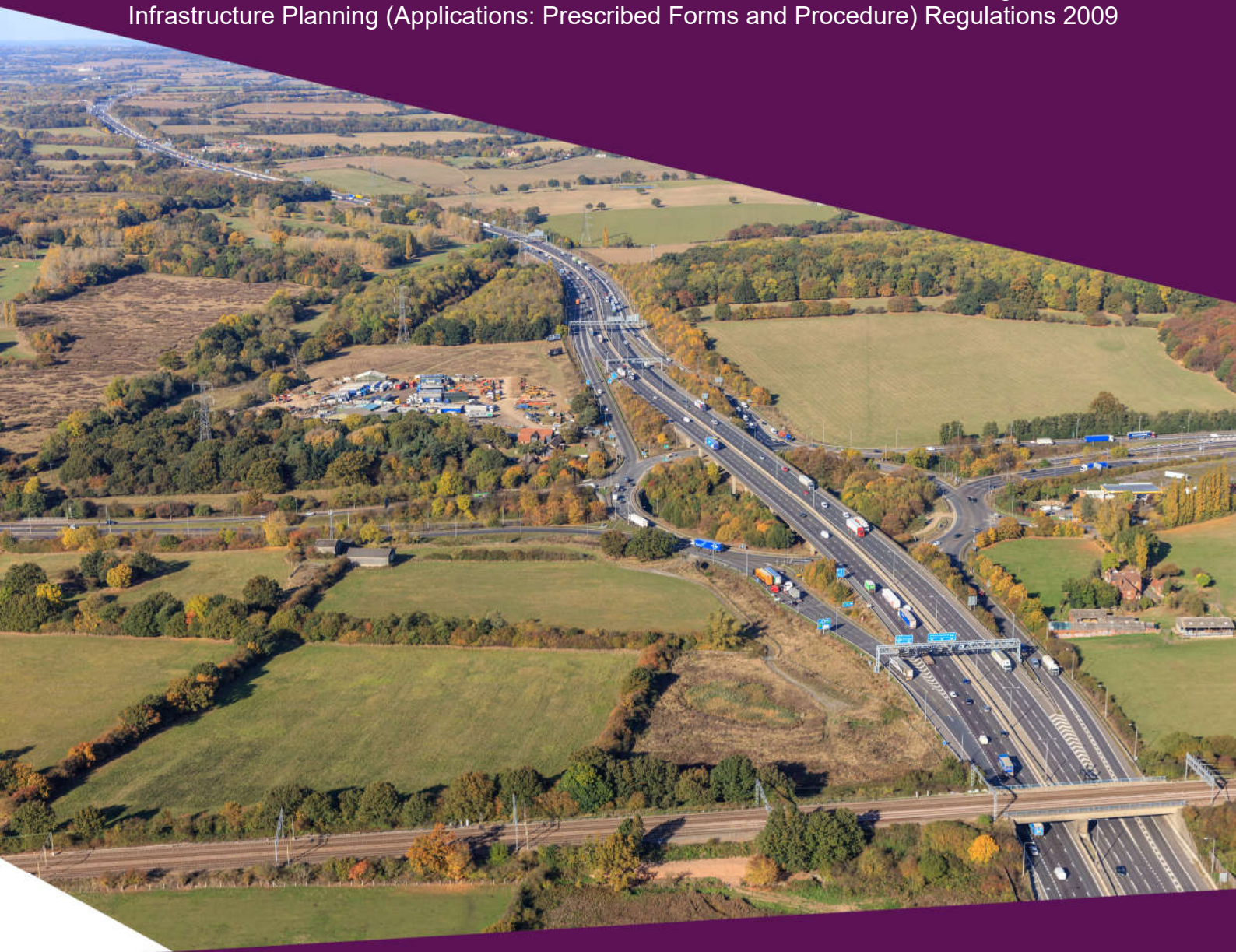
M25 junction 28 improvement scheme
TR010029
6.3 Environmental Statement
Appendix 7.8: Invertebrate scoping survey

APFP Regulation 5(2)(a)
Planning Act 2008
Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009



Volume 6
May 2020

Infrastructure Planning

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

M25 junction 28 scheme
Development Consent Order 202[x]

6.3 ENVIRONMENTAL STATEMENT
7.8: INVERTEBRATE SCOPING SURVEY

Regulation Number:	Regulation 5(2)(a)
Planning Inspectorate Scheme Reference:	TR010029
Application Document Reference:	TR010029/APP/6.3
Author:	M25 junction 28 improvement scheme project team, Highways England

Version	Date	Status of Version
1	May 2020	Application issue

Table of contents

Appendix 7.8 Invertebrate scoping survey

JUNCTION 28, M25:
INVERTEBRATE SCOPING SURVEY REPORT

MARK G. TELFER

11TH APRIL 2018

THIS REPORT WAS PRODUCED FOR RSK ADAS LTD

[redacted]@btinternet.com
http://markgtelfer.co.uk/

This report should be quoted as:

Telfer, M.G. (2018). *Junction 28, M25: invertebrate scoping survey report.* Report to RSK ADAS Ltd.

Contents

1 Summary

An invertebrate scoping survey was carried out of an area adjacent to Junction 28 of the M25, based on a single visit on 27th March 2018.

The scoping survey aimed to make an assessment of the area's potential to support invertebrate species or assemblages of conservation importance.

