

# A27 Arundel Bypass Terrestrial Invertebrate Interim Baseline Survey Report

Appendix 8-22: Terrestrial Invertebrate Interim Baseline Survey  
Report

19 August 2019

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## Executive Summary

An invertebrate Habitat Suitability Assessment and subsequent targeted survey of terrestrial invertebrates were undertaken. These comprised a range of survey techniques (pitfall traps, pan traps, window traps, sweep netting, beating and grubbing) to gather samples, which were subsequently sorted and identified. Sampling was undertaken in late May, July, August and September 2017 and May, late June and July 2018. The survey was supported by a review of desk study information obtained from the local Biological Records Centre. In addition, invertebrate survey reports provided by Mid-Arun Valley Environmental Survey were reviewed to provide context on the wider invertebrate interest within the landscape surrounding the Field Survey Area.

The results of the targeted surveys provided an indication of the relative species diversity of the targeted groups of invertebrates predicted to be well represented within the Field Survey Area. Over 2,600 specimens were collected or incidentally recorded during the survey visits and 614 invertebrate taxa identified to species level. Of the target groups, Coleoptera was the dominant order recorded: 351 species; Hemiptera was represented by 81 species; Hymenoptera was represented by 67 species; Lepidoptera (mostly butterflies) 30 species and Diptera 52 species. The majority of the species recorded are without a recognised status, being widely distributed and common, and exhibiting little habitat specificity. Forty-one of the species recorded (c. 7 %) currently have a recognised conservation status.

Many of the species recorded that have conservation status are known to be associated with woodland habitats, and within the study area these habitats are of particular value for invertebrates. Other areas of value for their invertebrate assemblages include the wetland habitats (ditch banks) in the east of the Field Survey Area, Services Junction also in the east, the sand pit of Lower Rewell Wood (Slindon Pit) - part of the Rewell Wood Complex LWS – in the north west of the study area, and Binsted Rife in the south west of the study area.

# 1 Introduction

## 1.1 Project Background

1.1.1.1 The scope of the A27 Arundel Bypass scheme as described in the Road Investment Strategy <sup>1</sup> is:

*“The replacement of the existing single carriageway road with a dual carriageway bypass, linking together the two existing dual carriageway sections of the road”.*

1.1.1.2 This corresponds to the six-kilometre section of the A27 from the A284 Crossbush junction (east of Arundel) to the west of Yapton Lane (west of Arundel). The A27 currently goes through the South Downs National Park and the town of Arundel passing over the River Arun and crossing the railway line.

1.1.1.3 The Scheme options taken forward to the Public Consultation were Options 1, Option 3 and Option 5A. These are briefly described individually below.

- **Option 1** consists of new dual carriageway from Crossbush junction south of the current A27 to the south-west of Arundel railway station, joining the A27 east of Ford Road. With a new bridge over the River Arun alongside the existing bridge. From Ford Road roundabout, which will be signalised, the existing A27 would be widened to dual carriageway.
- **Option 3** is an off-line route from the existing A27 alignment. Option 3 would consist of a new dual carriageway corridor along its entire length. The proposed alignment will then be joined to the existing A27 via an extension of the existing infrastructure at Crossbush Junction. The alignment that runs westwards across the floodplain south of Tortington Priors and requires two new overbridges, firstly over the Arun Valley Railway Line and secondly over the River Arun. Its alignment diverges north through the Binsted Woods Complex Local Wildlife Site (LWS), Tortington Common and South Downs National Park, re-joining the existing A27 at Havenwood Park. It requires four new underbridges at Old Scotland Lane, Binsted Lane, Tortington Lane and at Ford Road.

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<sup>1</sup> Road Investment Strategy: for the 2015/2016 – 2019/2020 Road Period, Department for Transport, March 2015

- **Option 5A** is a new dual carriageway from Crossbush junction south of the current A27. The alignment crosses the Arun Valley Railway, continuing west across the floodplain, over Ford Road, running south of Tortington Priory Scheduled Monument before going north through the Binsted Woods Complex LWS and the South Downs National Park, re-joining the existing A27 at a new junction near Yapton Lane.

1.1.1.4 When referring to the combined footprint of the Scheme (all options), the term ‘Scheme options’ is used in this report. When discussing the footprint of any single Option, it is referred to by its number i.e. Option 1, Option 3 or Option 5A.

1.1.1.5 In October 2018, Highways England announced that a further, non-statutory public consultation would be undertaken on the Scheme (the Further Consultation) and that the Scheme would return to PCF Stage 2 (Option Selection). Through the additional studies and surveys, Highways England came across new and important information. Highways England wishes to ensure that forthcoming decision on the preferred route is made taking this new information into account and that consultees are given a fair opportunity to comment on the options on the basis of the information available. The further PCF Stage 2 work (Option Selection) (2018/2019) work included the identification of a suite of potential new Scheme options.

1.1.1.6 The process for identifying and short-listing the new set of Scheme options for consideration in PCF Stage 2, is set out in **Chapter 3** of the Environmental Assessment Report. Ecological field survey data is not available for the western sections of Options 4/5AV1 and 5BV1. This is because these sections were previously too far west of the study area to necessitate a survey. Additional survey work targeting these areas is ongoing in 2019 and will be reported on in winter 2019. The information collected for Options 1, Option 3 and Option 5A in 2017 and 2018 will be used to inform an assessment of the six Scheme options and Scheme option selection.

## 1.2 Ecological Background

1.2.1.1 Highways England is undertaking an Environmental Impact Assessment of the Scheme options to inform scheme development by avoiding and minimising impacts on sensitive habitats and species, and to inform possible mitigation requirements. Comprehensive survey data for terrestrial invertebrate species and suitable terrestrial invertebrate habitat are required to inform the Environmental Impact Assessment.

### 1.3 Aims and Objectives

- 1.3.1.1 WSP was commissioned by Highways England to undertake the following tasks:
- A detailed desk study;
  - Field surveys to determine species present and habitat suitability within the Field Survey Area;
  - Provide an evaluation of the potential conservation importance of the Field Survey Area for invertebrates, including an appraisal of key areas and their associated habitats / features considered likely to be of greatest invertebrate value;
  - List the terrestrial invertebrate species collected / observed during the course of the survey and provide an interpretation of the results including an appraisal of any Species of Principal Importance, nationally scarce or rare species, following the International Union for the Conservation of Nature and Natural Resources (IUCN) and Red Data Book criteria;
  - Outline the legislative and / or policy protection afforded to any species of conservation value associated with the Field Survey Area; and
  - Based on the findings of the targeted survey work, make recommendations for further survey, where considered appropriate.
- 1.3.1.2 The methods and results of this survey, and subsequent recommendations, are included within this report.
- 1.3.1.3 The contents of this report represent interim baseline survey findings collected at Project Control Framework Stage 2 (option selection). Highways England intend to collect further survey information for Project Control Framework Stage 3 (preliminary design) and it is intended that baseline data presented in this report will be updated when the Environmental Impact Assessment for the Proposed Scheme is published.

## 2 Methods

### 2.1 Study Area

2.1.1.1 The desk study and field surveys were undertaken within the following study areas.

- Desk Study Area – a zone extending to two kilometres from the outer boundary of the Scheme options footprint was identified within which ecological information regarding protected and notable species of invertebrate from 1980 to March 2017 was obtained.
- Field Survey Area:
  - In 2017 land within 0.1 kilometres of the outer boundary of the Scheme options footprint was subject to field survey work (this area is referred to as the '2017 Field Survey Area'). Butterfly transects (A to D) also included suitable butterfly habitat in adjacent land outside this corridor.
  - In 2018 land within 0.1 kilometres of the outer boundary of the footprint of Scheme Option 5A was subject to field survey work (this area is referred to as the '2018 Field Survey Area'). One area not previously assessed in 2017, but which was covered in 2018, was the Services Junction in the east of the site. A single visit was completed in 2018 for Slindon Pit, in the north east of the 2018 Field Survey Area. The survey area was also extended to include Binsted Rife due to potential concern of an indirect impact on the habitats of this area, in the absence of mitigation. Butterfly transects (A, B, C and E) also included suitable butterfly habitat in adjacent land outside this corridor.

### 2.2 Desk Study

2.2.1.1 A desk-based review of existing biological information was undertaken across the Desk Study Area which utilised the following information sources:

- Multi Agency Geographic Information for the Countryside <sup>2</sup>;
- Ordnance Survey mapping and publicly available aerial photography; and
- An Ecological Impact Assessment undertaken by the Department for Transport in 1991.<sup>3,4</sup>

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<sup>2</sup> DEFRA (2014). Magic [online] <http://magic.defra.gov.uk>.

<sup>3</sup> Department for Transport (1991) A27 Arundel Bypass Ecological Impact Assessment

<sup>4</sup> Although this falls outside the 10 year cut off for consideration of data, this EIA describes the landscape of Arundel in 1991 and details the species assemblages that were present at the time. The purpose for review

2.2.1.2 In addition, data received from the Sussex Biodiversity Records Centre was supplemented by a review of invertebrate assessment work undertaken for Mid-Arun Environmental Survey (MAVES), of areas which overlap with parts of the Field Survey Area (notably the area referred to as ‘Binsted Park’ in the west of the Field Survey Area). A summary of the key reports considered are given below.

## **2.2.2 The Beetles of Binsted <sup>5</sup>**

2.2.2.1 This report includes records taken during 2016 for a hedgerow within the Scheme option footprint. It also included survey of Lake Copse and a second hedgerow, both south of the Scheme options.

## **2.2.3 An Entomological Survey within Binsted Parish, 2016 and 2017 <sup>6</sup>**

2.2.3.1 This survey covered land within Binsted Parish. Surveys were undertaken in June and July 2016, and in March and June 2017, focussing on Binsted Park, Binsted Rife and ‘North Wood’ (three areas of woodland, which appear to include Little Danes Wood, Brickkiln Copse and Pedlar’s Croft in the north of the Field Survey Area), Binsted Park, Binsted Rife (mainly a southern section) and an area ‘East of Minor Road’ (near Meadow Lodge). The majority of the area covered by this survey overlaps with the 2018 Field Survey Area, including, for example, hedgerows that would be bisected by the Scheme options. Some survey areas are however more peripheral, such as Binsted Rife, which is in the south-west of the 2018 Field Survey Area and separated from the Scheme options by a minor road.

## **2.2.4 An Ecological Survey of the Mid Arun Valley <sup>7</sup>**

2.2.4.1 This report synthesises much of the desk study information on invertebrates in the Mid Arun Valley.

## **2.2.5 MAVES species records provided in spreadsheet format**

2.2.5.1 Spreadsheets of invertebrate records recorded by various surveyors were provided by MAVES as follows.

- Records made during 2017 by Nathalie Guerlain for Noor Wood (supplied by MAVES in October 2017 and updated list including two further species supplied by MAVES in October 2018).

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of this was to provide historical data on habitats and species within the wider environment and forms a background to the assessment, and was not used for inclusion with the desk study assessment.

<sup>5</sup> Grove, K. (2016). The Beetles of Binsted. Unpublished report to the Mid-Arun Environmental Survey (MAVES).

<sup>6</sup> Edwards, M. (2016 and 2017). An Entomological survey within Binsted Parish, 2016-2017. Unpublished report to the Mid-Arun Environmental Survey (MAVES).

<sup>7</sup> Thompson, J. (October, 2017). The Mid Arun Valley 2015 – 2017 A27 Arundel bypass Road Options 1, 3 and 5A Ecological Impact Report (using current data) Wildlife Splash on behalf of the Mid-Arun Environmental Survey.

- Records made during 2015 by Nathalie Guerin for Binsted Rife, an area of complex open wet grassland and fen habitat east of Binsted golf course and west of Binsted Lane (although not directly affected by the proposals) (supplied by MAVES in October 2018).
- Records, mostly of butterflies (insofar as terrestrial invertebrates are concerned) made during 2017 by Jacqueline Thompson for various sites at ‘Binsted’ and ‘Tortington’ (supplied by MAVES in October 2018).
- Records made during 2018 by Jacqueline Thompson for various sites, including (but not limited to): Paines Wood, Binsted Rife, Madonna Pond and Jupps Wood (supplied by MAVES in October 2018).
- Records mostly of butterflies and moths, made during 2018 by various recorders for various sites, but mostly from ‘Binsted’ (supplied by MAVES in October 2018).

## 2.3 Field Survey

### 2.3.1 Habitat Suitability Assessment

2.3.1.1 The 2017 Field Survey Area (shown on **Figure 1**) was assessed in May 2017 by suitably qualified entomologists for its suitability to support important invertebrate assemblages. This was updated in 2018 (the 2018 Field Survey Area) (shown on **Figure 2**) in response to access being possible to additional areas and a refinement of the scope of survey to focus on Route Option 5A only. Survey effort was focussed on habitats that were most likely to be directly impacted by the Scheme options, (e.g. through habitat loss).

2.3.1.2 Features likely to be of importance for notable invertebrate assemblages were recorded, including areas with dense patches of flowering plants; south-facing banks; patchy mosaic habitat, including aggregations of bare ground; margins of scrub/woodland and substrate containing high organic content; veteran or mature trees, including standing and fallen dead wood; temporary areas of water <sup>8</sup> (e.g. ephemeral pools and seepages) and associated terrestrial habitat (e.g. marshy grassland). Features that might limit invertebrate interest were also noted where present. Examples of features are shown in (**Appendix A**).

2.3.1.3 The distribution and extent of features informed the design of the targeted terrestrial invertebrate surveys that were subsequently conducted within the 2017 and 2018 Field Survey Areas.

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<sup>8</sup> Permanent aquatic habitats (e.g. rivers, ditches and ponds) were not included in this assessment as these are considered in the aquatic invertebrate report.

## 2.3.2 Targeted Survey for Terrestrial Invertebrates

- 2.3.2.1 The locations in which targeted surveys were undertaken were identified following the Habitat Suitability Assessment. Land parcels within terrestrial habitats that were suitable to support important invertebrate assemblages were identified for targeted survey (**Figures 1 and 2**).
- 2.3.2.2 These parcels predominantly comprised woodland (deciduous and mixed), woodland edge (with scrub and grassland) and hedgerows. This approach was taken with reference to the guidance set out in Drake et al. (2007)<sup>9</sup>; which lists (on pages 70 and 71) many of the target taxa of field layer and arboreal assemblages and their value in assessment. Coleoptera (beetles) and Hemiptera (true bugs) are two orders that are strongly represented in such assemblages; therefore, these were targeted by the surveys. Certain families (and suborders) of the order Diptera - flies (e.g. Syrphidae - hoverflies) and other Brachycera<sup>10</sup> were also targeted.
- 2.3.2.3 In suitable habitats such as scrub edge and field layer assemblages, sampling methods also enabled the collection of aculeate Hymenoptera (bees, ants and wasps) and Orthoptera (grasshoppers and crickets). Incidental observations of other invertebrate taxa were also recorded.
- 2.3.2.4 A range of different sampling methods were employed, including pitfall traps, pan traps, window traps, sweep-netting, beating, grubbing and shallow pond netting (of ephemeral pools). Also, because records of notable butterflies had been returned during the desk study, walked transects were carried out for butterflies during mid and late summer. These methods are described in detail below.

### ***Pitfall Traps***

- 2.3.2.5 Pitfall traps were set out in clusters of three (shown on **Figures 1 and 2**). Pitfall traps were constructed from circular plant pot trays (24 cm diameter x 5 cm depth) sunk into excavated circular holes with the tray rims flush with the surrounding ground level. Preserving fluid (and a drop of detergent to break the surface tension) was poured into the trays until they were half full. A layer of mesh was secured over the tray to prevent capture of small mammals, amphibians and reptiles.

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<sup>9</sup> 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. Natural England

<sup>10</sup> A diverse suborder of flies which includes, amongst others: robberflies, bee-flies and snipeflies.

2.3.2.6 **Photograph 1** in **Appendix A** shows a pitfall trap deployed within the Field Survey Area. The traps were operational during the period from 26 July to 8 August 2017, 5 to 18 September 2017, 17 and 18 May to 28 May 2018 and 28 June to 11 July 2018.

#### ***Pan Traps***

2.3.2.7 Clusters of three pan or water traps were set out in flower-rich areas on 30 May, 31 May, 25 July, 9 August, 6 September and 19 September 2017 (**Figure 1**); and 8 May, 17 May, 28 June and 10 July 2018 (**Figure 2**) The pan traps comprised yellow plastic trays into which a small amount of water was poured (along with a few drops of detergent to break the surface tension). Such traps mimic large yellow flowers and attract flying insects of many groups especially aculeate Hymenoptera and certain Diptera, which become trapped in the fluid.

2.3.2.8 During favourable (dry and sunny) weather conditions in 2017, the traps were operational for the duration of each survey visit (typically six to eight hours) and were collected at the end of each day. Due to generally more favourable weather in 2018, the traps were operational for a longer period (i.e. up to 32 hrs), being set towards the start of a survey visit and retrieved at the end. **Photograph 2** shows a pan trap deployed in situ.

#### ***Window Flight Interception Traps***

2.3.2.9 Four window flight interception traps (referred to hereafter as ‘window traps’) were used to target the dead wood fauna of veteran and over mature trees in certain woodland parcels, and also other winged insects flying along the structural ecotones of hedgerows. Each trap was composed of four, two litre plastic drinks bottles, securely locked in place at the base, and so contained within a circular plant pot tray (24 cm diameter x 5 cm depth), which also acted as a roof to shield the trap from excessive rain water. Wire fittings were used to bind the four bottles to the circular tray.

2.3.2.10 An outward facing rectangular hole (the ‘window’) was cut out of each bottle. Each constructed trap was inverted and therefore suspended from its base by hanging it from a branch. Each trap was positioned inside a hollow of a veteran tree (e.g. **Photograph 3**) or close to standing dead wood or in a prominent location suspended from a mature tree (e.g. **Photograph 4**). Approximately 30 ml of preserving fluid, comprising one part ethylene glycol (antifreeze) to two parts water was poured into each bottle via the ‘windows’ made on each bottle.

2.3.2.11 The traps were operational during the period from 8 May to 11 July 2018; although some traps were rotated around the Field Survey Area to provide increased coverage of sampling. Those positioned in Parcels 1 and 5 remained in place for the duration of the spring and summer sampling seasons (8 May 2018 to 11 July 2018). Those positioned in Parcels 6 and 7c were in place between 8 May and 28 June. Those positioned in Parcels 7a and 13 were in place between 28 June and 11 July 2018. The locations of the window traps are illustrated on **Figure 2**.

### ***Sweep Netting***

2.3.2.12 Sweep netting was conducted by walking at a steady pace through the vegetation and passing an entomologist's sweep net back and forth through vegetation in a figure of eight motion. Sweep netting was accompanied by 'spot-sweeping' where individual invertebrates were targeted and collected via a single sweep.

### ***Beating***

2.3.2.13 Beating is a useful technique for extracting beetles from overhanging branches. A beating tray is positioned beneath a branch before several sharp blows are delivered to the branch, causing invertebrates to dislodge and fall into the beating tray. Beating was conducted during each survey visit, targeting scrub edge habitat and lower reaches of woodland canopies within all Parcels, where appropriate.

### ***Grubbing***

2.3.2.14 Grubbing is the name generally applied to the extraction of invertebrates by hand from a variety of substrates such dead wood or fungi and from beneath bark; from moist cracked ground in seasonally inundated habitats; or dense aggregations of leaf matter and detritus (e.g. base of grass tussocks, ferns and leafy / woody deposits).

2.3.2.15 To assist in the detection of small beetles, material was sieved or placed in a bucket of water to capture invertebrates floating to the surface. Grubbing mostly targeted the saproxylic (dead-wood feeding) invertebrate fauna of wooded parcels as is present within standing and fallen dead wood, flaking bark, rot holes, and especially at bases of coppiced hazel (*Corylus avellana*) and associated fungi (which was most evident during the September surveys). This survey was conducted in Parcels 1, 2, 3a and 3b, 4, 5, 6, 7a-7c, 11 and 13.

### **Shallow Pond Netting**

2.3.2.16 A number of shallow, ephemeral pools are present within identified parcels of the Field Survey Area, which include old wheel ruts, trampled marshy areas and temporarily inundated areas that hold surface water especially during spells of wet weather. A combination of hand searching of muddy edges and pond netting was used to investigate these ephemeral features which included: a damp seepage with temporarily ponding water and muddy edges (Parcel 3a); seasonally waterlogged and trampled ground of a glade passing through plantation woodland (Parcel 4); organic material derived from ditch dredging (Parcel 11a) and springlines emerging from a valley-side (Parcel 13). The areas where shallow pond netting took place are shown on **Figures 1 and 2**.

### **2.3.3 Sample Sorting and Identification**

2.3.3.1 Whilst some species could be identified in the field, the majority of specimens were stored in 70% methanol solution for later identification, using a stereoscopic microscope with the aid of identification literature.

### **2.3.4 Butterfly Transects**

2.3.4.1 Walked transects searching for butterflies were undertaken on 25 July 2017 and 06 September 2017 along four transect routes (A – D); and on 17 and 18 May 2018 and 10 and 11 July 2018 along four transect routes (A, B, C and E) (**Figure 3**).

- The transect routes were selected so as to cover a large proportion of the typical habitats present within the Field Survey Area. These included the most suitable habitats for butterflies. Each survey took approximately five hours to complete. The method used comprised an adapted protocol of the UK Butterfly Monitoring Scheme (UKBMS) as follows.
- Timed counts were made between 10:00 and 16:00 hours. This is a slightly earlier start and later end than that recommended by the UKBMS, but was necessary in order to fit the four transects into one day of survey.
- Survey was only carried out during warm, bright and dry weather, with no more than moderate winds.
- Each transect was walked at a slow, steady pace whilst counting all butterflies seen within a fixed distance, 2.5 metres either side of the transect line and five metres ahead.
- Care was taken to maintain a steady pace and avoid waiting at favoured hotspots which would have increased the count and thus biased the results.

- Butterfly numbers and percentage sunshine in each section were recorded using the standard UKBMS proforma. Wind speed was estimated using the Beaufort scale (zero - no wind, six - moderate wind).

### **2.3.5 Dates of Survey and Personnel**

- 2.3.5.1 The lead surveyor was a principal consultant entomologist (BSc, PhD, MCIEEM) with extensive experience undertaking invertebrate surveys and assessment at over 100 development sites.
- 2.3.5.2 The invertebrate identification specialist is qualified to M.Sc. level, a fellow of the Royal Entomological Society (FRES) and Curator of Natural Science at Bolton Museum. He specialises in invertebrate identification, particularly Coleoptera, and has carried out work for a wide range of clients across the UK over the last 10 years.
- 2.3.5.3 **Table 2-1** summarises the survey dates and weather conditions encountered during each survey undertaken across the 2017 and 2018 field seasons.

**Table 2-1 - Survey dates and weather conditions**

Survey No.	Date	Weather Conditions
1	30/05/17	Early morning rain quickly clearing to becoming dry with sunny spells throughout the day. Gentle breeze, max temp. 18°C. Hot and sunny in preceding week.
	31/05/17	Following overnight rain, a dry day with sunny spells, light breeze, max temp. 19°C.
2	25/07/17	Dry and bright for much of the day, but becoming cloudy towards close of survey by late-afternoon, light breeze, max temp. 19°C. Variable with sun and rain and unseasonally cool in preceding week.
	26/07/17	Overcast in morning with patchy rain developing late morning and becoming more persistent in the afternoon. Light breeze, max temp. 18°C.
3	08/08/17	Dry but overcast with occasional sunny spells, especially during the morning. Gentle breeze, max temp. 19°C. Variable, with warm, sunny and overcast days (with rain) in preceding week.
	09/08/17	Dry and overcast in the morning. Heavy rain developing by midday, bringing a close to the survey. Light wind, max temp. 18°C.
4	05/09/17	Dry, scattered cloud, moderate breeze, max temp. 19°C. Mostly dry, warm and sunny, but with occasional wet and overcast days in preceding week.
	06/09/17	Dry, sunny, gentle breeze, max temp. 19°C.
5	18/09/17	Dry, scattered cloud, gentle breeze, max temp. 17°C. Mixture of sunny and overcast days (with rain) in preceding week, with temperatures ranging between 16°C and 19°C.
6	08/05/18	Dry, gentle breeze with variable cloud throughout the day. Max temp. 22 °C. Warm and dry in preceding week, with temperatures frequently over 20°C.
	09/05/18	Dry, gentle breeze, sunny with little cloud. Max temp. 22°C.
7	17/05/18	Dry, sunny with little cloud and moderate breeze. Max temp. 17°C. Mostly dry and warm, but occasional isolated and localised rain showers in preceding week.
	18/05/18	Dry, sunny with little cloud and light breeze. Max temp. 17°C.
8	28/06/18	Dry, sunny with no cloud and light breeze. Max temp. 2 °C. Dry and warm in preceding week. Temperatures in low twenties the previous week, but getting increasingly hotter. No rain.
9	10/07/18	Dry, sunny, gentle breeze with hardly any cloud. Max temp. 25°C. Hot and dry the previous week.
	11/07/18	Dry, mostly sunny but variable cloud and light breeze. Max temp. 21°C.

