Surveying terrestrial and freshwater invertebrates for conservation evaluation (Drake et al., 2007).

Surveys were completed in sunny conditions for all survey areas with weather generally considered to be optimal for all site visits. During the first survey temperatures ranged from 18 to 21℃ with approximately 10 to 30 % cloud cover and little wind. During the second survey temperatures ranged from 18 to 23℃ with approximately 40% cloud cover and little wind.

The results within this report reflect the condition of survey areas at the time of survey. Many invertebrates can disperse large distances overland to colonise new aquatic and terrestrial habitats. Therefore, colonisation of new areas is possible within a relatively short timescale.

Consequently, if the construction of the proposed development is delayed for an extended period of time, the survey results would be less reliable and the surveys may need to be repeated in order to provide an up to date assessment.

2.4 Southern Damselfly Habitat Assessment

A walkover survey was conducted to identify areas of habitat with negligible to low, moderate, and high suitability to support southern damselfly populations. Southern damselfly populations require a mid-successional, management dependent habitat. Three broad habitat types are required namely unpolluted, base-rich, shallow streams with constant, moderate flow rate and relatively high water temperatures. Shaded sites from dense scrub and woodland are considered unsuitable for supporting southern damselfly populations as heavy shading reduces water temperature. Dense vegetation can also impede dispersal.

Habitat was assessed for key attributes (as recommended in the British Dragonfly Society Southern Damselfly Management Handbook (Dalley, 2016)):

- Stream flow-rate;
- Stream substrate;
- Degree of shading;
- Pollution;
- Marginal vegetation (type and percentage cover);
- Livestock poaching of bank edges; and
- Adjacent land-use.

Any damselflies present during the survey were examined through close-focusing binoculars to determine species present.

2.5 Limitations

2.5.1 Terrestrial Invertebrate Survey

Vegetation within the west verge of the island enclosed by the roundabout of Junction 9 (Compartment E as shown in Figure 1) had been cut shortly before the first terrestrial invertebrate survey in June 2020. This would have negatively impacted the number of invertebrate species present within the compartment during the first survey and, to a lesser extent, during the second survey in July 2020. However similar habitat was present within the east verge of the island (Compartment A as shown in Figure 1) which had not been cut. Therefore, the invertebrate species assemblage recorded is deemed likely to fairly reflect the assemblage of both verges.

Passive trapping methods such as pitfall trapping were not used due to the survey area being within a publicly accessible area. Pitfall traps would be vulnerable to vandalism and were deemed hazardous due to the necessity of using chemical preservative. Travel restrictions during the COVID-19 pandemic limited the extent to which such traps could be monitored and were therefore deemed a risk to small mammals and domestic animals. Ground-searching effort was increased to compensate for the absence of pitfall trapping. This is likely to have increased the number of less mobile, root-dwelling invertebrates sampled such as weevils (Curculionidae) but the number of highly mobile invertebrates sampled such as ground beetles (Carabidae) is likely to have been negatively impacted.

2.5.2 Southern Damselfly Habitat Assessment

The following land within the southern damselfly habitat assessment area could not be accessed during the surveys:

- Dense vegetation immediately to the east of the A34 and the central reservations and verges of the A34 and M3 were not accessed for safety reasons but were viewed from bridges and other vantage points where available, shown in Figure 2.
- Livestock present within a field west of the A34 precluded access for survey. However, habitat was assessed from adjacent tracks, shown in Figure 2.

3. Results

3.1 Terrestrial Invertebrate Survey

3.1.1 Species recorded

A total of 280 species were recorded in the survey area comprising compartments A to E. The greatest number of species recorded comprised the beetles (Coleoptera) with 63 species. True bugs (Hemiptera) and bees, ants and wasps (Aculeate Hymenoptera) were the next most common groups with 50 species recorded in each. Two-winged flies (Diptera) followed with 41 species and spiders (Araneae) with 40 species. Eighteen butterfly and moth species (Lepidoptera) were recorded comprising 10 butterflies and eight moths. Other groups with a small number of species recorded (less than five) were slugs and snails (Pulmonata), woodlice (Isopoda), dragonflies and damselflies (Odonata), harvestmen (Opiliones), grasshoppers, crickets and groundhoppers (Orthoptera), lacewings (Neuroptera), book lice and bark lice (Psocoptera), and thrips (Thysanoptera). A table of all recorded species, including the compartment in which they were found, and their protected or notable status is included in Appendix C.

The high biomass of samples collected using pan traps is of note and is indicative of the abundance of terrestrial invertebrates living or foraging within the survey area.

3.1.2 Species protected / notable status

The term “Nationally Scarce” is frequently referred to throughout this report and is applied to species that are known to occur in 16 to 100 ten-km squares. This is a Great Britain specific category based on restricted distribution rather than risk and is often used alongside IUCN Red List criteria, such as “Least Concern” which are more concerned with assessing threat than distribution. Another status category of “Local” is also frequently referred to which refers to locally distributed or abundant species known to occur in 101 to 300 ten-km squares.

See Appendix E for more details of the IUCN Red List and GB Rarity Status Categories and additional status definitions.

3.1.3 Compartment A (central grid reference: SU49783047)

Compartment A (see Figure 1 and Appendix A) comprised calcareous grassland within the east verge of the island enclosed by the roundabout of Junction 9. The grassland was dominated by calcicolous forbs, including greater knapweed (*Centaurea scabiosa*), wild basil (*Clinopodium vulgare*) and wild marjoram (*Origanum vulgare*), with abundant pyramidal orchid (*Anacamptis pyramidalis*) around the roundabout.

3.1.3.1 Protected and Notable Species

Six protected / notable terrestrial invertebrate species were found within Compartment A as detailed in the following section.

In addition, 11 species regarded as Local were recorded within this compartment; namely *Cryptocephalus moraei*, *Hedychridium roseum*, spined mason bee (*Hoplitis spinulosa*), *Longitarsus membranaceus*, pale-footed pipiza hoverfly (*Pipiza luteitarsis*), iridescent centurion soldierfly (*Sargus iridatus*), shothole borer (*Scolytus rugulosus*), *Sicus ferrugineus*, *Sitona humeralis*, small beegrabber (*Thecophora atra*), and large tiphia wasp (*Tiphia femorata*).

3.1.3.1.1 *Bembecia ichneumoniformis* (Nationally Scarce):

Commonly known as the six-belted clearwing, this moth can be found on habitats such as chalk downs, rough grassland and quarries. Caterpillars of this species typically feed on common bird's foot trefoil (*Lotus corniculatus*) but also feeds on kidney vetch (*Anthyllis vulneraria*) and possibly horseshoe vetch (*Hippocrepis comosa*). It can be found on the wing from June to August predominantly within southern Britain (Newland et al., 2013).

3.1.3.1.2 *Liparus coronatus* (Nationally Scarce):

A large weevil associated with various umbelliferous plants such as cow parsley (*Anthriscus sylvestris*) and hogweed. The larvae feed in the rhizomes and are generally found around their roots. It is often found on calcareous soils, is very local and generally scarce (Duff, 2020).

3.1.3.1.3 *Nigma puella* (Nationally Scarce - Least Concern):

A spider which occurs on low broad-leaved bushes and shrubs and spins a small web on the surface of leaves. Adults occur throughout Spring and Summer (Roberts, 1996). The spider's occurrence can be very local but frequent in some areas. Females are creamy-white with a conspicuous red cardiac mark on the abdomen (Bee, Oxford, & Smith, 2017).

3.1.3.1.4 *Nomada fucata* (Nationally Scarce[1]):

A cuckoo bee known as the painted nomad bee which has two generations along with its host species the yellow-legged mining bee (*Andrena flavipes*) (also recorded in Compartments A and E). The spring generation flies from April to June and the summer generation in July and August. The species is most frequently found on soft rock cliffs, chalk downland, and brownfield sites. The bee collects pollen from spring-flowering shrubs, composites, buttercups (*Ranunculus* spp.) and cinquefoils (*Potentilla* spp.). It is one of the UK's most rapidly expanding bees following the expansion of its host. Its current abundance suggests that its nationally scarce status should be revised (Falk, 2015).

3.1.3.1.5 *Trachys scrobiculatus* (Nationally Scarce – Least Concern):

This ground-ivy jewel beetle develops inside ground-ivy (*Glechoma hederacea*) leaves. The species can be found predominantly throughout the Midlands to southern England (Alexander, 2014).

[1] Current status does not reflect the recent expansion of this species and is due for revision.

3.1.3.1.6 *Variimorda villosa* (Nationally Scarce - Least Concern):

A tumbling flower beetle usually found on umbellifers or members of the daisy family from June to August. Such small beetles are very distinctive with an extended pygidium (hind segment) which resembles a sting. Adults are characteristically found curled up in flowers, where they feed on pollen. When disturbed, their escape mechanism is to tumble on to the ground hence their vernacular name. The species' occurrence is local and mainly restricted to the southern half of England.

3.1.4 Compartment B (central grid reference: SU49753047)

Compartment B (see Figure 1 and Appendix A) consisted of a footpath adjacent to the east verge of the island enclosed by the roundabout of Junction 9 bordered by scattered and dense scrub, patches of chalk grassland verge, and bordering dogwood (*Cornus sanguinea*), hawthorn (*Crataegus monogyna*), wayfaring tree (*Viburnum lantana*) and wild privet (*Ligustrum vulgare*). Flower-rich patches of verge consisted of plants such as umbellifers, red clover (*Trifolium pratense*), hawkweeds, and hemp agrimony (*Eupatorium cannabinum*).