Only part of the area affected by road improvement proposals was covered: the land inside (south-west of) the M25 and north-west of the A12.

Three Section 41 species (species listed in Section 41 of the Natural Environment and Rural Communities Act 2006 as being 'of principal importance for the purpose of conserving biodiversity') are known to occur within 2 km of the survey area: Stag Beetle Lucanus cervus, Alder Flea-weevil Orchestes testaceus and White-letter Hairstreak butterfly Satyrium w-album.

Suitable habitat exists within the survey area for Stag Beetle and Alder Flea-weevil. There is a high potential for these species to occur and they should be the subject of targeted survey.

Elm was not found to be present and thus there will be no need to survey for White-letter Hairstreak butterfly.

The mature and veteran trees and shrubs within the survey area, especially along the Weald Brook but also in hedges, fields and on woodland edges, are of high potential for invertebrates and should be subject to a full invertebrate survey, targeting deadwood invertebrates (saproxylics) as well as canopy invertebrates.

Both woodlands (The Grove and Alder Wood) should be regarded as of at least moderate potential for invertebrates, and should thus be subject to full invertebrate survey.

The Grove contains a series of woodland ponds which are of moderate potential and should be surveyed for aquatic and wetland invertebrates.

The Weald Brook should be regarded as of high potential for invertebrates. Full survey should cover aquatic, wetland and submerged deadwood habitats.

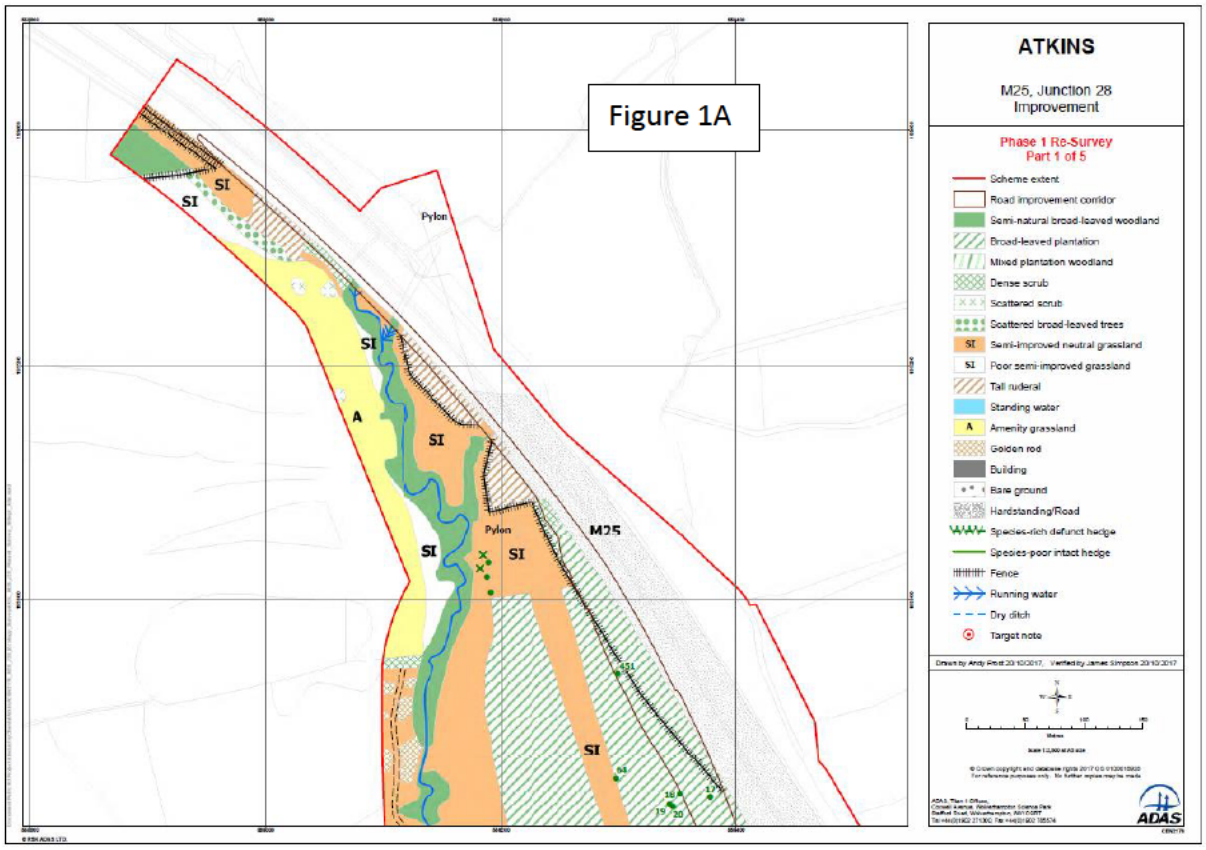
Some of the pasture habitat is of moderate potential for invertebrates and should be surveyed accordingly.

A scope of works to fulfil these survey requirements would typically involve several fieldwork visits spread across the survey season (April to September). Were the survey to be restricted to those areas directly under the footprint of the road improvement proposals, then the scope of works would be correspondingly reduced.

2 Introduction

A scoping survey for invertebrates was carried out by the author on 27th March 2018.

The scoping survey was required to inform plans for improvement of Junction 28 of the M25 motorway. The red line for the road improvement scheme includes areas on all sides of the junction but this scoping survey targeted land inside (south-west of) the M25 and north-west of the A12 (Figure 1). A new loop road is proposed for this block of land (Figure 1B).