## Evaluation

2.3.5.4 The following results and discussion section places a value on the rare and notable invertebrates found at the Field Survey Area dependent on their current national status. Further information on status definitions and criteria of invertebrate groups can be found in **Section 2.5** of this report.

### 2.3.6 Pantheon Assemblage Analysis

2.3.6.1 The list of species derived from the targeted terrestrial invertebrate surveys were analysed using the “Pantheon” database tool <sup>11</sup> developed by Natural England and the Centre for Ecology and Hydrology. For each species recognised by Pantheon, various attributes relating to associated habitats and resources, assemblage types and habitat fidelity scores are placed against them. Reports can then be generated including those that provide:

2.3.6.2 Information on each individual species entered into the database included;

- A list of species belonging to different feeding guilds (e.g. xylophagous, saprophagous, nectivorous);
- A list of species with different associations (e.g. to certain groups of plant, fungi or animal);
- A summary of the number of species within the sample that have a particular score or fidelity and, if relevant an overall score that provides insight into the quality of the Field Survey Area that the sample has come from; and,
- Summary tables that assess where species live and what assemblages they are associated with.

2.3.6.3 In the context of this assessment, the output that Pantheon provides relating to locations species occupy and what assemblages they are associated with is useful in evaluating the relative importance of the Field Survey Area for its invertebrates. This considers the habitats and resources used by an invertebrate species at various hierarchical levels, from broad biotopes (e.g. tree associated, wetland, coastal) at the highest level, down to specific habitats (e.g. tall sward and scrub, decaying wood, arboreal, marshland) at a mid-level, and resources (e.g. sapwood and bark decay, heartrot and fungal fruiting bodies all associated with the decaying wood habitat) at the finest level.

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<sup>11</sup> 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 [online] Available at: <http://www.brc.ac.uk/pantheon/> [Accessed 30 November 2018].

- 2.3.6.4 The assessment also considers the “ISIS” (Invertebrate Species-habitat Information System) assemblage types that had previously been developed by Natural England<sup>12</sup>. The original Specific Assemblage Types (SATs) are therefore carried forward in their original form, although ‘Habitats’ have replaced the ISIS Broad Assemblage Types (BATs).
- 2.3.6.5 SATs include only habitat specific species, which are normally faithful to a single habitat or resource, which are often closely associated with locations of higher conservation value. Analysis of SATs is helpful to inform the determination of the nature conservation value of a location for invertebrates; locations with high-scoring SATs are considered to have good quality invertebrate assemblages.
- 2.3.6.6 The original role of ISIS was to guide Natural England on assessing the conservation value of Site of Special Scientific Interest (SSSI) for their invertebrate assemblages (especially for the purposes of Common Standards Monitoring). This was done by identifying whether an assemblage associated with a location was in a “favourable condition” (i.e. where it was considered to be of sufficient condition to meet the threshold criteria for an assemblage of SSSI-level value). However, whilst the condition assessment function is still retained within Pantheon, it is not the sole use. Accordingly, the analysis may be used in other situations (e.g. by nature reserve managers or those assessing the effects of a development) to help understand which assemblages (SATs) within a Field Survey Area are likely to be important.
- 2.3.6.7 A useful measure of the quality of a location for its invertebrate assemblage is to count and assign scores that are more heavily weighted towards the rarer species. The Species Quality Index (SQI) is a numerical scoring system contained within Pantheon that does exactly this. Each species recorded from a sample is given a Species Quality Score (SQS) based on their conservation status. The SQI is the sum of all SQSs divided by the number of species in that sample. This score is multiplied by 100 to give a three-figure value without decimal places (e.g.100 rather than a 1.00).
- 2.3.6.8 This SQI score is preferred to the SQS since it eliminates to a greater extent the effect of recorder effort. Notwithstanding this, locations where little effort has been made to record the common species could result in overly amplified SQI scores. There is presently no published guidance on what SQI score might be classed as ‘good’ or ‘average’, as this might vary between habitats and regions (e.g. Northern vs. Southern England). However, as a general rule of thumb, based on the experience of the author, a habitat with an SQI score exceeding 125 is likely to be of some value and merit further consideration.

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<sup>12</sup> 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. Natural England.

### 2.3.7 Status definitions

- 2.3.7.1 Much invertebrate conservation evaluation hinges on nationally threatened and scarce species. For many invertebrate groups, species rarity has often been gauged by the number of national 10-kilometre grid squares in which they occur. The fewer “spots on a map”, the rarer it is. This, however, does not exactly equate with how threatened a species is, since some species may be naturally confined to very few localities but are very abundant where they do occur and under no immediate threat of extinction. The matter of how threatened the “rarest” species are, has been addressed in a series of Red Data Books (RDB), such as for insects<sup>13</sup>. Here, the listing as RDB1 (Endangered), RDB2 (Vulnerable) and RDB3 (Rare) is an assessment of how threatened or endangered the species is in Britain, rather than how scarce it is in terms of map spot counting.
- 2.3.7.2 Over the last decade the RDB categories are slowly being replaced by IUCN red-list categories (Critically Endangered, Endangered and Vulnerable), which use different criteria to those developed for the RDBs. The process of replacing RDB categories with IUCN ones is however slow, and IUCN categories are not available for all groups. Accordingly, wherever IUCN categories have been allocated in the report, these are also shown in preference, ahead of RDB categories.
- 2.3.7.3 IUCN also recognised the value of a Near Threatened category to identify species that need to be kept under review to ensure that they have not become vulnerable to extinction. This category is used for species which have been evaluated against the criteria but do not qualify for a threatened category, although they may be close to qualifying or likely to qualify in the near future.

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<sup>13</sup> Shirt, D. B (ed) (1987) British Red Data Books: Insects. JNCC.

- 2.3.7.4 At the national level, countries are permitted to refine the definitions for the non-threatened categories and to define additional ones of their own, which essentially sit below RDB / IUCN status (i.e. Near Threatened). Thus, less rare but still significant species can be defined as Nationally Scarce (formerly called Nationally Notable), which is often sub-divided into Na (scarce), Nb (less scarce). These sub-categories were originally devised by <sup>14</sup> and are based on 10-kilometre square spot counting for the Great Britain grid system. The Na sub-category represents scarce taxa that are thought to occur in 30 or fewer 10-kilometre squares of the Great Britain grid system. The Nb sub-category represents less scarce taxa that occur in 31 to 100, 10-kilometre squares. Taxa in the N- sub-category are those listed as 'Notable', but not always distinguished into sub-category Na or Nb. These species are thought to occur in 16 to 100 10-kilometre squares of the National Grid but are too poorly known for their status to be more precisely estimated.
- 2.3.7.5 IUCN (pre 1994) categories remain relevant to certain taxa if an update has not been forthcoming. These categories are as follows:
- IUCN (pre 1994) Rare - taxa with small populations that are not at present Endangered or Vulnerable, but are at risk. In the UK, this was interpreted as species which exist in fifteen or fewer 10-kilometre squares. Superseded by new IUCN categories in 1994, but still applicable to lists that have not been reviewed since 1994.
  - IUCN (pre 1994) Vulnerable - taxa believed likely to move into the Endangered category in the near future if the causal factors continue operating. Superseded by new IUCN categories in 1994, but still applicable to lists that have not been reviewed since 1994.
- 2.3.7.6 During an assessment of the status of British ground beetles, Telfer (2016)<sup>15</sup> in consultation with others, decided that a group of 33 ground beetles, whilst not fitting into the IUCN Near Threatened category, should be added to an 'Amber List' of declining species. These are ground beetles seen to possibly be at risk due to fragmentation of habitat or a need for early successional habitat, the latter resulting in wide population variability. 'There is considerable uncertainty about what priority conservationists should attach to these species but it is clear that they should all be closely monitored and that the next status review of British carabids will need to consider these species in detail' <sup>16</sup>.

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<sup>14</sup> Ball, S.G. (1986) Terrestrial and freshwater invertebrates with Red Data Book, Notable or habitat indicator status. Invertebrate Site Register internal report number 66. NCC.

<sup>15</sup> Telfer, M.G. (2016). A review of the beetles of Great Britain: Ground Beetles (Carabidae). Species Status No.25. Natural England Commissioned Report NECR189.

<sup>16</sup> Telfer, M.G. (2016). A review of the beetles of Great Britain: Ground Beetles (Carabidae). Species Status No.25. Natural England Commissioned Report NECR189.

*The Sussex Rare Species Inventory*

2.3.7.7 The Sussex Rare Species Inventory (RSI) contains over 3,400 species. These species are selected according to strict criteria of rarity associated with their occurrence in Sussex. The criteria for selection of species are listed below:

- All species in the British Red Data Books including all Notable fauna and Nationally Scarce flora and British endemic taxa which have ever occurred in Sussex whether extinct or not.
- Species included in the UK Biodiversity Action Plan (BAP species).
- Internationally rare taxa cited in the Bern Convention, IUCN Red Data lists, or EU Habitats Directive which are not covered by any of the above.
- County rarities.

## 2.4 Assumptions and Limitations

2.4.1.1 Surveys conducted between May and September cover the optimal survey period for invertebrates, although extending this to include April and October can yield additional taxa that are mostly active either early or late in the year<sup>17</sup>. Accordingly, surveys are liable to be biased, to some extent, by the life histories of the invertebrate species themselves, a proportion of which may be found in spring, for example.

2.4.1.2 Due to the time taken to obtain land ownership consent to access large parts of the Field Survey Area in 2017, species active only in spring will have been missed. However, for the remaining optimal survey period, between late May and September 2017, a full level of survey effort was applied involving five visits (four of these lasting two days). During 2018, surveys were conducted in spring (throughout May); these surveys focussed on parcels within the Field Survey Area of Scheme Option 5A, and also Binsted Rife, and included a fifth butterfly transect in the area north of the services at the junction of the A27 and Lyminster Road. Therefore, parcels exclusively within the Field Survey Area of other Scheme options were not sampled during spring (either in 2017 or 2018).

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<sup>17</sup> 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. Natural England.

- 2.4.1.3 Whilst every effort was made to gain full access to all areas within 100 metres of all the Scheme options (during 2017) and within 100 metres of the Scheme option 5A during 2018, several areas could not be accessed, either at all, or in some cases, until the last survey visit in each survey year (e.g. Arun floodplain area in 2017 and Slindon Pit in 2018). Due to this limitation, it has been particularly useful to have a large dataset of records for the wider area including the information obtained from MAVES which has helped to fill in some of the gaps in knowledge.
- 2.4.1.4 It is not considered that the access limitations to certain land parcels have caused any significant impacts on the data obtained.
- 2.4.1.5 It should be noted that the confidence in the ISIS / Pantheon analysis of SATs is reduced where survey work does not follow the precise ISIS sampling protocols. Since the objectives of the present survey were to identify a broad range of invertebrates across target groups in predicted key areas of habitat, the methods employed do vary slightly from the ISIS protocol. In such instances Webb et al. (2018)<sup>18</sup> advises that caution is applied when using the SAT assessments, and that confidence in a favourable condition should be considered as 'Medium' for semi-ISIS compliant samples. In the present context, the analysis is considered to be broadly indicative; and may therefore give further steer to help understand which assemblages within the Field Study Area are likely to be important.

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<sup>18</sup> 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 [online] Available at: <http://www.brc.ac.uk/pantheon/> [Accessed 30 November 2018].

## 3 Results

### 3.1 Desk Study

3.1.1.1 Over 2,000 aquatic and terrestrial invertebrate records were provided by Sussex Biodiversity Records Centre for the search area. These are summarised in **Table 3-1**. This sets out the overall numbers of records returned which relate to species with a recognised conservation status (including Species of Principal Importance; Endangered, Rare, Vulnerable, Near Threatened, Nationally Scarce species, or those listed on the Sussex Rare Species Inventory; further detail relating to these categories is set out in **Section 3.2** of this report). Species of Principal Importance identified are highlighted in **Table 3-1**.

Table 3-1 - Desk Study Results

Taxon (group)	Total no. records	Total no. species <sup>19</sup>	No. of SPI	Species of Principal Importance: Scientific names
Coleoptera	287	139	1	<i>Lucanus cervus</i>
Lepidoptera (butterflies)	704	15	11	<i>Apatura iri</i> , <i>Boloria euphrosyne</i> , <i>Boloria selene</i> , <i>Coenonympha pamphilus</i> , <i>Cupido minimus</i> , <i>Erynnis tages</i> , <i>Lasiommata megera</i> , <i>Limenitis camilla</i> , <i>Pyrgus malvae</i> , <i>Satyrium w-album</i> , <i>Thecla betulae</i>
Lepidoptera (moths)	635	142	60	<i>Acronicta psi</i> , <i>Acronicta rumicis</i> , <i>Agrochola helvola</i> , <i>Agrochola lychnidis</i> , <i>Allophyes oxyacanthae</i> , <i>Amphipoea oculea</i> , <i>Amphipyra tragopoginis</i> , <i>Apamea remissa</i> , <i>Arctia caja</i> , <i>Atethmia centrigo</i> , <i>Caradrina morpheus</i> , <i>Ceramica pisi</i> , <i>Chesias rufata</i> , <i>Chiasmia clathrate</i> , <i>Chiasmia clathrata subsp.clathrate</i> , <i>Cirrhia icteritia</i> , <i>Cosmia diffinis</i> , <i>Diarsia rubi</i> , <i>Diloba caeruleocephala</i> , <i>Ecliptopera silaceata</i> , <i>Ennomos erosaria</i> , <i>Ennomos fuscantaria</i> , <i>Ennomos quercinaria</i> , <i>Epirrhoe galiata</i> , <i>Eugnorisma glareosa</i> , <i>Euxoa nigricans</i> , <i>Hemistola chrysoprasaria</i> , <i>Hepialus humuli</i> , <i>Hepialus humuli subsp. humuli</i> , <i>Hoplodrina blanda</i> , <i>Hydraecia micacea</i> , <i>Leucania comma</i> , <i>Lycia hirtaria</i> , <i>Malacosoma neustria</i> , <i>Melanchra persicariae</i> , <i>Melanthia procellata</i> , <i>Minoa murinata</i> , <i>Orthonama vittata</i> , <i>Orthosia gracilis</i> , <i>Rhizedra lutosa</i> , <i>Scotopteryx chenopodiata</i> , <i>Spilosoma lubricipeda</i> , <i>Spilosoma lutea</i> , <i>Tholera cespitis</i> , <i>Tholera decimalis</i> , <i>Timandra comae</i> , <i>Trichiura crataegi</i> , <i>Trichopteryx polycommata</i> , <i>Tyria jacobaeae</i> , <i>Watsonalla binaria</i> , <i>Xanthorhoe ferrugata</i>
Odonata	5	4	-	-
Hymenoptera	526	67	4	<i>Bombus ruderatus</i> , <i>Bombus humilis</i> , <i>Bombus ruderarius</i> , <i>Chrysis fulgida</i>
Orthoptera	46	6	1	<i>Gryllus campestris</i>
Hemiptera	20	11	-	-
Diptera	58	41	2	<i>Asilus crabroniformis</i> , <i>Dorycera graminum</i>

<sup>19</sup> These records relate to species with a recognised conservation status (including Species of Principal Importance; Endangered, Rare, Vulnerable, Nationally Scarce species, or those listed on the Sussex Rare Species Inventory).

- 3.1.1.2 Care needs to be taken in interpreting **Table 3-1**; since a large proportion of the records were taken from areas that are relatively distinct (geographically). For example, Rewell Wood (north of the current A27) is described by Edwards (2016) <sup>20</sup> as ‘well-recorded, and very significant’ in terms of its invertebrate fauna. This is supported by the findings of the desk study, which returned some 973 records, belonging to 94 species with a recognised conservation status. Other examples include the 233 records (72 unique species) that have been taken for the area north of Arundel, which largely includes wetland / aquatic habitat (e.g. Arundel Wetland Centre) and parkland (Arundel Park). Also, 230 records (of 30 unique species) have been taken from Fairmile Bottom, a Local Nature Reserve and SSSI that contains chalk grassland and yew and beech woodland, approximately 0.8kilometres north of the Field Survey Area and separated by the current A27.
- 3.1.1.3 The exact locations of records described in **Table 3-1** are not specified; although species records that can be attributed to the Field Survey Area are described further in **Table 3-2**.

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<sup>20</sup> Edwards, M. (2016). An Entomological survey within Binsted Parish, 2016. Unpublished report to the Mid-Arun Environmental Survey (MAVES).

Table 3-2 - Desk study data within the Field Survey Area

Order	Family	Species name	Status	Further Information
Diptera	Tachinidae	<i>Gymnosoma rotundatum</i>	NR, Sussex Rare	Restricted to south-east England. Parasitoid of shieldbugs. Recorded from parks, gardens and heathland with a preference for sandy sites
Coleoptera	Chrysomelidae	<i>Agelastica alni</i>	NR	Re-introduced after an absence of 50+ years <sup>21</sup> . Currently increasing range distribution <sup>22</sup> and likely to be downgraded.
Coleoptera	Lucanidae	<i>Lucanus cervus</i>	NS, SPI, Sussex Rare	'Although the species is clearly Nationally Scarce, it does not appear to be at risk of extinction and the declines observed from the data are mostly historic' <sup>23</sup> . Develops in decaying stumps and logs of various trees.
Lepidoptera	Erebidae	<i>Tyria jacobaeae</i>	SPI	Widespread and commonly found. Larvae feed on Ragwort. SPI status is for scientific recording reasons only.
Lepidoptera	Hesperiidae	<i>Pyrgus malvae</i>	SPI	Prefers warm sheltered, sparsely vegetated sites, develops on Rosaceae. Widespread in Southern England but declining <sup>24</sup> .
Lepidoptera	Nymphalidae	<i>Boloria euphrosyne</i>	SPI, Sussex Rare	Wide distribution across Britain but in decline, develops on <i>Viola</i> species among Bracken <sup>25</sup> .
Lepidoptera	Nymphalidae	<i>Llmenitis camilla</i>	SPI	A woodland species that develops on bramble. Although increasing in range it shows large fluctuations in numbers at some sites <sup>26</sup> .
Mollusca	Hydrobiidae	<i>Mercuria confusa</i> ( <i>Pseudamnicola confusa</i> )	RDB E, UK Bap, Sussex Rare	The Arun valley is one of two main strongholds for this snail. ' <i>M. confusa</i> has very specialised habitat requirements. It is typically found on bare mud exposed at low tide beneath emergent vegetation such as <i>Phragmites australis</i> or <i>Glyceria maxima</i> <sup>27</sup> .

<sup>21</sup> Stenhouse, D. (2006). Records of *Agelastica alni* (L) (Chrysomelidae) in South Lancashire and Cheshire in two successive years. *The Coleopterist* 15(1): 21-24.

<sup>22</sup> Stenhouse, D.A. (2012). A History of *Agelastica alni* in the British Isles. *Entomologists Monthly Magazine*. 147: 197-212.

<sup>23</sup> 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. Natural England Commissioned Report NECR224. Species Status No. 31. Natural England.

<sup>24</sup> <http://www.ukbutterflies.co.uk/species.php?species=malvae>

<sup>25</sup> <http://www.ukbutterflies.co.uk/species.php?species=euphrosyne>

<sup>26</sup> <http://www.ukbutterflies.co.uk/species.php?species=camilla>

<sup>27</sup> <http://www.biodiversitysussex.org/swollenspiresnail.html>

- 3.1.1.4 One area that is of acknowledged interest, that lies just at the edge of the Field Survey Area, is the sand pit of Lower Rewell Wood (also known as Slindon Pit) - part of the Rewell Wood Complex. This quarry is adjacent to the north-western end of Option 5A, to the north of the current A27. At this location, 142 mostly Hymenopteran records have been returned (there are occasional Dipteran records) belonging to 16 unique species of conservation status. This is relevant as access to the quarry was denied for the 2017 surveys. Rewell Wood Complex itself is designated as a LWS, which recognises Slindon Pit for its invertebrate interest in the site citation:
- “The area has an extremely rich butterfly fauna which includes Dingy Skipper, Grizzled Skipper, Green Hairstreak, Duke of Burgundy, Pearl-bordered Fritillary, White Admiral and Purple Emperor. Many of these are regionally uncommon. The Drab Looper, a very rare moth, has been recorded. Wide rides and glades support a rich flora and butterfly fauna. The disused gravel pits are of entomological importance”<sup>28</sup>.*
- 3.1.1.5 Binsted Woods Complex LWS, within our Field Survey Area, is also designated as a LWS, partly for its entomological interest:
- “There is a rich butterfly fauna including Ringlet, Silver-washed Fritillary, White Admiral and Purple Emperor. Freshwater Cockles, first recorded from Binsted Brook in 1896, still occur there. Glow-worms have been seen”<sup>29</sup>.*
- 3.1.1.6 The MAVES survey entitled ‘The Beetles of Binsted’<sup>30</sup> found 230 beetle species, including one Red Data Book species and eleven Nationally Scarce species in two hedgerows and an arm of wet woodland at Lake Copse. A number of saproxylic species were recorded and the author surmised that the site was likely to be of importance for this guild of invertebrates. A summary of the key findings from this report is included in **Table 3-3**.

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<sup>28</sup> Roberts, G. (1992) Rewell Wood Complex Site Citation. Site of Nature Conservation Importance (SNCI). Sussex Biological Records Centre (SxBRC).

<sup>29</sup> Roberts, G. & Clark, L. (1992). Binsted Wood Complex Site Citation. Site of Nature Conservation Importance (SNCI). Sussex Biological Records Centre (SxBRC).

<sup>30</sup> Grove, K. (2016). The Beetles of Binsted. Unpublished report to the Mid-Arun Environmental Survey (MAVES).

**Table 3-3 - Summary of key beetle species recorded from two hedgerows and Lake Copse in the south-west of the study area (derived from Grove, 2016).**

Order	Family	Species name	Status	Comments
Coleoptera	Staphylinidae	<i>Scaphisoma boleti</i>	NB	Widespread across England and Wales, with a few records in Scotland. Found in fungi on trees in woodland <sup>31</sup> .
Coleoptera	Eucnemidae	<i>Melasis buprestoides</i>	NB	Widespread across England and typically found in dead wood of various deciduous trees <sup>32</sup> .
Coleoptera	Ptinidae	<i>Dorcatoma substriata (serra)</i>	NA	Widespread and very local across England and typically found in soft bracket fungi on ash and beech <sup>33</sup> , particularly associated with ancient wood pastures and historic parkland <sup>34</sup> .
Coleoptera	Nitidulidae	<i>Cryptarcha strigata</i>	NB	Widespread across Southern England and Wales and recorded at sap and under the bark of oak and ash <sup>35</sup> .
Coleoptera	Endomychidae	<i>Lycoperdina bovistae</i>	RDB 3	Widespread across Southern England in puff-ball fungi such as <i>Lycoperdina bovista</i> and <i>L. perlatum</i> <sup>36</sup> .
Coleoptera	Tenebrionidae	<i>Prionychus melanarius</i>	NS	Associated with ancient broad-leaved and pasture woodland. Develops in wood mould and adults are rarely seen. Status recently confirmed in Alexander et al (2014) <sup>37</sup> .

<sup>31</sup> Hyman, P.S. and Parsons, M.S. (1994). A review of the scarce and threatened Coleoptera of Great Britain. Part 2. UK Nature Conservation: 3. Peterborough: Joint Nature Conservation Committee.

<sup>32</sup> Hyman, P.S. and Parsons, M.S. (1992). A review of the scarce and threatened Coleoptera of Great Britain. Part 2. UK Nature Conservation: 3. Peterborough: Joint Nature Conservation Committee.

<sup>33</sup> Hyman, P.S. and Parsons, M.S. (1992). A review of the scarce and threatened Coleoptera of Great Britain. Part 2. UK Nature Conservation: 3. Peterborough: Joint Nature Conservation Committee.

