

A303 Sparkford to Ilchester Dualling Scheme
TR010036
6.3 Environmental Statement
Appendix 8.11 Invertebrate Technical Report

APFP Regulation 5(2)(a)
Planning Act 2008

Infrastructure Planning (Applications: Prescribed
Forms and Procedure) Regulations 2009
July 2018



Infrastructure Planning

Planning Act 2008

**The Infrastructure Planning
(Applications: Prescribed Forms
and Procedure) Regulations
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**A303 Sparkford to Ilchester Dualling
Scheme**

Development Consent Order 201[X]

**6.3 Environmental Statement
Appendix 8.11 Invertebrate Technical Report**

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Executive summary

The proposed A303 Sparkford to Ilchester Dualling scheme (hereafter referred to as 'the scheme') is to provide a continuous dual-carriageway on the A303 linking the Podimore Bypass and the Sparkford Bypass.

ECOSA were commissioned by Mott McDonald Sweco Joint Venture to carry out general invertebrate surveys at 16 selected sites along the route of the A303 and to assess the impacts and effects of the proposals on the invertebrate communities and any rare or scarce species present. The main findings of the survey were:

- The diversity of the sites selected for survey are relatively low, and a low number of rare and scarce species were recorded on the sites. This is likely to be due to the relatively species poor nature of the habitats present.
- Recommendations have been given for the compensation of lost habitat including the planting of new hedgerows and scrub and planting of wildflower grassland.

1 Introduction

1.1 Overview of the scheme

Existing corridor

1.1.1 The A303 forms part of Highways England's Strategic Road Network (SRN) and a strategic link between the south west and the rest of the south, south-east and London. The route comprises multiple road standards, including dual carriageway, single carriageway and single carriageway sections with overtaking lanes. Speed limits also vary between 40 miles per hour and 70 miles per hour, depending on the character of the road and its surroundings.

Existing road

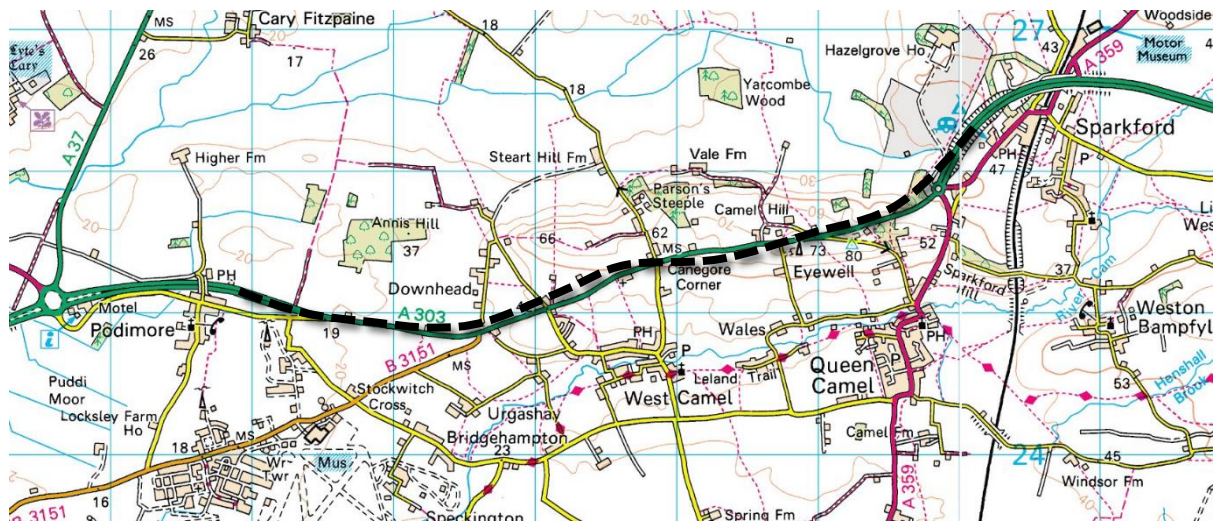
1.1.2 The section of the A303 that is being upgraded as part of this scheme commences at the eastern limits of the existing dual carriageway, the Podimore Bypass. Travelling east, the corridor reaches the junction with the B3151 before bearing north east and rising upwards through Canegore Corner to reach the crest of Camel Hill at Eyewell. This section of the corridor is characterised by a single lane road, with double white lines negating overtaking and subject to a 50 miles per hour speed limit. There are several priority junctions along the route giving access to the settlements of Queen Camel and West Camel to the south and Downhead to the north, as well as several farm accesses and parking laybys.

1.1.3 From the crest of Camel Hill, the corridor descends to meet the roundabout at the western limit of the dual carriageway Sparkford Bypass (Hazlegrove Roundabout). This section comprises 2 lanes in the westbound direction, 1 lane in the eastbound direction and is also subject to a 50 miles per hour speed limit. Hazlegrove Roundabout forms a junction between the A303 and the A359 which runs south through Queen Camel and north-east through Sparkford. The roundabout also provides access to a service station, and to a school at Hazlegrove House.

1.1.4 The section of the A303 that is to be upgraded is almost 3.5 miles, or approximately 5.6 kilometres long.

1.1.5 The extents of the scheme are illustrated in Figure 1.1 of Volume 6.1 below. Figure 2.1 of Volume 6.2 shows the proposed red line boundary for the scheme.

Figure 1.1: Scheme extents



Source: Mott MacDonald Sweco Joint Venture (MMSJV)

Scheme proposals

1.1.6 The proposed scheme is to provide a continuous dual-carriageway linking the Podimore Bypass and the Sparkford Bypass. The scheme would involve the removal of at-grade junctions and direct accesses. The Hazlegrove Junction would be constructed to grade-separated standards and Downhead Junction and Camel Cross Junction would be constructed to compact grade-separated standards, as illustrated on Figure 2.3 General Arrangement Plans, contained in Volume 6.2.

1.1.7 A detailed description of the scheme is provided within Chapter 2 The Scheme of Volume 6.1.

1.2 Scope of report

1.2.1 The objectives of this report are:

- to inform the Environmental Impact Assessment (EIA)
- to present the results of the invertebrate surveys, with particular reference to scarce or threatened species encountered
- to assess the potential impacts of the scheme on populations of scarce and threatened invertebrates
- to provide recommendations for mitigation or habitat enhancement for scarce species where applicable

1.3 Legislation

1.3.1 No legally protected species of invertebrate were recorded during the surveys, although some of the species encountered have been accorded Nationally Scarce, Red Data Book or *UK Biodiversity Action Plan* (BAP) status.

2 Methodology

2.1 Survey methods

- 2.1.1 The Zone of Influence (Zol) for the invertebrate surveys comprised areas of habitat potentially suitable for supporting notable invertebrate species within a 200 metre radius of the scheme. It is considered, through professional judgement, that the scheme would not result in impacts to invertebrate species beyond this distance.
- 2.1.2 The invertebrate surveys undertaken consisted of 2 surveys for each of the 16 sites that were surveyed. The location of each site surveyed is provided in appendix A.
- 2.1.3 The invertebrate surveys were undertaken by suitably qualified ecologists from ECOSA, on various dates in July and September 2017.
- 2.1.4 Survey methods involved visual searching of nectaring sites and basking areas, the use of a hand net or pooter to capture individual species, sweeping vegetation, beating foliage, and grubbing. These methods were employed at all sites.
- 2.1.5 Additionally, the use of pitfall traps was employed at Site 7. A series of pitfall traps were placed on the site, following Natural England guidelines¹. The series comprised a row of 5 pitfall traps, spaced approximately 2 metres apart. Each trap consisted of a plastic half pint tumbler, diameter 7.5 centimetres and depth 11 centimetres. Each was filled to a depth of around 2 centimetres with undiluted ethylene glycol, to which a few drops of washing up liquid was added to help reduce surface tension. The traps were buried so that the rim of each trap was slightly below ground level. The traps were covered with wire mesh to prevent small mammals from falling in and drowning. Samples were collected after the traps had been in situ for 4 days.
- 2.1.6 The use of pan-traps was employed at Site 2. Two yellow plastic trays measuring approximately 45 centimetres by 30 centimetres were placed in clearings within the woodland. These were filled to a depth of around 7 centimetres with ethylene glycol, and washing up liquid was added to reduce surface tension. Samples were collected after the traps had been in-situ for 4 days.