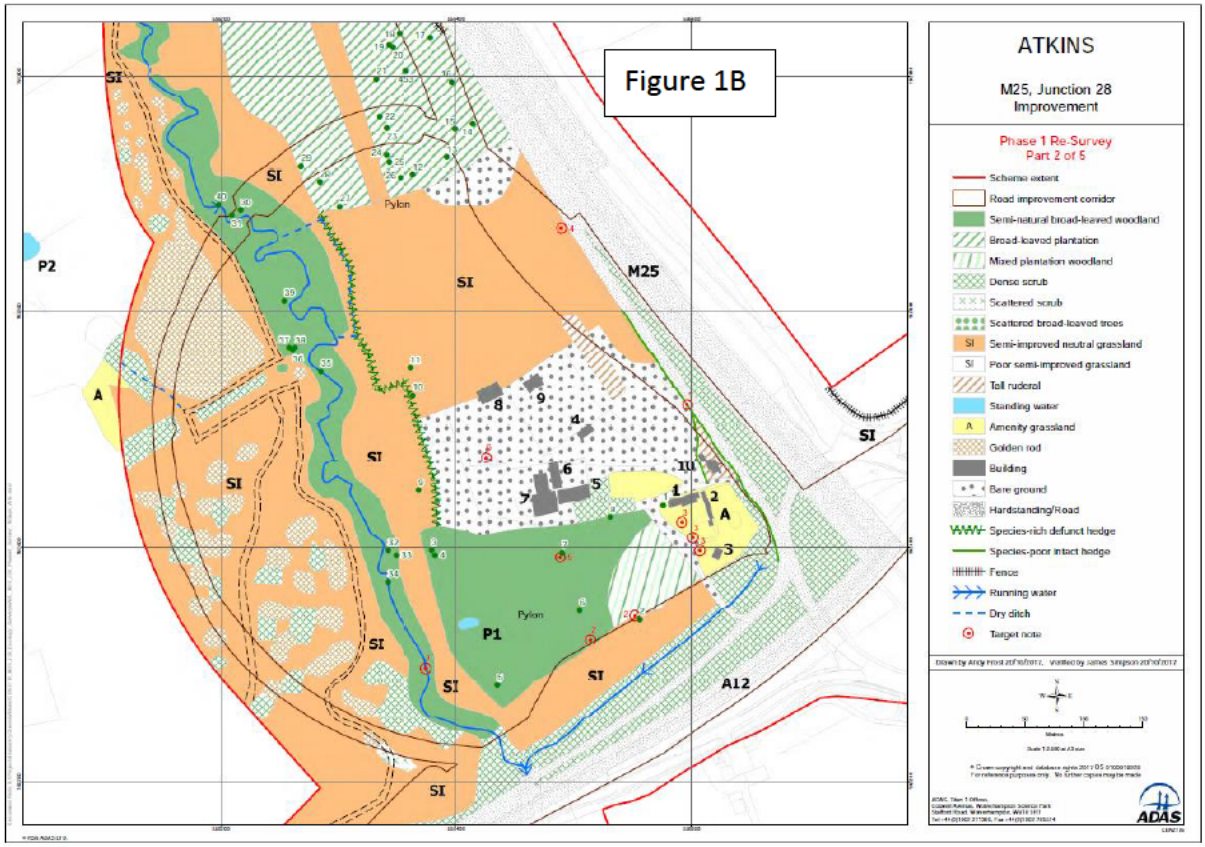


Figure 1 A, B: The survey area, delimited by the red line.

The area covered by the scoping survey lies entirely within the London Borough of Havering, Greater London, and is covered by the grid squares TQ5692 and TQ5693.

Most of the area covered by the scoping survey lies within the Ingrebourne Marshes Site of Metropolitan Importance for Nature Conservation.

2.1 PREVIOUS INVERTEBRATE SURVEY AND RECORDING

The author is not aware of any previous invertebrate survey work from the area. However, ecological data searches have been prepared in September 2019 for ADAS by Greenspace Information for Greater London (GIGL), Essex Field Club (EFC) and the Essex Record Centre (ERC). In both cases, the searches cover the survey area and extend up to 2 km in all directions.

From the invertebrate records gleaned by these data searches, it is known that Stag Beetle *Lucanus cervus* has been recorded within 2 km of the survey area, Alder Flea-weevil *Orchestes testaceus* has been recorded within 1 km of the survey area, and White-letter Hairstreak butterfly *Satyrium w-album* has been recorded within 500 m of the survey area. Further information about these species is given below.

2.2 STAG BEETLE *LUCANUS CERVUS*

Stag Beetle is an Annex 2 species in the Habitats Directive which lists animal and plant species of Community interest (i.e. endangered, vulnerable, rare or endemic in the European Community) whose conservation requires the designation of Special Areas of Conservation. Stag Beetle is also a Section 41 species (species listed in Section 41 of the

Natural Environment and Rural Communities Act 2006 as being 'of principal importance for the purpose of conserving biodiversity'). Stag Beetle is treated as a Nationally Scarce (NS) species by Lane and Mann (2016).

Stag Beetle larvae develop in large pieces of soft, well-rotted wood, often at least partly buried. A range of broad-leaved tree species may be used including oak, apple, beech, lime and elm. The scoping survey aimed to assess the potential for Stag Beetle to occur, focusing on woodland and other areas with mature trees.