<sup>34</sup> Alexander, K.N.A. (2017). A review of the status of the beetles of Great Britain; The wood-boring beetles, spider beetles, woodworm, false powder-post beetles, hide beetles and their allies – Derodontoidae (Derodontidae) and Bostrichoidea (Dermestidae, Bostrichidae and Ptinidae). Species Status No.33. Natural England Commissioned Report NECR236.

<sup>35</sup> Hyman, P.S. and Parsons, M.S. (1994). A review of the scarce and threatened Coleoptera of Great Britain. Part 2. UK Nature Conservation: 3. Peterborough: Joint Nature Conservation Committee.

<sup>36</sup> Hyman, P.S. and Parsons, M.S. (1994). A review of the scarce and threatened Coleoptera of Great Britain. Part 2. UK Nature Conservation: 3. Peterborough: Joint Nature Conservation Committee.

<sup>37</sup> Alexander, K.N.A., Dodd, S. & Denton, J.S. (2014). A review of the scarce and threatened beetles of Great Britain; The darkling beetles and their allies: Aderidae, Anthicidae, Colydiidae, Melandryidae, Meloidae, Mordellidae, Mycetophagidae, Mycteridae, Oedemeridae, Pyrochroidae, Pythidae, Ripiphoridae, Salpingidae, Scaptiidae, Tenebrionidae & Tetratomidae (Tenebrionoidea less Ciidae). Species Status No.18. Natural England Commissioned Report NECR148.

Order	Family	Species name	Status	Comments
Coleoptera	Pyrochroidae	<i>Pyrochroa coccinea</i>	<del>NB</del>	This has recently been downgraded in Alexander et al (2014) <sup>38</sup> following range increase and is regarded as a non-native species.
Coleoptera	Melandryidae	<i>Conopalpus testaceus</i>	NB	Associated with dead wood in ancient broad-leaved woodland, hedgerows and orchards. Widespread but local.
Coleoptera	Chrysomelidae	<i>Longitarsus parvulus</i>	<del>NA</del>	Recently downgraded in Hubble (2014) <sup>39</sup> following range increase.
Coleoptera	Curculionidae	<i>Trachodes hispidus</i>	NB	Local in England, develops in damp mouldy wood and the adults can be found under bark, on dead branches and twigs or in leaf litter in woods near or on oaks <sup>40</sup> .
Coleoptera	Curculionidae	<i>Kyklioacalles roboris</i>	NB	A saproxylic species that can be found locally in woods on dead branches of various broad-leaved tree, and leaf litter in most months of the year <sup>41</sup> .
Coleoptera	Curculionidae	<i>Kissophagus vicinus</i> (as <i>hederae</i> )	NB	Found locally in the dead and dying stems of Ivy <i>Hedera</i> sp.

<sup>38</sup> Alexander, K.N.A., Dodd, S. & Denton, J.S. (2014). A review of the scarce and threatened beetles of Great Britain; The darkling beetles and their allies: Aderidae, Anthicidae, Colydiidae, Melandryidae, Meloidae, Mordellidae, Mycetophagidae, Mycteridae, Oedemeridae, Pyrochroidae, Pythidae, Ripiphoridae, Salpingidae, Scaptiidae, Tenebrionidae & Tetratomidae (Tenebrionoidea less Ciidae). Species Status No.18. Natural England Commissioned Report NECR148.

<sup>39</sup> Hubble, D. S. (2014). A review of the scarce and threatened beetles of Britain. The leaf beetles and their allies Chrysomelidae, Megalopodidae and Orsodacnidae. Species Status No.19. Natural England Commissioned Reports, Number 161.

<sup>40</sup> Duff, A.G. (2016). Beetles of Britain & Ireland. Vol 4: Cerambycidae to Curculionidae. A.G. Duff (Publishing).

<sup>41</sup> Duff, A.G. (2016). Beetles of Britain & Ireland. Vol 4: Cerambycidae to Curculionidae. A.G. Duff (Publishing).

3.1.61.2 The MAVES survey entitled ‘An Entomological Survey within Binsted Parish, 2016, 2017’<sup>42</sup> found a total of 551 species, including 36 which have been listed as being of conservation importance many of which are on the Sussex Rare Species Inventory. An account of the 36 species of conservation importance is presented on **Table 3-4**. It is relevant to note that some of these species no longer have a recognised national status or are likely to be downgraded at future review.

**Table 3-4 - Summary of key invertebrate species recorded from Binsted Parish**

Order	Family	Species name	Status SxRSI = Sussex Rare Species Inventory	Comments Unless indicated otherwise these have been taken from the Edwards report
Araneae	Amaurobiidae	<i>Coelotes terrestris</i>	NS	Locally commonly found. Associated with woodland, mature scrub and mature heather. Recorded at Binsted Park.
Araneae	Araneidae	<i>Zilla diodia</i>	NS, SxRSI	Locally frequently found. On heather, tall vegetation and patches of scrub on heathland, open woodland and hedgerows. Recorded at North Wood 2 and Binsted Park.
Araneae	Dysderidae	<i>Trematocephalus cristatus</i>	NS	Frequently found, but very localised. Almost confined in location to the High and Low Weald where it can be frequently found on scrub and the lower branches of trees in woodland, heathland and gardens. Recorded at North Wood 2 and Binsted Park.
Orthoptera	Tettigoniidae	<i>Conocephalus fuscus</i>	NA, SxRSI	Commonly found. Increasingly widespread throughout Southern England. Likely to be downgraded at next review. Recorded at Binsted Park.
Orthoptera	Tettigoniidae	<i>Metrioptera roeselii</i>	NB, SxRSI	Commonly found in long grasslands and spreading rapidly in Southern Britain. Likely to be downgraded at next review. Recorded at Binsted Park.
Coleoptera	Ptinidae	<i>Anobium inexpectatum</i>	NB, SxRSI	Infrequently found. The larvae bore into old ivy. Recorded at Binsted Park.

<sup>42</sup> Edwards, M. (2016 and 2017). An Entomological survey within Binsted Parish, 2016-2017. Unpublished report to the Mid-Arun Environmental Survey (MAVES).

Order	Family	Species name	Status SxRSI = Sussex Rare Species Inventory	Comments Unless indicated otherwise these have been taken from the Edwards report
Coleoptera	Cantharidae	<i>Cantharis fusca</i>	NS, SxRSI	Infrequently found. Formerly widespread in England and Wales but recently (post-1970) only recorded from four vice counties, all in Southern England, suggesting that a decline has taken place. Recorded from a variety of unimproved habitats including fens, woodland edges river banks and coastal grasslands. Recorded at Binsted Park.
Coleoptera	Carabidae	<i>Notiophilus quadripunctatus</i>	NS	Local and infrequently found. Associated with sparsely vegetated ground such as woodland tracks, heathland, undercliffs and the sides of drainage ditches. Predatory, and may prefer acidic soils. Recorded at North Wood 2.
Coleoptera	Cerambycidae	<i>Pseudovadonia livida</i>	SxRSI	No national conservation status. In deciduous and Pine trees where they develop in humus, adults feeding on pollen and nectar of Apiaceae.
Coleoptera	Chrysomelidae	<i>Chrysolina oricalcia</i>	NB	Locally frequently found in dry grasslands. Feeds on the foliage of umbellifers. Recorded at Binsted Rife.
Coleoptera	Chrysomelidae	<i>Pilemostoma fastuosa</i>	NR, NT, SxRSI	Very local, infrequently found. Associated with Asteraceae, especially Ploughman's Spikenard and Common Fleabane. Recorded at Binsted Park.
Coleoptera	Chrysomelidae	<i>Plateumaris rustica</i>	NS	Infrequently found and local. Associated with sedges growing at the margins of waterbodies. Recorded at Meadow Lodge.
Coleoptera	Chrysomelidae	<i>Podagrica fuscicornis</i>	NS	Locally frequently found. Adults feed on foliage and larvae on roots of Mallows. Recorded at Binsted Park.
Coleoptera	Curculionidae	<i>Isochnus populicola</i>	RDB K Insuff Known	Infrequently found. Reliably recorded from Kent, East Sussex and Middlesex, it is now beginning to spread. The larvae are leaf miners. Associated with poplar and willow but most records are from Crack Willow <i>Salix fragilis</i> . Recorded at Binsted Park.

Order	Family	Species name	Status SxRSI = Sussex Rare Species Inventory	Comments Unless indicated otherwise these have been taken from the Edwards report
Coleoptera	Curculionidae	<i>Rhinocyllus conicus</i>	NS	Infrequently found. Found in grassland habitats, particularly on calcareous soils. Most records are for coastal sites, but it also occurs inland. Associated with a variety of thistles ( <i>Cirsium</i> and <i>Carduus</i> sp.). Recorded at Binsted Rife.
Coleoptera	Drilidae	<i>Drilus flavescens</i>	NA, SxRSI	Of concern in Sussex but recently 'officially' downgraded from NA - 'Common and widespread in the Chalk districts of South East England; much suitable habitat not yet investigated; very likely that many additional hectads will be forthcoming; predicted to occur in more than 100' <sup>43</sup> . Recorded at Binsted Park and Meadow Lodge.
Coleoptera	Eucnemidae	<i>Microrhagus pygmaeus</i>	RDB3, SxRSI	Infrequently found. Associated with broad-leaved woodland and pasture woodland. The larvae develop in dead wood including oak, beech and birch. Recorded at Meadow Lodge.
Coleoptera	Melandryidae	<i>Abdera biflexuosa</i>	NS	Locally frequently found, in ancient broad-leaved woodland and parkland. Associated with dead wood, especially small dead twigs of oak, ash, lime and probably other tree species. Recorded at Meadow Lodge.
Coleoptera	Mordellidae	<i>Mordellistena neuwaldeggiana</i>	NS – recently downgraded from RDBK in Alexander et al (2014), SxRSI	Very local in Southern England. Due to confusion with closely related species, the current status and distribution is uncertain. Occurs in or at the edges of woodland and pasture woodland. Recorded at Binsted Park.

<sup>43</sup> Alexander, K.N.A., Dodd, S. & Denton, J.S. (2014). A review of the scarce and threatened beetles of Great Britain; The darkling beetles and their allies: Aderidae, Anthicidae, Colydiidae, Melandryidae, Meloidae, Mordellidae, Mycetophagidae, Mycteridae, Oedemeridae, Pyrochroidae, Pythidae, Ripiphoridae, Salpingidae, Scaptiidae, Tenebrionidae & Tetratomidae (Tenebrionoidea less Ciidae). Species Status No.18. Natural England Commissioned Report NECR148.

Order	Family	Species name	Status SxRSI = Sussex Rare Species Inventory	Comments Unless indicated otherwise these have been taken from the Edwards report
Coleoptera	Oedemeridae	<i>Ischnomera cyanea</i> , SxRSI	NB	Frequently found; previously confused with the similar (and rarer) <i>I. caerulea</i> . Found mainly in ancient broad-leaved woodland, pasture woodland and old hedgerows. Adults frequently visit flowers including hawthorn and hogweed. The larvae develop in a variety of tree species. Recorded at Binsted Park and North Wood 3.
Coleoptera	Scirtidae	<i>Prionocyphon serricornis</i>	NB, SxRSI	Frequently found, but local. In puddles within crowns and the roots of trees. Recorded at North Wood 3.
Diptera	Limoniidae	<i>Limnophila pictipennis</i>	RDB2	Infrequently found. Associated with fens and the edges of streams. Recorded at North Wood 1.
Diptera	Limoniidae	<i>Limonia masoni</i>	RDB3	Rarely found. Usually associated with the edges of damp calcareous woodland. Recorded at North Wood 1.
Diptera	Stratiomyidae	<i>Beris clavipes</i>	NS	Infrequently found. Larva develops at edges of water bodies, probably in leaf litter. Recorded at Binsted Rife.
Diptera	Stratiomyidae	<i>Beris fuscipes</i>	NS	Infrequently found. Associated with fens, marshes and wet woodland. Recorded at Meadow Lodge.
Diptera	Syrphidae	<i>Criorhina ranunculi</i>	NN, SxRSI	Locally frequent in long-established woodland. Adults have been seen to oviposit at the base of large trees. Recorded at Binsted Park and North Wood 3.
Diptera	Syrphidae	<i>Orthonevra brevicornis</i>	NS	Locally frequent. Associated with base-rich seepages. Recorded at Binsted Rife.
Diptera	Tachinidae	<i>Zophomyia temula</i>	NN, SxRSI	Recorded widely across Southern England with records as far as Yorkshire. Associated with a variety of habitats. Recorded at Binsted Park.

Order	Family	Species name	Status SxRSI = Sussex Rare Species Inventory	Comments Unless indicated otherwise these have been taken from the Edwards report
Diptera	Ulidiidae	<i>Dorycera graminum</i>	RDB-R, S41, BAP	Scattered records in Southern England north to Warwickshire, with sites concentrated within the Thames Gateway and southern coastal districts. It is typically found in rank grassland with plentiful large umbellifers, especially Hogweed, but also Hemlock Water-dropwort at some sites. Recorded at Binsted Park.
Hymenoptera	Andrenidae	<i>Andrena bucephala</i>	RDB3, SxRSI	Ground nesting species that collects pollen from a variety of flowers. Recorded at Meadow Lodge.
Hymenoptera	Andrenidae	<i>Andrena labiata</i>	NA, SxRSI	Locally frequent. Associated with old meadowland and heathy grassland. Collects pollen from a variety of flowers, but especially germander speedwell. Recorded at North Wood 1, Binsted Park and Meadow Lodge.
Hymenoptera	Apidae	<i>Bombus ruderatus</i>	NB, S41, BAP, SxRSI	Specialises in visiting deep flowers such as Foxglove and Comfrey and populations are centred mainly on lowland unimproved grazed meadows, especially in river valley systems. Recorded at Binsted Park.
Hymenoptera	Crabronidae	<i>Nysson trimaculatus</i>	NB, SxRSI	Infrequently found. A cleptoparasite on Gorytes sp (another genus of crabronid wasp). Recorded at Binsted Park.
Hymenoptera	Crabronidae	<i>Pemphredon morio</i>	NB, SxRSI	Ranges from Southern England as far as Yorkshire and nests in rotten wood. Recorded at Meadow Lodge.

Order	Family	Species name	Status SxRSI = Sussex Rare Species Inventory	Comments Unless indicated otherwise these have been taken from the Edwards report
Hymenoptera	Halictidae	<i>Lasioglossum malachurum</i>	NA, SxRSI	Formerly regarded as scarce but now widespread in Southern England and extending its range. It can be very numerous, forming huge colonies along well-trodden paths and sparsely vegetated south facing slopes <sup>44</sup> . Due to the large number of recent records, the bee does not deserve its current status and is likely to be downgraded in any future review. Recorded at Binsted Park.
Hymenoptera	Halictidae	<i>Lasioglossum pauxillum</i>	NA, SxRSI	Formerly regarded as scarce but now widespread in Southern England and extending its range. Found in a range of open habitats, favouring chalk downland and calcareous brownfield sites <sup>45</sup> and visits plants of various families including buttercups, Rape, Asteraceae and Blackthorn. Due to the large number of recent records, the bee does not deserve its current status and is likely to be downgraded in any future review. Recorded at Binsted Park and Meadow Lodge.

<sup>44</sup> Falk, S. (2015) Field Guide to the Bees of Great Britain and Ireland. British Wildlife Field Guides. Bloomsbury.

<sup>45</sup> Falk, S. (2015) Field Guide to the Bees of Great Britain and Ireland. British Wildlife Field Guides. Bloomsbury.

- 3.1.61.3 The MAVES spreadsheet data includes very few additional invertebrate records of significance that are not already covered in the above accounts. However, several species of note have been identified as follows:
- *Geotrupes mutator* (Near Threatened) taken from the Binsted Woods Complex LWS (near Paines Wood) in September 2018 by Graeme Lyons. This species has a distinctly local distribution in southern counties of England, with one outlying population in north-east England. It inhabits unimproved pasture and moor, coastal grassland and coastal heathland and is associated with cattle, horse and sheep dung. This species qualifies as NT as it is only known from 13 locations and historical decline is evident.
  - *Anthocomus fasciatus* (Nationally Scarce) taken from Binsted Rife by Natalie Guerin in May 2015. This four-millimetre beetle is a predator as a larva on the larvae of bark beetles. As an adult it feeds on small flies etc and is commonly found under trees on long grass. Although widely recorded in England, it has recently been reviewed in Alexander and upgraded to Nationally Scarce due to the paucity of records since 1980.
  - *Xanthodelphax flaveola* (Nationally Scarce) taken from Binsted Rife by Natalie Guerin in August 2015. According to British Bugs this species is 'historically scarce with no recent records in the known range of southeast England, but new populations have recently been found in Wales and Shropshire.' The species feeds on *Poa pratensis* in generally dry areas and is understood to be intolerant of mowing.

## 3.2 Field Study

### 3.2.1 Habitat Suitability Assessment

- 3.2.1.1 Parcels of complementary habitats within the Field Survey Area were distinguished based on suitability to support invertebrates. This informed subsequent targeted surveys as to where important invertebrate assemblages were more likely to be encountered.

3.2.1.2 **Figures 1 and 2** show the location of the areas assessed for invertebrates, showing locations of higher suitability (subjected to further targeted survey), and the remainder of the 2017 and 2018 Field Survey Areas with lower suitability (these areas are left blank on the plan). The habitat descriptions (below) are accompanied by photographs of features / habitats of note (**Appendix A**). For ease of reference, place names derived from the OS Explorer Map (OL10; 1: 25,000 scale) have been used to aid the descriptions of the Field Survey Area; and specific parcels of land where targeted survey for invertebrates has been undertaken have been numbered Parcel 1 to 13.

### 3.2.2 **General Habitat Description**

#### ***West of Ford Road***

3.2.2.1 Much of this area, where it lies west of Ford Road, comprises large expanses of woodland separated into smaller blocks (e.g. Tortington Common, Paine's Wood, Barn's Copse and Little Danes Wood) that are of varying quality (e.g. ancient woodland through to recent mixed and coniferous plantation woodland). It also includes areas of farmland (mostly arable), with occasional grassland fields and boundary features (e.g. hedgerows and wooded ditches).

#### ***Woodland***

3.2.2.2 Some of the woodland blocks, such as those centred on Tortington Common, comprise mixed and coniferous plantation and are of limited interest to invertebrates because of the presence of even-aged stands of semi-mature Scots pine (*Pinus sylvestris*) and sweet chestnut (*Castanea sativa*), with locally frequent holly (*Ilex aquilinum*) and hazel in the shrub layer (Photograph 5). The uniform structure and sparse ground layer (restricted to honeysuckle (*Lonicera periclymenum*) and ivy (*Hedera helix*) of these plantation blocks mean that they are unlikely to support a diverse or notable invertebrate fauna. As such, the parcels selected for targeted survey were restricted to areas of deciduous woodland with greater structural and species diversity such as Parcels 1, 2 and 3a (Photographs 6 to 8) and a mixed plantation woodland with a large glade running through its centre that provides much of the invertebrate interest (Parcel 4 – Photograph 9).

- 3.2.2.3 Of the former, Parcel 1 (Barn's Copse and Little Danes Wood – Photograph 6a and 6b) is an area of ancient semi-natural woodland close to the A27 with frequent mature standard trees of pedunculate oak (*Quercus robur*) and ash (*Fraxinus excelsior*). Silver birch (*Betula pendula*) is also locally frequent. The shrub layer is mostly formed by hazel, although cherry laurel (*Prunus laurocerasus*) locally abundant. Patches of bracken (*Pteridium aquilinum*), bluebell (*Hyacinthoides non-scripta*), ivy and honeysuckle are present amongst a relatively sparse ground layer on the whole. Given the apparent age of this woodland the soil layer is likely to be enriched with organic matter and this is further contributed to by fallen dead wood of varying diameter. Occasional trees also exhibit standing dead wood, an important component for saproxylic invertebrates.
- 3.2.2.4 On the western sloping sides of the wood is a seasonal spring, where plants of damp dappled shade proliferate, including certain ferns, Enchanter's nightshade (*Circaea lutetiana*), remote sedge (*Carex remota*) and lesser celandine (*Ficaria verna*). Fallen dead wood is locally frequent. This habitat is particularly suitable for craneflies and hoverflies.
- 3.2.2.5 There is a small parcel of hazel coppice at Paine's Wood (Parcel 2 – Photograph 7), just south of the existing A27. This is understood to be a Planted Ancient Woodland Site (Natural England Inventory of Ancient Woodland). The area of particular interest for invertebrates has many of the qualities of the previously described woodland parcels, in that deciduous trees are dominant, in this case hazel and ash, and there is some standing and fallen dead wood. Bluebell dominates the ground flora, although wood anemone (*Anemone nemorosa*), violets *Viola* spp., Enchanter's nightshade and ivy are also present. The trees appear to be no more than 40 to 50 years old, which will limit their value to invertebrates; however, former coppicing of the hazel trees (that may be older than the surrounding trees) has resulted in sizeable stools which are likely to be of value to saproxylic species. Furthermore, the connectivity of this parcel to a large block of woodland (Binsted Woods Complex LWS; Ancient Semi Natural Woodland) will make it of greater interest than if it occurred in isolation in the landscape.
- 3.2.2.6 On the north side of the current A27 opposite Little Danes Wood is Danes Wood. The southernmost part of this falls within the Field Survey Area, and this parcel of woodland (Parcel 3a – Photographs 8a and 8b) was noted as being of high invertebrate value for a number of reasons, as follows:
- It is connected to an extensive tract of woodland that incorporates Danes Wood and Rewell Wood to the north.

- It has good structural diversity, with a varied canopy of mature pedunculate oak, beech (*Fagus sylvatica*), sweet chestnut and silver birch.
- There is a diverse shrub and ground layer, which includes (to name a few plants of structural and foraging value to invertebrates) holly, hazel, bracken, bramble (*Rubus fruticosus agg.*), honeysuckle, pendulous sedge (*Carex pendula*), ivy, wood avens (*Geum urbanum*), wood spurge (*Euphorbia amygdaloides*), herb Robert (*Geranium robertianum*) and wild strawberry (*Fragaria vesca*).
- There is frequently occurring standing and fallen dead wood including up to moderate diameter branches.
- There is a damp seepage passing through the woodland with temporary ponding water and muddy edges.
- Lower slopes, close to the A27 are marshy in places, especially where these border the area used by 4 x 4 vehicles (see Parcel 3b), which have created several temporary ponds in old wheel ruts. A characteristic wetland flora is present, including (but not limited to): common fleabane (*Pulicaria dysenterica*), common cattail (*Typha latifolia*), marsh thistle (*Cirsium palustre*), soft rush (*Juncus effusus*) and water starwort (*Caltriche sp.*).
- The topography of the woodland in this area has been affected in the past by the creation of the current A27, and this has resulted in a variable topography that creates sheltered areas and soil exposures that increase the range of microclimatic conditions for invertebrates.

#### 3.2.2.7

The aforementioned glade running through a mixed plantation woodland (Parcel 4 – Photograph 9) is considered likely to be of importance to invertebrates because of its woodland setting, which provides shelter, warmth and humidity along its length, and also due to the varied and structurally complex vegetation that is present, particularly in the part closest to 'Pinewoods'. The vegetation is primarily associated with marshy ground, and includes frequent to abundant pendulous sedge, remote sedge, marsh thistle, hemp agrimony (*Eupatoria cannabinum*), St John's wort (*Hypericum sp.*) and various grasses and rushes of damp ground. Drier areas, closer to the planted woodland edge support wood sage (*Teucrium scorodonia*), ling (*Calluna vulgaris*), bramble, gorse *Ulex sp.*, and bracken. There are patches of exposed soil and muddy trampled ground, including ephemeral pools / ruts that will provide for a different, semi-aquatic invertebrate fauna.

### **Agricultural Fields**

- 3.2.2.8 The arable fields and improved and semi-improved grassland within the Field Survey Area (west of Ford Road) are of low suitability to invertebrates owing primarily to their homogenous structure and dominance of relatively few plant species (Photographs 10, 11, 12 and 13); and also to their exposed nature (many of these fields are very large and windswept), lack of exposed soil and intensive / routine management. On these grounds fields of this nature have been discounted from further consideration in respect to invertebrates.