¹ Drake, C. M., Lott, D. A. Alexander, K. N. A. & Webb, J. (2007) *Surveying terrestrial and freshwater invertebrates for conservation evaluation*. 1st Edition. Draft document for Natural England.

2.2 Field survey

2.2.1 The weather conditions during the invertebrate surveys are detailed in Table 2.1.

Table 2.1: Weather conditions for the invertebrate surveys

Survey date	Sites surveyed	Weather conditions
25 th July 2017	8, 9, 10, 11, 12, 14, 15 and 16	Warm and sunny, 27°C, 25% cloud cover with a south-westerly moderate breeze.
26 th July 2017	1, 2, 3, 4, 5, 6 and 7	Morning wet and windy and no surveys undertaken. Brightening from 13:00 when surveys commenced. Cool and breezy with brighter spells, 21°C, 75% cloud cover with a south-westerly moderate to strong breeze.
27 th July 2017	1, 2, 3 and 13	Generally bright and sunny with a heavy shower between 12:30-12:45, 23°C, cloudy to 25% cloud cover with a westerly moderate breeze.
4 th September 2017	7, 8, 9, 10 and 11	Sunny spells and occasional light showers, 19°C, 75% cloud cover with a moderate breeze.
5 th September 2017	12, 14 and 15	Heavy rain in morning and no surveys carried out. Breezy, sunny spells and occasional light showers, 18°C.
6 th September 2017	4, 7, 13 and 16	Generally warm and sunny with some light showers, 18°C, 50% cloud cover with a westerly moderate breeze.
7 th September 2017	7 and 8 (collecting traps only)	Heavy rain, 16°C with a strong westerly breeze.

2.3 Survey constraints

2.3.1 The surveys on 25 July 2017 and 5 September 2017 were only undertaken in the afternoon due to heavy rain in the morning.

2.3.2 Due to the time of year the surveys were commissioned, the invertebrate surveys were only undertaken between July and September 2017, and, therefore spring to early summer invertebrate species will have been missed.

2.3.3 It must be considered that the survey period represents a snapshot of invertebrate activity, and therefore, the list of species recorded is only a small proportion of the total invertebrate fauna likely to be present at any given site.

2.3.4 Following the first tranche of surveys carried out in July, Site 1, Site 2, Site 3, Site 5 and Site 6 were removed from the survey requirements, and subsequently were not surveyed again in September.

3 Results

3.1 Survey results

- 3.1.1 A list of all invertebrate species recorded from each site is provided in appendix B. During the course of invertebrate surveys, a number of Nationally Scarce or UK BAP species were recorded; their locations shown in appendix C and appendix D and are detailed below.

Lepidoptera

Brown Hairstreak (Thecla betulae) UK BAP

- 3.1.2 No adults were seen during the course of the surveys, but ova were recorded from 3 of the sites surveyed. A single egg was recorded along the western boundary hedgerow at ST 5651 2603 within Site 2 on 27 July 2017. A further group of 2 ova were recorded from Site 3 along the eastern boundary hedgerow on the same date. A total of 5 eggs were found at ST 5867 2560 within Site 7 on 6 September 2017. These comprised 2 sets of 2 ova and a further singleton in a third area of the site, all of which were found along southern side of the northern boundary hedgerow. All eggs were attached to blackthorn *Prunus spinosa*, which is the larval foodplant of the brown hairstreak. The adult flies from mid July to September, but is known to be elusive, with males frequently staying high in the canopy. The brown hairstreak has declined considerably in both range and abundance in the last century. Records are now largely confined to Surrey, Oxfordshire, Buckinghamshire, West Sussex, Devon and Somerset. The brown hairstreak also occurs in Wales. South Somerset is amongst the remaining English strongholds for this species.

White-letter hairstreak (Satyrium w-album) UK BAP

- 3.1.3 A single adult was recorded from the southern perimeter of Site 5 on 26 July 2017, where it was recorded visiting a bramble flower at ST 5817 2654. This species is most frequently seen in woodland rides or edges, but also occurs in sheltered hedgerows where the larval foodplant occurs. Several species of elm are utilised. English elm *Ulmus minor* (or its hybrids) was frequent around the edge of the survey site. Although the white-letter hairstreak remains quite widespread in England, it has suffered considerable decline, and has therefore been added to the BAP listings.

Diptera

A soldierfly (Chorisops nagatomii) Nationally Scarce (N).

- 3.1.4 A single specimen was beaten from oak on the northern boundary at ST 5893 2552 within Site 15 on 5 September 2017. A further specimen was found in the

pan-trap sample at ST 5909 2573 within Site 8, in place between 4 and 9 September 2017. Larvae of this species are terrestrial, and believed to develop in decaying vegetation. Nationally, *Chorisops nagatomii* is widespread but scarce in southern England and Wales. There are a number of previous records for the south Somerset area.

A thick-headed fly (*Leopoldius signatus*) Nationally Scarce (N).

3.1.5 At least 1 specimen was recorded visiting ivy flowers along the southern hedgerow at ST 5721 2548 within Site 4 on 6 September 2017. Larvae of *Leopoldius signatus* are believed to develop as parasitoids in the abdomen of social wasps of the genera *Vespula* and *Dolichovespula*. Adults of *Leopoldius signatus* are active between late July and early October, when they are frequently found at ivy blossom, a flower favoured by social wasps. Most records of *Leopoldius signatus* are from southern England, where it appears to have increased in recent decades². However, there appear to be few records of *Leopoldius signatus* from the south-west of England, including Somerset.

A picture-winged fly (*Acanthiophilus helianthin*) Nationally Scarce (N).

3.1.6 A single specimen was swept from the flowers of black knapweed *Centaurea nigra* at ST 5647 2620 within Site 2 on 27 July 2017. A further 4 specimens were swept from this plant at ST 5670 2595 within Site 3 on the same date. At the latter site *Acanthiophilus helianthin* was found to be quite widely distributed across the site. In the United Kingdom, larvae of *Acanthiophilus helianthin* develop in the seed heads of black knapweed and possibly greater knapweed. Nationally, this species is largely confined to southern English counties. The maps provided by the national recording scheme for Tephritid flies³ suggest that there are few records of *Acanthiophilus helianthin* in Somerset.

A picture-winged fly (*Campiglossa malaris*) Endangered (RDB 1).

3.1.7 A specimen of this fly was recorded by sweeping ragwort at ST 5670 2595 within Site 3 on 27 July 2017. The larval stage of *Campiglossa malaris* is believed to be associated with ragworts. The first British record of *Campiglossa malaris* was from Kent in 1974 and by 2008 it had been recorded from a total of 20 10 kilometre Ordnance Survey squares in Britain. This rapid expansion has continued, and in 2011 *Campiglossa malaris* proved to be abundant and widespread as far north as Warwickshire. Current information suggests that *Campiglossa malaris* is now recorded from at least 67 10 kilometre Ordnance Survey squares in England³, although it remains seldom recorded from Somerset. During the last few years the species has been recorded from a considerable number of sites in southern England where ragwort occurs in

² Falk, S. J. (1991) *A review of the scarce and threatened flies of Great Britain (part 1)*. Research & survey in Nature Conservation No. 39. Nature Conservancy Council, Peterborough.