3.1.4.1 Protected and Notable Species

Two protected / notable terrestrial invertebrate species were found within Compartment B as detailed in the following section.

In addition, two species regarded as Local were recorded within this compartment; namely *Hedychridium roseum* and a large tiphia wasp.

3.1.4.1.1 *Mordellistena variegata* (Nationally Scarce):

A tumbling flower beetle. Such small beetles are very distinctive with an extended pygidium (hind segment) which resembles a sting. Adults are characteristically found curled up in flowers, where they feed on pollen. When disturbed, their escape mechanism is to tumble on to the ground hence their vernacular name. The larvae develop in decaying wood but no details are known. The adults are typically found at blossom in July and August within the Midlands and South-east England. Sites include woodland glades, wood pastures and open farmland situations with old trees (Alexander, 2019).

3.1.4.1.2 *Variimorda villosa* (Nationally Scarce - Least Concern):

See Compartment A for species account.

3.1.5 Compartment C (central grid reference: SU49773062)

Compartment C (see Figure 1 and Appendix A) comprised parallel hedgerows along Easton Lane to the east of the M3, predominantly bounding arable fields. Both hedgerows were species rich, supporting a diverse range of woody and herbaceous plant species. Verges were flower-rich in places consisting of plants such as common hogweed (*Heracleum sphondylium)* and lady's bedstraw (*Galium verum*).

3.1.5.1 Protected and Notable Species

Eight protected / notable terrestrial invertebrate species were found within Compartment C as detailed in the following section.

In addition, six species regarded as Local were recorded within this compartment; namely stripe-legged robberfly (*Dioctria baumhaueri*), barley flea beetle (*Phyllotreta vittula*), *Psenulus concolor*, *Sitona humeralis*, small beegrabber, and superb ant-hill hoverfly (*Xanthogramma pedissequum*).

3.1.5.1.1 *Andrena fulvago* (Nationally Scarce):

A bee known as hawk's-beard mining bee which has conspicuous orange hairs at the end of the abdomen. The bee has one generation and flies from mid-May to early August. The bee has been recorded from chalk and limestone grassland and also coastal and heathland habitats. As its vernacular name suggests the bee collects pollen from yellow composites such as hawk's-beard species (*Crepis* spp.), hawkbit species (*Leontodon* spp.), mouse-ear-hawkweed (*Hieracium pilosella*), cat's-ear (*Hypochaeris radicata*) and dandelions (*Taraxacum officinale* agg.), and also ragwort (*Jacobaea vulgaris*). The bee nests in light soils and is widespread but generally scarce in England (Falk, 2015).

3.1.5.1.2 *Cassida prasina* (Nationally scarce - Least Concern):

A green leaf beetle which feeds on yarrow (*Achillea millefolium*) and sneezewort (*Achillea ptarmica*). The beetle is widely scattered throughout the UK but with evidence of decline in some areas (Hubble, 2014).

3.1.5.1.3 *Ero aphana* (Nationally scarce - Least Concern):

A spider which occurs on dry lowland heath, garden and brownfield sites. Two pairs of tubercles (rounded projections) present on its abdomen form the four corners of a square. The species is widely scattered but frequent where it occurs in southern England and it appears to be extending its range (Bee et al.,, 2017). Adults occur in Summer and Autumn (Roberts, 1996).

3.1.5.1.4 *Liparus coronatus* (Nationally Scarce):

See Compartment A for species account.

3.1.5.1.5 *Mordellistena variegata* (Nationally Scarce):

See Compartment B for species account.

3.1.5.1.6 *Platynaspis luteorubra* (Nationally Scarce):

A ladybird of low growing vegetation and grassland which lives in association with ants such as the small black ant (*Lasius niger*). The beetle feeds on aphids and is largely restricted to southern England (Roy et al., 2013).

3.1.5.1.7 *Trachys scrobiculatus* (Nationally Scarce – Least Concern):

See Compartment A for species account.

3.1.5.1.8 *Variimorda villosa* (Nationally Scarce - Least Concern):

See Compartment A for species account.

3.1.6 Compartment D (central grid reference: SU49773059)

Compartment D (see Figure 1 and Appendix A) located to the south-east of Easton Lane, was an area of chalk grassland dominated by false oat-grass (*Arrhenatherum elatius*), with abundant yarrow and common ragwort.

3.1.6.1 Protected and Notable Species

Three protected / notable terrestrial invertebrate species were found within Compartment D as detailed below.

3.1.6.1.1 *Asilus crabroniformis* (NERC S41 (Natural Environment and Rural Communities Act 2006); Least Concern (Drake, 2017) ; Hampshire BAP Priority species (2000))

The UK's largest robberfly named the hornet robberfly due to its black and yellow abdomen. It predates large insects such as grasshoppers, beetles, bees and wasps, and other robberflies. Females usually lay their eggs in or under the dry crust of old dung of cows, horses and rabbits and sometimes in adjacent soil. Habitats include heaths, limestone and chalk downs, grassland on commons and unimproved neutral pasture. It is a local species, only rarely reported in large numbers. There are probably only 45-50 sites in England where it breeds. Most populations exist on unimproved pasture where dung has plenty of roughage. The grassland in this compartment is not grazed and therefore unsuitable as a breeding ground for this species however the abundance of invertebrate prey makes this compartment and surrounding habitats in compartments A, B, C and E suitable hunting ground. Adults are on the wing in late summer from late July to early October (Stubbs & Drake, 2014).

3.1.6.1.2 Merzomyia westermanni (Nationally Scarce)

A gallfly, whose larvae form a gall in the flower head of Ragwort (*Senecio* and *Jacobaea* spp.), especially Hoary Ragwort (*Jacobaea erucifolia*) (Clemons, 2004). It has a very local distribution across much of the south of the UK.

3.1.6.1.3 Lygus pratensis (Rare – Red Data Book 3 (RDB3)[1])

A plant bug which has recently undergone a dramatic range expansion. It is now widespread throughout much of southern Britain and is much commoner than its RDB3 status suggests. It is polyphagous, feeding on a variety of herbaceous plants.

3.1.7 Compartment E (central grid reference: SU49603047)

Compartment E (see Figure 1 and Appendix A) comprised calcareous grassland within the west verge of the island enclosed by the roundabout of Junction 9. The grassland had been cut shortly before the first survey in June 2020 but had shown some regrowth by the second survey in July 2020 with yarrow and goldenrod (*Solidago* spp.) providing the main nectar sources for invertebrates.

3.1.7.1 Protected and Notable Species

Two protected / notable terrestrial invertebrate species were found within Compartment E as detailed in the following section.

In addition, seven species regarded as Local were recorded within this compartment; namely *Astata boops*, *Derephysia foliacea*, *Eupteryx origami*, yellow-legged black fly (*Pachygaster leachii*), *Sicus ferrugineus*, large tiphia wasp, and *Tychius junceus*.

3.1.7.1.1 *Trachys scrobiculatus* (Nationally Scarce – least concern - see Appendix E):

See Compartment A for species account.

3.1.7.1.2 *Variimorda villosa* (Nationally Scarce - least concern – see Appendix E):

See Compartment A for species account.

3.2 Southern Damselfly Habitat Assessment

3.2.1 West of the A34: Winnall Moors Reserve (central grid reference: SU49113113)

The area of Winnall Moors Reserve surveyed consists of managed floodplain meadows (TN1 Appendix B & Figure 2). These grazed fen meadows comprise SSSI units 61, 63, 64, and 59.

The River Itchen flows along the east side of the reserve, which is also traversed by a number of ditches and associated sluice mechanisms to control site water levels.

The main stretch of river within the reserve was bordered by a cut grass footway to the west with dense reeds abundant on both sides of the river (TN2 Appendix B & Figure 2). The river, approximately 3 to 4m wide, was slow flowing and deep due to the historical management of dredging (*R. Remnant of Hampshire and Isle of Wight Wildlife Trust pers. comm.*). Tall marginal vegetation was present along the majority of the river bank (T4 Appendix B & Figure 2) but for some small areas of poaching.

To the west of the river, within the main body of the reserve, the fields were composed of freshly cut hay meadow and grazed fen meadows with an abundance of rushes bordered by deep ditches with dense reed margins (TN3 Appendix B & Figure 2).

Wet woodland stretched alongside the western boundary of the reserve, adjacent to the A34, and was predominantly composed of willow (*Salix* spp.) and alder (*Alnus glutinosa*). An area of semi-natural broadleaved woodland was also present to the east of the river where it crossed the A34. This woodland was composed of willow, alder and hawthorn and shaded the adjacent watercourses (TN5 Appendix B & Figure 2).

Overall habitat suitability for southern damselfly is considered suboptimal within the reserve especially due to the intermittent flooding which all the watercourses here are subject to. Poached berms are generally considered suitable habitat with low-lying vegetation and an abundance of aquatic vegetation such as brook lime (*Veronica beccabunga*) (*B. Rushbrook of Hampshire and Isle of Wight Wildlife Trust pers. comm*.). Such habitat was generally lacking within this area. However, the presence of southern damselfly cannot be ruled out as some aspects of this habitat had some suitability such as unshaded stretches of watercourse and good water quality.

Overall habitat suitability: low to moderate.