2.3 ALDER FLEA-WEEVIL *ORCHESTES TESTACEUS*

Alder Flea-weevil is a Section 41 species and is listed as Vulnerable by Hyman and Parsons (1992).

The larvae develop in leaf-mines on the leaves of Alder *Alnus glutinosa*. The scoping survey aimed to assess whether Alder occurs within the survey area, targeting the streambanks which would be typical habitat for Alder, and thus to assess the potential for Alder Flea-weevil to occur within the survey area.

2.4 WHITE-LETTER HAIRSTREAK *SATYRIUM W-ALBUM*

White-letter Hairstreak is a Section 41 species and is listed as Endangered in Britain by Fox *et al*. (2010), indicating that on the best available evidence it is facing a very high risk of extinction in the wild.

White-letter Hairstreak caterpillars feed on elm leaves. The scoping survey aimed to assess whether elm is present within the survey area, and whether elms are present in sufficient size and quantity potentially to support White-letter Hairstreak.

3 Methods

3.1 SCOPING

Fieldwork for the scoping survey was by walking over the survey area (Figure 2) and making visual assessments of the available habitats and habitat features for invertebrates, informed by the invertebrate assemblage classifications used by Natural England's ISIS and Pantheon applications (Drake *et al.*, 2007; Webb *et al.*, 2018). For each habitat or habitat feature, the scoping survey aimed to make an assessment of its potential to support invertebrate species or assemblages of conservation importance.

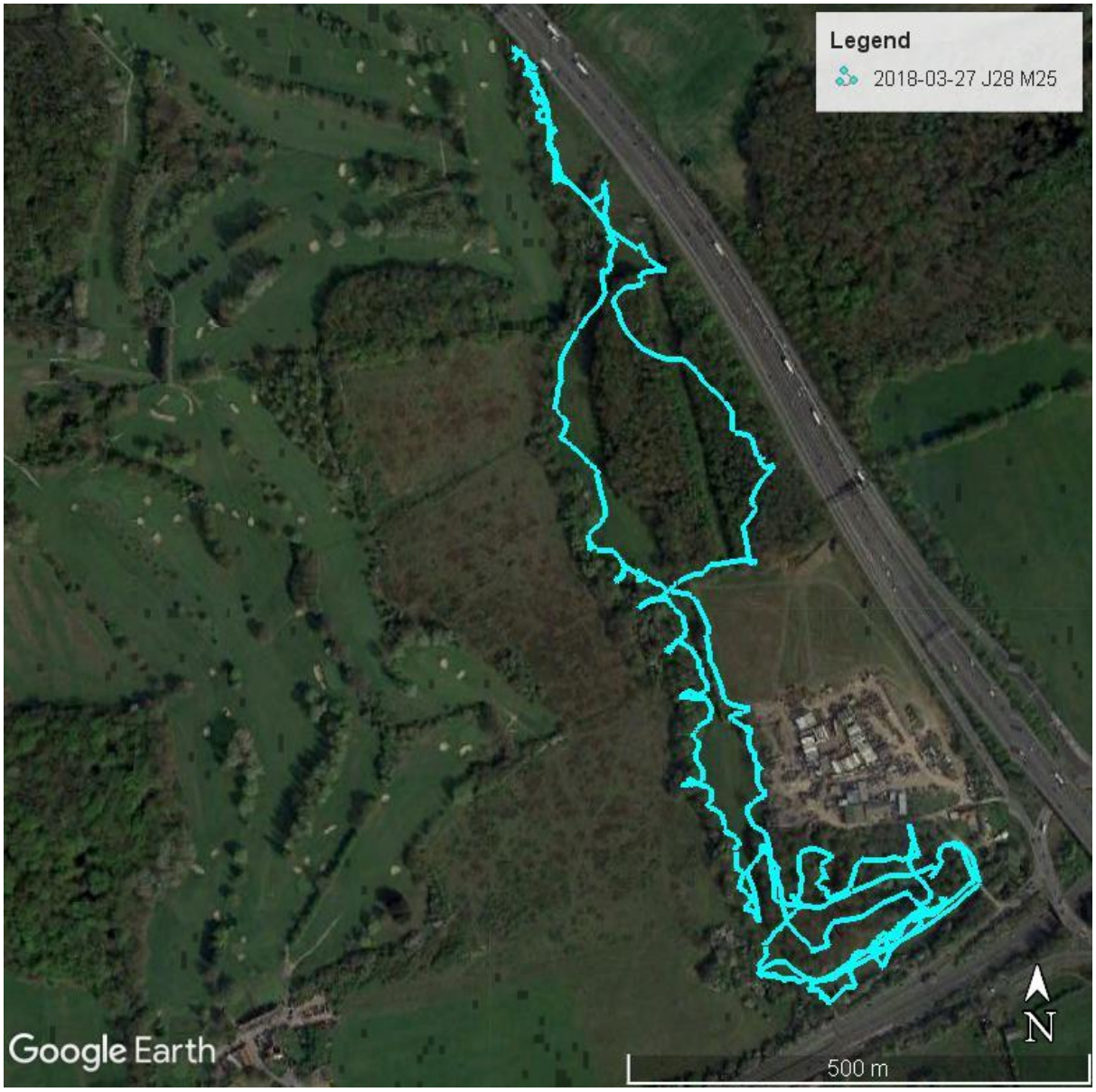


Figure 2: The author's GPS track during the scoping visit of 27th March.