### **Boundary Features**

- 3.2.2.9 The farmland is separated by hedgerows and in some cases by narrow woodland belts aligned roughly north-south in the areas of Binsted Park and south of Tortington Common. These woodland belts are of invertebrate interest due to their intrinsic woodland attributes, and also due to their connectivity to more extensive woodland to the north. Parcel 5 (Photograph 14) extends from Ash Piece / Binsted Woods Complex LWS in the north and is a remnant, narrow strip of Ancient Semi Natural Woodland.
- 3.2.2.10 Two large fields of rye grass (*Lolium sp.*) are positioned east and west of the parcel. The woodland is similar to other examples of ancient woodland in the area, with mature pedunculate oak and ash (some of these being of considerable size) forming a canopy, beneath which coppiced hazel is most prominent in the shrub layer. The shrub and ground layers are diverse (in structure and species), which will benefit a greater range of invertebrates, with shrubs including (but not limited to) butcher's-broom (*Ruscus aculeatus*), grey willow (*Salix cinerea*) and hawthorn (*Crataegus monogyna*); and herbs in the ground layer including frequent red campion (*Silene dioica*), greater stitchwort (*Stellaria holostoides*), bluebell, nettle, ivy and bramble. Other features of interest to invertebrates include the frequent fallen and standing dead wood, including some large diameter branches / trunks, and a seasonally wet ditch that may support species of temporary pools and high humidity, especially given the position of the woodland cut into a shallow valley.
- 3.2.2.11 Parcel 6 is connected to Parcel 5, where the two more or less meet in their southern extremities, between Manor House and Meadow Lodge. It is therefore unsurprising that Parcel 2 has similar characteristics, although in this case a more permanent stream that flows at its base. The woodland grades from wet woodland dominated by grey willow in low-lying areas saturated by the stream (Photograph 15a), and drier sloping sides with frequent mature pedunculate oak and ash. The shrub layer of these drier areas is diverse; dominated by hazel, but also with frequent blackthorn, elder (*Sambucus nigra*), field maple (*Acer campestre*) and holly.

- 3.2.2.12 The ground flora comprises bluebell, ivy, male fern (*Dryopteris felix-mas*), nettle, bramble, red campion, Enchanter's nightshade, wood avens, bracken and butcher's broom. Wetter areas, especially in the wet willow woodland include hemlock water dropwort (*Oenanthe crocata*), gypsywort (*Lycopus europeus*), wild angelica (*Angelica silvestris*) and opposite-leaved golden saxifrage (*Saxifraga oppositifolium*). There is frequent fallen and standing dead wood, some of medium to large diameter.
- 3.2.2.13 In all, the structural complexity of the woodland; its antiquity and dead wood; the diverse range of micro-habitats, including a stream, wet woodland, dry woodland and woodland edge (Photograph 15b); and its position, connected to other woodlands and in a shallow valley sheltered from the wind, mean that this parcel potentially has good suitability to support a wide variety of species associated with these (micro) habitats.
- 3.2.2.14 Parcels 7 a, b and c (Photographs 16a – c) are all similar again in properties to Parcels 5 and 6. They are comprised of mature pedunculate oak and ash, have similar understoreys with frequent hazel, bluebell, red campion, bramble and ivy. Dead wood is present, albeit more infrequently than for Parcels 5 and 6, and streams / ditches are present, flowing from north to south. The main difference with these however, is that they are less well connected in the local landscape, for example being connected to hedgerows and grassland to the south, rather than to woodland, and they are narrow (no more than 30 metres wide) and susceptible to strong winds and drift of agrochemicals from surrounding arable fields, meaning that they are potentially less likely to support some of the specialist species more typical of larger woodland interiors. Notwithstanding this, these parcels were collectively put forward for further targeted survey owing to their positive attributes for invertebrates.
- 3.2.2.15 Several of the field boundaries of the Field Survey Area are of relatively low value to invertebrates, these being for example uniform and species-poor hedgerows or dry field ditches (e.g. Photograph 17). These linear boundaries are likely to permit movement of wildlife (including invertebrates), but not being of sufficient structural complexity and size, or floral species diversity to merit further consideration in terms of targeted survey.
- 3.2.2.16 Several boundary features are however of greater interest and in particular, there is an old double-sided hedgerow (Parcel 8a – Photographs 18a and 16b) running along Old Scotland Lane (Path) in the west of the Field Survey Area, which has some invertebrate interest and merits further targeted survey. Due to the hedgerow being double sided (at least in part), it provides greater structural diversity than would a single hedgerow line.

- 3.2.2.17 It is also of value to invertebrates due to the rich diversity of woody (mostly fruiting) species that it is composed of, including: guelder rose (*Viburnum opulus*), dogwood (*Cornus sanguinea*), hawthorn, hazel, spindle (*Euonymus europaeus*), blackthorn, plum (*Prunus domestica*) and bramble. The hedge bank flora is also diverse and this has encroached into the neighbouring grassland to the south. Herbs of particular value to invertebrates include: various vetches *Vicia* spp. and buttercups (*Ranunculus* spp.), common knapweed (*Centaurea nigra*), crosswort (*Galium cruciate*), lesser stitchwort (*Stellaria graminoides*), cow parsley (*Anthriscus silvestris*), red campion, cut-leaved crane's-bill (*Geranium dissectum*), common fleabane and hogweed (*Heracleum sphondylium*).
- 3.2.2.18 A second, relatively substantial hedgerow that is closely linked to Old Scotland Lane runs between Pedler's Croft (a part of Binsted Woods Complex LWS) in the north, and Binsted Nursery in the south (Parcel 8b). This hedgerow is moderately species-rich; with good structure (up to 4 m tall x 2.5 m wide and occasional mature oak standard trees) (Photograph 19). Woody species include abundant blackthorn, with frequent to occasional hawthorn, field maple, English elm (*Ulmus procera*) and dogwood. At the base of the hedgerow is a ground flora that comprises: bluebell, ground ivy (*Glechoma hederacea*), red campion, greater stitchwort, crosswort and white dead nettle (*Lamium album*). To the west of the hedgerow is a wide border of unmanaged rough grassland, with coarse grasses and herbs including cow parsley, nettle, common fleabane, hogweed, creeping buttercup and common knapweed. The floral species diversity of the hedgerow and rough grassland is similar to that of Parcel 8a and is considered likely to support a similar invertebrate fauna.
- 3.2.2.19 Off Tortington Lane, there are two other areas that deserve further mention, the first of which is along a farm track at New Barn that heads west, connecting woodland Parcels 7a-c described above. This track has a wide, floristically diverse margin on the north side of the track (Parcel 9 – Photograph 20). Herbs include common fleabane, silverweed (*Potentilla anserine*), clovers (*Trifolium* spp), great willowherb (*Epilobium hirsutum*), common knapweed, hogweed, teasel (*Dipsacus fullonum*) and creeping thistle (*Cirsium arvense*), all of which are frequent to abundant. The diversity and abundance of herbs along this track makes it potentially an important source of pollen and nectar, especially for bees and wasps, of which certain species may utilise the hollowed-out bramble stems of the adjoining hedgerows.

3.2.2.20 The other noteworthy feature is a small wooded copse and associated grassland and scrub and connecting hedgerow along Tortington Lane, ca. 300 m north of New Barn (Parcel 10 – Photograph 21). This covers a relatively small area, but within it there are several features of interest to invertebrates, including the wooded copse with frequent stag-headed pedunculate oak trees with their standing dead wood; a scrubby edge to the copse, comprising bramble, nettle and coarse grasses, and an area of sheltered grassland facing south-west with hogweed, creeping thistle, creeping buttercup (*Ranunculus repens*) and red campion present. The small size of this Parcel and overall limited plant species diversity mean that this is likely to restrict its value to important invertebrate assemblages. Notwithstanding this, it might be expected to support a range of common and widespread species, and to also provide complementary habitat (e.g. pollen and nectar sources and nesting sites in aerial stems of bramble) for certain groups, such as solitary bees and wasps, as well as good undisturbed structure for spiders, grasshoppers and crickets.

#### **Slindon Pit**

3.2.2.21 Slindon Pit (Parcel 3b) is an area understood to be a former sand quarry, which is currently used for a 4x4 off-road safari experience. Immediately south west of the Pit is a more heavily wooded bank, which is described by Parcel 3a. However, Slindon Pit has a more open aspect, with sandy exposures, which are in some cases extensive, and pockets of scrub and herb-rich grassland (Photographs 22a). The most interesting areas for invertebrates are considered likely to be the peripheral areas of the sand exposures, especially where these are south facing and have a gradation from bare earth to grassland to scrub and pioneer woodland. The herb-rich grassland includes many species favoured by invertebrates that include those feeding off the foliage or visiting for pollen and nectar; such as: common fleabane, viper's bugloss (*Echium vulgare*), common ragwort (*Jacobaea vulgaris*), teasel, various thistles (*Cirsium* sp.), bird's-foot trefoil (*Lotus corniculatus*), common figwort (*Scrophularia nodosa*), musk mallow (*Malva moschata*) and St John's-wort (*Hypericum* spp.). The woodland and scrub component is likely to act as a baffle to the winds, creating shelter across much of the Pit owing to its frequently patchy distribution, and therefore will contribute to the creation of a warm microclimate for invertebrates, especially those nesting within the sandy banks (Photograph 22b) and occasional clifflets (Photograph 22c). Structurally, this habitat may also support invertebrates associated with the trees, most of which are important for invertebrates, including pedunculate oak, grey willow, goat willow (*Salix caprea*), ash, silver birch and hazel.

**Binsted Rife**

- 3.2.2.22 Binsted Rife (Parcel 13) is an elongated area of fen and wet grassland in the base of a shallow valley between the sloping ground east of Binsted golf course and west of Binsted Lane (south of the church) (Photograph 23a). Review of ordnance survey maps indicate that Binsted Rife is fed principally by a stream that flows from the north, arising in the area of Little Danes Wood, and also by springs that emerge on the valley sides along the length of the fen. During the summer survey (2018) the site was being grazed by a small number of cattle (Photograph 23b); such grazing is likely to maintain the diversity of vegetation, including complexity of habitats, that is considered likely to benefit invertebrates, as well as inadvertently provide additional opportunities in the form of animal dung, and localised poached areas of ground.
- 3.2.2.23 Tall herbs and monocotyledons make up the fen in the base of the valley and along the seeps and spring-lines spreading up the valley sides. These include (amongst others): common reed (*Phragmites australis*), reed sweet grass (*Glyceria maxima*), reed canary grass (*Phalaris arundinacea*), lesser pond sedge (*Carex acutiformis*), hard rush (*Juncus inflexus*), water horsetail (*Equisetum fluviatile*), meadowsweet (*Filipendula ulmaria*), water figwort (*Scrophularia auriculata*), watercress (*Nasturtium officinale*), hemlock water dropwort, ragged robin (*Lychnis flos-culi*), water mint (*Mentha aquatica*), cuckoo-flower (*Cardamine pratensis*) and nettle. This habitat is considered likely to be important for invertebrates of seasonally wet and marshy ground, especially flies, beetles and spiders.
- 3.2.2.24 Drier parts of the valley sides are covered in tussocky grassland that is dominated by grasses (e.g. cock's-foot *Dactylis glomerata*) false oat grass (*Arrhenatherum elatius*), sweet vernal (*Anthoxanthum odoratum*), red fescue (*Festuca rubra*) and meadow foxtail (*Alopecurus pratensis*). Localised patches of herbs provide sources of nectar and pollen to invertebrates and include various species of buttercup (*Ranunculus sp.*) and thistle (*Cirsium sp.*), ground ivy, yarrow (*Achillea millefolium*), common knapweed and common sorrel (*Rumex acetosa*).
- 3.2.2.25 Further structural complexity to this area is provided at the upper slopes which are bounded by mature and unmanaged hedgerows with scrub that is encroaching down the slopes of the valley and providing localised shelter for invertebrates as well as sources of prey, nectar, pollen fruit and foliage. Hawthorn, blackthorn, elder, willow (*Salix sp.*), hazel, pedunculate oak and bramble are all frequent to abundant components of the hedgerows

**East of Ford Road**

- 3.2.2.26 The landscape becomes much flatter east of Ford Road as it enters the River Arun floodplain. Much of the land within this floodplain is pasture, grazed by sheep and cattle and is of low value to invertebrates because of its uniform structure, limited floral diversity and relatively exposed position (Photographs 24 and 25).
- 3.2.2.27 In this area many of the fields are divided by a network of open drainage ditches, which are periodically maintained to keep a continuous flow. Some of these ditches are fenced from grazing livestock and as such the ditches and their banks can be expected to have some invertebrate interest due to the large volumes of organic matter in the arisings left on the banks and the elevated interest of the banks created by the lack of grazing pressure (Parcel 11a – Photograph 26a). Common reed (*Phragmites australis*) is dominant along the ditches, although other species that are frequent include: celery-leaved buttercup (*Ranunculus sceleratus*), gypsywort, common club-rush (*Schoeneoplectus lacustris*), false-fox sedge (*Carex otrubae*), greater pond sedge (*Carex riparia*) and marsh foxtail (*Alopecurus geniculatus*). In other areas, where grazing has taken place close to the ditch edge, the ditch sides are poached with muddy, damp exposures that are suitable for specialist invertebrate assemblages (primarily of ground beetles, rove beetles and certain flies such as dance and soldier flies) associated with poached, waterlogged and dung enriched conditions (Parcel 11a – Photograph 26b). Further habitat interest is added by a seasonal, heavily poached pond (Photograph 26c), that is characterised by plants of inundated habitat, such as marsh foxtail, sweet-grass (*Glyceria sp.*), redshank (*Persicaria maculosa*), creeping bent (*Agrostis stolonifera*) and soft rush.
- 3.2.2.28 A further element to this Parcel is on the slightly more raised ground west of the railway line, where lines of trees, mostly stag-headed pedunculate oak, are set within defunct hedgerows along some of the drier ditch banks (Photograph 26d). The oak trees in this landscape are in the region of 150 to 200 years old, and whilst subject to heavy grazing pressure beneath and being very exposed in the landscape, still harbour some invertebrate interest owing to the maturity of these trees and a small degree of connectivity that they provide, linking the wetter ditches and some hedgerows to the west with the railway corridor to the east.
- 3.2.2.29 Close to the River Arun, there is a small area of salt marsh habitat with estuarine plants including sea purslane (*Atriplex portulacoides*), sea couch (*Elytrigia atherica*), common glasswort (*Salicornia europaea*) and common reed (Parcel 11b, Photograph 27).

- 3.2.2.30 Whilst only occurring across a small area, the habitat is relatively varied and may support an assemblage typical of the habitat, including certain bugs (e.g. shorebugs) and beetles (e.g. ground beetles), the later of which may be well represented in the strandline, which was prominent in this location.
- 3.2.2.31 East of the railway line connecting Arundel to Littlehampton, the land has a more elevated position (e.g. at Broomhurst Farm). However, the value of the agricultural fields surrounding the farm for invertebrates is limited, with hedgerows and ditches forming boundary features that are poorly connected in the wider landscape and generally lacking any structural complexity or species diversity so are therefore undeserving of further consideration in respect to invertebrates (Photograph 28).

### **Services Junction**

- 3.2.2.32 At the eastern end of the Field Survey Area is the junction of Lyminster Road with the A27; immediately north of the services (Parcel 12). The junction is raised above the surrounding ground level, but also partially in cutting, so therefore forms a bowl shape, with sloping banks of grassland and scrub with a base of ephemeral vegetation overlying made ground (Photograph 29). The bowl shape of the landform, and also the juxtaposition of habitats with the large bridge formed by the overpass at the junction mean that there are likely to be areas of constant shelter provided from the wind irrespective of wind direction, thus creating favourable areas for basking by warmth loving invertebrates.
- 3.2.2.33 Vegetation of this area is generally diverse and therefore, is likely to provide interest for a variable invertebrate assemblage. The grassland flora includes favoured sources of pollen and nectar such as: creeping thistle, common ragwort, common fleabane, ox-eye daisy (*Leucanthemum vulgare*), common knapweed, forget-me-not (*Myosotis sp.*), ground ivy, bird's-foot trefoil and St John's-wort (*Hypericum sp.*). Added structural complexity and diversity of food sources for invertebrates is provided by the young trees and shrubs, which include: gorse (*Ulex sp.*), elder, hazel, pedunculate oak, hawthorn, dog rose, ash and bramble.
- 3.2.2.34 Rabbit grazing is maintaining a variable structure of the grassland, with areas of short lawn interspersed with a taller grassland sward. Whilst not observed during the surveys, it is considered likely that the slopes may be periodically maintained by grass cutting.

### 3.2.3 Invertebrate Species Assemblage

- 3.2.3.1 The results of the targeted terrestrial invertebrate surveys provide an indication of the relative species diversity within the targeted groups of invertebrates. Over 2,600 specimens were collected or recorded over the course of the 2017 and 2018 surveys, allowing 614 species to be identified from the Field Survey Areas.
- 3.2.3.2 Of the target groups, Coleoptera was the dominant order recorded: 351 species; Hemiptera was represented by 81 species; Hymenoptera was represented by 67 species; Lepidoptera (mostly butterflies) 30 species and Diptera 52 species. Other orders, with fewer than ten species included (but was not limited to) Orthoptera (grasshoppers and crickets), Julida (millipedes) and Isopoda (woodlice).
- 3.2.3.3 Of the species recorded, 426 (c. 69%) are without any recognised status, being widely distributed and common, and exhibiting little habitat specificity; and 147 species (c. 24%) are regarded as locally common or locally scarce. Forty-one of the species recorded (c. 7%) are currently regarded as Nationally Scarce or Rare; this includes ten species listed on the Index of Ecological Continuity as used for saproxylic beetles<sup>46</sup>. The full list of invertebrates recorded within the Field Survey Area is displayed in tabular format in **Appendix B**.
- 3.2.3.4 Two species that are presented in Pantheon as being rare, but misleadingly so, include the beetle *Dacne rufifrons* and bee *Hylaeus dilatatus*, as explained below.
- 3.2.3.5 *Dacne rufifrons* is shown as being ‘Data Deficient’ in Pantheon. However, in the UK this species is not scarce and is widely distributed in southern and central England and Wales. It is understood that in Europe the species has not been recorded enough for taxonomists to decide how scarce or not it is<sup>47</sup>. Accordingly, the Pantheon status has been disregarded and *Dacne rufifrons* is listed as Local, as this status category appears to be the most relevant given its UK geographical distribution.
- 3.2.3.6 Pantheon identifies *Hylaeus dilatatus* as Red Data Book 3. However, until recently it was incorrectly recorded as *Hylaeus annularis*, which is a much scarcer species that is restricted to the south coast, so name changes for that species ‘could potentially cause confusion’<sup>48</sup>.

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<sup>46</sup> Alexander, K.N.A. (2004). Revision of the Index of Ecological Continuity as used for saproxylic beetles. English Nature Research Report No. 574.

<sup>47</sup> Don Stenhouse (pers. comm)

<sup>48</sup> Else, G.R. and Edwards, M. (2018). Handbook of The Bees of the British Isles. Vol 2. Ray Society.

- 3.2.3.7 As *Hylaeus dilatatus* is not regarded as rare in that publication it is likely that the Pantheon status is in error, especially as *Hylaeus annularis* is shown without status, so probably conflated with that of *Hylaeus dilatatus*. A check on the JNCC designations spreadsheet <sup>49</sup> lists *Hylaeus annularis* as Rare but has no entry for *Hylaeus dilatatus*. For these reasons, the Pantheon status has been disregarded and *Hylaeus dilatatus* listed as Local.
- 3.2.3.8 A further species identified in Pantheon as being of conservation status is the cinnabar moth *Tyria jacobaea*. This species is correctly classed as a priority species, listed on Section 41 of the NERC Act; however, this is not a designation based on rarity or level of threat to the species, but instead is based on scientific recording and research reasons so is not discussed further in the report.
- 3.2.3.9 Further information relating to species which were recorded with an assessed status, is provided below.

#### **Coleoptera (Beetles)**

##### ***Aderidae (Ant-like Leaf Beetles) Euglenes oculatus - UK Status: Nationally Scarce***

- 3.2.3.10 This small beetle has wide distribution across southern and central England and is typically found in broad-leaved woodland and pasture-woodland; it has been recorded mainly from stumps and branches of oak, but is also found on lime, hawthorn, beech, birch and chestnut <sup>50</sup>.
- 3.2.3.11 The status of this species has recently been reviewed<sup>51</sup>.
- 3.2.3.12 Three specimens were taken from a window trap set in parcel 7a in July 2018

##### ***Buprestidae (Jewel Beetles) Trachys scrobiculatus – UK Status: Nationally Scarce***

- 3.2.3.13 The larvae of this tiny beetle are miners in the leaves of ground-ivy and henbane (*Hyoscyamus niger*) <sup>52</sup>, although it has also been recorded from mints on the Continent.

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<sup>49</sup> JNCC (2018) (Joint Nature Conservation Committee) Designations Spreadsheet <http://jncc.defra.gov.uk/page-3408> (Accessed 11 Oct 2018).

<sup>50</sup> Hyman, P.S. and Parsons, M.S. (1992) A review of the scarce and threatened Coleoptera of Great Britain. Part 2. UK Nature Conservation: 3. Peterborough: Joint Nature Conservation Committee.

<sup>51</sup> Alexander, K.N.A., Dodd, S. and Denton, J.S. (2014). A review of the scarce and threatened beetles of Great Britain; The darkling beetles and their allies: Aderidae, Anthicidae, Colydiidae, Melandryidae, Meloidae, Mordellidae, Mycetophagidae, Mycteridae, Oedemeridae, Pyrochroidae, Pythidae, Ripiphoridae, Salpingidae, Scaptiidae, Tenebrionidae and Tetratomidae (Tenebrionoidea less Ciidae). Species Status No.18. Natural England Commissioned Report NECR148.

<sup>52</sup> Levey, B. (1977). Buprestidae. Handbooks for the Identification of British Insects, Vol V, part 1 (b). Royal Entomological Society.

- 3.2.3.14 The adult has been found between April and December, and during the winter it hibernates in moss. Distribution is southerly with groups of records around the Oxford and Peterborough areas and the south-east counties.
- 3.2.3.15 The status of this species has recently been reviewed <sup>53</sup>.
- 3.2.3.16 One specimen was taken from a pan trap in parcel 12, on 28 June 2018.

***Carabidae (Ground Beetles) Bembidion maritimum – UK Status: Nationally Scarce (Amber List)***

- 3.2.3.17 This is a coastal insect found 'on muddy estuary banks, sometimes well inland on tidal riverbanks, and on the seashore where fresh water enters the sea' <sup>54</sup>.
- 3.2.3.18 The status of this species has recently been reviewed. <sup>55</sup>
- 3.2.3.19 Four beetles were identified from Parcel 11b during grubbing along the saltmarsh habitat of the River Arun on 08 May 2018.

***Carabidae (Ground Beetles) Bembidion stephensii - UK Status: Nationally Scarce***

- 3.2.3.20 This is a species typically found on bare gravelly clay soil in abandoned quarries and maritime soft-rock cliffs, usually near water, in most months of the year <sup>56</sup>. It is widespread across Britain, yet locally distributed where it does occur. A review by Telfer (2016) <sup>57</sup> confirms the beetle as nationally scarce.
- 3.2.3.21 Three specimens were taken from a seepage in Parcel 3a on 31 May 2017.

***Carabidae (Ground Beetles) Odacantha melanura - UK Status: Nationally Scarce***

- 3.2.3.22 This beetle is noted as being 'Hygrophilous, on tall standing vegetation, often reeds Phragmites, near fresh water', and has a local distribution in southern England and Wales.<sup>58</sup>
- 3.2.3.23 The status of this species has recently been reviewed <sup>59</sup>.
- 3.2.3.24 A singleton was taken from a pitfall trap set in Parcel 11a in May 2018.

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<sup>53</sup> Alexander, K.N.A. (2014). A review of the scarce and threatened beetles of Great Britain; Buprestidae, Cantharidae, Cleridae, Dasytidae, Drilidae Lampyridae, Lycidae, Lymexylidae, Malachiidae, Phloiophilidae and Trogossitidae. Species Status No.16. Natural England Commissioned Report NECR134.

<sup>54</sup> Duff, A.G. (2012). Beetles of Britain and Ireland. Vol 1: Sphaeriusidae to Silphidae. A.G. Duff (Publishing).

<sup>55</sup> Telfer, M.G. (2016). A review of the beetles of Great Britain: Ground Beetles (Carabidae). Species Status No.25. Natural England Commissioned Report NECR189.

<sup>56</sup> Duff, A.G. (2012). Beetles of Britain and Ireland. Vol 1: Sphaeriusidae to Silphidae. A.G. Duff (Publishing).