³ Clemons, L. (2015) *The Tephritidae of Britain and Ireland*. Computer generated document.

quantity. As *Campiglossa malaris* is now so well established, it is clear that the status of this species requires review and downgrading, and may now no longer meet the criteria to qualify for any threat status whatsoever.

A picture-winged fly (*Myopites inulaedyssentericae*) Rare (RDB 3)

3.1.8 A specimen of this fly was found by sweeping common fleabane at ST 5670 2598 within Site 3 on 27 July 2017. Larvae of this species develop in the seed heads of common fleabane. In the past *Myopites inulaedyssentericae* was an extremely localised species in southern and south-eastern England. Although it is still largely confined to this geographical area *Myopites inulaedyssentericae* appears to have become more common in recent decades and its current threat status requires downgrading. The distribution map³ shows 1 previous record for south Somerset, suggesting that *Myopites inulaedyssentericae* is scarce in the area.

A picture - winged fly (*Terellia vectensis*) Rare (RDB 3).

3.1.9 A specimen of this species was found by sweeping saw-wort *Serratula tinctoria* at ST 5670 2595 within Site 3 on 27 July 2017. *Terellia vectensis* develops in the seed heads of saw-wort. Nationally, *Terellia vectensis* has a restricted distribution in southern England. Clemons (2015)³ gives a total of 21 modern 10 kilometre Ordnance Survey squares for records of *Terellia vectensis*, but only 1 of these records is from south Somerset, confirming that *Terellia vectensis* is a scarce insect in this area.

Hymenoptera

A mining bee (*Lasioglossum pauxillum*) Nationally Scarce (Na).

3.1.10 Specimens of *Lasioglossum pauxillum* were recorded from ST 5646 2017 within Site 2 on 27 July 2017 and from ST 5951 2630 within Site 10 on 25 July 2017. This species nests in sparsely vegetated light soils in warm, sunny conditions. It may be found in a variety of habitats including calcareous grassland, soft rock coastal cliffs and heathland. Previously, *Lasioglossum pauxillum* was a scarce species restricted to south-east England, but in the last decade it has increased in frequency and expanded its range northwards and westwards⁴. Its current Nationally Scarce (Na) status now requires downgrading. There appear to be rather few records of *Lasioglossum pauxillum* from Somerset, and they are considered to be scarce in south-west England⁵.

⁴ Edwards, R. & Broad, G. (Eds.) (2005) *Provisional atlas of the aculeate Hymenoptera of Britain and Ireland part 5*. Centre for Ecology and Hydrology, Huntingdon.

⁵ Falk, S. & Lewington, R. (2015) *Field Guide to the bees of Great Britain and Ireland*. Bloomsbury Publishing Plc, London.

4 Potential impacts

4.1 Construction

- 4.1.1 Vegetation and ground clearance during construction would result in the loss of suitable invertebrate habitat and may cause harm or disturbance to invertebrate species.

4.2 Operation

- 4.2.1 Annual flailing of roadside hedgerows and cutting of grassland may result in the loss or detrimental modification to invertebrate habitat.

5 Mitigation and enhancement recommendations

5.1 Site 1, 11, 12, 13, 14 and 16

5.1.1 No scarce species were recorded within the site, and, therefore no specific mitigation and enhancement recommendations are provided.

5.2 Sites 2, 3, 5, and 6

5.2.1 The sites would no longer be affected by the scheme, and therefore mitigation and enhancement is not relevant.

5.3 Site 4

5.3.1 The Nationally Scarce thick-headed fly *Leopoldius signatus* was recorded here. This species is mainly associated with ivy blossom, which it visits in order to find social wasps, upon which it is parasitic. Loss of ivy would be likely to result in loss of habitat locations where *Leopoldius signatus* can locate host social wasps. Wherever possible, ivy would be retained within the site. New hedgerow and scrub planting within the site would incorporate ivy.

5.4 Site 7

5.4.1 Several ova of the brown hairstreak butterfly were found at this site, all on the southern edge of the northern boundary hedge. Eggs are laid on blackthorn, and remain on this plant through the winter. Eggs are normally laid at the junction of young branches. Actions such as removal of blackthorn hedgerows, mechanical flailing or trimming too regularly are likely to diminish the hatching success of brown hairstreak eggs and therefore adversely affect populations. Management of blackthorn hedges by sectional rotational cutting on a 3 year cycle or traditional hedgerow laying may prove beneficial in maintaining brown hairstreaks on a site. Hedgerows that would be lost to the scheme should be replaced through additional scrub and hedgerow planting where a high density of blackthorn is utilised.

5.5 Site 8

5.5.1 A specimen of the Nationally Scarce soldierfly *Chorisops nagatomii* was recorded from the pan-trap samples at this site. Adults are found in a variety of situations, including fens, woodland and parkland. The larval biology of this species is poorly known, although it is believed that larvae of *Chorisops nagatomii* may develop in damp leaf litter. In the absence of a firm knowledge of the exact requirements, it is not feasible to provide mitigation advice, however, maintenance of the woodland environment would not be likely to result in a significant negative impact to the species.

5.6 Site 10

- 5.6.1 The mining bee *Lasioglossum pauxillum* was recorded during general sweeping. This species forages at a variety of plants and nests in various habitats where sparsely vegetated soils occur in warm conditions. Due to a considerable recent increase in both range and frequency, *Lasioglossum pauxillum* no longer fulfils the criteria to qualify for its current Nationally Scarce status, and therefore no specific mitigation and enhancement recommendations are provided.

5.7 Site 15

- 5.7.1 A specimen of the Nationally Scarce soldierfly *Chorisops nagatomii* was recorded from oak along the northern boundary hedgerow. Adults are found in a variety of situations, including fens, woodland and parkland. The larval biology of this species is poorly known, although it is believed that larvae of *Chorisops nagatomii* may develop in damp leaf litter. Where possible this hedgerow should be retained and it appears to be sufficiently far from the proposed works to enable this.