A limited amount of invertebrate sampling and identification work was also undertaken, aiming to corroborate the visual assessments. Photographs of habitats and habitat features were taken.

3.2 SAMPLING INVERTEBRATES

During the main walkover phase of the scoping visit, a few invertebrates were noted on the trunks of trees. Later in the day, invertebrates were recorded by turning over reptile mats to look for grassland and ground-living invertebrates. As well as direct observation of trees and deadwood, a sample of the bracket fungus *Inonotus radiatus* was collected from a fallen Alder for later extraction, a partly-submerged Ash trunk was sampled by bark-flaking, old fruit-bodies of King Alfred's Cakes *Daldinia concentrica* on Ash were examined, a sample of red-rotten heartwood from a veteran oak was sieved, and a sample of leaf-litter from the crown of a pollarded Alder was taken for extraction.

3.3 IDENTIFICATION

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

3.4 CONSTRAINTS

No part of the visit on 27th March was constrained by the weather, which was mostly dull with a forecast maximum of 12 °C and a forecast westerly Moderate Breeze (Force 4). There was one brief shower and brief spells of sunshine.

The verges of the A12 and M25 were not visited due to safety concerns but, to the extent that they could be viewed from outside, the scoping assessment aimed also to cover this ground.

The Weald Brook was running very full during the survey visit and it was judged to be too difficult to cross safely. Hence the scoping survey was only able to cover the areas west of the Brook by looking across and scanning with binoculars.

4 Invertebrate sampling results

A total of 65 species of invertebrate were identified from the limited amount of sampling undertaken during the scoping survey, and the full list is presented in Appendix 2.

The species list includes members of a wide range of taxonomic groups: woodlice, spiders, harvestmen, millipedes, springtails, earwigs, bugs, beetles, ants, bees, moths, slugs and snails.

Amongst the 65 species are five which have a rare or scarce conservation status: one RDB3 click-beetle, *Procraerus tibialis*, three Nationally Scarce or Nationally Scarce (Nb) beetles, and the Nationally Scarce (Na) Brown Tree Ant *Lasius brunneus*. An explanation of these conservation status categories is provided as Appendix 1.

5 Invertebrate habitats and habitat features

In this section, each of the habitats and habitat features present within the survey area is discussed. The classification of habitats and habitat features is made from an entomological perspective. 'Habitat' is used to describe broad swathes of similar vegetation (such as a patch of woodland), whereas a 'habitat feature' is a smaller, distinct patch of habitat (such as a pond within a woodland).

In each case, the emphasis is on an assessment of the potential for the habitat or habitat feature to support invertebrate species or assemblages of conservation importance. This could be in the form of Section 41 species or species regarded as threatened, near threatened, rare or scarce in the various Red List assessments and nature conservation reviews.

5.1 TREES AND SHRUBS

There are many veteran trees and shrubs within the survey area and these form potentially the most important habitat for invertebrates. The trees on site have had arboricultural surveys under Atkins. This section deals with trees and shrubs but does not cover the two woodlands, which are dealt with in detail in Section 5.2 below.

Many of the mature and veteran trees grow along the Weald Brook, where there are substantial numbers of oaks *Quercus* sp., Alder *Alnus glutinosa*, Field Maple *Acer campestre* and sallows *Salix* sp. (Figure 3). The shrub species are also largely represented by mature or over-mature specimens with deadwood features, including Hazel *Corylus avellana*, hawthorn *Crataegus* sp. and Blackthorn *Prunus spinosa*. By contrast, Ash *Fraxinus excelsior* was mostly present as sub-mature or mature trees but at least one collapsing veteran Ash was noted, with abundant deadwood features.

Figure 3 A - C: Mature or veteran Alder, willow and Field Maple, respectively.

Away from the Weald Brook there are several veteran oaks in and near the hedge which connects The Grove with Alder Wood, as well as two over-mature/veteran oaks on the southern edge of The Grove. These include open-grown maidens and pollards. A fairly brief examination of some red-rotten heartwood from one of these veterans (see photograph on front cover) yielded the Rare (Red Data Book category 3) click-beetle *Procraerus tibialis*. This species is widely but thinly distributed across southern Britain. It has been regarded as a species that is restricted to ancient parklands and wood-pastures, and has been classed as a Grade 1 Indicator of Ecological Continuity (Alexander, 2004) though there are more recent observations which may suggest otherwise.

The numbers of mature and veteran trees and shrubs of a range of species strongly suggest that this habitat is of high potential for invertebrates.

Alders are noted in the citation for the Ingrebourne Marshes Site of Metropolitan Importance for Nature Conservation. The numbers of Alders along the Weald Brook, and the ecological continuity of habitat evidenced by the presence of many veteran trees, suggests that there is a very high potential for Alder Flea-weevil *Orchestes testaceus* to occur here.

There is extensive suitable habitat for Stag Beetle *Lucanus cervus* and thus there is high potential for Stag Beetle to occur within the survey area.