<sup>57</sup> Telfer, M.G. (2016). A review of the beetles of Great Britain: Ground Beetles (Carabidae). Species Status No.25. Natural England Commissioned Report NECR189.

<sup>58</sup> Duff, A.G. (2012). Beetles of Britain and Ireland. Vol 1: Sphaeriusidae to Silphidae. A.G. Duff (Publishing).

<sup>59</sup> Telfer, M.G. (2016). A review of the beetles of Great Britain: Ground Beetles (Carabidae). Species Status No.25. Natural England Commissioned Report NECR189.

***Carabidae (Ground Beetles) Pterostichus longicollis – UK Status: Nationally Scarce (Amber List)***

- 3.2.3.25 This species is found in damp litter, under stones and logs etc, usually near water and recorded year-round. It has a local distribution, particularly on the eastern side of England as far as Yorkshire, and South-East Wales<sup>60</sup>. A review by Telfer (2016)<sup>61</sup> confirms the beetle as nationally scarce and places it on an ‘amber’ list of declining species.
- 3.2.3.26 A single specimen was extracted from dredged leaf litter at Parcel 11a on 19 September 2017.
- 3.2.3.27 A further singleton was taken from a pitfall trap set in Parcel 11a in May 2018.

***Carabidae (Ground Beetles) Stenolophus skrimshiranus – UK Status: Nationally Scarce***

- 3.2.3.28 This is a very local ground beetle of Southern and Eastern-Central England. It is found at ‘plant roots on marshy vegetated soils near fresh water’<sup>62</sup>.
- 3.2.3.29 The status of this species has recently been reviewed <sup>63</sup>.
- 3.2.3.30 One specimen was extracted from the base of vegetation during grubbing in Parcel 13 on 18 May 2018.

***Cerambycidae (Longhorn Beetles) Tetrops starkii – UK Status: Red Data Book Insufficiently Known (RDBK)***

- 3.2.3.31 This rare longhorn beetle is restricted to central and southern England and is recorded from ‘woods, on various broad-leaved trees and shrubs, sometimes on hawthorn Crataegus flowers’<sup>64</sup>.
- 3.2.3.32 It is listed as a saproxylic species<sup>65</sup>.
- 3.2.3.33 One beetle was taken during sweeping and beating in Parcel 3a on 10 July 2018.

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<sup>60</sup> Duff, A.G. (2012). Beetles of Britain and Ireland. Vol 1: Sphaeriusidae to Silphidae. A.G. Duff (Publishing).

<sup>61</sup> Telfer, M.G. (2016). A review of the beetles of Great Britain: Ground Beetles (Carabidae). Species Status No.25. Natural England Commissioned Report NECR189.

<sup>62</sup> Duff, A.G. (2012). Beetles of Britain and Ireland. Vol 1: Sphaeriusidae to Silphidae. A.G. Duff (Publishing).

<sup>63</sup> Telfer, M.G. (2016). A review of the beetles of Great Britain: Ground Beetles (Carabidae). Species Status No.25. Natural England Commissioned Report NECR189.

<sup>64</sup> Duff, A.G. (2012). Beetles of Britain and Ireland. Vol 1: Sphaeriusidae to Silphidae. A.G. Duff (Publishing).

<sup>65</sup> Alexander, K.N.A. (2004). Revision of the Index of Ecological Continuity as used for saproxylic beetles. English Nature Research Report No. 574.

***Cleridae (Checkered beetles) Tillus elongatus – UK Status: Nationally Scarce***

3.2.3.34 A widespread species in south and central England with a few records as far as north Yorkshire and usually recorded from ancient broad-leaved and pasture-woodland. It has been found in oak, hazel, black poplar, holly and ivy and predates Anobium species, one of which was also recorded.

3.2.3.35 The status of this species has recently been reviewed.<sup>66</sup> It is listed as a saproxylic species.<sup>67</sup>

3.2.3.36 One female was identified from a window trap retrieved from Parcel 5 in July 2018.

***Curculionidae (True Weevils) Acalles ptinoides – UK Status: Nationally Scarce (NbB)***

3.2.3.37 This species is very small, at approximately two millimetres, is cryptically coloured, and usually found on dead branches or twigs or in litter<sup>68</sup>. It is listed as a saproxylic species in Alexander (2004)<sup>69</sup>.

3.2.3.38 A singleton was taken in a pitfall trap set in woodland next to a footpath in Parcel 3a, in September 2017.

***Curculionidae (True Weevils) Caenopsis fissirostris – UK Status: Nationally Scarce (NbB)***

3.2.3.39 Reported as very local in central and south England and very local in the north-west of England and Wales<sup>70</sup>, this is a fairly small weevil at 5 mm and typically found on the ground on heaths and in oak woods.

3.2.3.40 One specimen was taken from a pitfall trap set in woodland in Parcel 1, in September 2017.

***Curculionidae (True Weevils) Magdalis cerasi – UK Status: Nationally Scarce (NbB)***

3.2.3.41 This weevil is very small at approx. two millimetres, cryptically coloured, and usually found on dead branches or twigs or in litter and has a widespread distribution in central and south-east England<sup>71</sup>.

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<sup>66</sup> Alexander, K.N.A. (2014). A review of the scarce and threatened beetles of Great Britain; Buprestidae, Cantharidae, Cleridae, Dasytidae, Drilidae Lampyridae, Lycidae, Lymexylidae, Malachiidae, Phloiophilidae and Trogossitidae. Species Status No.16. Natural England Commissioned Report NECR134.

<sup>67</sup> Alexander, K.N.A. (2004). Revision of the Index of Ecological Continuity as used for saproxylic beetles. English Nature Research Report No. 574.

<sup>68</sup> Duff, A.G. (2016). Beetles of Britain and Ireland. Vol 4: Cerambycidae to Curculionidae. A.G. Duff (Publishing)

<sup>69</sup> Alexander, K.N.A. (2004). Revision of the Index of Ecological Continuity as used for saproxylic beetles. English Nature Research Report No. 574.

<sup>71</sup> Duff, A.G. (2016). Beetles of Britain and Ireland. Vol 4: Cerambycidae to Curculionidae. A.G. Duff (Publishing)

- 3.2.3.42 It is included on the list of saproxylic species <sup>72</sup>.
- 3.2.3.43 One male was taken from a window trap retrieved from Parcel 6 in May 2018.

***Curculionidae (True Weevils) Microplontus campestris – UK Status: Nationally Scarce (NbB)***

- 3.2.3.44 This weevil is found on oxeye daisy and is widely distributed but local in central and southern England<sup>73</sup>.
- 3.2.3.45 One specimen was identified from a pan trap set in Parcel 12 between the 12<sup>th</sup> and 18<sup>th</sup> May 2018.

***Microplontus triangulum – UK Status: Nationally Scarce (NbB)***

- 3.2.3.46 At approximately two millimetres long, this is a small weevil. It is reported to be associated with yarrow and is local in South England and Wales, getting scarcer up to south-west Scotland.
- 3.2.3.47 A single beetle was swept from hedge bank margins at Parcel 11a on 19 September 2017.

***Curculionidae (True Weevils) Polydrusus (Chrysophis) formosus – UK Status: Nationally Scarce (NbA)***

- 3.2.3.48 Although formerly restricted to the south, this species is now much commoner and widespread<sup>74</sup>. There are also many records that are not shown on current distribution maps and it is certainly common in Lancashire and Cheshire for example. It is probably overlooked as it closely resembles several other common weevils. A review will undoubtedly downgrade the species as the number of 10 kilometre squares it has been recorded in greatly exceeds that necessary for Notable A status.
- 3.2.3.49 It is a polyphagous species and found on a variety of tree species, including oak, hazel and fruit trees such as apple, pear and cherry species <sup>75</sup>.
- 3.2.3.50 One weevil was taken from a window trap retrieved from Parcel 6 in June 2018.

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<sup>72</sup> Alexander, K.N.A. (2004). Revision of the Index of Ecological Continuity as used for saproxylic beetles. English Nature Research Report No. 574.

<sup>73</sup> Duff, A.G. (2016). Beetles of Britain and Ireland. Vol 4: Cerambycidae to Curculionidae. A.G. Duff (Publishing)

<sup>74</sup> Stenhouse, D. (2004). *Polydrusus splendidus* (Herbst) (Curculionidae) in South Lancashire and Cheshire. The Coleopterist 13(4): 133.

<sup>75</sup> Duff, A.G. (2016). Beetles of Britain and Ireland. Vol 4: Cerambycidae to Curculionidae. A.G. Duff (Publishing).

***Curculionidae (True Weevils) Rhinocyllus conicus – UK Status: Nationally Scarce (NbA)***

- 3.2.3.51 Mostly recorded on the coast, this fairly distinctive species feeds on thistles *Cirsium* and *Carduus* species in open places. Although local in South and Central England, and scarcer further north, it is apparently ‘rapidly increasing in range’<sup>76</sup>.
- 3.2.3.52 One specimen was swept from ruderal vegetation (including thistles) at the edge of the small wooded copse at Parcel 10, on 31 May 2017. The desk study also revealed this species has been recorded from Binsted Rife to the south-west of the Field Survey Area<sup>77</sup>.

***Curculionidae (True Weevils) Zacladus exiguus – UK Status: Nationally Scarce (NbB)***

- 3.2.3.53 This is one of two similar, small (three millimetres) weevil species both of which feed on *Geranium* species. This tends to be found on smaller-flowered annual species. According to Duff (2016)<sup>78</sup>, although very local in Southern England, it can be frequent where found.
- 3.2.3.54 One weevil was swept from the species-rich hedge bank at Parcel 8 on 25 July 2017.

***Elateridae (Click Beetles) Ampedus elongantulus – UK Status: Nationally Scarce (NbA), Near Threatened***

- 3.2.3.55 This species is described as an obligate saproxylic species<sup>79</sup>. The larvae develop in red-rotten heartwood of living old oak and pine trees. It has also been reported from beech. Larvae pupate at the end of the season and overwinter as adults; the adults are active from mid-May to July, and are attracted to hawthorn blossom, other shrubs and grasses. In Britain it is largely confined to ancient woodlands and wood pastures in the cultural landscape rather than forest. Apparently, the species is in decline in Europe<sup>80</sup>.
- 3.2.3.56 The species is listed as a saproxylic species and is one of the species used in the calculation of Index of Ecological Continuity (IEC)<sup>81</sup>.

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<sup>76</sup> Duff, A.G. (2016). Beetles of Britain and Ireland. Vol 4: Cerambycidae to Curculionidae. A.G. Duff (Publishing).

<sup>77</sup> Edwards, M. (2016 and 2017). An Entomological survey within Binsted Parish, 2016-2017. Unpublished report to the Mid-Arun Environmental Survey (MAVES).

<sup>78</sup> Duff, A.G. (2016). Beetles of Britain and Ireland. Vol 4: Cerambycidae to Curculionidae. A.G. Duff (Publishing).

<sup>79</sup> Alexander, K.N.A. (2002). The invertebrates of living and decaying timber in Britain and Ireland – a provisional annotated checklist. English Nature Research Report No. 467.

<sup>80</sup> <http://www.iucnredlist.org/details/157503/1>.

<sup>81</sup> Alexander, K.N.A. (2004). Revision of the Index of Ecological Continuity as used for saproxylic beetles. English Nature Research Report No. 574.

3.2.3.57 One click beetle was beaten from buddleia in the wooded ride of Parcel 4 on 30 June 2017. The desk study also revealed this species has been recorded from Noor Wood.

***Elateridae (Click Beetles) Procræus tibialis – UK Status: Nationally Rare (RDB3)***

3.2.3.58 A fairly small click beetle found in ‘ancient broad-leaved woodland and pasture woodland’. It develops in ‘dead wood in hollow and decayed oak, beech and hornbeam’ and is widely but locally distributed in southern and central England<sup>82</sup>.

3.2.3.59 The species is listed as a saproxylic species and is one of the species used in the calculation of Index of Ecological Continuity (IEC) <sup>83</sup>.

3.2.3.60 Two males were identified from a window trap retrieved from Parcel 5 in July 2018.

***Eucnemidae (False Click Beetles) Microrhagus pygmaeus – UK Status: Nationally Rare (RDB3)***

3.2.3.61 This species is found in broad-leaved woodland, with the larvae developing in dead wood. Adults have been found from a variety of different types of wood at differing stages of decay, although it is particularly associated with oak<sup>84</sup>.

3.2.3.62 It is included on the list of saproxylic species and listed as a saproxylic species used in the calculation of the Index of Ecological Continuity.<sup>85</sup>

3.2.3.63 One male was taken during sweeping and beating at Parcel 12 on 28 June 2018 and one female was taken from a window trap retrieved from Parcel 1 in July 2018.

3.2.3.64 The desk study also revealed this species has been recorded from Meadow Lodge to the south of the Field Survey Area<sup>86</sup>.

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<sup>82</sup> Hyman, P.S. and Parsons, M.S. (1992) A review of the scarce and threatened Coleoptera of Great Britain. Part 2. UK Nature Conservation: 3. Peterborough: Joint Nature Conservation Committee.

<sup>83</sup> Alexander, K.N.A. (2004). Revision of the Index of Ecological Continuity as used for saproxylic beetles. English Nature Research Report No. 574.

<sup>84</sup> Joy, N.H. (1932). A Practical Handbook of British Beetles. 2, vols. London. H.F. and G. Witherby, Vol. 1 xxvii+622 pp, Vol. 2 194pp.

<sup>85</sup> Alexander, K.N.A. (2004). Revision of the Index of Ecological Continuity as used for saproxylic beetles. English Nature Research Report No. 574.

<sup>86</sup> Edwards, M. (2016 and 2017). An Entomological survey within Binsted Parish, 2016-2017. Unpublished report to the Mid-Arun Environmental Survey (MAVES).

***Eucnemidae (False Click Beetles) Hylis cariniceps – UK Status: Nationally Rare (RDB1)***

- 3.2.3.65 This small beetle is found in ‘broad-leaved woodland’ and is ‘probably associated with ancient beech’, with the larvae probably developing in dead wood<sup>87</sup>.
- 3.2.3.66 This appears to be a genuinely rare species with very few records. The only apparent records are for ‘one female in 1966 from near some beech trees in Mallard Wood, New Forest, Hampshire and a second example found, post 1976, on Brownsea Island Dorset’. Therefore, this record is of importance, potentially extending the known distribution into a new vice-county.
- 3.2.3.67 It is included on the list of saproxylic species in Alexander<sup>88</sup>.
- 3.2.3.68 One female was taken from a window trap retrieved from Parcel 5 in July 2018.

***Lymexylidae (Ship-timber Beetles) Lymexylon navale – UK Status: Nationally Scarce***

- 3.2.3.69 This is typically regarded as a species of ancient broad-leaved woodland and pasture woodland, that breeds in dead oak. The larvae live in ‘seasoned timber of dead standing oaks’ and ‘local populations are often restricted to individual trees’<sup>89</sup>. Most modern records are from South-East and Central England as far as Manchester.
- 3.2.3.70 It is included on the list of saproxylic species and listed as a saproxylic species used in the calculation of the Index of Ecological Continuity<sup>90</sup>.
- 3.2.3.71 The status of this species has recently been reviewed<sup>91</sup>.
- 3.2.3.72 One specimen was taken from a window trap retrieved from Parcel 1 in July 2018.

***Mordellidae (Tumbling Flower Beetles) Variimorda villosa – UK Status: Nationally Scarce***

- 3.2.3.73 This is one of the larger (five to eight millimetre) members of a distinctive family.

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<sup>87</sup> Hyman, P.S. and Parsons, M.S. (1992) A review of the scarce and threatened Coleoptera of Great Britain. Part 2. UK Nature Conservation: 3. Peterborough: Joint Nature Conservation Committee.

<sup>88</sup> Alexander, K.N.A. (2004). Revision of the Index of Ecological Continuity as used for saproxylic beetles. English Nature Research Report No. 574.

<sup>89</sup> Hyman, P.S. and Parsons, M.S. (1992) A review of the scarce and threatened Coleoptera of Great Britain. Part 2. UK Nature Conservation: 3. Peterborough: Joint Nature Conservation Committee.

<sup>90</sup> Alexander, K.N.A. (2004). Revision of the Index of Ecological Continuity as used for saproxylic beetles. English Nature Research Report No. 574.

<sup>91</sup> Alexander, K.N.A. (2014). A review of the scarce and threatened beetles of Great Britain; Buprestidae, Cantharidae, Cleridae, Dasytidae, Drilidae Lampyridae, Lycidae, Lymexylidae, Malachiidae, Phloiophilidae and Trogossitidae. Species Status No.16. Natural England Commissioned Report NECR134.

- 3.2.3.74 The larvae develop in the rotten wood of poplars and willows, often in flood plains and the adults feed on various flowers in the families Asteraceae (daisies) and Apiaceae (umbellifers) <sup>92</sup>..
- 3.2.3.75 The status of this species has recently been reviewed<sup>93</sup>.
- 3.2.3.76 Seven beetles were identified from a pan trap set in Parcel 3b on 11 July 2018.

***Nitidulidae (Sap Beetles) Cryptarcha strigata – UK Status: Nationally Scarce***

- 3.2.3.77 This species is widely distributed in southern and central England as far as south Yorkshire and also in Wales. It is associated with broad-leaved and pasture woodland and reported ‘at the sap and under bark of oak and ash’<sup>94</sup>.
- 3.2.3.78 It is included on the list of saproxylic species in Alexander <sup>95</sup>.
- 3.2.3.79 One beetle was taken from a window trap retrieved from Parcel 13 in July 2018.

***Oedemera femoralis – UK Status: Nationally Scarce***

- 3.2.3.80 This species has been recorded mainly in South-East England and South Wales, but has been found as far as Cumbria, and often on the coast. It is nocturnal, frequenting Ivy and Sallow from April. The status has been recently reviewed <sup>96</sup>..
- 3.2.3.81 One specimen was swept from the coppice woodland in Parcel 2 on 30 May 2017.

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<sup>92</sup> Ermisch, Von. K. (1969). In Freude, H., Harde, K.W. and Lohse, G. A. Die Käfer Mitteleuropas, Mordellidae. 8: 160 – 188. Krefeld.

<sup>93</sup> Alexander, K.N.A., Dodd, S. and Denton, J.S. (2014). A review of the scarce and threatened beetles of Great Britain; The darkling beetles and their allies: Aderidae, Anthicidae, Colydiidae, Melandryidae, Meloidae, Mordellidae, Mycetophagidae, Mycteridae, Oedemeridae, Pyrochroidae, Pythidae, Ripiphoridae, Salpingidae, Scaptiidae, Tenebrionidae and Tetratomidae (Tenebrionoidea less Ciidae). Species Status No.18. Natural England Commissioned Report NECR148.

<sup>94</sup> Hyman, P.S. and Parsons, M.S. (1992) A review of the scarce and threatened Coleoptera of Great Britain. Part 2. UK Nature Conservation: 3. Peterborough: Joint Nature Conservation Committee.

<sup>95</sup> Alexander, K.N.A. (2004). Revision of the Index of Ecological Continuity as used for saproxylic beetles. English Nature Research Report No. 574.

<sup>96</sup> Alexander, K.N.A., Dodd, S. and Denton, J.S. (2014). A review of the scarce and threatened beetles of Great Britain; The darkling beetles and their allies: Aderidae, Anthicidae, Colydiidae, Melandryidae, Meloidae, Mordellidae, Mycetophagidae, Mycteridae, Oedemeridae, Pyrochroidae, Pythidae, Ripiphoridae, Salpingidae, Scaptiidae, Tenebrionidae and Tetratomidae (Tenebrionoidea less Ciidae). Species Status No.18. Natural England Commissioned Report NECR148.

***Rhynchitidae (Tooth-nosed Snout Weevils) Temnocerus longiceps – UK Status: Nationally Scarce (NbB)***

- 3.2.3.82 This three-millimetre weevil is found on several common tree species, including birches, willows and Alder (*Alnus* spp.)<sup>97</sup>. It has a widespread distribution in England as far as Cumbria.
- 3.2.3.83 One specimen was taken during sweeping and beating at Parcel 7a on 17 May 2018.

***Staphylinidae (Rove Beetles) Alaobia hybrida – UK Status: Red Data Book Insufficiently Known (RDBK)***

- 3.2.3.84 There is very little known about this small three-millimetre beetle. It is difficult to identify and extremely similar to many related species, so easy to overlook. It has been recorded at sap<sup>98</sup> and has been reported from aerial traps baited with fermenting fruit<sup>99</sup>. The known distribution is based on very few records and shows it to be found from Southern England up to Cumbria with a record for Wales.
- 3.2.3.85 One male was taken from the fungus, birch polypore *Piptoporus betulinus* in Parcel 3, on 31 May 2017.

***Staphylinidae (Rove Beetles) Gabrius bishopi – UK Status: Nationally Scarce (NbB)***

- 3.2.3.86 The typical habitat for this four to five-millimetre species is exposed sediment by slow-flowing rivers and fluctuating marsh. It is widespread in England but more frequently recorded in the north<sup>100</sup>.
- 3.2.3.87 One male was taken from muddy ditch margins in the Arun floodplain at Parcel 11a, on 19 September 2017.

***Staphylinidae (Rove Beetles) Ilyobates propinquus – UK Status: Nationally Scarce (Nb)***

- 3.2.3.88 This rove beetle is typically found in sandy places such as river banks and sandpits, but has been taken from flood meadows<sup>101</sup>. It has been recorded from south-east and central England.

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<sup>97</sup> Duff, A.G. (2016). Beetles of Britain and Ireland. Vol 4: Cerambycidae to Curculionidae. A.G. Duff (Publishing).

<sup>98</sup> Hyman, P.S. and Parsons, M.S. (1994). A review of the scarce and threatened Coleoptera of Great Britain. Part 2. UK Nature Conservation: 3. Peterborough: Joint Nature Conservation Committee.

<sup>99</sup> Tronquet, M. (2006). Catalogue Iconographique des Coléoptères des Pyrénées-Orientales. Volume 1 (édition revue et augmentée) Staphylinidae. Supplément au tome XV de la Revue de l' Association Roussillonnaise d'Entomologie. Gibou Arts Graphiques 7, place du Canigou F-66200 Elne.

<sup>100</sup> Lott, D.A. and Anderson, R. (2011). The Staphylinidae (rove beetles) of Britain and Ireland. Oxyporinae, Steninae, Euaesthetinae, Pseudopsinae, Paederinae, Staphylininae. Handbooks for the Identification of British Insects: Royal Entomological Society. Vol. 12 Part 7 and 8.

<sup>101</sup> Hyman, P.S. and Parsons, M.S. (1994). A review of the scarce and threatened Coleoptera of Great Britain. Part 2. UK Nature Conservation: 3. Peterborough: Joint Nature Conservation Committee.

3.2.3.89 One specimen was extracted from a pitfall trap set in Parcel 13 in July 2018.

***Staphylinidae (Rove Beetles) *Platydracus fulvipes* – UK Status: Nationally Scarce (NbB)***

3.2.3.90 Although one author<sup>102</sup> claims the habitat of this rove beetle to be ‘uncertain’, on the continent it has been taken ‘under stones, in litter, mosses, especially in woodland’<sup>103</sup>. It has been widely recorded as far north as Cumbria but there are few records for south east and south west England.

3.2.3.91 One beetle was taken from a pitfall trap set in hazel coppice of Parcel 2, in September 2017.

***Tenebrionidae (Darkling Beetles) *Diaperis boleti* – UK Status: Nationally Scarce***

3.2.3.92 This species has been found in the bracket fungus *Piptoporus betulinus* on birch and *Polyporus squamosus* on poplar. It has a pronouncedly south-easterly distribution in England and is locally common.<sup>104</sup>

3.2.3.93 The status of this species has recently been reviewed<sup>105</sup>.

3.2.3.94 Two beetles were taken from a window trap retrieved from Parcel 5 in July 2018.

### **3.2.4 Hemiptera - True Bugs**

***Saldidae (Shore Bugs) *Saldula pallipes* – UK Status: Nationally Scarce***

3.2.4.1 This bug is widespread and locally common, by inland pools and in flooded gravel pits, at least as far north as Southern Scotland<sup>106</sup>.

3.2.4.2 One shore bug was taken from muddy ditch margins in the Arun floodplain at Parcel 11a, on 19 September 2017.

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<sup>102</sup> Lott, D.A. and Anderson, R. (2011). The Staphylinidae (rove beetles) of Britain and Ireland. Oxyporinae, Steninae, Euaesthetinae, Pseudopsinae, Paederinae, Staphylininae. Handbooks for the Identification of British Insects: Royal Entomological Society. Vol. 12 Part 7 and 8.