3.2.2 West of the A34: North of Winnall Moors Reserve (central grid reference: SU49203158)

To the north of Winnall Moors Reserve shallow chalk streams ran adjacent to tall grassland and tall ruderal vegetation (TN6 Appendix B & Figure 2). The adjacent grazed meadow east of the adjacent A34 contained some tall vegetation such as meadowsweet (*Filipendula ulmaria*) and thistles (*Cirsium* spp.) (TN7 Appendix B & Figure 2). The shallow streams here contained abundant marginal aquatic vegetation such as water mint (*Mentha aquatica*). Whilst vegetation and tree cover were dense in most areas there were significant unshaded stretches of stream where azure damselfly (*Coenagrion puella*) were present in abundance.

Overall habitat suitability for southern damselfly is considered suboptimal north of Winnall Moors Reserve in most part due to the high degree of shading. However, some short stretches of stream were considered suitable as they were sun-exposed with suitable marginal vegetation and substrate.

Overall habitat suitability: low to moderate.

3.2.3 East of the A34 (central grid reference: SU49583207)

The area adjacent and east of the A34 was covered in dense vegetation which prohibited detailed survey. However, the density of such vegetation provided shading over all watercourses present in that section thus rendering such habitat of low suitability for southern damselfly.

Further west towards Abbots Worthy Mill the River Itchen and shallow chalk streams were predominantly bordered by dense tall ruderal vegetation, reeds and hemp agrimony. However, in some unshaded areas marginal vegetation graded down in to the water's edge with abundant water mint and water starwort (*Callitriche palustris*) (TN10 Appendix B & Figure 2).

At Abbot's Worthy Ford the watercourse was fast flowing and shallow, with a rock and sediment substrate. The stream narrowed from approximately 5 to 2m with some low-lying vegetation grading in to the stream but white poplar (*Populus alba*), sycamore (*Acer pseudoplantus*) and hawthorn provided dense shading (TN9 Appendix B & Figure 2).

Further south and adjacent to the A34 the River was shaded by woodland. To the east of the River where it crossed the A34, a grazed pasture provided a large area of un-shaded grassland with scattered reeds, rushes and tall ruderal vegetation (TN8 Appendix B & Figure 2). However, the river banks themselves were heavily shaded by sycamore and black poplar (*Populus nigra*).

Overall habitat suitability for southern damselfly is considered suboptimal east of the A34. The majority of the area was heavily shaded which provided unsuitable habitat for southern damselfly.

Overall habitat suitability: negligible to low

4. Discussion

4.1 Terrestrial Invertebrate Survey

Twelve protected / notable terrestrial invertebrate species were present within the entire survey area. A further 35 species were recorded which are regarded as Local.

An overall Pantheon assessment of the total species list found the rich flower resource present within the survey area to be in favourable condition with 17 species of bee and wasp utilising the survey area for this resource. The scrub edge assemblage type also scored as favourable, although the species quality index (SQI) of this assemblage was calculated using less than the Pantheon threshold of 15 species. Nevertheless, this is a good indicator of the habitat quality of scrub and woodland edge present on site. The scrub edge assemblage was composed of spiders, beetles, two-winged flies, bees and wasps, and crickets.

The grass verges surrounded by the roundabout at M3 J9 (Compartments A and E) were floristically rich and diverse and provided a major contribution to the high-quality flower-rich habitat of the survey area. Notable species recorded here such as the six-belted clearwing moth and tumbling flower beetle *Variimorda villosa* rely on nectaring and pollen sources. The painted nomad bee recorded in Compartment A also depends upon the presence of its host the yellow-legged mining bee which was recorded on both verges, and undoubtedly benefits from this flower-rich habitat as a pollen and nectaring source.

The species-rich footpath verge (Compartment B), hedgerow (Compartment C) and adjacent chalk grassland site (Compartment D) also provided a rich floristic resource for notable species such as hawk's-beard mining bee, leaf beetle *Cassida prasina*, tumbling flower beetles *Variimorda villosa* and *Mordellistena variegata*, weevil *Liparus coronatus*, ladybird *Platynaspis luteorubra* and gallfly *Merzomyia westermanni*.

The scrub margins of each compartment also provided valuable habitat for terrestrial invertebrates with notable spider species such as *Ero aphana* and *Nigma puella* present. The notable ground-ivy jewel beetle, dependent upon ground-ivy for its larval development was found in both the east verge (Compartment A) and hedgerow (Compartment C) and benefits from the presence of this plant present along the woodland and hedgerow margins.

The abundance of terrestrial invertebrates recorded within the survey area is reflected in the large volume of samples collected from pan trapping. The survey area is likely to provide valuable feeding grounds for predatory invertebrate species such as the notable, Hampshire BAP Priority hornet robberfly. Nearby grazing habitat may provide breeding opportunities for this species.

4.2 Southern Damselfly Habitat Assessment

The majority of the southern damselfly habitat assessment area was considered sub-optimal to support a southern damselfly population. To the west of the A34 at Winnall Moors Reserve the watercourses are subject to intermittent flooding which is generally regarded as unsuitable for southern damselfly. North of Winnall Moors Reserve, habitat was again considered sub-optimal due to predominant shading of watercourses. However, some short stretches of watercourse within and to the north of the reserve were considered suitable due to good sun-exposure, water quality, and suitable aquatic and marginal vegetation. Therefore, the presence of southern damselfly cannot be entirely precluded from the area west of the A34.

To the east of the A34, the majority of watercourses were heavily shaded which is considered unsuitable for southern damselfly. One small area of grassland to the south of the eastern

assessment area provided good, sun-exposed adjacent habitat however the river itself which runs under the A34 at this point was heavily shaded and surrounded by dense scrub. Therefore, the area to the east of the A34 is unlikely to support a southern damselfly population.

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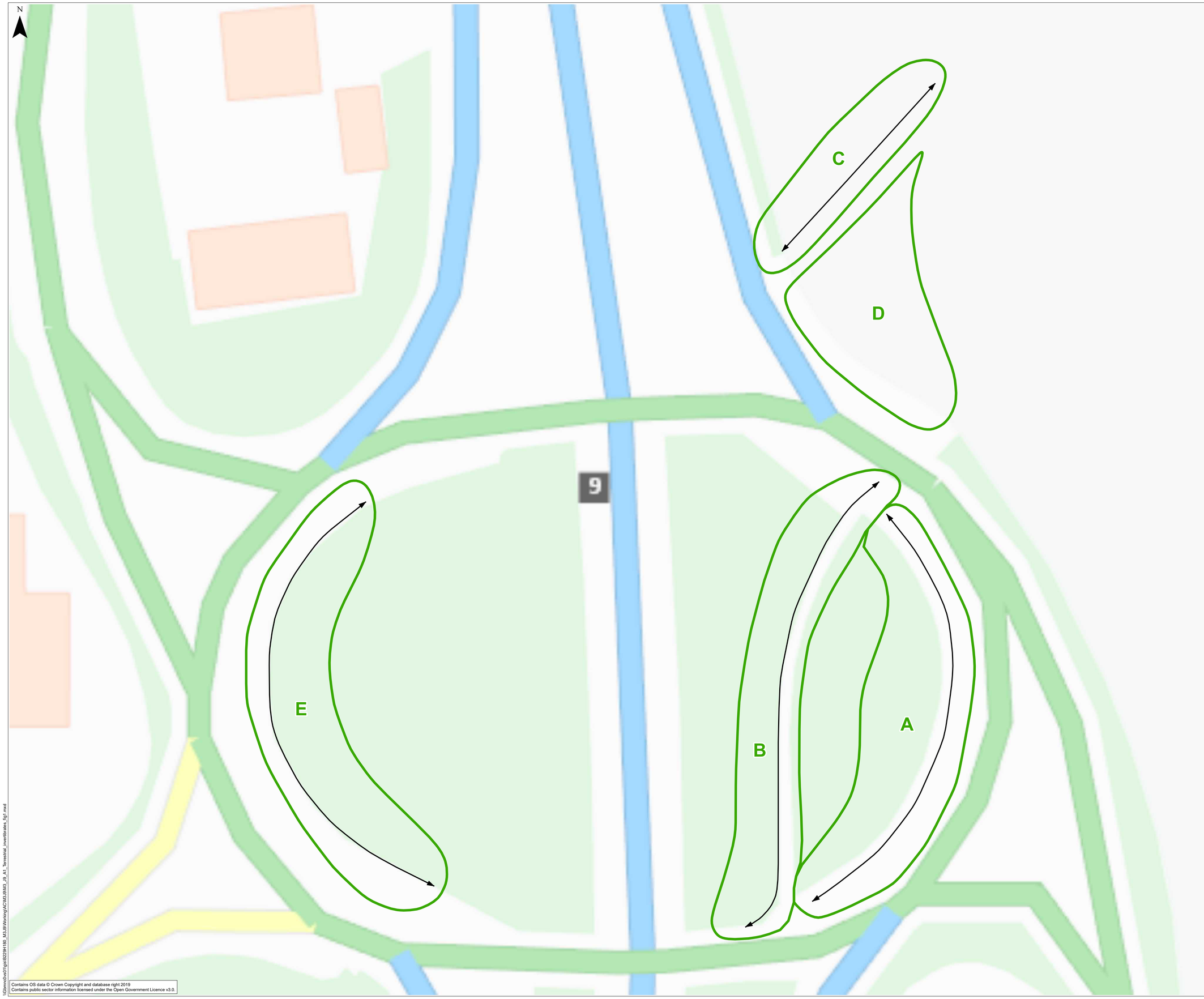
6. Figures