5.2 WOODLANDS: THE GROVE AND ALDER WOOD

The Grove appears to have originated as a plantation, with conifers in its eastern corner, and sub-mature oaks growing in more-or-less discernible lines in large parts of the wood. Despite this, the wood has a number of features which suggest it could be of at least moderate potential for invertebrates. These features include a diversity of tree and shrub species (including cherry *Prunus* sp. (Figure 4), hawthorns, birches *Betula* sp., Ash, poplar *Populus* sp., Elder *Sambucus nigra*, Field Maple and Hornbeam *Carpinus betulus*, as well as oaks and conifers), abundant deadwood, ponds (discussed further below), a large Badger sett, and sunlit glades along the wayleave. The herb-layer of the woodland is rather uniform, apparently dominated by Bluebells, and probably reflects high levels of deer-grazing. While the herb-layer is likely to be correspondingly poor for invertebrates, the ground-layer, canopy and deadwood assemblages should be regarded as of at least moderate potential for invertebrates.

Figure 4: A fallen cherry within The Grove.

Alder Wood to the north is also traversed by an electricity wayleave that forms a broad ride through the wood. This wood is on a low rise and does not have ponds though ground conditions are still rather wet in places, especially at the southern end. This woodland differs quite substantially from The Grove, with much greater proportions of Ash, Hornbeam and Field Maple, and with many Sycamores *Acer pseudoplatanus* (Figure 5). A row of old Hornbeam coppards on the northern boundary woodbank has invertebrate potential. The field-layer is more structurally and floristically varied than in The Grove, with abundant Dog's-mercury and Tufted Hair-grass *Deschampsia cespitosa* tussocks. Deadwood is abundant. Alder Wood should be regarded as of at least moderate potential for invertebrates.

Figure 5: Interior of Alder Wood.

5.3 PONDS

The Phase 1 survey map (Figure 1B) indicates the presence of a single woodland pond, P1, within The Grove (Figure 6).

Thanks to the wet conditions prevailing at the time of the scoping survey, it was readily apparent that P1 is only the deepest and most permanent of a varied series of woodland ponds extending eastwards up a shallow valley (Figure 7). The ponds are rather varied in character including rush-choked and grassy ponds in the sunnier wayleave and shaded, leaf-filled ponds under denser woodland canopy. It is likely that at least some of these ponds become dry at some times of year. As a group, these ponds are of moderate potential for aquatic and wetland invertebrates in general, and for the beetles which specialise on woodland ponds in particular.

Figure 6: Pond P1 of the Phase 1 survey map, at the lower edge of The Grove.

Figure 7 A - D: A series of varied woodland ponds within The Grove.

5.4 STREAMS AND STREAMBANKS

The Weald Brook enters the survey area from the north under the M25, where it is joined by a small tributary stream before meandering southwards to flow under the A12. Just before passing under the A12, it is joined by a small tributary stream from the east which takes a rather canalised route along the north side of the A12.

This section of the Weald Brook follows a natural channel with frequent meanders and the watercourse as a whole provides a range of microhabitats for aquatic and wetland invertebrates, including a few bars of silt, gravel and pebbles, areas of deer-poached bank, riffles over exposed tree roots, deeper, slow-flowing sections, partially submerged coarse woody debris, debris dams and accumulations of flood debris (Figure 8).

The Weald Brook is lined with trees and shrubs throughout, though it is nowhere densely shaded and maintains a moderately open aspect.

The Nationally Scarce semi-aquatic beetle *Cercyon granarius* was found beside the Weald Brook. It is a species found in rich lowland fens and beside streams and ponds. It does not appear to have been recorded from Essex previously (Hammond, 2000; Foster *et al.*, 2014).

The Weald Brook should be regarded as of high potential for invertebrates.

Figure 8 A - M: The Weald Brook, illustrating the range of available microhabitats.

5.5 PASTURE

There are small, narrow, semi-improved pasture fields along the south side of The Grove and all the way along the east side of Weald Brook. These fields may not be very herb-rich and thus may not support a rich fauna of plant-feeding invertebrates. However, grasslands can support a wide range of predators and detritus-feeders. These pastures have a number of features which suggest they may be of moderate potential for invertebrates, including grass-tussocks (especially of *Deschampsia cespitosa*), large ant-hills, well-established moles, rabbits, varied topography, varied vegetation structure, varied drainage and established fringing scrub and trees.

The larger, squarish, semi-improved pasture north of the scrap metal yard appeared to be drier and more uniform and may be regarded as of lower potential.

By inspection from the other side of the Weald Brook, the large area of grassland on the west side of the Brook appears to have been agriculturally abandoned in recent years. A conspicuous feature of this area is the extensive cover of goldenrod *Conyza* sp., growing as patches within a rank grassland sward. This area is probably of low or moderate potential.

6 Survey recommendations

The mature and veteran trees and shrubs within the survey area, especially along the Weald Brook but also in hedges, in-field and on woodland edges, are of high potential for invertebrates and should be subject to a full invertebrate survey, targeting deadwood

invertebrates (saproxylics) as well as canopy invertebrates. This survey should also include some targeted survey effort for Stag Beetle *Lucanus cervus* by observations at the appropriate time of year, and targeted survey for Alder Flea-weevil *Orchestes testaceus*, principally by searching for leaf-mines.

Elm was not found to be present and thus there will be no need to survey for White-letter Hairstreak butterfly *Satyrium w-album*.

Both woodlands (The Grove and Alder Wood) should be regarded as of at least moderate potential for invertebrates, and should thus be subject to a full invertebrate survey. The survey should cover the ground-layer, herb-layer, canopy and deadwood assemblages.

The Grove contains a series of woodland ponds which are of moderate potential and should be surveyed for aquatic and wetland invertebrates in general, and for the beetles which specialise on woodland ponds in particular.