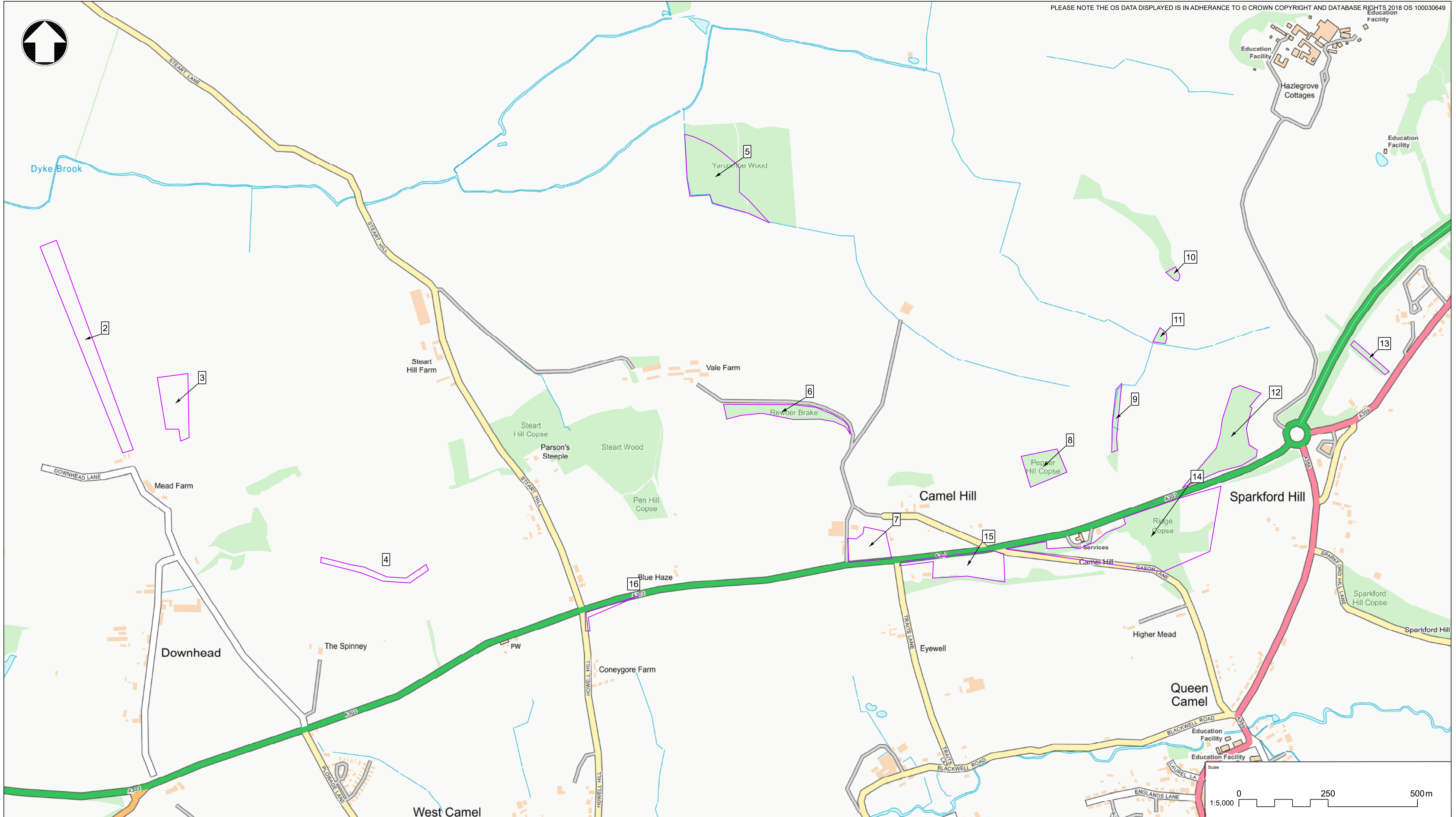
5.8 General

- 5.8.1 Given the generally fairly low diversity of the invertebrate communities present, general mitigation, enhancement and compensation required for invertebrates is relatively minimal. Replacing lost hedgerows and scrub with diverse native species replacement hedgerows that contain a good range of flowering species such as hawthorn *Crataegus monogyna*, blackthorn, dogwood *Cornus sanguinea* and wayfaring tree *Viburnum lantana*.
- 5.8.2 Grassland planting should consist of native species wildflower mixes containing a good diversity of high value nectar rich species such as common birds-foot-trefoil *Lotus corniculatus*, black knapweed *Centaurea nigra* and hogweed *Heracleum sphondylium*.
- 5.8.3 Wood arising from any trees to be felled should be stacked into habitat piles to provide habitat for saproxylic species. These habitat piles should be placed in a range of sunny and shady locations.

6 Conclusion

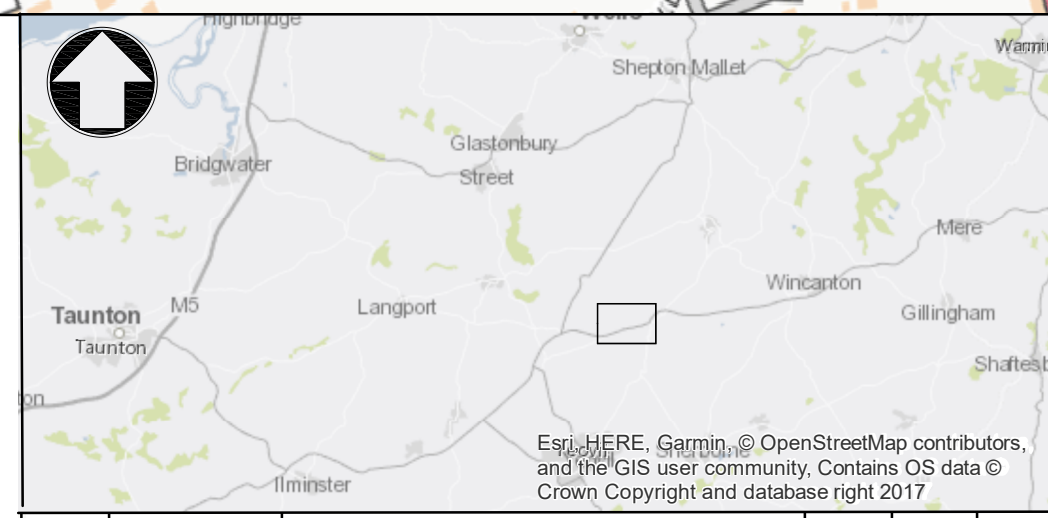
- 6.1.1 The communities of invertebrates recorded during the current survey were generally of low diversity and lacked significant numbers of particularly rare or scarce species. As a result, the impacts on the communities present of the proposed road improvements are considered minimal. General landscaping recommendations including the provision of replacement scrub and hedgerows, planting of wildflower grassland and the creation of log piles would help to maintain the communities present within the local area.

Appendix A: Site location plan



KEY

SITE BOUNDARY



Project Title A303 SPARKFORD TO ILCHESTER DUALLING					
Drawing Title INVERTBRATE SURVEY SITE BOUNDARY					
Drawing Status Published - DEFINITION					Suitability A3
Scale AS SHOWN	Designed ER	Drawn ER	Checked VC	Approved ER	
Original Size A1	Date JULY 2018	Date JULY 2018	Date JULY 2018	Date JULY 2018	
Drawing Number HE 55 1507 - MMSJV - EBD			Project Ref. No. 389107		Revision C01
C01	JULY 2018	DCO SUBMISSION	ER	VC	ER
REV.	DATE	AMENDMENT DETAILS	ORIG	CHK'D	APP'D

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Appendix B: Invertebrate survey results