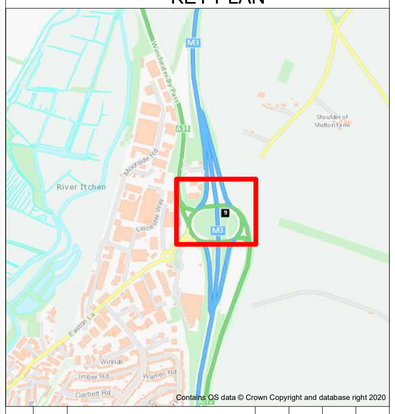


LEGEND

Pan Trap Locations

Survey Areas (A-E)

KEY PLAN



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Rev.	Date	Description of revision	Drawn	Checked	Review'd	Approv'd
P01	07/09/20	Initial Issue	AC	NS	AB	MZ

DRAWING STATUS

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Tel: +44 (0)118 946 7000
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M3 JUNCTION 9 IMPROVEMENTS

DRAWING TITLE

FIGURE 1
Terrestrial Invertebrate Survey Areas

DRAWING UNITS U.N.O.
ALL DIMENSIONS IN METRES UNLESS STATED OTHERWISE

SCALE AT A1 (841 x 594mm)
1:500

DRAWING No.
HE551511-JAC-EGN-0_00_00-DR-GI-0048

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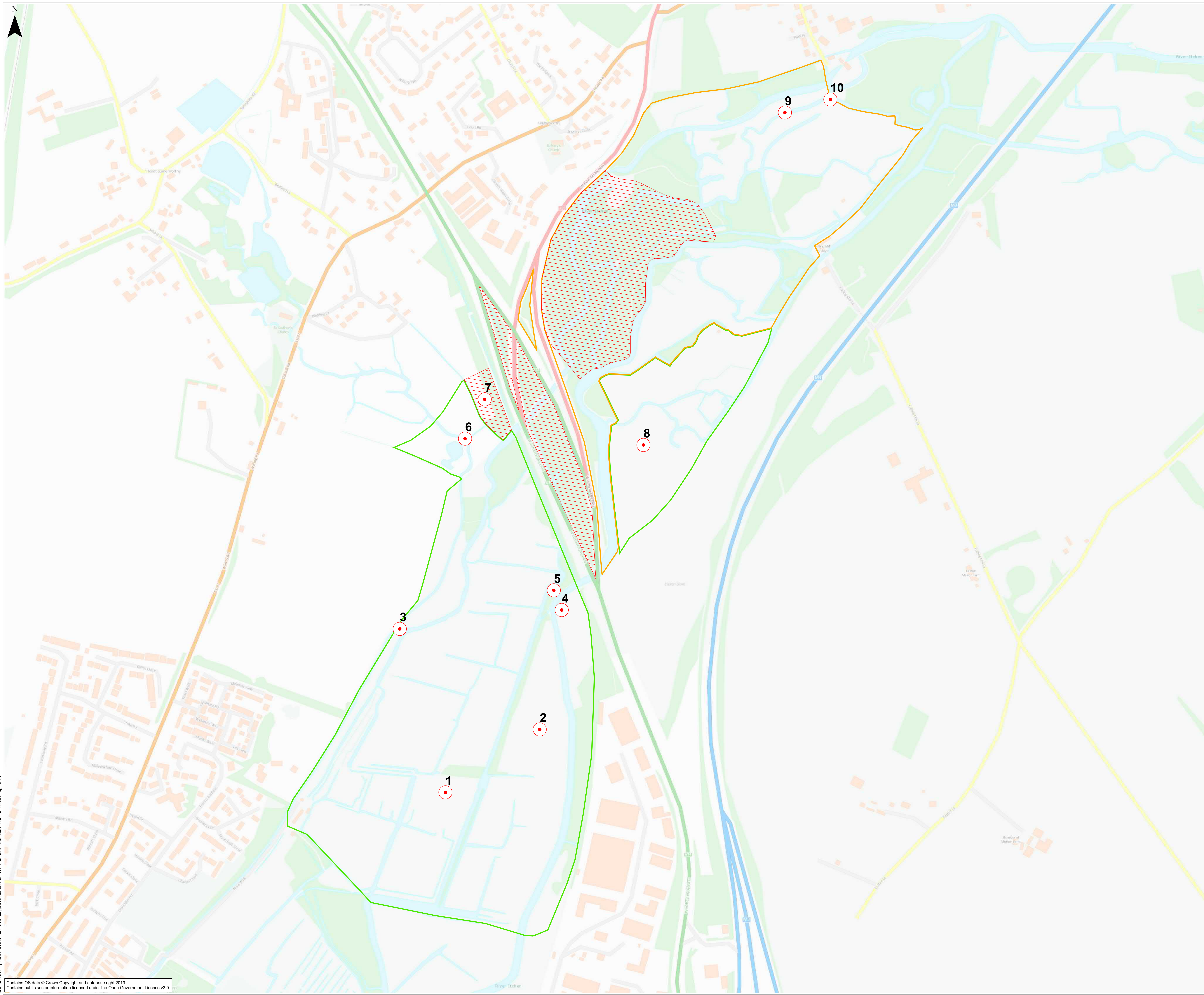
P01



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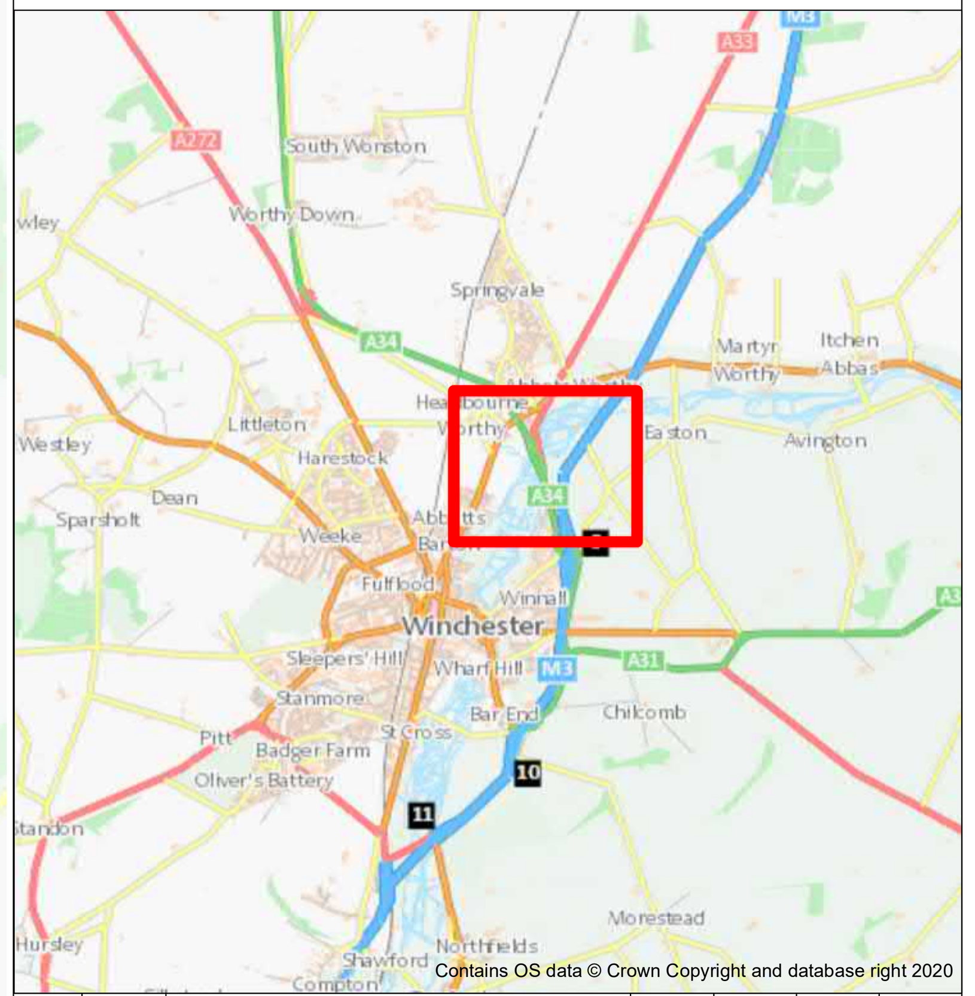
- Target notes

Habitat assessment

- Moderate habitat suitability
- Low habitat suitability
- Not accessible

KEY PLAN



Rev.	Date	Description of revision	Drawn	Checked	Review'd	Approv'd
P01	07/09/20	Initial Issue	RW	NS	AB	MZ

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SCHEME TITLE

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FIGURE 2
Southern Damselfly Habitat Assessment