The Weald Brook should be regarded as of high potential for invertebrates. Full survey should cover the range of aquatic habitats within the channel as well as the varied habitats for wetland invertebrates on the stream banks and associated with partially submerged deadwood.

Some of the pasture habitat is of moderate potential for invertebrates and should be surveyed accordingly, with survey effort at ground level (e.g., ground-searching, suction-sampling) as well as within the herb-layer (e.g., sweeping).

A scope of works to fulfil these survey requirements would typically involve several fieldwork visits spread across the survey season (April to September). Were the survey to be restricted to those areas directly under the footprint of the road improvement proposals, then the scope of works would be correspondingly reduced.

7 Acknowledgements

I would like to thank James Simpson and Henry Smith for arranging this survey and for their help with visiting arrangements.

8 References

Alexander, K.N.A. (2004). *Revision of the Index of Ecological Continuity as used for saproxylic beetles*. English Nature Research Reports, number 574. Peterborough: English Nature.

Drake, C.M., Lott, D.A., Alexander, K.N.A. and Webb, J. (2007). *Surveying terrestrial and freshwater invertebrates for conservation evaluation*. Natural England Research Report NERR005. Sheffield: Natural England.

Foster, G.N., Bilton, D.T. and Friday, L.E. (2014). *Keys to adults of the water beetles of Britain and Ireland (Part 2): (Coleoptera: Polyphaga: Hydrophiloidea - both aquatic and terrestrial species)*. Handbooks for the identification of British insects, vol. 4, part 5b. St. Albans: Royal Entomological Society.

Fox, R., Warren, M.S., Brereton, T.M., Roy, D.B. and Robinson, A. (2010). A new Red List of British butterflies. *Insect Conservation and Diversity*, **4**, 159 - 172.

Hammond, P.M. (2000). The millennial status in Essex of Nationally Scarce and Threatened species of Coleoptera: further data and summary. *Essex Naturalist*, **17**, 173 - 190.

Hyman, P.S. (revised by Parsons, M.S.) (1992). *A review of the scarce and threatened Coleoptera of Great Britain. Part 1.* UK Nature Conservation, number 3. Peterborough: Joint Nature Conservation Committee.

IUCN (2001). *IUCN Red List Categories and Criteria: version 3.1. Prepared by the IUCN Species Survival Commission*. Gland, Switzerland: International Union for Conservation of Nature.

Lane, S.A. and Mann, D.J. (2016). *A review of the status of the beetles of Great Britain. The stag beetles, dor beetles, dung beetles, chafers and their allies - Lucanidae, Geotrupidae, Trogidae and Scarabaeidae*. Species Status, number 31. Natural England Commissioned Reports, number 224. Natural England.

Shirt, D.B. (ed.) (1987). *British Red Data Books: 2. Insects*. Peterborough: Nature Conservancy Council.

Webb, J., Heaver, D., Lott, D., Dean, H.J., van Breda, J., Curson, J., Harvey, M., Gurney, M., Roy, D.B., van Breda, A., Drake, M., Alexander, K.N.A. and Foster, G. (2018). Pantheon - database version 3.7.6. Available at: www.brc.ac.uk/pantheon/.

Appendix 1: British Conservation Status Categories – Definitions

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

These status categories and criteria were introduced for British insects by Shirt (1987) and received some modifications by later authors (e.g. Hyman and Parsons (1992)).

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.

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

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

Critically Endangered (CR)

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

Endangered (EN)

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

Vulnerable (VU)

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

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

Data Deficient (DD)

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

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

Near Threatened (NT)

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

Least Concern (LC)

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

Not Applicable (NA)

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

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

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

Nationally Rare (NR)

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

Nationally Scarce (NS)

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

Appendix 2: List of invertebrates recorded at Junction 28 on 27th March 2018 by Mark G. Telfer

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

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Malacostraca	Isopoda	Trichoniscidae	*Haplophthalmus danicus*	a woodlouse	LC
Malacostraca	Isopoda	Trichoniscidae	*Trichoniscus provisorius*	a common pygmy woodlouse	LC
Malacostraca	Isopoda	Philosciidae	*Philoscia muscorum s.s.*	Common Striped Woodlouse	LC
Malacostraca	Isopoda	Oniscidae	*Oniscus asellus*	Common Shiny Woodlouse	LC
Malacostraca	Isopoda	Armadillidiidae	*Armadillidium vulgare*	Common Pill-woodlouse	LC
Malacostraca	Isopoda	Porcellionidae	*Porcellio scaber*	Common Rough Woodlouse	LC
Arachnida	Araneae	Segestriidae	*Segestria senoculata*	a spider	LC
Arachnida	Araneae	Dysderidae	*Harpactea hombergi*	a spider	LC
Arachnida	Araneae	Araneidae	*Nuctenea umbratica*	a spider	LC
Arachnida	Opiliones	Nemastomatidae	*Nemastoma bimaculatum*	a harvestman	None
Diplopoda	Julida	Blaniulidae	*Proteroiulus fuscus*	a millipede	LC
Diplopoda	Julida	Julidae	*Tachypodoiulus niger*	White-legged Millipede	LC
Diplopoda	Julida	Julidae	*Cylindroiulus punctatus*	Blunt-tailed Millipede	LC
Diplopoda	Polydesmida	Polydesmidae	*Polydesmus coriaceus*	a flat-backed millipede	LC
Collembola	Entomobryomorpha	Entomobryidae	*Orchesella cincta*	a springtail	None
Insecta	Dermaptera	Forficulidae	*Forficula auricularia*	Common Earwig	LC
Insecta	Hemiptera: Heteroptera	Miridae	*Deraeocoris lutescens*	a mirid bug	None
Insecta	Hemiptera: Heteroptera	Pentatomidae	*Podops inuncta*	Knobbed Shieldbug	LC
Insecta	Coleoptera	Carabidae	*Platyderus depressus*	a ground beetle	LC
Insecta	Coleoptera	Carabidae	*Paranchus albipes*	a ground beetle	LC
Insecta	Coleoptera	Hydrophilidae	*Cercyon granarius*	an aquatic beetle	Nationally Scarce