Table B.1: Invertebrate survey results

Order	Family	Scientific Name	English Name	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15	Site 16	Status		
ORTHOPTERA (Grasshoppers and Crickets)	N/A	<i>Chorthippus brunneus</i>	Field Grasshopper		1	1				1			1							Common Widespread		
		<i>Chorthippus parallelus</i>	Meadow Grasshopper		1					1			1			1		1	1	Common Widespread		
		<i>Conocephalus discolor</i>	Long-winged Conehead		1	1					1										Common Widespread	
		<i>Conocephalus dorsalis</i>	Short-winged Conehead								1										Common Widespread	
		<i>Leptophyes punctatissima</i>	Speckled Bush Cricket	1						1	1						1				Common Widespread	
		<i>Metrioptera roeselii</i>	Roesel's Bush Cricket	1	1	1					1									1	Common Widespread	
		<i>Pholidoptera griseoptera</i>	Dark Bush Cricket	1		1				1	1	1	1	1	1			1		1	Common Widespread	
		<i>Tetrix undulata</i>	Common Ground Hopper												1							Common Widespread
		<i>Tettigonia viridissima</i>	Great Green Bush Cricket																1		1	Local
DERMAPTERA (Earwigs)	N/A	<i>Forficula auricularia</i>	Common Earwig				1			1		1	1	1						Common Widespread		
HEMIPTERA (True Bugs)	Coreidae (Squash Bugs)	<i>Coreus marginatus</i>	Squash Bug				1			1		1	1			1				Common Widespread		
	Pentatomidae (Shield Bugs)	<i>Palomena prasina</i>	Green Shield Bug									1	1			1	1	1			Common Widespread	
		<i>Pentatoma rufipes</i>	Forest Bug													1	1				Common Widespread	
		<i>Troilus luridus</i>	A Shield Bug									1				1					Common Widespread	
	Scutelleridae (Tortoise Bugs)	<i>Eurygaster testudinaria</i>	Common Tortoise Bug		1																Common Widespread	
ODONATA (Dragonflies and Damselflies)	Coenagriidae (Damselflies)	<i>Ischnura elegans</i>	Blue-tailed Damselfly						1											Common Widespread		
	Agiidae (Demoiselles)	<i>Agrion splendens</i>	Banded Demoiselle		1				1												Common Widespread	
		<i>Agrion virgo</i>	Beautiful Demoiselle												1						Common Widespread	
	Aeshnidae (Hawkers)	<i>Aeshna cyanea</i>	Southern Hawker						1												Common Widespread	
		<i>Aeshna mixta</i>	Migrant Hawker							1			1		1	1	1		1		Common Widespread	
		<i>Anax imperator</i>	Emperor Dragonfly						1												Common Widespread	
	Libellulidae (Skimmers and Chasers)	<i>Sympetrum sanguineum</i>	Ruddy Darter																1		Common Widespread	
		<i>Sympetrum striolatum</i>	Common Darter	1						1				1			1		1		Common Widespread	
LEPIDOPTERA (Butterflies and Moths)		<i>Aglais urticae</i>	Small Tortoiseshell																1	Common Widespread		
		<i>Aphantopus hyperantus</i>	Ringlet	1		1		1													Common Widespread	
		<i>Argynnis paphia</i>	Silver-washed Fritillary	1																	Common Widespread	

Order	Family	Scientific Name	English Name	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15	Site 16	Status
		<i>Aricia agestis</i>	Brown Argus	1	1													1		Common Widespread
		<i>Celastrina argiolus</i>	Holly Blue	1									1							Common Widespread
		<i>Inachis io</i>	Peacock			1					1						1			Common Widespread
		<i>Lycaena phlaeas</i>	Small Copper		1															Common Widespread
		<i>Maniola jutina</i>	Meadow Brown	1				1	1	1	1	1	1		1	1	1	1		Common Widespread
		<i>Neozephyrus quercus</i>	Purple Hairstreak	1																Common Widespread
		<i>Pararge aegeria</i>	Speckled Wood		1		1		1	1	1	1	1	1	1	1	1	1		Common Widespread
		<i>Pieris brassicae</i>	Large White	1	1	1				1	1	1	1	1	1			1	1	Common Widespread
		<i>Pieris napi</i>	Green-veined White	1	1		1	1		1	1	1						1		Common Widespread
		<i>Polygonia c - album</i>	Comma								1					1		1		Common Widespread
		<i>Pyronia tithonus</i>	Gatekeeper	1		1	1	1	1	1	1	1	1			1	1		1	Common Widespread
		<i>Satyrrium w-album</i>	White-letter Hairstreak					1												UK BAP
		<i>Thecla betulae</i>	Brown Hairstreak		1	1				1										UK BAP
		<i>Thymelicus lineola</i>	Essex Skipper		1				1											Common Widespread
		<i>Thymelicus sylvestris</i>	Small Skipper		1															Common Widespread
		<i>Vanessa atalanta</i>	Red Admiral	1	1	1	1			1	1	1				1	1		1	Common Widespread
		<i>Acleris forsskaleana</i>					1													Common Widespread
		<i>Agriphilla straminella</i>				1	1									1				Common Widespread
		<i>Amphipyra pyramidea</i>	Copper Underwing										1							Common Widespread
		<i>Anthophila fabriciana</i>																1		Common Widespread
		<i>Autographa gamma</i>	Silver Y			1												1		Common Widespread
		<i>Celypha lacunana</i>										1	1	1			1	1	1	Common Widespread
		<i>Crambus perlella</i>								1										Common Widespread
		<i>Eilema griseola</i>	Dingy Footman				1													Common Widespread
		<i>Epiphyas postvittanna</i>																1		Common Widespread
		<i>Hypena proboscidalis</i>	Snout									1	1							Common Widespread

Order	Family	Scientific Name	English Name	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15	Site 16	Status		
		<i>Mesoligia furuncula</i>	Cloaked Minor															1		Common Widespread		
		<i>Opisthograptis luteolata</i>	Brimstone Moth				1													Common Widespread		
		<i>Orgyia antiqua</i>	Vapourer Moth		1															Common Widespread		
		<i>Rivula sericealis</i>	Straw Dot	1	1															Common Widespread		
		<i>Scotopteryx chenopodiata</i>	Shaded Broad Bar		1	1										1				Common Widespread		
		<i>Timandra griseata</i>	Blood-vein	1		1														Common Widespread		
		<i>Xestia xanthographa</i>	Square-spot Rustic							1										Common Widespread		
		<i>Ypsophila sequella</i>					1													Common Widespread		
		<i>Zygaena filipendulae</i>	Six-spot Burnet		1															Common Widespread		
DIPTERA (True Flies)	Stratiomyidae (Soldier Flies)	<i>Chloromyia formosa</i>										1	1				1	1		Common Widespread		
		<i>Chorisops nagatomii</i>										1							1		Nationally Scarce N	
		<i>Sargus bipunctatus</i>																	1		Common Widespread	
	Rhagionidae (Snipe Flies)	<i>Chrysopilus cristatus</i>			1																Common Widespread	
	Tabanidae (Horse Flies)	<i>Haematopota pluvialis</i>		1																	Common Widespread	
	Dolichopodidae (Long-headed Flies)	<i>Dolichopus festivus</i>		1			1										1				Common Widespread	
		<i>Poecilobothrus nobilitatus</i>					1														Common Widespread	
	Syrphidae (Hoverflies)	<i>Baccha elongata</i>														1		1			Common Widespread	
		<i>Cheilosia pagana</i>				1										1					Common Widespread	
		<i>Cheilosia soror</i>											1								Local Widespread	
		<i>Cheilosia vernalis</i>												1							Common Widespread	
		<i>Epistrophe grossulariae</i>										1									Common Widespread	
		<i>Episyrphus balteatus</i>		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Common Widespread
		<i>Eristalis arbustorum</i>				1					1	1	1	1			1	1	1	1	1	Common Widespread
<i>Eristalis horticola</i>									1												Common Widespread	
<i>Eristalis interruptus</i>					1											1	1		Common Widespread			
<i>Eristalis intricarius</i>				1																Common Widespread		