DRAWING UNITS U.N.O.
ALL DIMENSIONS IN METRES UNLESS STATED OTHERWISE

SCALE AT A1 (841 x 594mm)
1:3500

DRAWING No.
HE551511-JAC-EGN-0_00_00-DR-GI-0049

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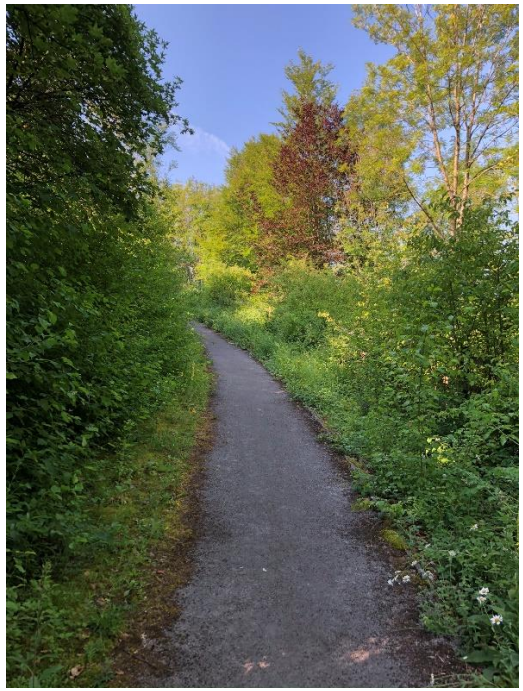
7. Appendices

Appendix A. Terrestrial Invertebrate Photographs

Table A.1 Photographs collected during Terrestrial Invertebrate Survey

Description	Photograph	
Compartment A		Compartment A was composed of calcareous grassland verge within the east verge of the island enclosed by the roundabout of Junction 9. The grassland was dominated by calcicolous forbs, including greater knapweed (*Centaurea scabiosa*), wild basil (*Clinopodium vulgare*) and wild marjoram (*Origanum vulgare*), with abundant pyramidal orchid (*Anacamptis pyramidalis*) around the roundabout. The verge bordered an area of heavily shaded broad-leaved woodland predominantly composed of dogwood (*Cornus sanguinea*) and ground-ivy understorey.

Compartment B		Compartment B consisted of a footpath adjacent to the east verge of the island enclosed by the roundabout of Junction 9 bordered by scattered, and dense scrub, patches of chalk grassland verge, and bordering dogwood (*Cornus sanguinea*), hawthorn (*Crataegus monogyna*), wayfaring tree (*Viburnum lantana*) and wild privet (*Ligustrum vulgare*). Flower-rich patches of verge consisted of plants such as umbellifers, red clover (*Trifolium pratense*), oxeye daisy (*Leucanthemum vulgare*) hawkweeds (*Hieracium* spp.), and hemp agrimony (*Eupatorium cannabinum*).

Compartment C		Compartment C comprised parallel hedgerows along Easton lane to the east of the M3 predominantly bounding arable fields. Both hedgerows were species rich, supporting a diverse range of woody and herbaceous plant species such as blackthorn (*Prunus spinosa*), hawthorn, bramble (*Rubus fruticosus* agg.) and dog rose (*Rosa canina* agg.). Verges were flower-rich in places consisting of plants such as common hogweed (*Heracleum sphondylium*), lady's bedstraw (*Galium verum*), hedge bindweed (*Calystegia sepium*), and field scabious (*Knautia arvensis*).

Compartment D		Compartment D located, to the south-east of Easton Lane, was an area of grassland dominated by false oat-grass (*Arrhenatherum elatius*), with abundant yarrow (*Achillea millefolium*) and common ragwort (*Jacobaea vulgaris*).

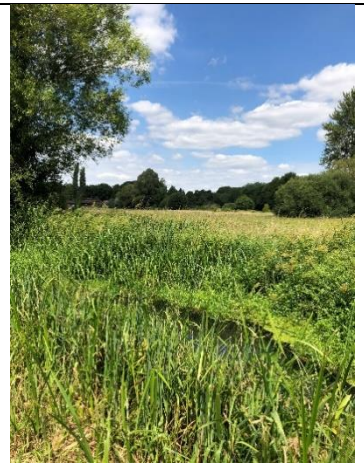
Compartment E		Compartment E was composed of calcareous grassland verge within the west verge of the island enclosed by the roundabout of Junction 9. The grassland had been cut shortly before the first survey in June 2020 but had shown some regrowth by the second survey in July 2020 with yarrow and goldenrod (*Solidago virgaurea*) and early goldenrod (*Solidago gigantea*) providing the main nectar sources. The verge bordered an area of heavily shaded broad-leaved woodland predominantly composed of dogwood (*Cornus sanguinea*).

Appendix B. Target notes for Southern Damselfly Habitat Assessment

Table B.1 Target notes recorded during Southern Damselfly Habitat Assessment

Target Note	Photo(s)	Description
1		Freshly cut hay meadow common throughout the reserve. Winnall Moors reserve is a managed flood meadow with water levels controlled through a series of sluice mechanisms. Watercourses on the reserve are therefore subject to intermittent flooding.
2	 	Fen meadow and adjacent river. A cut grass footway lies to the western side of the River Itchen and tall reeds (*Phragmites australis*) dominate both banks. Willow (*Salix* spp.) and alder (*Alnus glutinosa*) woodland lies behind the stream adjacent to the A34 boundary.

Target Note	Photo(s)	Description
3		Freshly cut hay meadow to the west of the reserve traversed by a series of slow-flowing ditches dominated by common reed and reed sweet grass (*Glyceria maxima*).
4	 	Unshaded, deep stretches of the River Itchen east of the reserve with banks dominated by common reed, and abundant meadowsweet (*Filipendula ulmaria*) and occasional purple loosestrife (*Lythrum salicaria*). The river has been historically dredged. Bankside vegetation is predominantly tall along the river's edge although there are occasional areas of poaching and shorter vegetation.

Target Note	Photo(s)	Description
5		Shaded woodland of willow, alder, and hawthorn (*Crataegus monogyna*) adjacent to the area where the River Itchen crosses the A34. Shaded watercourses are deemed sub-optimal habitat for southern damselfly.
6	 	Shallow, sun-exposed, slow-flowing stretch of stream north of Winnall Moors reserve and east of the A34. Vegetation gradually grades in to the stream such as water mint (*Mentha aquatica*) and reeds. Adjacent land comprises a cut grass path, tall ruderal and dense scrub, and grazed pasture. Azure damselflies (*Coenagrion puella*) were abundant resting in marginal vegetation.

Target Note	Photo(s)	Description
7		Cattle grazed pasture between stream north of Winnall Moors Reserve and west of the A34 boundary.
8		Grazed grassland adjacent to the River Itchen to the east of the A34. This unshaded grassland with scattered tall vegetation such as scattered hawthorn may provide damselfly basking opportunities. The River adjacent is heavily shaded by sycamore (*Acer pseudoplatanus*) and black poplar (*Populus nigra*).

Target Note	Photo(s)	Description
9		Shaded stretch of the River Itchen to the east of the A34. The majority of river channels within this area are shallow and fast-flowing but heavily shaded by sycamore, black poplar and hawthorn. Shaded watercourses are deemed sub-optimal habitat for southern damselfly.
10		Shallow, fast-flowing stretch of the River Itchen at Abbots Worthy Mill. The river width narrows from approximately 5m to 2m with a gravel and fine sediment bottom. This sun-exposed stretch may provide basking opportunities for damselflies however the majority of the area is heavily shaded by woodland and scrub providing unsuitable habitat for southern damselfly.

Appendix C: Species List

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Araneae	*Agalenatea redii*	An orbweaver spider	Local	X			X	
Araneae	*Anelosimus vittatus*					X		
Araneae	*Araneus diadematus*					X		X
Araneae	*Argiope bruennichi*	Wasp spider	Local				X	
Araneae	*Bathyphantes gracilis*					X		

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Araneae	*Cheiracanthium erraticum*						X	
Araneae	*Clubiona comta*			X		X		
Araneae	*Clubiona terrestris*					X		
Araneae	*Dictyna arundinacea*			X		X		
Araneae	*Dictyna uncinata*					X		
Araneae	*Enoplognatha ovata*	Common candy-striped spider		X	X	X	X	X

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Araneae	*Erigone atra*					X		
Araneae	*Erigone dentipalpis*						X	
Araneae	*Ero aphana*		Nationally scarce – least concern (2017)			X		
Araneae	*Heliophanus cupreus*	Copper sun-jumper			X	X		X
Araneae	*Heliophanus flavipes*			X	X	X	X	X
Araneae	*Ixodes ricinus*					X		

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Araneae	*Lepthyphantes tenuis*					X		X
Araneae	*Lepthyphantes zimmermanni*					X		
Araneae	*Mangora acalypha*			X				
Araneae	*Meioneta rurestris*					X		
Araneae	*Metellina mengei*			X				
Araneae	*Micaria pulicaria*	Glossy ant spider				X		

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Araneae	*Microlinyphia pusilla*							X
Araneae	*Neon reticulatus*					X		
Araneae	*Nigma puella*		Nationally scarce – least concern (2017)	X				
Araneae	*Ozyptila praticola*					X		
Araneae	*Pardosa nigriceps*			X				X
Araneae	*Pardosa palustris*			X		X		

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Araneae	*Pardosa pullata*			X	X	X		X
Araneae	*Pardosa saltans*					X		
Araneae	*Philodromus cespitum*	Turf-running spider		X		X		X
Araneae	*Pisaura mirabilis*	Nursery web spider		X				X
Araneae	*Salticus scenicus*	Zebra spider						X
Araneae	*Theridion sisyphium*	Mothercare spider		X				X