<sup>103</sup> Tronquet, M. (2006). Catalogue Iconographique des Coléoptères des Pyrénées-Orientales. Volume 1 (édition revue et augmentée) Staphylinidae. Supplément au tome XV de la Revue de l' Association Roussillonnaise d'Entomologie. Gibou Arts Graphiques 7, place du Canigou F-66200 Elne.

<sup>104</sup> Hyman, P.S. and Parsons, M.S. (1994). A review of the scarce and threatened Coleoptera of Great Britain. Part 2. UK Nature Conservation: 3. Peterborough: Joint Nature Conservation Committee.

<sup>105</sup> Alexander, K.N.A., Dodd, S. and Denton, J.S. (2014). A review of the scarce and threatened beetles of Great Britain; The darkling beetles and their allies: Aderidae, Anthicidae, Colydiidae, Melandryidae, Meloidae, Mordellidae, Mycetophagidae, Mycteridae, Oedemeridae, Pyrochroidae, Pythidae, Ripiphoridae, Salpingidae, Scaptiidae, Tenebrionidae and Tetratomidae (Tenebrionoidea less Ciidae). Species Status No.18. Natural England Commissioned Report NECR148.

<sup>106</sup> [http://www.britishbugs.org.uk/heteroptera/Saldidae/Saldula\\_pallipes.html](http://www.britishbugs.org.uk/heteroptera/Saldidae/Saldula_pallipes.html).

### 3.2.5 Hymenoptera – Bees, Wasps and Ants

#### ***Andrenidae (Mining Bees) Andrena fulvago – UK Status: Nationally Scarce (NbA)***

3.2.5.1 This bee is regarded as being very local but widely distributed in Southern England, between Kent and Cornwall and as far as Hereford in the North<sup>107</sup>. It 'frequents coastal cliffs, chalk grassland, dunes and the margins of moors' and visits flowers in the Asteraceae such as common cat's ear (*Hypochaeris radicata*) and dandelion (*Taraxacum officinale* agg).

3.2.5.2 During May 2018, bees were taken from pan traps in both Parcel 6 and Parcel 8.

#### ***Crabronidae (Digger Wasps) Didineis lunicornis – UK Status: Nationally Scarce (NbA)***

3.2.5.3 Until fairly recently, this species was regarded as a rarity. It is unclear whether the flush of records over the past two decades indicates an increase in its status and range or whether it had been overlooked as an ichneumon or pompilid wasp.

3.2.5.4 Most modern records are from south-east England as far north as Peterborough and it is associated with 'deep desiccation cracks that appear on clay rich ground in summer months'<sup>108</sup>.

3.2.5.5 One male wasp was swept from flowers at Parcel 12 on 28 June 2018.

#### ***Crabronidae (Digger Wasps) Diodontus insidiosus – UK Status: Nationally Rare (RDB3)***

3.2.5.6 Very little appears to be known about this tiny (approximately four millimetre) wasp. It apparently favours open dry ground and short grassland and nests have been found on bare sandy ground, both flat and banked. The prey is probably aphids and the season June to September. As the insect was last reviewed by Falk (1991) it is overdue for re-assessment but seems to be genuinely scarce although it may be overlooked due to its size<sup>109</sup>.

3.2.5.7 One male was taken from a pan trap in Parcel 3b on 11 July 2018.

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<sup>107</sup> Else, G.R. and Edwards, M. (2018). Handbook of the Bees of the British Isles. Vol 2. Ray Society.

<sup>108</sup> <http://www.bwars.com/wasp/crabronidae/nyssoninae/didineis-lunicornis>

<sup>109</sup> <http://www.bwars.com/wasp/crabronidae/pemphredoninae/diodontus-insidiosus>

***Crabronidae (Digger Wasps) Nysson trimaculatus – UK Status: Nationally Scarce (NbB)***

- 3.2.5.8 This wasp is recorded widely in Southern England but in recent decades has been found more widely, as far as Yorkshire, from where it was unrecorded in the 1970's. It is a cleptoparasite of several Gorytes species of bee, but is often scarcer than the hosts. It tends to be found in open habitats 'on light soils, including heathland, dry grassland and scrub, open woodland, coastal landslips and soft rock cliffs, quarries and other post-industrial sites and occasionally heavily urbanised locations' and is 'usually observed running on sparsely-vegetated ground or low herbage'<sup>110</sup>
- 3.2.5.9 One wasp was collected from a pan trap near the small copse at Parcel 10, on 25 July 2017 and one male was taken from a pan trap in Parcel 3b on 11 July 2018.
- 3.2.5.10 The desk study also revealed this species has been recorded from Meadow Lodge to the south of the Field Survey Area<sup>111</sup>..

***Halictidae (Base-banded Furrow Bees) Lasioglossum malachurum – UK Status: Nationally Scarce (NbA)***

- 3.2.5.11 This species was regarded as scarce but is now widespread in Southern England and is extending its range distribution into the midlands. It can be very numerous, forming huge colonies along well-trodden paths and sparsely vegetated south facing slope<sup>112</sup>. Due to the large number of recent records, the bee is understood to not deserve its current status and is likely to be downgraded in any future review.
- 3.2.5.12 The species was taken from all three locations where pan traps had been set, on 25 July 2017, which included Parcels 8 – 10. It was also taken from a pan trap near the small copse at Parcel 10, on 6 September 2017. The desk study also revealed this species in the Binsted Park area in the west of the Field Survey Area<sup>113</sup>.

***Halictidae (Base-banded Furrow Bees) Lasioglossum pauxillum - UK Status: Nationally scarce (NbA)***

- 3.2.5.13 Although formerly regarded as scarce this small bee is now one of the most common Lasioglossum species in Southern England<sup>114</sup> and has been recorded as far as Yorkshire.

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<sup>110</sup> <http://www.bwars.com/wasp/crabronidae/nyssoninae/nysson-trimaculatus>

<sup>111</sup> Edwards, M. (2016 and 2017). An Entomological survey within Binsted Parish, 2016-2017. Unpublished report to the Mid-Arun Environmental Survey (MAVES).

<sup>112</sup> Falk, S. (2015) Field Guide to the Bees of Great Britain and Ireland. British Wildlife Field Guides. Bloomsbury.

<sup>113</sup> Edwards, M. (2016 and 2017). An Entomological survey within Binsted Parish, 2016-2017. Unpublished report to the Mid-Arun Environmental Survey (MAVES).

<sup>114</sup> Falk, S. (2015) Field Guide to the Bees of Great Britain and Ireland. British Wildlife Field Guides. Bloomsbury.

- 3.2.5.14 This species can be found in a range of open habitats, favouring chalk downland and calcareous brownfield sites<sup>115</sup> and visits plants of various families including buttercups, Rape, Asteraceae and Blackthorn. Due to the large number of recent records, the bee does not deserve its current status and is likely to be downgraded in any future review.
- 3.2.5.15 A single bee was collected from a pan trap along the flower-rich farm track, at Parcel 9, on 25 July 2017. Two females were identified from a pan trap along the woodland edge of Parcel 6, on 9 May 2018.
- 3.2.5.16 The desk study also revealed this species in the Binsted Park area, and also at Meadow Lodge in the west of the Field Survey Area and to the south of the Field Survey Area, respectively<sup>116</sup>.

***Halictidae (Base-banded Furrow Bees) Lasioglossum puncticolle - UK Status: Nationally scarce (NbB)***

- 3.2.5.17 According to BWARS<sup>117</sup> this species is restricted to the South, although records suggest it is found more widely in Norfolk and the Wales border. It is 'often found in open, broad-leaved woodland but also associated with coastal land slips, soft-rock cliffs and estuarine fore-shores'. It is found from April to October, digs nests in clayey soil and collects pollen primarily from wild carrot (*Daucus carota*), although it has been seen pollen gathering from fleabane, thistles (*Cirsium spp.*) yellow Asteraceae such as dandelion and buttercups.
- 3.2.5.18 One female was collected from a pan trap set in Parcel 12 on 18 May 2018.

***Melittidae (Melittid Bees Bees) Dasypoda hirtipes - UK Status: Nationally scarce (NbB)***

- 3.2.5.19 This rather large, hairy and distinctive species appears to be largely coastal, preferring sandy heaths and dunes. Females dig long burrows in sparsely vegetated level ground between late June and early September and some sites may contain large nest aggregations. It is known to visit various yellow Asteraceae flowers that open in the morning<sup>118</sup>.
- 3.2.5.20 Six males were taken from a pan trap set at Parcel 3b on 11 July 2018.

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<sup>115</sup> Falk, S. (2015) Field Guide to the Bees of Great Britain and Ireland. British Wildlife Field Guides. Bloomsbury.

<sup>116</sup> Edwards, M. (2016 and 2017). An Entomological survey within Binsted Parish, 2016-2017. Unpublished report to the Mid-Arun Environmental Survey (MAVES).

<sup>117</sup> <http://www.bwars.com/bee/halictidae/lasioglossum-puncticolle>

<sup>118</sup> <http://bwars.com/index.php?q=bee/melittidae/dasypoda-hirtipes>

### **3.2.6 Butterfly Transects**

- 3.2.6.1 Twenty-three butterfly species were observed during the course of the transect surveys. Summaries of the transect survey results in 2017 and 2018 are shown in **Table 3-5 and Table 3-6** respectively, and the route of the transects is shown in **Figure 3**.

**Table 3-5 - Summary of butterfly transect survey results in 2017**

Common name	Latin name	Number of sightings 25 July 2017				Number of sightings 6 September 2017			
		A	B	C	D	A	B	C	D
Common Blue	<i>Polyommatus icarus</i>	5		11					
Brimstone	<i>Gonepteryx rhamni</i>				1				
Gatekeeper	<i>Pyronia tithonus</i>	17	41	45	7				
Meadow Brown	<i>Maniola jurtina</i>	14	35	27	10				
Speckled Wood	<i>Pararge aegeria</i>	1		1	2	3	1	2	7
Ringlet	<i>Aphantopus hyperantus</i>			1					
Silver-washed Fritillary	<i>Argynnis paphia</i>	2	16	1	8				
Comma	<i>Polygonia c-album</i>			3			1	1	1
Red Admiral	<i>Vanessa atalanta</i>	2	6	3	2	1	8	9	
Peacock	<i>Aglais io</i>			3	2			1	
Large Skipper	<i>Ochlodes sylvanus</i>			1					
Essex Skipper	<i>Thymelicus lineola</i>			1					
Large White	<i>Pieris brassicae</i>			6			1		
Small White	<i>Pieris rapae</i>		3	3	2	10	4	21	
Green-Veined White	<i>Pieris napi</i>			1				1	

**Table 3-6 - Summary of butterfly transect survey results in 2018**

Common name	Latin name	Number of sightings 17 / 18 May 2018				Number of sightings 10 / 11 July 2018			
		A	B	C	E	A	B	C	E
Common Blue	<i>Polyommatus icarus</i>				1	1			1
Brown argus	<i>Aricia agestis</i>							1	1
Holly blue	<i>Celastrina argiolus</i>				1				
Brimstone	<i>Gonepteryx rhamni</i>								
Gatekeeper	<i>Pyronia tithonus</i>					19	42	18	10
Meadow Brown	<i>Maniola jurtina</i>					35	40	18	7
Speckled Wood	<i>Pararge aegeria</i>			1		2	3	5	
Ringlet	<i>Aphantopus hyperantus</i>					23	11	2	
Silver-washed Fritillary	<i>Argynnis paphia</i>					6	13	1	
Comma	<i>Polygonia c-album</i>					2	2	1	
Red Admiral	<i>Vanessa atalanta</i>			1		1	2	2	
White admiral	<i>Limenitis camilla</i>						1		
Small tortoiseshell	<i>Aglais urticae</i>					2			
Peacock	<i>Aglais io</i>			6		8	3	1	1
Small skipper	<i>Thymelicus sylvestris</i>					3			
Large Skipper	<i>Ochlodes sylvanus</i>					2	3	1	
Essex Skipper	<i>Thymelicus lineola</i>					1		1	
Essex / small skipper agg.	-							1	6

Common name	Latin name	Number of sightings 17 / 18 May 2018				Number of sightings 10 / 11 July 2018			
		A	B	C	E	A	B	C	E
Large White	<i>Pieris brassicae</i>	4	1	22		17	9	53	5
Small White	<i>Pieris rapae</i>			9				10	1
Green-Veined White	<i>Pieris napi</i>			10	1	13	4	17	1
Small copper	<i>Lycaena phlaeas</i>				2	2			
Orange-tip	<i>Anthocharis cardamines</i>	2		16					
Marbled white	<i>Melanargia galathea</i>					1	1		
Silver Y (moth)	<i>Autographa gamma</i>					1	2		
Swallow-tailed moth	<i>Ourapteryx sambucaria</i>							1	
Six-spot burnet (moth)	<i>Zygaena filipendulae</i>						1		3

3.2.7.1 The diversity of butterfly species is typical for a site of this type and location. The species recorded are generally considered to be common and widespread across Southern England.

3.2.7.2 One species, white admiral *Limenitis camilla*, stands out as being of conservation status. This species is a priority species, listed on Section 41 of the NERC Act, and is classified as Vulnerable following a population decline over the last ten years <sup>119</sup>. It is described by Butterfly Conservation as using shady woodland and ride edges often associated with neglected or mature woodland, both deciduous and mixed deciduous/coniferous, with large patches of bramble to provide nectar for the adults <sup>120</sup> *Limenitis camilla* has also been widely recorded in the desk study area.

### 3.2.8 Pantheon Assemblage Analysis

3.2.8.1 As explained in the methodology section, the Pantheon database has been used principally to help understand which assemblages within the site are likely to be important. The entire combined species list derived from the targeted surveys across the 2017 and 2018 Field Survey Areas was entered into Pantheon. The data output from the analysis is shown in **Table 3-7**, **Table 3-8** and **Table 3-9** below which considers invertebrate assemblages at three different levels.

#### Broad Biotopes

**Table 3-7 - Summary of Pantheon output for broad biotopes**

Broad biotope	No. of species	Number of species with conservation status recognised by Pantheon
Open habitats	347	17
Tree-associated	143	17
Wetland	90	7

3.2.8.2 **Table 3-7** shows that there are three broad assemblage types which are recognised by Pantheon. The best represented is that belonging to open habitats. This is initially unexpected since the majority of the survey effort targeted wooded habitats that could have been expected to return more species associated with the ‘tree-associated’ biotope.

<sup>119</sup> Fox, R., Warren, M.S., and Brereton, T.M. (2009). *A new Red List of British Butterflies, Species Status 12*; 1-32. Joint Nature Conservation Committee, Peterborough.

<sup>120</sup> <https://butterfly-conservation.org/sites/default/files/white-admiral-psf.pdf>

- 3.2.8.3 This result may therefore indicate that a large proportion of the invertebrates sampled from woodland parcels were more closely associated with wooded edge habitats such as the ecotone of the woodland exterior, rather than the shaded and canopy dominated interior. This is supported by the fact that many of the wooded habitats surveyed (e.g. Parcels 3, 5, 6, 7 and 10) were relatively small or linear, therefore did not include the large wooded interior of Parcels such as Parcel 1 (Barnes Copse and Little Danes Wood). The sampling of grassland habitat at Binsted Rife (Parcel 13) and later addition of the former sand quarry of Slindon Pit (Parcel 3b); both characterised by open field layers would also have contributed to the number of species from this broad biotope.
- 3.2.8.4 Notwithstanding the above, the tree-associated biotope was relatively well represented, and this would have been due to the considerable targeted survey efforts within woodland habitats. The setting of window traps in particular, to target saproxylic species would almost exclusively record species from this biotope. Also, due to the characteristic nature of dead wood habitats being rich in scarce species, it is unsurprising that a proportionally high number of species with conservation status (12% of records) was returned from this biotope, when compared with the lower proportions returned from the other two biotopes (8% for wetland and 5% for open habitats).
- 3.2.8.5 The wetland habitat would have most likely been associated the areas of ditch of the Arun floodplain in the east of the Field Survey Area (Parcel 11a) and also the seepages along the valley of Binsted Rife (Parcel 13).

## Habitats

Table 3-8 - Summary of Pantheon output for habitats

Broad biotope	Habitat	No. of species	SQI	Species with conservation status recognised by Pantheon (those underlined do not merit conservation status)
Open habitats	Tall sward and scrub	260	106	7 ( <i>Trachys scrobiculatus</i> , <i>Caenopsis fissirostris</i> , <i>Zacladus exiguous</i> , <i>Oedemera femoralis</i> , <i>Platydracus fulvipes</i> , <u><i>Hylaeus dilatatus</i></u> , <u><i>Tyria jacobaeae</i></u> )
Open habitats	Short sward and bare ground	69	130	11 ( <i>Microplontus campestris</i> , <i>Microplontus triangulum</i> , <i>Rhinocyllus conicus</i> , <i>Andrena fulvago</i> , <u><i>Hylaeus dilatatus</i></u> , <i>Didineis lunicornis</i> , <i>Diodontus insidiosus</i> , <i>Lasioglossum malachurum</i> , <i>Lasioglossum pauxillum</i> , <i>Lasioglossum puncticolle</i> , <i>Dasyпода hirtipes</i> )
Tree-associated	Decaying wood	68	191	13 ( <i>Euglenes oculatus</i> , <i>Tetrops starkii</i> , <i>Tillus elongatus</i> , <i>Acalles ptinoides</i> , <i>Magdalis cerasi</i> , <i>Ampedus elongantulus</i> , <i>Prokraerus tibialis</i> , <u><i>Dacne rufifrons</i></u> , <i>Hylis cariniceps</i> , <i>Microrhagus pygmaeus</i> , <i>Lymexylon navale</i> , <i>Cryptarcha strigata</i> , <i>Diaperis boleti</i> )
Tree-associated	Shaded woodland floor	44	100	1 ( <i>Nysson trimaculatus</i> )
Wetland	Marshland	44	114	2 ( <i>Pterostichus longicollis</i> , <i>Saldula pallipes</i> )
Tree-associated	Arboreal	36	117	3 ( <i>Polydrusus formosus</i> , <i>Temnocerus longiceps</i> , <i>Limenitis camilla</i> )
Wetland	Peatland	33	119	2 ( <i>Odacantha melanura</i> , <i>Stenolophus skrimshiranus</i> )
Other habitats	Running water, wet woodland, saltmarsh, brackish pools and ditches, upland, lake	<15	N/A	2 from running water habitat ( <i>Bembidion stephensii</i> , <i>Gabrieus bishopi</i> ) 1 from saltmarsh habitat ( <i>Bembidion maritimum</i> )

- 3.2.8.6 **Table 3-8** adds a finer level of detail to **Table 3-7**, sub-dividing broad biotopes into habitats. The most prominent habitat that features is that of ‘tall sward scrub’ that lies within the broad biotope of open habitats. Whilst belonging to the open habitats biotope, it could be considered as borderline with the tree-associated biotope, since the definition of this habitat in Pantheon, as ‘Areas of dense herbage or partial shade where a humid microclimate is maintained at ground level. Dominance by woody plants is limited by exposure, grazing or cutting of vegetation, but they often form an important component of the habitat.’<sup>121</sup>; leans on the importance of woody plants. The number of species with conservation status associated with this habitat is comparatively low, with only five such species of the 260 recorded<sup>122</sup>, which is reflected by a relatively low SQI score. Four of these five species were all recorded from woodland (e.g. the wooded copse at Parcel 2) or woodland edge or hedgerow (e.g. the hedgerow at Parcel 8). The fifth, *Trachys scrobiculatus* was taken at the Services Junction at the east of the Field Survey Area, most likely from a pan trap set within the carpet of low growing ground ivy that covered a large proportion (tens of square metres) of the ground in this location.
- 3.2.8.7 The short sward and bare ground habitat was represented by 69 species, ten of which have a conservation status<sup>123</sup>. All ten of these were taken from open habitats as could be expected, including flower rich margins by hedgerow banks and periodically disturbed areas. Three flower rich areas, including Parcel 3b (Slindon Pit), Parcel 10 (wooded copse at the side of Tortington Lane, which included small areas of open grassland some of which was short and flower rich) and Parcel 12 (Services Junction) all supported at least three such species.
- 3.2.8.8 Twelve species with conservation status<sup>124</sup> were recorded from habitats belonging to the ‘tree-associated’ biotope (decaying wood). The SQI score for this habitat is likely to be significant as it was high, owing to the higher proportions of scarce and rare species taken, many of which were contributed by the window traps set in 2018. One window trap in particular was highly productive, returning four species with conservation status. This was a trap set within Parcel 5 across the hollow of a veteran / over mature ash tree (shown in **Photograph 3**).
- 3.2.8.9 All the species of conservation importance were taken from woodland or woodland edge habitat; the only two exceptions were beetles taken from Parcel 12 (Services Junction) and 13 (Binsted Rife).

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<sup>121</sup> 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 [online] Available at: <http://www.brc.ac.uk/pantheon/> [Accessed 30 November 2018].

<sup>122</sup> discounting the more common *Tyria jacobaeae* and *Hylaeus dilatatus*

<sup>123</sup> discounting the more common *Hylaeus dilatatus*

<sup>124</sup> discounting the more common *Dacne rufifrons*

- 3.2.8.10 This is considered likely to suggest that these species were taken whilst feeding on nectar or pollen within these two flower-rich areas, and therefore underlines the importance of a range of resources, including dead wood and foraging areas for saproxylic species.
- 3.2.8.11 Two weevils and the white admiral butterfly associated with arboreal habitat were recorded from the wooded strips extending south from Binsted Woods Complex LWS and Tortington Common (Parcels 6 and 7a). Given the coverage of woodland across the Field Survey Area, this habitat was most likely under-represented, with only 36 species recorded, that equates to 3% of the species pool that contributes to this habitat. This is most likely due to the survey techniques involved, which were unable to exclusively target the canopy layer. Also, moths would have contributed to this habitat type, although this group was not targeted during the surveys.
- 3.2.8.12 The marshland and peatland habitats each included two species of conservation status, and these wetland habitats could be regarded as having a good invertebrate assemblage. The majority of the species recorded from these habitats, including three of the four with conservation status were taken from wetland habitat in the Arun floodplain (Parcel 11a), where the cattle poached ditch banks and associated reedy margins formed the focus of the survey efforts. Binsted Rife (Parcel 13) also returned a species of conservation status (*Stenolophus skrimshiranus*).
- 3.2.8.13 Whilst having fewer than 15 species, and therefore not being able to generate a reliable SQI score, the ‘running water’ habitat included two species of conservation status; one of these being from a seep within woodland in Parcel 3a, and the other from next to a ditch in the Arun floodplain (Parcel 11a). The saltmarsh habitat next to the River Arun (Parcel 11b) also returned a species of conservation status (*Bembidion maritimum*).

### Specific Assemblage Types

**Table 3-9 - Summary of Pantheon output for specific assemblages types (15 or more species per SAT)**

Broad biotope	Habitat	SAT	No. of species	Reported condition
Open habitats	n/a	Rich flower resource	42	Favourable
Tree-associated	Decaying wood	Bark and sapwood decay	37	Favourable
Open habitats	n/a	Scrub edge	21	Favourable

Tree-associated	Decaying wood	Heartwood decay	15	Favourable
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- 3.2.8.14 **Table 3-9** shows that there are four specific assemblage types (SATs) which are recognised by Pantheon with 15 or more species within each SAT. The presence of SATs with high numbers of representative species, especially those in favourable condition provides an insight into the rarest and, often most unique invertebrate assemblages associated with a Field Survey Area. Such assemblages within the Field Survey Area are considered likely to be the most important.
- 3.2.8.15 The ‘Favourable’ condition returned for ‘rich flower resource’ suggests that the open habitats within the Field Survey Area have an important resource of large flower patches capable of supporting a range of associated species (especially aculeate Hymenoptera). It is relevant to note that such large flower patches were not overwhelmingly obvious during the surveys, with the more characteristic areas being at Parcels 3b, 8, 9, 10, 12 and 13 (the latter two in particular). However, such flower-rich resources can include those associated with woody species (e.g. ivy, hawthorn, willow) as well as those associated with more typical herbaceous flowering plants. As explained in Pantheon<sup>125</sup>, the detection of this assemblage is relevant in that it flags up the importance of the floral resource within the Field Survey Area.
- 3.2.8.16 The scrub edge SAT which is in favourable condition is described in Pantheon<sup>126</sup>, as an ‘assemblage type which is found where scrub or woodland grades into or is interspersed with open areas of grassland, heathland or early successional vegetation types.’ Such habitat was widely covered by the targeted surveys of the Field Survey Area and represented in all parcels. A wide range of invertebrates can be expected to be recorded from this SAT, but especially aculeate Hymenoptera. It is the arrangement of open and woody vegetation and all the variables between this make this SAT important to invertebrates, especially those with complex life cycles that require different microhabitats at different stages of development.
- 3.2.8.17 The favourable condition attributed to the bark and sapwood decay and also the heartwood decay SATs, both associated with the decaying wood habitat, signifies the importance of these SATs, and decaying wood habitat in general, within the Field Survey Area.