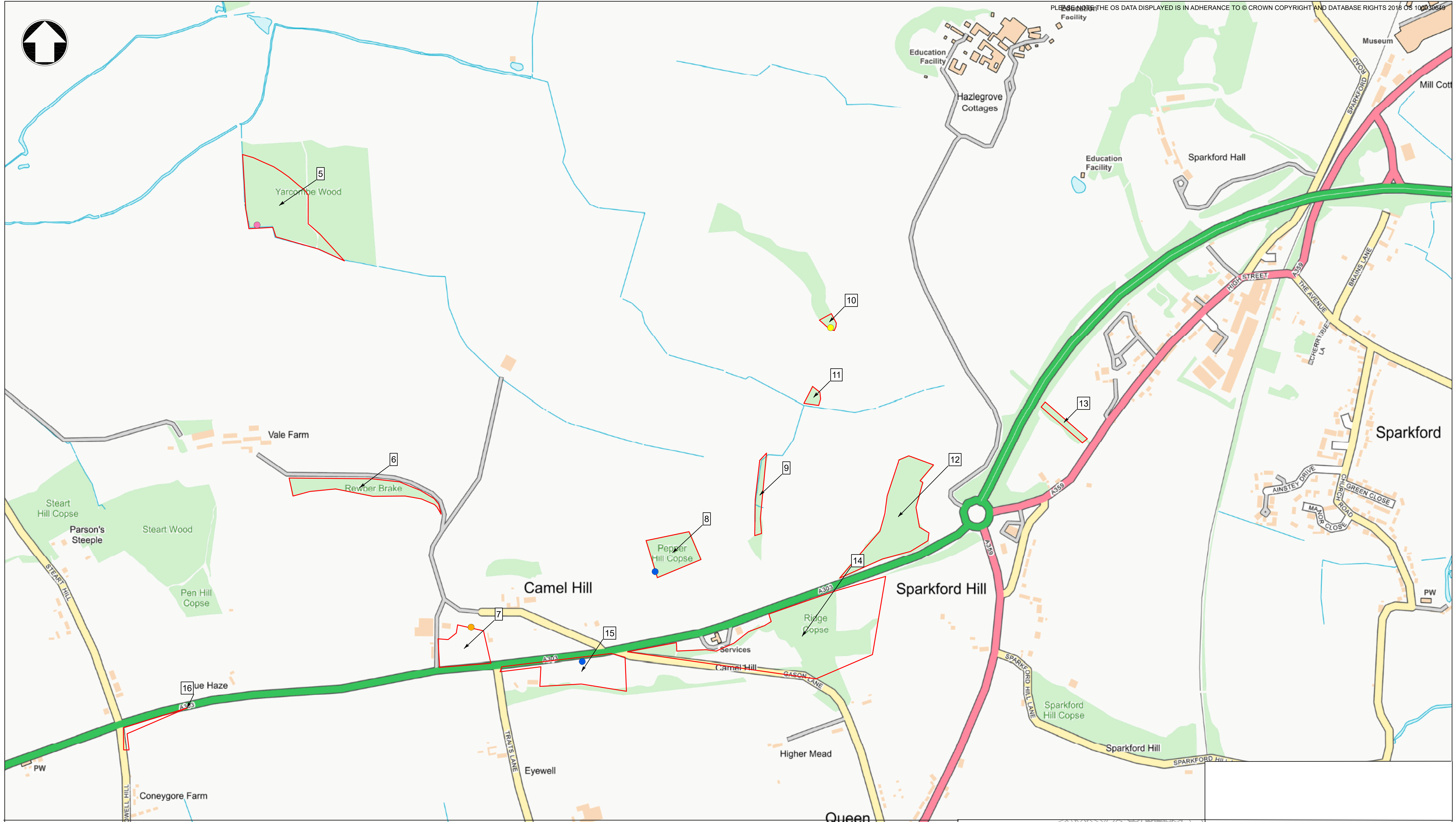
Order	Family	Scientific Name	English Name	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15	Site 16	Status
		<i>Eristalis pertinax</i>		1			1	1			1	1		1	1			1		Common Widespread
		<i>Eristlis tenax</i>			1	1	1		1	1	1	1	1	1	1	1	1	1	1	Common Widespread
		<i>Eupeodes corollae</i>				1	1									1	1		1	Common Widespread
		<i>Ferdinandea cuprea</i>									1				1					Common Widespread
		<i>Helophilus hybridus</i>													1					Common Widespread
		<i>Helophilus pendulus</i>		1	1	1				1			1			1		1		Common Widespread
		<i>Helophilus trivittatus</i>													1			1		Common Widespread
		<i>Melanostoma mellinum</i>			1	1	1		1	1		1	1		1			1	1	Common Widespread
		<i>Melanostoma scalare</i>		1			1				1			1			1		1	Common Widespread
		<i>Myathropa florea</i>				1	1											1		Common Widespread
		<i>Neoascia podagrica</i>									1						1	1		Common Widespread
		<i>Orthonevra nobilis</i>									1									Common Widespread
		<i>Pipiza noctiluca</i>		1		1														Common Widespread
		<i>Pipizella viduata</i>		1																Common Widespread
		<i>Platycheirus albimanus</i>		1		1					1				1		1	1		Common Widespread
		<i>Platycheirus clypeatus</i>											1							Common Widespread
		<i>Platycheirus rosarum</i>		1																Common Widespread
		<i>Platycheirus scutatus s.l.</i>															1			Common Widespread
		<i>Rhingia campestris</i>								1	1		1		1		1		1	Common Widespread
		<i>Scaeva pyrastris</i>								1										Common Widespread
		<i>Sphaerophoria</i>																		Common Widespread
		<i>Sphaerophoria scripta</i>				1				1									1	Common Widespread
		<i>Sphaerophoria taeniata</i>			1	1	1			1										Common Widespread
		<i>Syrpitta pipiens</i>			1		1		1	1		1	1		1		1	1	1	Common Widespread
		<i>Syrphus ribesii</i>										1					1			Common Widespread
		<i>Syrphus vitripennis</i>			1		1			1	1				1					Common Widespread

Order	Family	Scientific Name	English Name	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15	Site 16	Status	
		<i>Volucella pelluscens</i>					1			1					1	1		1		Common Widespread	
		<i>Volucella zonaria</i>					1					1				1	1			Common Widespread	
		<i>Xylota segnis</i>									1						1			Common Widespread	
		<i>Xylota sylvarum</i>									1									Common Widespread	
	Conopidae (Thick-headed Flies)	<i>Conops quadrifasciatus</i>			1							1								Common Widespread	
		<i>Leopoldius signatus</i>					1													Nationally Scarce N	
		<i>Thecophora atra</i>												1							Local Widespread
	Tephritidae (Picture-winged Flies)	<i>Acanthophilus helianthi</i>			1	1														Nationally Scarce N	
		<i>Campiglossa malaris</i>				1															Endangered RDB 1
		<i>Chaetostomella cylindrica</i>				1	1														Common Widespread
		<i>Myopites inulaedyssentericae</i>					1														Rare RDB 3
		<i>Sphenella marginata</i>									1										Common Widespread
		<i>Tephritis formosa</i>				1								1							Common Widespread
		<i>Terrellia tussilaginis</i>			1			1					1					1	1	1	Common Widespread
		<i>Terrellia vectensis</i>					1														Rare RDB 3
		<i>Urophora quadrifasciata</i>				1	1														Common Widespread
		<i>Xyphosia miliaria</i>					1														Common Widespread
	Opomyzidae (Opomyzid Flies)	<i>Opomyza florum</i>				1														Common Widespread	
	Sciomyzidae (Snail-killing Flies)	<i>Coramacera marginata</i>										1								Common Widespread	
		<i>Pherbellia albocostata</i>										1								Local Widespread	
		<i>Tetanocera elata</i>				1		1													Common Widespread
	Scathophagidae (Dung Flies)	<i>Scathophaga stercoraria</i>	Common Yellow Dung Fly	1			1			1	1	1	1			1	1	1	1	Common Widespread	
	Tachinidae (Tachinid Flies)	<i>Eriothrix rufomaculatus</i>			1	1		1		1	1		1			1		1	1	Common Widespread	
		<i>Phasia obesa</i>													1						Common Widespread
	Muscidae (House Flies)	<i>Mesembrina meridiana</i>										1	1			1		1		Common Widespread	
HYMENOPTERA (Bees, Wasps and Ants)	Symphyla (Sawfleis)	<i>Tenthredo scrophulariae</i>														1				Common Widespread	