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Araneae	*Theridion varians*			X				
Araneae	*Tibellus oblongus*					X	X	X
Araneae	*Xysticus cristatus*	Common crab spider		X		X	X	
Araneae	*Xysticus ulmi*	Swamp crab spider	Local	X				
Araneae	*Zelotes latreillei*		Local	X				
Coleoptera	*Agriotes sputator*	Common click beetle						X

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Coleoptera	*Amara familiaris*				X			
Coleoptera	*Amara ovata*					X		
Coleoptera	*Amphimallon solstitiale*	Summer chafer	Local	X				
Coleoptera	*Anaspis fasciata*			X				
Coleoptera	*Anaspis rufilabris*					X		
Coleoptera	*Anthonomus rubi*					X		

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Coleoptera	*Athous bicolor*	A click beetle	Local	X				X
Coleoptera	*Athous haemorrhoidalis*					X		
Coleoptera	*Barypeithes pellucidus*	Hairy spider weevil		X	X	X		X
Coleoptera	*Batophila aerata*					X		
Coleoptera	*Bruchidius imbricornis*			X				
Coleoptera	*Calathus fuscipes*			X				

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Coleoptera	*Carabus violaceus*	Violet ground beetle				X		
Coleoptera	*Ceutorhynchus obstrictus*			X	X	X		X
Coleoptera	*Chaetocnema hortensis*	A flea beetle		X	X			X
Coleoptera	*Cionus hortulanus*	A weevil		X				
Coleoptera	*Coccinella septempunctata*	Seven-spot ladybird		X	X			
Coleoptera	*Cordylepherus viridis*						X	X

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Coleoptera	*Cortinicara gibbosa*					X		
Coleoptera	*Cryptocephalus moraei*		Local	X				
Coleoptera	*Dromius linearis*					X		
Coleoptera	*Grammoptera ruficornis*	A longhorn beetle		X				X
Coleoptera	*Gymnetron pascuorum*	A weevil		X	X			
Coleoptera	*Halyzia sedecimguttata*	Orange ladybird		X				

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Coleoptera	*Harmonia axyridis*	Harlequin ladybird		X	X	X		
Coleoptera	*Harpalus rufipes*	Strawberry seed beetle				X		
Coleoptera	*Hoplia philanthus*	Welsh chafer	Local	X				
Coleoptera	*Leiosoma deflexum*	A weevil		X	X			
Coleoptera	*Liparus coronatus*	A weevil	Nationally scarce (1992)	X		X		
Coleoptera	*Longitarsus membranaceus*		Local	X				

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Coleoptera	*Malthinus seriepunctatus*		Local	X				
Coleoptera	*Mecinus pascuorum*			X				
Coleoptera	*Meligethes aeneus*	Common pollen beetle		X	X	X	X	X
Coleoptera	*Mordellistena variegata*	A tumbling flower beetle	Nationally scarce – least concern (2014)		X	X		
Coleoptera	*Oedemera lurida*			X	X	X	X	X
Coleoptera	*Oedemera nobilis*	Swollen-thighed beetle		X	X	X	X	X

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Coleoptera	*Otiorhynchus singularis*	Raspberry weevil		X				
Coleoptera	*Paederus littoralis*	A rove beetle		X		X		
Coleoptera	*Phyllobius argentatus*	Silver-green leaf weevil				X		
Coleoptera	*Phyllotreta nigripes*	Turnip flea beetle						
Coleoptera	*Phyllotreta vittula*	Barley flea beetle	Local			X		
Coleoptera	*Platynaspis luteorubra*	A ladybird	Nationally scarce	X				

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Coleoptera	*Propylea quattuordecimpunctata*	Fourteen-spot ladybird		X	X		X	
Coleoptera	*Psyllobora vigintiduopunctata*	Twenty-two-spot ladybird		X	X	X		
Coleoptera	*Psylliodes chrysocephala*	Cabbage-stem flea beetle		X				
Coleoptera	*Pterostichus madidus*	Black clock beetle		X		X	X	
Coleoptera	*Rhagonycha fulva*	Common red soldier beetle		X	X	X	X	
Coleoptera	*Rhagonycha lignosa*					X		

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Coleoptera	*Rhyzobius chrysomeloides*					X		
Coleoptera	*Scolytus rugulosus*	Shothole borer	Local	X				
Coleoptera	*Scymnus frontalis*	A ladybird		X				X
Coleoptera	*Sitona hispidulus*	Clover-root weevil		X				
Coleoptera	*Sitona humeralis*	A weevil	Local	X		X		
Coleoptera	*Sitona lineatus*			X		X	X	

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Coleoptera	*Sphaeroderma testaceum*	Artichoke beetle		X				X
Coleoptera	*Subcoccinella vigintiquattuorpunctata*	Twenty-four-spot ladybird						X
Coleoptera	*Trachys scrobiculatus*	Ground-ivy jewel beetle	Nationally scarce	X		X		X
Coleoptera	*Trechus quadristriatus*					X		X
Coleoptera	*Trichosirocalus troglodytes*	A weevil						X
Coleoptera	*Tytthaspis sedecimpunctata*	Sixteen-spot ladybird				X	X	

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Coleoptera	*Tychius junceus*	A weevil	Local					X
Coleoptera	*Variimorda villosa*	A tumbling flower beetle	Nationally scarce – least concern (2014)	X	X	X		X
Dermaptera	*Forficula auricularia*	Common earwig			X			X
Diptera	*Asilus crabroniformis*	Hornet robberfly	S41 (Natural Environment and Rural Communities Act 2006) Hampshire BAP Priority (2000)				X	

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Diptera	*Baccha elongata*	Gossamer hoverfly		X	X			X
Diptera	*Calliphora vicina*	Common bluebottle						X
Diptera	*Cheilosia soror*				X			X
Diptera	*Chloromyia formosa*	Broad centurion		X				X
Diptera	*Chrysotoxum bicinctum*	Two-banded wasp hoverfly	Local			X		
Diptera	*Coenosia tigrina*							X

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Diptera	*Coremacera marginata*			X				
Diptera	*Didea fasciata*					X		
Diptera	*Dioctria baumhaueri*	Stripe-legged robberfly	Local			X		
Diptera	*Episyrphus balteatus*	Marmalade hoverfly		X	X	X	X	X
Diptera	*Eriothrix rufomaculata*					X		X
Diptera	*Eumerus funeralis*	Lesser bulb-fly			X			

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Diptera	*Helophilus pendulus*	The footballer hoverfly		X	X	X		
Diptera	*Limnia unguicornis*			X	X	X	X	
Diptera	*Lucilia sericata*	Common green bottle fly		X				X
Diptera	*Machimus atricapillus*	Kite-tailed robberfly		X	X			
Diptera	*Melanostoma mellinum*	Short melanostoma hoverfly		X		X		X
Diptera	*Melanostoma scalare*	Chequered hoverfly				X	X	

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Dipetra	*Merodon equestris*	Greater bulb-fly		X		X		
Diptera	*Merzomyia westermanni*		Nationally scarce (1998)				X	
Diptera	*Myathropa florea*	Batman hoverfly		X		X		X
Diptera	*Musca autumnalis*	Autumn fly						X
Diptera	*Nephrotoma quadrifaria*	A crane fly		X				
Diptera	*Pachygaster atra*	Dark-winged black fly						X

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Diptera	*Pachygaster leachii*	Yellow-legged black fly	Local					X
Diptera	*Phaonia pallida*	Orange muscid fly				X		
Diptera	*Pipiza luteitarsis*	Pale-footed pipiza hoverfly	Local	X				
Diptera	*Pipizella viduata*	A hoverfly		X	X			X
Diptera	*Poecilobothrus nobilitatus*	Semaphore fly				X		
Diptera	*Sarcophaga carnaria*	Common flesh fly		X	X	X	X	X

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Diptera	*Sargus iridatus*	Iridescent centurion soldierfly	Local	X				
Diptera	*Sicus ferrugineus*		Local	X				X
Diptera	*Sphaerophoria scripta*	Long hoverfly		X	X	X		
Diptera	*Syrphus ribesii*	Humming syrphus hoverfly		X				X
Diptera	*Syrphus vitripennis*	Glass-winged syrphus hoverfly		X				
Diptera	*Thecophora atra*	Small beegrabber	Local	X		X		

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Diptera	*Thereva nobilitata*	Common stiletto fly						X
Diptera	*Trypetoptera punctulata*	Picture winged snail-killer			X	X		X
Diptera	*Vollucela pellucens*	Pellucid fly						X
Diptera	*Xanthogramma pedissequum*	Superb ant-hill hoverfly	Local			X		
Hemiptera	*Acalypta parvula*			X				X
Hemiptera	*Agallia consobrina*			X		X		

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Hemiptera	*Anaceratagallia ribauti*					X	X	X
Hemiptera	*Anthocoris confusus*					X		
Hemiptera	*Aphrodes makarovi*			X	X	X		X
Hemiptera	*Aphrophora alni*			X				
Hemiptera	*Atractotomus mali*					X		
Hemiptera	*Campyloneura virgula*			X		X		

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Hemiptera	*Capsus ater*					X		
Hemiptera	*Cicadella viridis*	Green leafhopper					X	X
Hemiptera	*Cicadula persimilis*	A leafhopper				X		
Hemiptera	*Coreus marginatus*						X	
Hemiptera	*Coriomeris denticulatus*			X				
Hemiptera	*Deraeocoris flavilinea*					X		