<sup>125</sup> 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 [online] Available at: <http://www.brc.ac.uk/pantheon/> [Accessed 30 November 2018].

<sup>126</sup> 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 [online] Available at: <http://www.brc.ac.uk/pantheon/> [Accessed 30 November 2018].

- 3.2.8.18 Decaying wood habitat was frequently targeted during the surveys in many of the Parcels, with the exception of Parcels 3b, 8, 9, 11, 12 and 13. Associations with a variety of trees, including, but not restricted to birch, oak, beech, ash, willow, alder, hawthorn and pine species were found for the 37-representative species; although oak was especially favoured by a large proportion of the species recorded.
- 3.2.8.19 The bark and sapwood decay assemblage type is described in Pantheon<sup>127</sup> as being ‘primarily associated with death and decay of the outer woody tissues of the trees or shrubs - the sapwood and bark’. The heartwood decay assemblage type is described in Pantheon<sup>128</sup> as being ‘found in and around mature and ancient trees and shrubs’. Open grown trees are especially important as these often develop the full range of heartwood decay conditions and also allow sunlight to reach the trunk and main limbs that can be important for larval development. Pantheon goes on to say that ‘the juxtaposition of mature and aging trees with open areas containing flowering shrubs is a key factor since the adult stages of many of the insect species have a requirement for pollen and nectar’.
- 3.2.8.20 Overall, these two SATs are considered likely to be well represented within the woodland and mature / veteran tree resource sampled across the Field Survey Area. Over mature (borderline veteran) trees, including some with considerable stature owing to open grown conditions that are likely to exhibit heartwood, sapwood and bark decay features, are prominent in the woodland blocks, including those in and at the edge of woodland blocks (e.g. Parcels 1, 3, 5 and 6) and hedgerows and linear woodland strips (e.g. Parcels 7 and 10).

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<sup>127</sup> 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 [online] Available at: <http://www.brc.ac.uk/pantheon/> [Accessed 30 November 2018].

<sup>128</sup> 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 [online] Available at: <http://www.brc.ac.uk/pantheon/> [Accessed 30 November 2018].

## 4 Discussion and Recommendations

### 4.1 Discussion

#### 4.1.1 Evaluation of Invertebrate Assemblages

- 4.1.1.1 The 2017 and 2018 Field Survey Areas support a diverse invertebrate fauna, which includes a sizeable number of species with recognised conservation status (at least 41 have been recorded for the present study). Other surveys of similar (albeit not identical) habitats, and in some case, overlapping habitats (e.g. Grove, 2016<sup>129</sup> and Edwards, 2017<sup>130</sup>) have revealed further species of conservation significance that are likely to be also found in the Field Survey Area. Therefore, the assessed number of species with a conservation status will most likely be an underestimate.
- 4.1.1.2 The 2017 and 2018 Field Survey Areas include diverse, mature and wooded habitats, centred on Tortington Common, Binsted Woods Complex LWS and Little Danes Wood (west of Ford Road, represented by Parcels 1 to 10).
- 4.1.1.3 This includes ancient woodland and wet woodland, recognised as a Habitat of Principal Importance (e.g. Parcel 1), and linear connecting features such as narrow woodland belts (e.g. Parcel 7) and species-rich hedgerows (e.g. Parcel 8). As a cumulative resource, these habitats are likely to provide the range of conditions (microhabitats) required by invertebrates, including those with complex life histories, such as saproxylic species, many of which rely on mature and ageing trees with open areas containing flowering shrubs and herbs to provide pollen and nectar for emerging adults.

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<sup>129</sup> Grove, K. (2016). The Beetles of Binsted. Unpublished report to the Mid-Arun Environmental Survey (MAVES).

<sup>130</sup> Edwards, M. (2016 and 2017). An Entomological survey within Binsted Parish, 2016-2017. Unpublished report to the Mid-Arun Environmental Survey (MAVES).

- 4.1.1.4 This has been supported in part by the findings of the surveys that returned favourable SATs for bark and sapwood decay and heartwood decay, with 37 and 15 species respectively belonging to these; and also by interrogation of the desk study information such as Grove (2016)<sup>131</sup> who found a number of saproxylic species among the 230 beetle species of two hedgerows and an arm of wet woodland at Lake Copse that were surveyed; and Edwards (2017)<sup>132</sup>, who observed a number of saproxylic species at Binsted Park and North Wood (covering parts of the western half of the Field Survey Area). Furthermore, some genuinely rare species have been recorded, such as *Hylis cariniceps*, a beetle with very few records to its name, and potentially a first record for the County.
- 4.1.1.5 Whilst the predominant land use (other than arable farmland) across the Field Survey Area is woodland, open habitats are also well represented and this is emphasised by 260 species of invertebrates recognised (using Pantheon) in association with the ‘tall sward and scrub’ habitat, five of which have a merited<sup>133</sup> conservation status; and 69 species associated with ‘short sward and bare ground’ ten of which have a merited<sup>134</sup> conservation status. Furthermore, the ‘rich flower resource’ SAT was assessed to be in favourable condition. Such a resource is likely to be associated with the field margins and track-side habitat. Numerous areas were identified to be important during the surveys due to the coverage and diversity of flowering plants, these being the hedgerow at Scotland Lane (Parcel 8), the farm track at Parcel 9 and the Services Junction (Parcel 12). The desk study adds additional context to the Pantheon assessment, in that Edwards (2017)<sup>135</sup> recorded 551 species across an area of Binsted Parish, in the west of the Field Survey Area, including 36 which have been listed as being of conservation importance, including Sussex Rare Species; a proportion of these species (e.g. *Bombus ruderatus*) are associated with open habitats and reliant on extensive and high-quality flower-rich resources.

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<sup>131</sup> Grove, K. (2016). The Beetles of Binsted. Unpublished report to the Mid-Arun Environmental Survey (MAVES).

<sup>132</sup> Edwards, M. (2016 and 2017). An Entomological survey within Binsted Parish, 2016-2017. Unpublished report to the Mid-Arun Environmental Survey (MAVES).

<sup>133</sup> Excluding *Hylaeus dilatatus*.

<sup>134</sup> Excluding *Hylaeus dilatatus* and *Tyria jacobaeae*.

<sup>135</sup> Edwards, M. (2016 and 2017). An Entomological survey within Binsted Parish, 2016-2017. Unpublished report to the Mid-Arun Environmental Survey (MAVES).

- 4.1.1.6 Two other areas beyond the Field Survey Area that were not surveyed in 2017, but were later included in the 2018 surveys, were the sand pit of Lower Rewell Wood (in the north-west; Parcel 3b) and Binsted Rife (in the south-west; Parcel 13). These were identified from the desk study as important areas for invertebrate assemblages of open habitats, based on the number of species recorded and the proportion of species with recognised conservation status. This was further reinforced during the 2018 surveys, with five species with conservation status taken from Slindon Pit and three such species taken from Binsted Rife.
- 4.1.1.7 Conservation value should also be placed on invertebrate assemblages of wetland habitats, the main areas being in association with the ditches of the Arun floodplain, east of Ford Road (Parcel 11a), but also the seepages of Binsted Rife (Parcel 13). Several species with a recognised conservation status were returned from this habitat, including those associated with ‘marshland’ and ‘running water’ habitats.
- 4.1.1.8 A large number of records were returned from the desk study for invertebrate species of wetlands (e.g. Arundel Wetland Centre). Whilst outside the parcels targeted for the present field surveys, the significance of the wetland associated invertebrates in association with the Arun floodplain is an important factor and one that spans the terrestrial and aquatic invertebrate assessment reports.

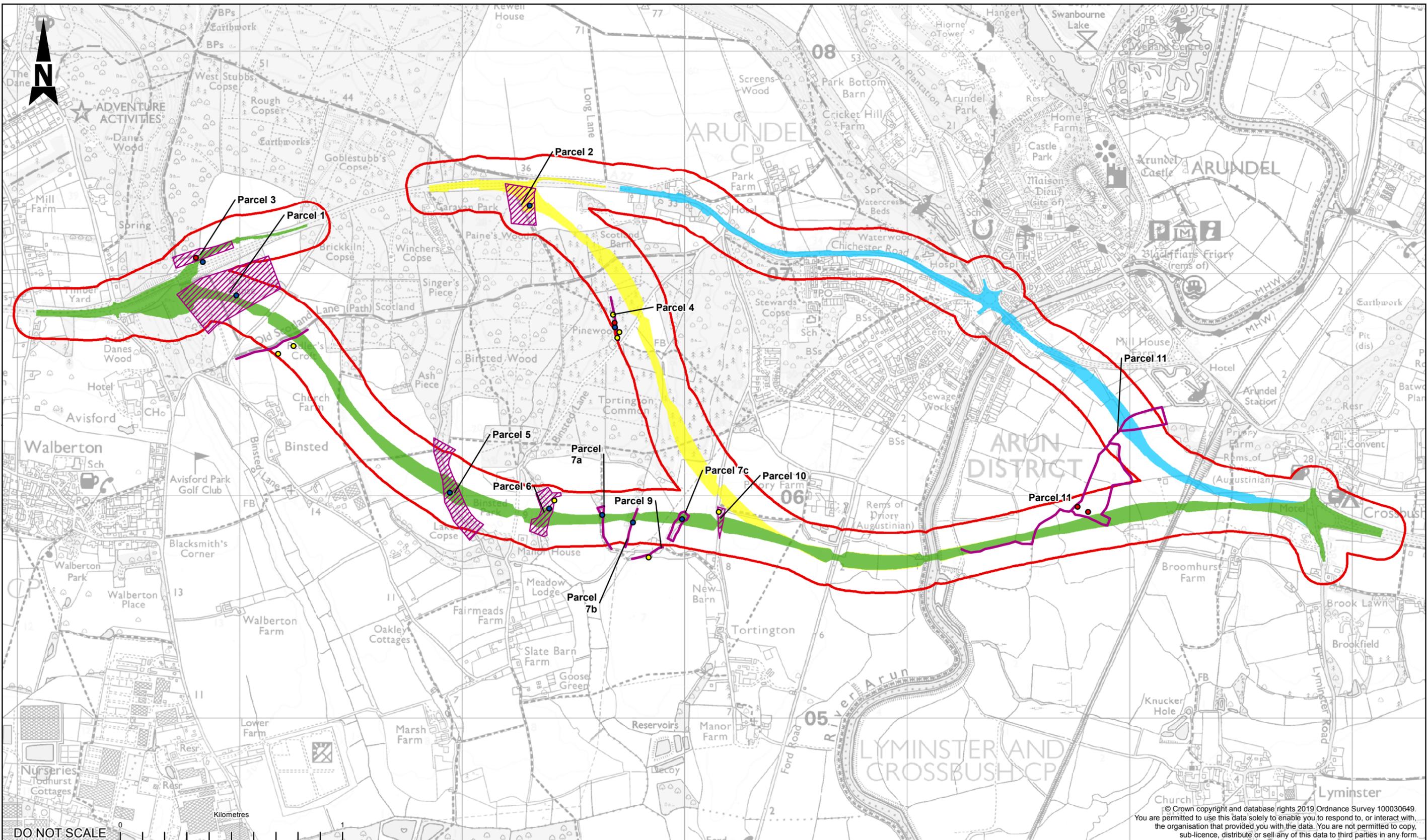
## 4.2 Further Survey Recommendations

- 4.2.1.1 With reference to the limitations described in **Section 2.4** (seasonality and location of survey), further survey is proposed in spring and summer of 2019 to obtain further baseline information on invertebrate activity and distribution within inaccessible parcels assessed as being likely to be of higher invertebrate value.

# 5 Figures

**Figure 1 - Invertebrate Trapping Survey**

**Figure 2 – Invertebrate Survey Parcels, Butterfly Transect and Trap Locations 2018**



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- KEY:**
- OPTION 1
  - OPTION 3
  - OPTION 5A
  - LAND PARCELS SURVEY
  - LAND PARCELS SURVEY (LINEAR)
- TRAPPING METHOD**
- PAN TRAP
  - PITFALL TRAP
  - SHALLOW POND NETTING

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION	
In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).	
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Maintenance / Cleaning	
Use	
Decommissioning / Demolition	

Drawing Status: FINAL

Suitability: S0



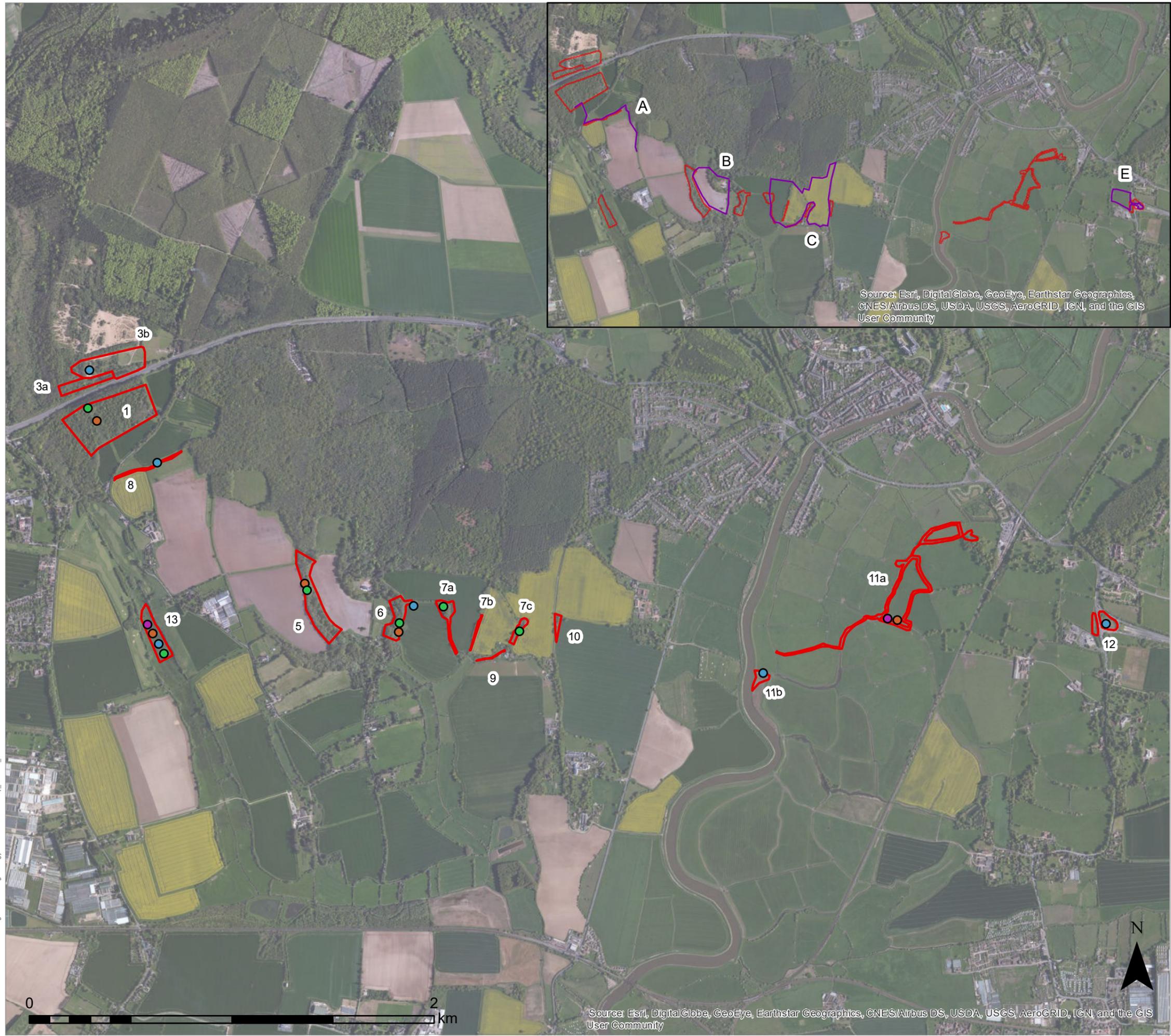
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Project Title: REGIONAL INVESTMENT PROGRAMME A27 ARUNDEL BYPASS				
Drawing Title: TERRESTRIAL INVERTEBRATE FIGURE 1 INVERTEBRATE TRAPPING SURVEYS				
Scale: 1:16,000	Drawn: AS	Checked: CH	Approved: AB	Authorised: PA
Original Size: A3	Date: 21/08/19	Date: 21/08/19	Date: 21/08/19	Date: 21/08/19
Drawing Number: HE551523-WSP-GEN-SWI-GI-DR-0651	Originator: SWI-GI-DR-0651	Volume: SWI-GI-DR-0651	Project Ref. No: 70052558	Revision: P01
Location:	Type:	Role:	Number:	



- LEGEND**
- Invertebrate survey parcel
  - Pan trap
  - Pitfall trap
  - Shallow pond netting
  - Window trap
  - Butterfly transect

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



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 T: 01433 651869  
 JOB REF: P18-115

PROJECT TITLE  
 ARUNDEL INVERTEBRATES 2018

DRAWING TITLE  
 Figure 2 : Invertebrate survey parcels, butterfly transect and trap locations 2018

DATE: 17.12.2018      CHECKED: JF      SCALE: 1:18,134  
 DRAWN: KW      APPROVED: JF      VERSION: 1.0

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 Sources: BSG Ecology survey data

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# Appendix A: Survey Photographs



1. Pitfall trap



2. Pan trap



3. Window trap in hollow of veteran / over  
mature ash at Parcel 5



4. Window trap suspended from mature oak  
along hedgerow feature at Parcel 14



5. Tortington Common



6a. Parcel 1: Barnes Copse / Little Danes  
Wood



6b. Parcel 1: Barnes Copse / Little Danes Wood -seepage at base of slope



7. Parcel 2: Paine's Wood



8a. Parcel 3a: Danes Wood (south)



8b. Parcel 3a: Danes Wood (south)



9. Parcel 4: glade in mixed plantation woodland



10. Agricultural field near Tortington



11. Agricultural field west of Binsted Lane (near Binsted Park)



12. Agricultural field east of Binsted Lane (near Binsted Park)



13. Agricultural field near Scotland Barn



14. Parcel 5: Woodland belt near Binsted Park



15a. Parcel 6: Wet woodland of woodland belt near Binsted Park



15b. Parcel 6: dry edge of woodland belt near Binsted Park



16a. Parcel 7A



16b. Parcel 7B



16c. Parcel 7C



17. Field boundary



18a. Parcel 8A: Old Scotland Lane hedgerow



18b. Parcel 8A: Old Scotland Lane hedgerow



19. Parcel 8B: Hedgerow and rough grassland



20. Parcel 9: off Tortington Lane



21. Parcel 10: adjacent to Tortington Lane



22a. Parcel 3b: Habitat mosaic of Slindon Pit.



22b. Parcel 3b: Lightly vegetated bank typical of Slindon Pit, with open aspect and periodic disturbance.



22c. Parcel 3b: clifflets created by 4 x 4's, colonised by nesting aculeates in sheltered part of Slindon Pit.



23a. Parcel 13: Binsted Rife



23b. Parcel 13: Grazing cattle at Binsted Rife



24. Arun floodplain



25. Arun floodplain



26a. Parcel 11a: Organic detritus from ditches clothes banks.



26b. Parcel 11a: Heavily poached ditch margins



26c. Parcel 11a: Heavily poached ephemeral pond.



26d. Tree-lined ditch in more elevated part of parcel.



27. Parcel 11b: Saltmarsh habitat next to River Arun



28. Land close to Broomhurst Lodge



29. Parcel 12. Open Mosaic Habitat at Lyminster Road junction.

# Appendix B: Species List

Order	Family	Taxon	Status <sup>135</sup>
Amphipoda	Talitridae	<i>Arcitalitrus dorrieni</i>	None
Chordeumatida	Craspedosomatidae	<i>Nanogona polydesmoides</i>	None
Coleoptera	Apionidae	<i>Apion frumentarium</i>	None
Coleoptera	Apionidae	<i>Eutrichapion ervi</i>	None
Coleoptera	Apionidae	<i>Eutrichapion viciae</i>	None
Coleoptera	Apionidae	<i>Oxystoma pomonae</i>	None
Coleoptera	Apionidae	<i>Perapion violaceum</i>	None
Coleoptera	Apionidae	<i>Protapion assimile</i>	None
Coleoptera	Apionidae	<i>Protapion fulvipes</i>	None
Coleoptera	Byturidae	<i>Byturus ochraceus</i>	Local
Coleoptera	Byturidae	<i>Byturus tomentosus</i>	None
Coleoptera	Cantharidae	<i>Cantharis cryptica</i>	None
Coleoptera	Cantharidae	<i>Cantharis flavilabris</i>	None
Coleoptera	Cantharidae	<i>Cantharis lateralis</i>	Local
Coleoptera	Cantharidae	<i>Cantharis nigricans</i>	None
Coleoptera	Cantharidae	<i>Cantharis pallida</i>	Local
Coleoptera	Cantharidae	<i>Cantharis rufa</i>	None
Coleoptera	Cantharidae	<i>Malthinus seriepunctatus</i>	Local
Coleoptera	Cantharidae	<i>Rhagonycha fulva</i>	None
Coleoptera	Cantharidae	<i>Rhagonycha limbata</i>	None
Coleoptera	Cantharidae	<i>Rhagonycha testacea</i>	None
Coleoptera	Carabidae	<i>Abax parallelepipedus</i>	None
Coleoptera	Carabidae	<i>Acupalpus dubius</i>	None
Coleoptera	Carabidae	<i>Agonum emarginatum</i>	Local
Coleoptera	Carabidae	<i>Amara convexior</i>	Local
Coleoptera	Carabidae	<i>Amara lunicollis</i>	Local
Coleoptera	Carabidae	<i>Amara ovata</i>	None
Coleoptera	Carabidae	<i>Asaphidion curtum</i>	None
Coleoptera	Carabidae	<i>Bembidion assimile</i>	Local
Coleoptera	Carabidae	<i>Bembidion biguttatum</i>	None
Coleoptera	Carabidae	<i>Bembidion deletum</i>	Local

<sup>135</sup> NS = Nationally Scarce, Unk = Unknown, SPI = Species of Principal Importance

Order	Family	Taxon	Status <sup>135</sup>
Coleoptera	Carabidae	<i>Bembidion guttula</i>	None
Coleoptera	Carabidae	<i>Bembidion illigeri</i>	None
Coleoptera	Carabidae	<i>Bembidion lampros</i>	None
Coleoptera	Carabidae	<i>Bembidion lunulatum</i>	None
Coleoptera	Carabidae	<i>Bembidion stephensii</i>	NS
Coleoptera	Carabidae	<i>Bembidion tetracolum</i>	None
Coleoptera	Carabidae	<i>Bradycellus sharpi</i>	Local
Coleoptera	Carabidae	<i>Calathus rotundicollis</i>	None
Coleoptera	Carabidae	<i>Carabus problematicus</i>	None
Coleoptera	Carabidae	<i>Curtonotus aulicus</i>	None
Coleoptera	Carabidae	<i>Cychrus caraboides</i>	Local
Coleoptera	Carabidae	<i>Elaphrus cupreus</i>	None
Coleoptera	Carabidae	<i>Harpalus latus</i>	None
Coleoptera	Carabidae	<i>Loricera pilicornis</i>	None
Coleoptera	Carabidae	<i>Nebria brevicollis</i>	None
Coleoptera	Carabidae	<i>Nebria salina</i>	None
Coleoptera	Carabidae	<i>Notiophilus biguttatus</i>	None
Coleoptera	Carabidae	<i>Notiophilus rufipes</i>	Local
Coleoptera	Carabidae	<i>Oxypselaphus obscurus</i>	Local
Coleoptera	Carabidae	<i>Paradromius linearis</i>	None
Coleoptera	Carabidae	<i>Paranchus albipes</i>	None
Coleoptera	Carabidae	<i>Pterostichus longicollis</i>	NS
Coleoptera	Carabidae	<i>Pterostichus madidus</i>	None
Coleoptera	Carabidae	<i>Pterostichus melanarius</i>	None
Coleoptera	Carabidae	<i>Pterostichus niger</i>	None
Coleoptera	Carabidae	<i>Pterostichus nigrita</i>	None
Coleoptera	Carabidae	<i>Pterostichus strenuus</i>	None
Coleoptera	Carabidae	<i>Pterostichus vernalis</i>	Local
Coleoptera	Carabidae	<i>Stomis pumicatus</i>	Local
Coleoptera	Carabidae	<i>Synuchus vivalis</i>	Local
Coleoptera	Carabidae	<i>Trechus obtusus</i>	None
Coleoptera	Carabidae	<i>Trechus quadristriatus</i>	None