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Coleoptera	Staphylinidae	*Sepedophilus marshami*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Drusilla canaliculata*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Cypha longicornis*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Oligota pumilio*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Anotylus rugosus*	a rove-beetle	None
Insecta	Coleoptera	Staphylinidae	*Stenus ossium*	a rove-beetle	None
Insecta	Coleoptera	Buprestidae	*Agrilus biguttatus*	Oak Jewel Beetle	LC
Insecta	Coleoptera	Buprestidae	*Agrilus sinuatus*	Hawthorn Jewel Beetle	LC
Insecta	Coleoptera	Elateridae	*Agriotes lineatus*	a click-beetle	None
Insecta	Coleoptera	Elateridae	*Agriotes sputator*	a click-beetle	None
Insecta	Coleoptera	Elateridae	*Procraerus tibialis*	a click-beetle	RDB3
Insecta	Coleoptera	Ptinidae	*Xestobium rufovillosum*	Death-watch Beetle	LC
Insecta	Coleoptera	Corylophidae	*Orthoperus nigrescens*	a beetle	Nationally Scarce (Nb)
Insecta	Coleoptera	Corylophidae	*Sericoderus brevicornis*	a beetle	None
Insecta	Coleoptera	Latridiidae	*Dienerella clathrata*	a beetle	None
Insecta	Coleoptera	Latridiidae	*Cartodere bifasciata*	a beetle	None
Insecta	Coleoptera	Latridiidae	*Cartodere nodifer*	a beetle	None
Insecta	Coleoptera	Latridiidae	*Corticarina similata*	a beetle	None
Insecta	Coleoptera	Ciidae	*Cis castaneus*	a beetle	None
Insecta	Coleoptera	Ciidae	*Ennearthron cornutum*	a beetle	None
Insecta	Coleoptera	Ciidae	*Octotemnus glabriculus*	a beetle	None
Insecta	Coleoptera	Rhynchitidae	*Involvulus caeruleus*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Sitona lineatus*	a weevil	None
Insecta	Coleoptera	Curculionidae	*Scolytus rugulosus*	Fruit Bark-beetle	None
Insecta	Coleoptera	Platypodidae	*Platypus cylindrus*	Oak Pin-hole Borer	Nationally Scarce (Nb)
Insecta	Hymenoptera: Aculeata	Formicidae	*Lasius brunneus*	Brown Tree Ant	Nationally Scarce (Na)
Insecta	Hymenoptera: Aculeata	Formicidae	*Lasius niger sens. str.*	an ant	None
Insecta	Hymenoptera: Aculeata	Formicidae	*Temnothorax nylanderi*	an ant	None

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status
Insecta	Hymenoptera: Aculeata	Formicidae	*Myrmica ruginodis*	an ant	None
Insecta	Hymenoptera: Aculeata	Apidae	*Bombus terrestris*	Buff-tailed Bumblebee	None
Insecta	Lepidoptera	Psychidae	*Luffia ferchaultella*	Virgin Smoke	None
Insecta	Lepidoptera	Psychidae	*Psyche casta*	Common Sweep	None
Insecta	Lepidoptera	Oecophoridae	*Diurnea fagella*	March Tubic	None
Gastropoda	Pulmonata	Agriolimacidae	*Deroceras laeve*	Marsh Slug	LC
Gastropoda	Pulmonata	Agriolimacidae	*Deroceras reticulatum*	Netted Field Slug	LC
Gastropoda	Pulmonata	Agriolimacidae	*Deroceras invadens*	Tramp Slug	LC
Gastropoda	Pulmonata	Arionidae	*Arion (Mesarion) subfuscus*	Dusky Slug	LC
Gastropoda	Pulmonata	Arionidae	*Arion (Kobeltia) hortensis*	Blue-black Soil Slug	LC
Gastropoda	Pulmonata	Arionidae	*Arion (Kobeltia) intermedius*	Hedgehog Slug	LC
Gastropoda	Pulmonata	Ellobiidae	*Carychium minimum*	Herald Snail	LC
Gastropoda	Pulmonata	Discidae	*Discus rotundatus*	Rounded Snail	LC
Gastropoda	Pulmonata	Helicidae	*Cepaea hortensis*	White-lipped Snail	LC
Gastropoda	Pulmonata	Limacidae	*Limax maximus*	Leopard Slug	LC
Gastropoda	Pulmonata	Zonitidae	*Oxychilus alliarius*	Garlic Snail	LC

Printed on paper from well-managed forests and other controlled sources.

Registered office Bridge House, 1 Walnut Tree Close, Guildford GU1 4LZ
Highways England Company Limited registered in England and Wales number 09346363