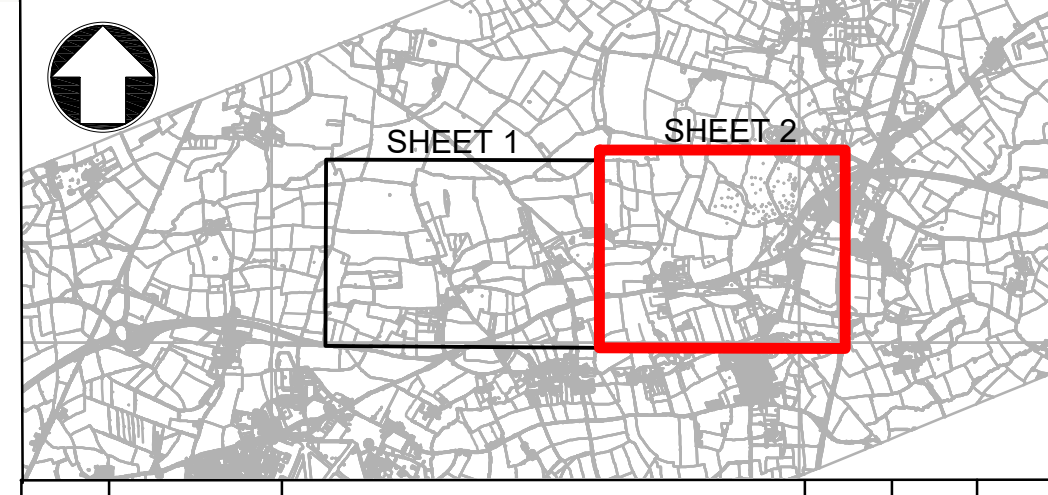
Order	Family	Scientific Name	English Name	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15	Site 16	Status	
	Formicidae (Ants)	<i>Myrmica rubra</i>								1										Common Widespread	
	Eumenidae (Potter and Mason Wasps)	<i>Symmorphus gracilis</i>		1																Common Widespread	
	Vespidae (Social Wasps)	<i>Vespa crabro</i>	Hornet									1	1		1					Local Widespread	
		<i>Vespula germanica</i>	German Wasp				1													Common Widespread	
		<i>Vespula vulgaris</i>	Common Wasp			1	1	1				1		1		1		1		Common Widespread	
	Crabronidae (Digger Wasps)	<i>Ectemnius continuus</i>									1	1								Common Widespread	
		<i>Ectemnius lituratus</i>									1	1								Common Widespread	
		<i>Trypoxylon attenuatum</i>										1								Common Widespread	
	Colletidae (Mining and Yellow-faced Bees)	<i>Colletes hederæ</i>	Ivy Bee				1													Common Widespread	
		<i>Hylaeus brevicornis</i>												1						Common Widespread	
		<i>Hylaeus communis</i>			1								1	1						Common Widespread	
		<i>Hylaeus confusus</i>													1					Common Widespread	
	Andrenidae (Mining Bees)	<i>Andrena flavipes</i>															1			Common Widespread	
		<i>Andrena nigroaenea</i>					1													Common Widespread	
	Halictidae (Mining and Cuckoo Bees)	<i>Halictus tumulorum</i>												1		1		1		1	Common Widespread
		<i>Lasioglossum albipes</i>			1																Common Widespread
		<i>Lasioglossum calceatum</i>					1					1		1		1					Common Widespread
		<i>Lasioglossum morio</i>																1			Common Widespread
		<i>Lasioglossum pauxillum</i>				1									1						Nationally Scarce Na
		<i>Lasioglossum villosulum</i>				1															Common Widespread
		<i>Lasioglossum zonulum</i>																	1		Common Widespread
		<i>Sphecodes ephippius</i>													1						Common Widespread
	Apidae (Social and Cuckoo Bees)	<i>Apis mellifera</i>	Western Honey Bee		1	1	1	1		1		1	1	1	1	1	1	1	1	Common Widespread	
		<i>Bombus hortorum</i>	Garden Bumblebee									1		1							Common Widespread
		<i>Bombus hypnorum</i>	Tree Bumblebee							1											Common Widespread
		<i>Bombus jonellus</i>	Heath Bumblebee							1											Common Widespread

Order	Family	Scientific Name	English Name	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15	Site 16	Status	
		<i>Bombus lapidarius</i>	Red-tailed Bumblebee		1	1											1		1	Common Widespread	
		<i>Bombus lucorum</i>	White-tailed Bumblebee	1	1	1			1	1	1	1	1		1	1	1	1	1	Common Widespread	
		<i>Bombus pascuorum</i>	Common Carder Bee	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	Common Widespread	
		<i>Bombus pratorum</i>	Early Bumblebee																1	Common Widespread	
		<i>Bombus terrestris</i>	Buff-tailed Bumblebee		1	1	1			1			1	1					1	Common Widespread	
		<i>Bombus vestalis</i>	Vestal Cuckoo Bumblebee								1									Common Widespread	
COLEOPTERA (Beetles)	Cantharidae (Soldier Beetles)	<i>Rhagonycha fulva</i>		1	1			1	1	1	1	1	1							Common Widespread	
	Carabidae (Ground and Tiger Beetles)	<i>Abax parallelipipidus</i>		1																	Common Widespread
		<i>Bembidion quadrimaculatum</i>										1									Common Widespread
		<i>Poecilus cupreus</i>																	1		Common Widespread
		<i>Pterostichus madidus</i>									1										Common Widespread
		<i>Pterostichus niger</i>									1										Common Widespread
	Cerambycidae (Longhorn Beetles)	<i>Rutpela maculata</i>	Spotted Longhorn Beetle												1						Common Widespread
	Chrysomelidae (Leaf Beetles)	<i>Cassida vibex</i>																	1		Common Widespread
		<i>Oulema obscura</i>												1							Common Widespread
		<i>Timarcha goettingensis</i>	Bloody-nose Beetle				1	1													Common Widespread
	Coccinellidae (Ladybirds)	<i>Adalia 10-punctata</i>	10-spot Ladybird													1					Common Widespread
		<i>Coccinella 7-punctata</i>	7-spot Ladybird												1						Common Widespread
		<i>Halyzia 16-guttata</i>	Orange Ladybird													1		1			Common Widespread
		<i>Harmonia axyridis</i>	Harlequin Ladybird		1	1						1								1	Common Widespread
		<i>Propylea 14-punctata</i>	14-spot Ladybird										1								Common Widespread
		<i>Psyllobora 22-punctata</i>	22-spot Ladybird											1		1		1			Common Widespread
	Curculionidae (Weevils)	<i>Liophloeus tessulatus</i>					1														Common Widespread
		<i>Otiorhynchus clavipes</i>					1														Common Widespread
	Oedemeridae (Oedemerid Beetles)	<i>Oedemera nobilis</i>			1	1					1	1	1							Common Widespread	
	Mordellidae (Flower Beetles)	<i>Mordellistena neuwaldeggiana</i>					1														Local Widespread