Order	Family	Taxon	Status <sup>135</sup>
Coleoptera	Cerambycidae	<i>Grammoptera ruficornis</i>	None
Coleoptera	Cerambycidae	<i>Leiopus nebulosus</i>	Local
Coleoptera	Chrysomelidae	<i>Altica lythri</i>	None
Coleoptera	Chrysomelidae	<i>Altica palustris</i>	None
Coleoptera	Chrysomelidae	<i>Batophila aerata</i>	Local
Coleoptera	Chrysomelidae	<i>Cassida rubiginosa</i>	None
Coleoptera	Chrysomelidae	<i>Cassida vibex</i>	Local
Coleoptera	Chrysomelidae	<i>Chaetocnema concinna</i>	None
Coleoptera	Chrysomelidae	<i>Chrysolina banksii</i>	Local
Coleoptera	Chrysomelidae	<i>Chrysolina polita</i>	None
Coleoptera	Chrysomelidae	<i>Crepidodera aurata</i>	None
Coleoptera	Chrysomelidae	<i>Crepidodera fulvicornis</i>	None
Coleoptera	Chrysomelidae	<i>Cryptocephalus pusillus</i>	Local
Coleoptera	Chrysomelidae	<i>Longitarsus atricillus</i>	None
Coleoptera	Chrysomelidae	<i>Longitarsus parvulus</i>	Local
Coleoptera	Chrysomelidae	<i>Neocrepidodera transversa</i>	None
Coleoptera	Chrysomelidae	<i>Oulema melanopus</i>	None
Coleoptera	Chrysomelidae	<i>Psylliodes chrysocephala</i>	Local
Coleoptera	Chrysomelidae	<i>Sermylassa halensis</i>	Local
Coleoptera	Chrysomelidae	<i>Sphaeroderma rubidum</i>	None
Coleoptera	Cicadellidae	<i>Adarrus ocellaris</i>	None
Coleoptera	Ciidae	<i>Cis bilamellatus</i>	None
Coleoptera	Ciidae	<i>Sulcacis affinis</i>	Local
Coleoptera	Coccinellidae	<i>Adalia bipunctata</i>	None
Coleoptera	Coccinellidae	<i>Coccidula rufa</i>	None
Coleoptera	Coccinellidae	<i>Coccinella septempunctata</i>	None
Coleoptera	Coccinellidae	<i>Halyzia sedecimguttata</i>	Local
Coleoptera	Coccinellidae	<i>Harmonia axyridis</i>	None
Coleoptera	Coccinellidae	<i>Propylea quattuordecimpunctata</i>	None
Coleoptera	Coccinellidae	<i>Rhyzobius litura</i>	None

Order	Family	Taxon	Status <sup>135</sup>
Coleoptera	Coccinellidae	<i>Subcoccinella vigintiquattuor punctata</i>	None
Coleoptera	Coccinellidae	<i>Tytthaspis sedecimpunctata</i>	Local
Coleoptera	Colydiidae	<i>Pycnomerus fuliginosus</i>	None
Coleoptera	Cryptophagidae	<i>Cryptophagus lycoperdi</i>	None
Coleoptera	Curculionidae	<i>Acalles ptinoides</i>	NS
Coleoptera	Curculionidae	<i>Anthonomus rubi</i>	None
Coleoptera	Curculionidae	<i>Archarius salicivorus</i>	None
Coleoptera	Curculionidae	<i>Caenopsis fissirostris</i>	NS
Coleoptera	Curculionidae	<i>Cionus tuberculosus</i>	None
Coleoptera	Curculionidae	<i>Euophryum confine</i>	None
Coleoptera	Curculionidae	<i>Exomias araneiformis</i>	None
Coleoptera	Curculionidae	<i>Exomias pellucidus</i>	None
Coleoptera	Curculionidae	<i>Gymnetron pascuorum</i>	None
Coleoptera	Curculionidae	<i>Hypera plantaginis</i>	None
Coleoptera	Curculionidae	<i>Leiosoma deflexum</i>	None
Coleoptera	Curculionidae	<i>Liophloeus tessulatus</i>	None
Coleoptera	Curculionidae	<i>Microplontus triangulum</i>	NS
Coleoptera	Curculionidae	<i>Nedyus quadrimaculatus</i>	None
Coleoptera	Curculionidae	<i>Otiorhynchus singularis</i>	None
Coleoptera	Curculionidae	<i>Phyllobius pomaceus</i>	None
Coleoptera	Curculionidae	<i>Phyllobius roboretanus</i>	None
Coleoptera	Curculionidae	<i>Polydrusus cervinus</i>	None
Coleoptera	Curculionidae	<i>Polydrusus tereticollis</i>	None
Coleoptera	Curculionidae	<i>Rhinocyllus conicus</i>	NS
Coleoptera	Curculionidae	<i>Rhinoncus pericarpus</i>	None
Coleoptera	Curculionidae	<i>Sitona ambiguus</i>	Local
Coleoptera	Curculionidae	<i>Sitona lineatus</i>	None
Coleoptera	Curculionidae	<i>Sitona obsoletus</i>	None
Coleoptera	Curculionidae	<i>Strophosoma melanogrammum</i>	None
Coleoptera	Curculionidae	<i>Tomicus piniperda</i>	None

Order	Family	Taxon	Status <sup>135</sup>
Coleoptera	Curculionidae	<i>Tychius picirostris</i>	None
Coleoptera	Curculionidae	<i>Zacladus exiguus</i>	NS
Coleoptera	Drilidae	<i>Drilus flavescens</i>	Local
Coleoptera	Dytiscidae	<i>Agabus bipustulatus</i>	None
Coleoptera	Dytiscidae	<i>Hydroporus pubescens</i>	None
Coleoptera	Elateridae	<i>Adrastus pallens</i>	None
Coleoptera	Elateridae	<i>Agriotes acuminatus</i>	None
Coleoptera	Elateridae	<i>Agriotes lineatus</i>	None
Coleoptera	Elateridae	<i>Agriotes pallidulus</i>	None
Coleoptera	Elateridae	<i>Ampedus elongantulus</i>	NS
Coleoptera	Elateridae	<i>Athous haemorrhoidalis</i>	None
Coleoptera	Elateridae	<i>Dalopius marginatus</i>	None
Coleoptera	Elateridae	<i>Denticollis linearis</i>	None
Coleoptera	Geotrupidae	<i>Anoplotrupes stercorosus</i>	Local
Coleoptera	Helophoridae	<i>Helophorus brevipalpis</i>	None
Coleoptera	Helophoridae	<i>Helophorus grandis</i>	None
Coleoptera	Hydraenidae	<i>Ochthebius minimus</i>	None
Coleoptera	Hydrophilidae	<i>Anacaena globulus</i>	None
Coleoptera	Hydrophilidae	<i>Hydrobius fuscipes</i>	None
Coleoptera	Hydrophilidae	<i>Megasternum concinnum</i>	None
Coleoptera	Hydrophilidae	<i>Sphaeridium lunatum</i>	None
Coleoptera	Kateretidae	<i>Brachypterus glaber</i>	None
Coleoptera	Latridiidae	<i>Corticicara gibbosa</i>	None
Coleoptera	Latridiidae	<i>Enicmus histrio</i>	None
Coleoptera	Lucanidae	<i>Dorcus parallelipedus</i>	Local
Coleoptera	Lycidae	<i>Platycis minutus</i>	Local
Coleoptera	Malachiidae	<i>Cordylepherus viridis</i>	Local
Coleoptera	Malachiidae	<i>Malachius bipustulatus</i>	None
Coleoptera	Nitidulidae	<i>Meligethes aeneus</i>	None
Coleoptera	Nitidulidae	<i>Meligethes atratus</i>	None
Coleoptera	Nitidulidae	<i>Meligethes carinulatus</i>	None
Coleoptera	Nitidulidae	<i>Meligethes nigrescens</i>	None

Order	Family	Taxon	Status <sup>135</sup>
Coleoptera	Nitidulidae	<i>Pria dulcamarae</i>	Local
Coleoptera	Oedemeridae	<i>Oedemera femoralis</i>	NS
Coleoptera	Oedemeridae	<i>Oedemera nobilis</i>	None
Coleoptera	Phalacridae	<i>Olibrus aeneus</i>	None
Coleoptera	Phalacridae	<i>Stilbus testaceus</i>	None
Coleoptera	Pyrochroidae	<i>Pyrochroa serraticornis</i>	None
Coleoptera	Rhynchitidae	<i>Neocoenorrhinus germanicus</i>	Local
Coleoptera	Salpingidae	<i>Vincenzellus ruficollis</i>	Local
Coleoptera	Scirtidae	<i>Cyphon coarctatus</i>	None
Coleoptera	Scirtidae	<i>Cyphon padi</i>	Local
Coleoptera	Scraptiidae	<i>Anaspis fasciata</i>	None
Coleoptera	Scraptiidae	<i>Anaspis garneysi</i>	None
Coleoptera	Scraptiidae	<i>Anaspis maculata</i>	None
Coleoptera	Silphidae	<i>Nicrophorus vespilloides</i>	Local
Coleoptera	Silphidae	<i>Silpha atrata</i>	None
Coleoptera	Staphylinidae	<i>Anotylus rugosus</i>	None
Coleoptera	Staphylinidae	<i>Anotylus sculpturatus</i>	None
Coleoptera	Staphylinidae	<i>Atheta crassicornis</i>	None
Coleoptera	Staphylinidae	<i>Atheta hybrida</i>	RDBK
Coleoptera	Staphylinidae	<i>Atrecus affinis</i>	None
Coleoptera	Staphylinidae	<i>Autalia impressa</i>	None
Coleoptera	Staphylinidae	<i>Bisnius subuliformis</i>	Local
Coleoptera	Staphylinidae	<i>Carpelimus elongatulus</i>	None
Coleoptera	Staphylinidae	<i>Dinaraea aequata</i>	None
Coleoptera	Staphylinidae	<i>Drusilla canaliculata</i>	None
Coleoptera	Staphylinidae	<i>Gabrius bishopi</i>	NS
Coleoptera	Staphylinidae	<i>Lathrobium geminum</i>	None
Coleoptera	Staphylinidae	<i>Lesteva sicula ssp. heeri</i>	None
Coleoptera	Staphylinidae	<i>Ocypus olens</i>	None
Coleoptera	Staphylinidae	<i>Othius subuliformis</i>	None
Coleoptera	Staphylinidae	<i>Paederus littoralis</i>	Local

Order	Family	Taxon	Status <sup>135</sup>
Coleoptera	Staphylinidae	<i>Philonthus cognatus</i>	None
Coleoptera	Staphylinidae	<i>Philonthus decorus</i>	None
Coleoptera	Staphylinidae	<i>Platydracus fulvipes</i>	NS
Coleoptera	Staphylinidae	<i>Quedius curtipennis</i>	None
Coleoptera	Staphylinidae	<i>Quedius fumatus</i>	Local
Coleoptera	Staphylinidae	<i>Quedius lateralis</i>	None
Coleoptera	Staphylinidae	<i>Quedius nigriceps</i>	Local
Coleoptera	Staphylinidae	<i>Rugilus rufipes</i>	None
Coleoptera	Staphylinidae	<i>Sepedophilus marshami</i>	None
Coleoptera	Staphylinidae	<i>Stenus aceris / impressus</i>	None
Coleoptera	Staphylinidae	<i>Stenus boops</i>	None
Coleoptera	Staphylinidae	<i>Stenus clavicornis</i>	None
Coleoptera	Staphylinidae	<i>Stenus flavipes</i>	None
Coleoptera	Staphylinidae	<i>Stenus fulvicornis</i>	None
Coleoptera	Staphylinidae	<i>Stenus ochropus</i>	None
Coleoptera	Staphylinidae	<i>Stenus providus</i>	None
Coleoptera	Staphylinidae	<i>Tachinus rufipes</i>	None
Coleoptera	Staphylinidae	<i>Tachyporus chrysomelinus</i>	None
Coleoptera	Staphylinidae	<i>Tachyporus dispar</i>	None
Coleoptera	Staphylinidae	<i>Tachyporus hypnorum</i>	None
Coleoptera	Staphylinidae	<i>Tasgius ater</i>	None
Coleoptera	Staphylinidae	<i>Tasgius melanarius</i>	None
Coleoptera	Staphylinidae	<i>Tasgius morsitans</i>	Local
Coleoptera	Staphylinidae	<i>Xantholinus gallicus</i>	Local
Coleoptera	Tenebrionidae	<i>Nalassus laevioctostriatus</i>	None
Coleoptera	Throscidae	<i>Trixagus carinifrons</i>	Local
Dermaptera	Forficulidae	<i>Forficula auricularia</i>	None
Diptera	Asilidae	<i>Machimus cingulatus</i>	Local
Diptera	Empididae	<i>Dilophus febrilis</i>	None
Diptera	Hippoboscidae	<i>Lipoptena cervi</i>	Local
Diptera	Sarcophagidae	<i>Sarcophaga carnaria</i>	None

Order	Family	Taxon	Status <sup>135</sup>
Diptera	Stratiomyidae	<i>Chloromyia formosa</i>	None
Diptera	Syrphidae	<i>Cheilosia albitarsis</i>	None
Diptera	Syrphidae	<i>Cheilosia antiqua</i>	Local
Diptera	Syrphidae	<i>Episyrphus balteatus</i>	None
Diptera	Syrphidae	<i>Eristalinus sepulchralis</i>	Local
Diptera	Syrphidae	<i>Eristalis arbustorum</i>	None
Diptera	Syrphidae	<i>Helophilus pendulus</i>	None
Diptera	Syrphidae	<i>Melanostoma scalare</i>	None
Diptera	Syrphidae	<i>Sphaerophoria scripta</i>	None
Diptera	Syrphidae	<i>Syrphus ribesii</i>	None
Diptera	Syrphidae	<i>Xylota segnis</i>	None
Diptera	Tipulidae	<i>Nephrotoma flavipalpis</i>	Local
Glomerida	Glomeridae	<i>Glomeris marginata</i>	None
Hemiptera	Anthocoridae	<i>Anthocoris nemorum</i>	None
Hemiptera	Aphrophoridae	<i>Aphrophora alni</i>	None
Hemiptera	Aphrophoridae	<i>Neophilaenus campestris</i>	None
Hemiptera	Aphrophoridae	<i>Neophilaenus lineatus</i>	None
Hemiptera	Aphrophoridae	<i>Philaenus spumarius</i>	None
Hemiptera	Cercopidae	<i>Cercopis vulnerata</i>	None
Hemiptera	Cicadellidae	<i>Alebra albostriella</i>	None
Hemiptera	Cicadellidae	<i>Cicadella viridis</i>	None
Hemiptera	Cicadellidae	<i>Cicadula quadrinotata</i>	None
Hemiptera	Cicadellidae	<i>Eupteryx stachydearum</i>	None
Hemiptera	Cicadellidae	<i>Euscelis incisus</i>	None
Hemiptera	Cicadellidae	<i>Linnavuoriana sexmaculata</i>	None
Hemiptera	Cicadellidae	<i>Macropsis scotti</i>	None
Hemiptera	Cicadellidae	<i>Aphrodes makarovi</i>	None
Hemiptera	Cicadellidae	<i>Arboridia parvula</i>	None
Hemiptera	Cicadellidae	<i>Evacanthus acuminatus</i>	None
Hemiptera	Cicadellidae	<i>Megophthalmus scabripennis</i>	None
Hemiptera	Cixiidae	<i>Cixius nervosus</i>	None

Order	Family	Taxon	Status <sup>135</sup>
Hemiptera	Cixiidae	<i>Tachycixius pilosus</i>	None
Hemiptera	Coreidae	<i>Coreus marginatus</i>	None
Hemiptera	Coreidae	<i>Gonocerus acuteangulatus</i>	Local
Hemiptera	Delphacidae	<i>Ditropis pteridis</i>	None
Hemiptera	Delphacidae	<i>Javesella pellucida</i>	None
Hemiptera	Delphacidae	<i>Xanthodelphax straminea</i>	Local
Hemiptera	Issidae	<i>Issus coleoptratus</i>	None
Hemiptera	Lygaeidae	<i>Cymus melanocephalus</i>	None
Hemiptera	Lygaeidae	<i>Drymus brunneus</i>	None
Hemiptera	Lygaeidae	<i>Scolopostethus affinis</i>	None
Hemiptera	Lygaeidae	<i>Scolopostethus thomsoni</i>	None
Hemiptera	Lygaeidae	<i>Stygnocoris rusticus</i>	Local
Hemiptera	Miridae	<i>Capsus ater</i>	None
Hemiptera	Miridae	<i>Cyllecoris histrionicus</i>	None
Hemiptera	Miridae	<i>Dicyphus epilobii</i>	None
Hemiptera	Miridae	<i>Grypocoris stysi</i>	None
Hemiptera	Miridae	<i>Liocoris tripustulatus</i>	None
Hemiptera	Miridae	<i>Lygus rugulipennis</i>	None
Hemiptera	Miridae	<i>Notostira elongata</i>	None
Hemiptera	Miridae	<i>Orthops kalmii</i>	None
Hemiptera	Miridae	<i>Psallus lepidus</i>	None
Hemiptera	Miridae	<i>Stenodema calcarata</i>	None
Hemiptera	Miridae	<i>Stenodema laevigata</i>	None
Hemiptera	Nabidae	<i>Himacerus mirmicoides</i>	None
Hemiptera	Nabidae	<i>Nabis limbatus</i>	None
Hemiptera	Nabidae	<i>Nabis rugosus</i>	None
Hemiptera	Pentatomidae	<i>Aelia acuminata</i>	Local
Hemiptera	Pentatomidae	<i>Dolycoris baccarum</i>	None
Hemiptera	Pentatomidae	<i>Elasmostethus interstinctus</i>	None
Hemiptera	Pentatomidae	<i>Eysarcoris venustissimus</i>	Local
Hemiptera	Pentatomidae	<i>Palomena prasina</i>	None

Order	Family	Taxon	Status <sup>135</sup>
Hemiptera	Pentatomidae	<i>Pentatoma rufipes</i>	None
Hemiptera	Pentatomidae	<i>Picromerus bidens</i>	None
Hemiptera	Psyllidae	<i>Cacopsylla melanoneura</i>	None
Hemiptera	Rhopalidae	<i>Corizus hyoscyami</i>	Local
Hemiptera	Saldidae	<i>Saldula pallipes</i>	NS
Hemiptera	Scutellaridae	<i>Eurygaster testudinaria</i>	Local
Hymenoptera	Andrenidae	<i>Andrena chrysoceles</i>	None
Hymenoptera	Andrenidae	<i>Andrena subopaca</i>	None
Hymenoptera	Andrenidae	<i>Andrena flavipes</i>	None
Hymenoptera	Apidae	<i>Apis mellifera</i>	None
Hymenoptera	Apidae	<i>Bombus campestris</i>	None
Hymenoptera	Apidae	<i>Bombus hypnorum</i>	None
Hymenoptera	Apidae	<i>Bombus lapidarius</i>	None
Hymenoptera	Apidae	<i>Bombus pascuorum</i>	None
Hymenoptera	Apidae	<i>Bombus pratorum</i>	None
Hymenoptera	Apidae	<i>Bombus sylvestris</i>	None
Hymenoptera	Apidae	<i>Bombus terrestris</i>	None
Hymenoptera	Colletidae	<i>Hylaeus communis</i>	None
Hymenoptera	Crabronidae	<i>Ectemnius continuus</i>	None
Hymenoptera	Crabronidae	<i>Mellinus arvensis</i>	None
Hymenoptera	Crabronidae	<i>Nysson trimaculatus</i>	NS
Hymenoptera	Crabronidae	<i>Passaloecus insignis</i>	Local
Hymenoptera	Crabronidae	<i>Trypoxylon attenuatum</i>	None
Hymenoptera	Crabronidae	<i>Trypoxylon figulus</i>	None
Hymenoptera	Formicidae	<i>Formica fusca</i>	None
Hymenoptera	Formicidae	<i>Lasius niger sensu lato</i>	None
Hymenoptera	Formicidae	<i>Myrmica ruginodis</i>	None
Hymenoptera	Formicidae	<i>Myrmica scabrinodis</i>	None
Hymenoptera	Formicidae	<i>Temnothorax nylanderi</i>	Local
Hymenoptera	Halictidae	<i>Halictus tumulorum</i>	None
Hymenoptera	Halictidae	<i>Lasioglossum calceatum</i>	None
Hymenoptera	Halictidae	<i>Lasioglossum lativentre</i>	None

Order	Family	Taxon	Status <sup>135</sup>
Hymenoptera	Halictidae	<i>Lasioglossum leucopus</i>	None
Hymenoptera	Halictidae	<i>Lasioglossum malachurum</i>	NS
Hymenoptera	Halictidae	<i>Lasioglossum minutissimum</i>	Local
Hymenoptera	Halictidae	<i>Lasioglossum morio</i>	None
Hymenoptera	Halictidae	<i>Lasioglossum pauxillum</i>	NS
Hymenoptera	Halictidae	<i>Lasioglossum smeathmanellum</i>	None
Hymenoptera	Pompilidae	<i>Evagetes crassicornis</i>	None
Hymenoptera	Vespidae	<i>Vespa crabro</i>	None
Hymenoptera	Vespidae	<i>Vespula vulgaris</i>	None
Isopoda	Oniscidae	<i>Oniscus asellus</i>	None
Isopoda	Philosciidae	<i>Philoscia muscorum</i>	None
Isopoda	Porcellionidae	<i>Porcellio scaber</i>	None
Isopoda	Trichoniscidae	<i>Trichoniscus pusillus</i>	None
Julida	Julidae	<i>Cylindroiulus caeruleocinctus</i>	Local
Julida	Julidae	<i>Cylindroiulus punctatus</i>	None
Julida	Julidae	<i>Tachypodoiulus niger</i>	None
Lepidoptera	Hesperiidae	<i>Ochlodes sylvanus</i>	None
Lepidoptera	Hesperiidae	<i>Thymelicus lineola</i>	None
Lepidoptera	Lycaenidae	<i>Polyommatus icarus</i>	None
Lepidoptera	Nymphalidae	<i>Aglais io</i>	None
Lepidoptera	Nymphalidae	<i>Aphantopus hyperantus</i>	None
Lepidoptera	Nymphalidae	<i>Argynnis paphia</i>	Local
Lepidoptera	Nymphalidae	<i>Maniola jurtina</i>	None
Lepidoptera	Nymphalidae	<i>Pararge aegeria</i>	None
Lepidoptera	Nymphalidae	<i>Polygonia c-album</i>	None
Lepidoptera	Nymphalidae	<i>Pyronia tithonus</i>	None
Lepidoptera	Nymphalidae	<i>Vanessa atalanta</i>	None
Lepidoptera	Pieridae	<i>Gonepteryx rhamni</i>	None
Lepidoptera	Pieridae	<i>Pieris brassicae</i>	None

Order	Family	Taxon	Status <sup>135</sup>
Lepidoptera	Pieridae	<i>Pieris napi</i>	None
Lepidoptera	Pieridae	<i>Pieris rapae</i>	None
Mecoptera	Panorpidae	<i>Panorpa germanica</i>	None
Orthoptera	Phaneropteridae	<i>Leptophyes punctatissima</i>	None
Orthoptera	Tetrigidae	<i>Tetrix subulata</i>	Local
Orthoptera	Tetrigidae	<i>Tetrix undulata</i>	None
Polydesma	Polydesmidae	<i>Polydesmus inconstans</i>	None
Scolopendromorpha	Cryptopidae	<i>Cryptops hortensis</i>	None