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Hemiptera	*Deraeocoris ruber*					X		
Hemiptera	*Derephysia foliacea*	A lace bug	Local					X
Hemiptera	*Dicyphus errans*					X		
Hemiptera	*Dolycoris baccarum*	Hairy shieldbug		X			X	
Hemiptera	*Doratura stylata*				X			
Hemiptera	*Eurydema oleracea*					X	X	

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Hemiptera	*Eurygaster testudinaria*						X	
Hemiptera	*Eupteryx origani*		Local					X
Hemiptera	*Euscelis incisus*			X				X
Hemiptera	*Gonocerus acuteangulatus*	Box bug	Local			X		
Hemiptera	*Heterotoma planicornis*			X		X		
Hemiptera	*Himacerus apterus*	Tree damsel bug				X		

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Hemiptera	*Himacerus mirmicoides*	Ant damsel bug		X				X
Hemiptera	*Ischnodemus sabuleti*	European cinchbug					X	
Hemiptera	*Issus coleoptratus*					X		
Hemiptera	*Javesella pellucida*							X
Hemiptera	*Legnotus limbosus*	Bordered shieldbug				X		
Hemiptera	*Leptopterna dolabrata*			X		X		X

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Hemiptera	*Lygus pratensis*		RDB3 (1992)[1]				X	
Hemiptera	*Lygus rugulipennis*						X	
Hemiptera	*Megophthalmus scabripennis*			X		X		
Hemiptera	*Nabis rugosus*	Common damsel bug		X		X		
Hemiptera	*Nysius huttoni*	Wheat bug		X				X
Hemiptera	*Orthonotus rufifrons*					X		

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Hemiptera	*Orthops campestris*					X		
Hemiptera	*Palomena prasina*			X	X	X		
Hemiptera	*Palomena prasina*	Common green shieldbug			X	X		
Hemiptera	*Philaenus spumarius*	Common froghopper		X		X		
Hemiptera	*Phytocoris ulmi*					X		X
Hemiptera	*Phytocoris varipes*			X			X	X

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Hemiptera	*Plagiognathus arbustorum*			X		X		X
Hemiptera	*Podops inuncta*	Turtle shieldbug				X		
Hemiptera	*Scolopostethus affinis*			X				X
Hemiptera	*Sehirus luctuosus*	Forget-me-not shieldbug	Local					X
Hemiptera	*Stenodema laevigata*					X		X
Hemiptera	*Stictopleurus punctatonervosus*		Local	X			X	

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Hymenoptera	*Ancistrocerus gazella*				X			X
Hymenoptera	*Andrena flavipes*	Yellow-legged mining bee		X				X
Hymenoptera	*Andrena fulvago*	Hawk's-beard mining bee				X		
Hymenoptera	*Andrena minutula*	Common mini-mining bee				X		
Hymenoptera	*Apis mellifera*	Honeybee		X	X	X	X	X
Hymenoptera	*Arge ochropus*	Rose sawfly		X				

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Hymenoptera	*Arge pagana*	Large rose sawfly		X	X			X
Hymenoptera	*Astata boops*	A wasp	Local					X
Hymenoptera	*Bethylus fuscicornis*	A parasitoid wasp	Local			X		
Hymenoptera	*Bombus hypnorum*	Tree bumblebee		X				
Hymenoptera	*Bombus lapidarius*	Red-tailed bumblebee		X	X			X
Hymenoptera	*Bombus lucorum agg.*	White-tailed bumblebee		X				

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Hymenoptera	*Bombus pascuorum*	Common carder bee		X	X	X		X
Hymenoptera	*Bombus pratorum*	Early bumblebee		X	X			
Hymenoptera	*Bombus terrestris*	Buff-tailed bumblebee		X	X	X		
Hymenoptera	*Bombus vestalis*	Vestal cuckoo bee			X			
Hymenoptera	*Cerceris rybyensis*	Ornate-tailed digger wasp		X	X	X		
Hymenoptera	*Entomognathus brevis*	A wasp			X			

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Hymenoptera	*Eutomostethus ephippium*	A sawfly				X		
Hymenoptera	*Gasteruption jaculator*	A parasitoid wasp				X		
Hymenoptera	*Halictus rubicundus*	Orange-legged furrow bee		X	X			
Hymenoptera	*Halictus tumulorum*	Bronze furrow bee		X	X	X		X
Hymenoptera	*Hedychridium roseum*	A cuckoo wasp	Local	X	X			
Hymenoptera	*Hoplitis spinulosa*	Spined mason bee	Local	X	X	X		X

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Hymenoptera	*Hylaeus communis*	Common yellow face bee			X	X		
Hymenoptera	*Hylaeus confusus*	White-jawed yellow face bee				X		
Hymenoptera	*Lasiogossum calceatum*	Common furrow bee						X
Hymenoptera	*Lasioglossum morio*	Common green furrow bee		X	X	X		
Hymenoptera	*Lasioglossum smeathmanellum*	Smeathman's furrow bee		X				
Hymenoptera	*Lasius flavus*	Yellow meadow ant		X				X

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Hymenoptera	*Lasius niger*	Black garden ant		X	X	X		X
Hymenoptera	*Lasius platythorax*	An ant						X
Hymenoptera	*Myrmecina graminicola*	An ant	Local	X				
Hymenoptera	*Myrmica ruginodis*	An ant				X		
Hymenoptera	*Myrmica scabrinodis*			X				
Hymenoptera	*Nomada fabriciana*	Fabricius' nomad bee		X				X

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Hymenoptera	*Nomada flavoguttata*	Small nomad bee		X	X			X
Hymenoptera	*Nomada fucata*	Painted nomad bee	Nationally scarce[1]	X				
Hymenoptera	*Osmia spinulosa*			X				
Hymenoptera	*Pemphredon inornata*	Shuckard's wasp			X			X
Hymenoptera	*Psenulus concolor*	A wasp	Local			X		
Hymenoptera	*Pseudomalus auratus*	A cuckoo wasp			X			

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Hymeoptera	*Sphecodes monilicornis*	Box-headed blood bee						X
Hymenoptera	*Temnothorax nylanderi*	An ant	Local					X
Hymenoptera	*Tiphia femorata*	Large tiphia wasp	Local	X	X			X
Hymenoptera	*Trychnosoma punctipleura*				X			
Hymenoptera	*Trypoxylon attenuatum*	Slender wood borer wasp				X		
Hymenoptera	*Trypoxylon clavicerum*	Club horned wood borer wasp			X	X		X

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Hymenoptera	*Vespula germanica*	German wasp						X
Hymenoptera	*Vespula vulgaris*	Common wasp		X	X	X	X	X
Isopoda	*Armadillidium vulgare*	Pill woodlouse		X				X
Isopoda	*Philoscia muscorum*	Common striped woodlouse		X	X	X		X
Isopoda	*Platyarthrus hoffmannseggii*	Ant woodlouse						X
Isopoda	*Porcellio scaber*	Common rough woodlouse		X	X	X		X

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Lepidoptera (butterfly)	*Aglais io*	Peacock butterfly			X	X		
Lepidoptera (butterfly)	*Gonepteryx rhamni*	Brimstone		X				
Lepidoptera (butterfly)	*Maniola jurtina*	Meadow brown			X	X	X	
Lepidoptera (butterfly)	*Melanargia galathea*	Marbled white				X	X	
Lepidoptera (butterfly)	*Pieris brassicae*	Large white				X	X	X
Lepidoptera (butterfly)	*Polygonia c-album*	Comma				X	X	

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Lepidoptera (butterfly)	*Polyommatus icarus*	Common blue		X				
Lepidoptera (butterfly)	*Pyronia tithonus*	Gatekeeper		X	X	X		X
Lepidoptera (butterfly)	*Thymelicus sylvestris*	Small skipper		X				
Lepidoptera (butterfly)	*Vanessa atalanta*	Red admiral			X	X		
Lepidoptera (moth)	*Bembecia ichneumoniformis*	Six-belted clearwing	Nationally scarce	X				
Lepidoptera (moth)	*Hellinsia osteodactylus*	Small goldenrod plume			X			

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Lepidoptera (moth)	*Mormo maura*	Old lady						Subway underpass near E
Lepidoptera (moth)	*Pterophorus pentadactyla*	White plume			X			
Lepidoptera (moth)	*Pyrausta aurata*	Mint moth		X				
Lepidoptera (moth)	*Rivula sericealis*	Straw dot				X		
Lepidoptera (moth)	*Tyria jacobaea*	Cinnabar moth	S41 (Research Only)[2]				X	

[2] Section 41 (Research Only) species are not assessed as Protected or Notable species. They are not currently considered scarce or threatened; their status was assigned to encourage research in to the species.