Appendix C: Eastern locations of nationally scarce or UK BAP species



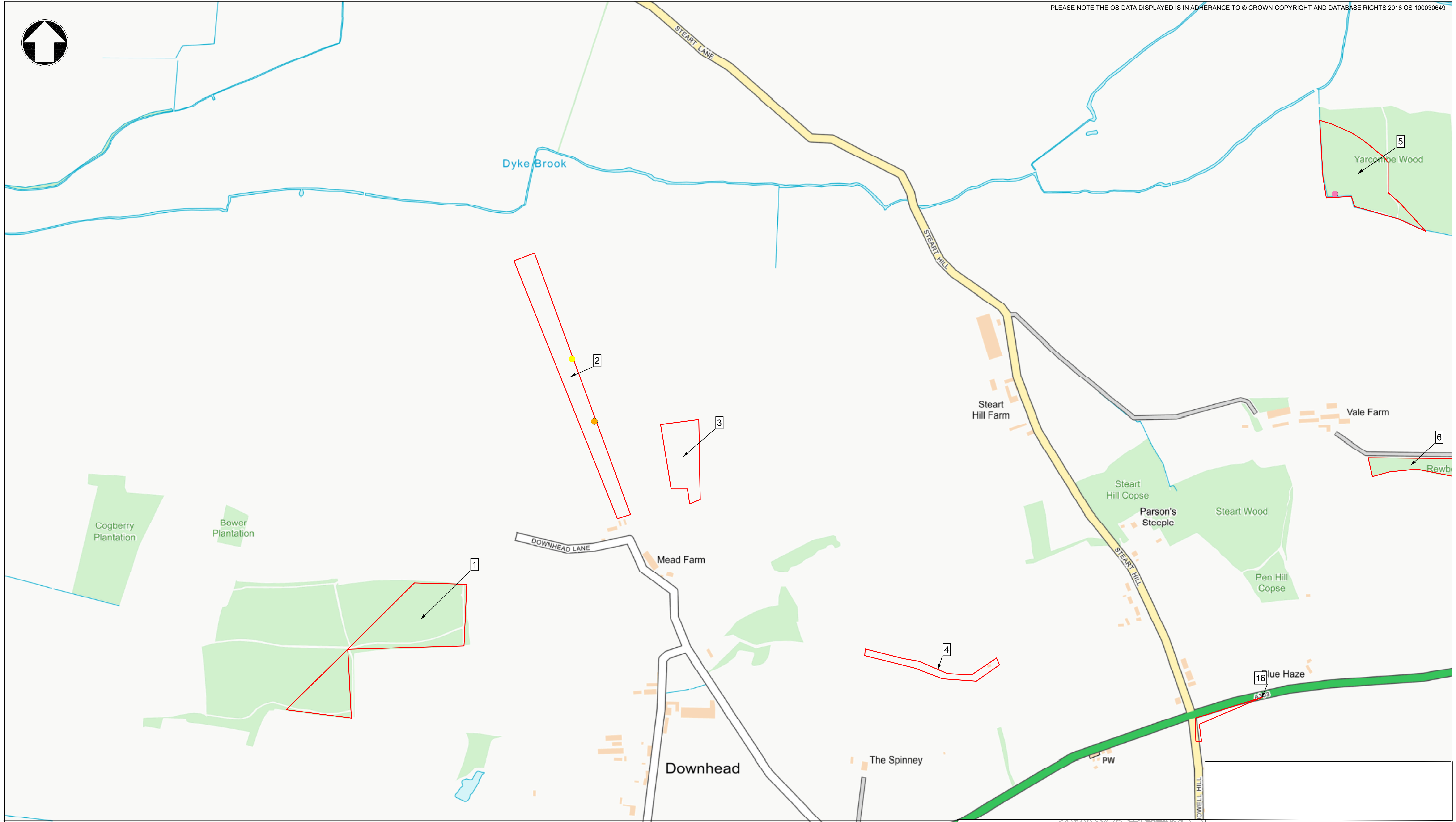
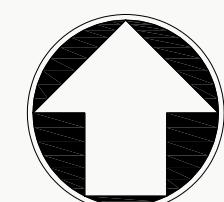
- KEY**
- SITE BOUNDARY
 - SPECIES**
 - CHORISOPS NAGATOMII
 - LASIOGLOSSUM PAUXILLUM
 - SATYRIUM W-ALBUM
 - THECLA BETULAE



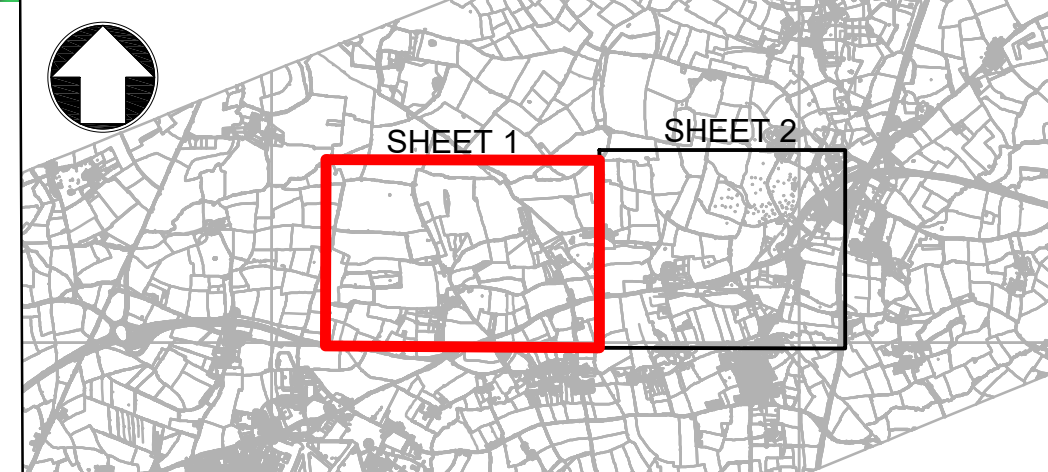
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Drawing Title EASTERN LOCATIONS OF NATIONALLY SCARCE OR UK BAP SPECIES SHEET 2					
Drawing Status Published - DEFINITION					Suitability A3
Scale NTS	Designed ER	Drawn ER	Checked VC	Approved ER	
Original Size A1	Date JULY 2018	Date JULY 2018	Date JULY 2018	Date JULY 2018	
Drawing Number HE551507 - MMSJV - EBD			Project Ref. No. 389107		Revision C01
REV. DATE		AMENDMENT DETAILS		Location 000	Type Role Number - DR - LB - 0091

0 10 20 30 40 50 60 70 80 90 100

Appendix D: Western locations of nationally scarce or UK BAP species



- KEY**
- SITE BOUNDARY
 - SPECIES**
 - CHORISOPS NAGATOMII
 - LASIOGLOSSUM PAUXILLUM
 - SATYRIUM W-ALBUM
 - THECLA BETULAE



Project Title A303 SPARKFORD TO ILCHESTER DUALLING					
Drawing Title WESTERN LOCATIONS OF NATIONALLY SCARCE OR UK BAP SPECIES SHEET 1					
Drawing Status Published - DEFINITION					Suitability A3
Scale NTS	Designed ER	Drawn ER	Checked VC	Approved ER	
Original Size A1	Date JULY 2018	Date JULY 2018	Date JULY 2018	Date JULY 2018	
Drawing Number HE551507 - MMSJV - EBD			Project Ref. No. 389107		Revision C01
REV. DATE		AMENDMENT DETAILS		Location 000 - DR - LB - 0090	
		ORIG	CHK'D	APP'D	

100
90
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