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Lepidoptera (moth)	*Zygaena filipendulae*	Six-spot burnet		X				
Neuroptera	*Chrysoperla carnea*	Common green lacewing			X	X	X	
Odonata	*Aeshna cyanea*	Southern hawker			X	X		
Odonata	*Calopteryx splendens*	Banded demoiselle			X	X	X	
Opiliones	*Mitopus morio*	A harvestman		X		X		
Opiliones	*Phalangium opilio*	A harvestman		X				X

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Orthoptera	*Chorthippus parallelus*	Meadow grasshopper		X	X	X	X	
Orthoptera	*Leptophyes punctatissima*	Speckled bush cricket		X		X		
Psocoptera	*Ectopsocus petersi*			X				
Pulmonata	*Cochlicopa lubrica agg.*					X		
Pulmonata	*Monacha cantiana*	Kentish snail				X		
Pulmonata	*Trichia hispida*	Hairy snail		X				

				Compartment				
Taxon group	Species Name	Vernacular Name	Status (see Appendix D & E)	East Verge (A)	East Footpath (B)	Hedgerow (C)	Field adjacent to hedgerow (D)	West Verge (E)
Pulmonata	*Trochulus hispidus*			X				
Thysanoptera	*Aeolothrips versicolor*	A thrip		X		X		

Appendix D. Legislative and Planning Context

The Habitats Regulations, and Wildlife and Countryside Act 1981 (as amended) (WCA)

The Habitat Regulations transpose Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (EC Habitats Directive) into UK law. The Regulations provide for the designation and protection of 'European Sites', the protection of 'European Protected Species' (EPS), and the adaptation of planning and other controls for the protection of European Sites. EPS are listed on Schedule 2 of the Conservation Regulations.

Under the combined measures included in the Habitats Regulations and WCA it is an offence to:

- deliberately capture, injure or kill any wild animal listed as an EPS;
- deliberately disturb wild animals of any such species in such a way as to be likely to impair their ability:
    - to survive, to breed or reproduce, or to rear or nurture their young; or
    - in the case of animals of a hibernating or migratory species, to hibernate or migrate;
- to affect significantly the local distribution or abundance of the species to which they belong;
- deliberately take or destroy the eggs of such an animal; or
- damage or destroy a breeding site or resting place of such an animal.

Natural Environment and Rural Communities Act 2006 (NERC 2006)

Section 40 of the Act concerns biodiversity and states: "*Every public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity*."

Section 41 of the NERC Act sates that: "*The Secretary of State must, as respects England, publish a list of the living organisms and types of habitat which in the Secretary of State's opinion are of principal importance for the purpose of conserving biodiversity*". Many terrestrial invertebrate species are categorised as 'Species of Principal Importance' under the NERC Act. The list of species can be downloaded from the natural England website at:

[redacted]

The Act stresses that "*it is important that public authorities seek not only to protect important habitats and species, but actively seek opportunities to enhance biodiversity through development proposals, where appropriate. Incorporating enhancement opportunities into projects may help applicants to achieve planning permission*."

A full list of UK Invertebrate Species protected by the Habitats Regulations, WCA and NERC Act (2006) can be found at: http://jncc.defra.gov.uk/page-3408

Appendix E. IUCN Red List and GB Rarity Status Categories

IUCN Red List:

Extinct (EX)

A taxon is Extinct when there is no reasonable doubt that the last individual has died. Extensive surveys in the taxon's known and / or expected habitat have failed to record an individual.

Extinct in the Wild (EW)

A taxon is Extinct in the Wild when it is known to only survive in cultivation, captivity or as a naturalised population/s well outside its past range. A taxon is Extinct in the Wild when extensive surveys in the taxon's known and / or expected habitat have failed to record an individual.

Critically Endangered (CR)

A taxon is Critically Endangered when it is considered to be facing an extremely high risk of extinction in the wild. The taxon must meet any of the following criteria:

- Reduction in population size based on any of the following:
  - population size reduction of ≥90% over the last 10 years of three generations, whichever is the longer, where the causes are clearly reversible, understood and ceased.
  - population size reduction ≥80% over the last 10 years or three generations, whichever is the longer, where the reduction or its causes may NOT be reversible, understood or ceased.
  - projected population size reduction ≥80% to be met within the next 10 years or three generations, whichever is the longer (up to a maximum of 100 years).
  - observed or projected population size reduction ≥80% over any 10 year or three generation period, whichever is the longer (up to a maximum of 100 years in the future). The time period must include the past and future and the reduction or its causes may not be reversible, understood or ceased.

- Extent of occurrence is estimated to be less than 100 km^2 or area of occupancy is estimated to be less than 10 km^2 and indicates at least two of: severe fragmentation, continuing decline (observed or projected) and/or extreme fluctuations.

- Population size is estimated to be fewer than 250 mature individuals and either:
  - an estimated decline of at least 25% within three years or one generation whichever is the longer (up to a maximum of 100 years in the future).
  - a continuing decline, observed or projected with no subpopulation estimated to contain more than 50 mature individuals or at least 90% of mature individuals are in one subpopulation.

- Population size estimated to be fewer than 50 mature individuals.

- Probability of extinction in the wild is at least 50% within the next 10 years or three generations, whichever is the longer (up to a maximum of 100 years).

More details of these criteria can be found in the IUCN Red List Categories and Criteria report (IUCN)

Endangered (EN)

A taxon is Endangered when it is considered to be facing an extremely high risk of extinction in the wild. The taxon must meet any of the following criteria:

- Reduction in population size based on any of the following:

- population size reduction of ≥70% over the last 10 years of three generations, whichever is the longer, where the causes are clearly reversible, understood and ceased.
- population size reduction ≥50% over the last 10 years or three generations, whichever is the longer, where the reduction or its causes may NOT be reversible, understood or ceased.
- projected population size reduction ≥50% to be met within the next 10 years or three generations, whichever is the longer (up to a maximum of 100 years).
- observed or projected population size reduction ≥50% over any 10 year or three generation period, whichever is the longer (up to a maximum of 100 years in the future). The time period must include the past and future and the reduction or its causes may not be reversible, understood or ceased.

- Extent of occurrence is estimated to be less than 5000 km^2 or area of occupancy is estimated to be less than 500 km^2 and indicates at least two of: severe fragmentation, continuing decline (observed or projected) and/or extreme fluctuations.

- Population size is estimated to be fewer than 2500 mature individuals and either:
  - an estimated decline of at least 20% within five years or two generations whichever is the longer (up to a maximum of 100 years in the future).
  - A continuing decline, observed or projected with no subpopulation estimated to contain more than 250 mature individuals or at least 95% of mature individuals are in one subpopulation.

- Population size estimated to be fewer than 250 mature individuals.

- Probability of extinction in the wild is at least 20% within the next 20 years or five generations, whichever is the longer (up to a maximum of 100 years).

More details of these criteria can be found in the IUCN Red List Categories and Criteria report (IUCN)

Vulnerable (VU)

A taxon is Vulnerable when it is considered to be facing an extremely high risk of extinction in the wild. The taxon must meet any of the following criteria:

- Reduction in population size based on any of the following:
  - population size reduction of ≥50% over the last 10 years of three generations, whichever is the longer, where the causes are clearly reversible, understood and ceased.
  - population size reduction ≥30% over the last 10 years or three generations, whichever is the longer, where the reduction or its causes may NOT be reversible, understood or ceased.
  - projected population size reduction ≥30% to be met within the next 10 years or three generations, whichever is the longer (up to a maximum of 100 years).
  - observed or projected population size reduction ≥30% over any 10 year or three generation period, whichever is the longer (up to a maximum of 100 years in the future). The time period must include the past and future and the reduction or its causes may not be reversible, understood or ceased.

- Extent of occurrence is estimated to be less than 20 000 km^2 or area of occupancy is estimated to be less than 2000 km^2 and indicates at least two of: severe fragmentation, continuing decline (observed or projected) and/or extreme fluctuations.

- Population size is estimated to be fewer than 10 000 mature individuals and either:
  - an estimated decline of at least 10% within 10 years or three generations whichever is the longer (up to a maximum of 100 years in the future).
  - A continuing decline, observed or projected with no subpopulation estimated to contain more than 1000 mature individuals or 100% of mature individuals are in one subpopulation.

- Population size estimated to be fewer than 1000 mature individuals and with a very restricted area of occupancy or number of locations.

- Probability of extinction in the wild is at least 10% within the next 100 years.

More details of these criteria can be found in the IUCN Red List Categories and Criteria report (IUCN)

Near Threatened (NT)

A taxon is Near Threatened when it has been evaluated against the Red List criteria but does not qualify for any of the above threatened categories but is close to qualifying for or is likely to qualify for a threatened category in the near future.

Least Concern (LC)

A taxon is Least Concern when it does not qualify for the above criteria. Widespread and abundant taxa are included in this category.

Data Deficient (DD)

A taxon is Data Deficient when there is inadequate information to make an assessment of its risk of extinction based on its distribution and/or population status.

Not Evaluated (NE)

A taxon is Not Evaluated having not yet been evaluated against the Red List criteria.

GB Rarity Status Categories

At the national level countries are permitted to refine the definitions for non-threatened categories and define categories of their own. Nationally Rare and Nationally Scarce categories are unique to Great Britain.

Nationally Rare

Taxa which occur in 15 or fewer hectads (10 km squares) in Great Britain

Nationally Scarce

Taxa which are recorded in 16 – 100 hectads (10 km squares) in Great Britain but are not included in one of the Red List Categories

Red Data Book

Taxa occurring in fewer than 16 10km squares of the National Grid, divided as:

- endangered (Red Data Book 1), for species known from a single population or in continuous recent decline and now known from five or fewer 10km squares;
- vulnerable (Red Data Book 2), likely to become endangered (Red Data Book 1) if causal factors continue;
- rare (Red Data Book 3), species at risk but not qualifying as vulnerable; and
- Red Data Book K, species insufficiently known but likely to qualify at least as rare;

Other Categories

Local

A species may be limited to a local distribution or abundance rather than being common and widespread. These species are known to occur in 101 to 300 ten-km squares.