A38 Derby Junctions

TR010022

Volume 6

6.3 Environmental Statement Appendices

Appendix 8.13b: Terrestrial Invertebrate Survey in 2015

Regulation 5(2)(a)

Planning Act 2008

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

April 2019

Infrastructure Planning

Planning Act 2008

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

A38 Derby Junctions Development Consent Order 202[ ]

6.3 Environmental Statement Appendices
Appendix 8.13b: Terrestrial Invertebrate Survey in 2015

Regulation Number	Regulation 5(2)(a)
Planning Inspectorate Scheme Reference	TR010022
Application Document Reference	6.3
Author	A38 Derby Junctions Project Team, Highways England

Version	Date	Status of Version
1	April 2019	DCO Application

A38 Derby Junctions

Terrestrial Invertebrate Survey Report

Report Number: 47071319-URS-05-RP-EN-013
March 2016

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1. INTRODUCTION

1.1 Background and Scope

1.1.1 On July 14, 2014 AECOM was awarded the contract by Highways England to provide design services regarding the development of the A38 Derby Junctions Scheme (referred to herein as the proposed scheme). The proposed scheme concerns three junctions on the A38 in Derby as follows (refer to Figure 1):

- A38/ A5111 Kingsway junction;
- A38/ A52 Markeaton junction; and
- A38/ A61 Little Eaton junction.

1.1.2 These three junctions are spread over an approximate 5.5 km distance along the A38 to the west and north-west of Derby.

1.1.3 AECOM will be preparing an Environmental Assessment Report (EAR) which will assess whether the proposed scheme has the potential to result in significant environmental effects, taking into account impact avoidance measures that are embedded into the proposed scheme design, as well as standard management activities that will be adopted. In order to support the ecological impact assessment to be reported in the EAR, AECOM has undertaken an extended Phase 1 habitat survey along the route of the proposed scheme (in January 2015). Results of the extended Phase 1 habitat survey (AECOM, 2015, report number 47071319-URS-05-RP-EN-003) identified potential habitat to support terrestrial invertebrates, therefore dedicated terrestrial invertebrate surveys were undertaken during the summer of 2015.

1.1.4 The terrestrial invertebrate surveys were undertaken on June 15, August 21 and 24, 2015. Results of these surveys are documented herein, together with desktop data. Recommendations for mitigation with regards to terrestrial invertebrates will be detailed in the EAR.

1.2 Study Site

1.2.1 The proposed scheme under appraisal (herein the proposed scheme footprint is referred to as the 'Site') encompass the Kingsway and Markeaton junctions, west of the City of Derby (Centroid SK 32801 36103) and the Little Eaton junction north of Derby (Centroid SK 36402 39990). A plan showing the Site boundaries is presented in Figures 2 and 3 in Appendix A.

1.2.2 The A38 is an existing and busy arterial 'A' road carrying traffic around the west and north of the City of Derby. South of the Kingsway junction, the road enters a cutting and is bordered by semi-improved grassland and scrub covered verges. The central reservation south of Kingsway junction and the junction island in this location support a mosaic of habitat types, including semi-improved neutral grassland and native broadleaved woodland. Bramble Brook flows from the west of the proposed scheme in this location, through culverts located under the north-bound carriageway and the central reservation before connecting with further culverts located between the junction islands. North of the Kingsway junction there is an area of mixed plantation represented by semi-mature trees on embankment.

1.2.3 The Markeaton junction section of the proposed scheme is bordered to the east by residential properties and to the west by parkland with veteran trees. The outfall from Markeaton Lake and Markeaton Brook flows through culverts beneath the existing A38 to the north of Markeaton junction.

1.2.4 The western boundary of the proposed scheme at Little Eaton junction borders the road bridge over the River Derwent. The existing A38 is on embankment in this location, with the embankments themselves represented by areas of scrub and

immature broadleaved plantation habitats. A variety of grassland habitats exist at the base of the embankments in this location.

1.3 Relevant Legislation and Biodiversity Strategies

1.3.1 The terrestrial invertebrate survey sought to identify the presence of protected or notable species, which are covered under one or more of the following pieces of legislation or policy:

- The Natural Environment and Rural Communities (NERC) Act 2006;
- The Wildlife and Countryside Act (1981) as amended (WCA);
- The EC Habitats Directive (Directive 92/43/ECC) as translated into UK law by The Habitats and Species Regulations 2010 (as amended);
- Section 41 of the NERC Act (2006);
- UK Biodiversity Action Plan (BAP); and
- Lowland Derbyshire Biodiversity Action Plan (LDBAP).

1.3.2 Schedule 5 of the Wildlife and Countryside Act (1981) as amended Great Britain lists 71 species of invertebrate with varying levels of protection (from full protection to protection of place of shelter only). These species include 34 species of moth and butterfly (Lepidoptera), eight species of beetle (Coleoptera), one species of cicada (Hemiptera), three species of cricket (Orthoptera), one species of dragonfly, one species of damselfly (Odonata), two species of spider (Arachnida), four species of crustacean (Crustacea), one species of bryozoan (Bryozoa), eight species of mollusc (Mollusca), four species of worm (Annelida), and four species of Coelenterata (Cnidaria and Ctenophora).

1.3.3 The Habitats and Species Regulations 2010 (as amended) lists one species of butterfly on Annex II and one species of butterfly on Annex IV, one species of moth on Annex II and one species of moth on Annex II and IV (Lepidoptera), and one species of snail on Annex V (Mollusca).

1.3.4 UK BAP priority species were those that were identified as being the most threatened and requiring conservation action between 1995 and 1999 originally with a number of amendments up to 2007, when a review was undertaken. The UK BAP was succeeded by the 'UK Post-2010 Biodiversity Framework' in July 2012. The UK list of priority species, however, remains an important reference source and has been used to help draw up statutory lists of priority species in England, Northern Ireland, Scotland and Wales required by the NERC Act 2006. In England, these are referred to as Section 41 species.

1.3.5 The Lowland Derbyshire Biodiversity Action Plan (LDBAP) seeks to conserve and enhance Lowland Derbyshire's existing wildlife and to redress past losses through habitat conservation, restoration, recreation and targeted action for priority species. The LDBAP lists 73 species of terrestrial invertebrate comprising 61 species of moth and seven species of butterfly (Lepidoptera), two species of bee and one species of ant (Hymenoptera), one species of beetle (Coleoptera), and one species of spider (Arachnid).

1.3.6 Highways England, through the national Road Investment Strategy (RIS), has set an aspiration that the operation, maintenance, and enhancement of the Strategic Road Network (SRN) should move to a position that delivers no net loss of biodiversity; and, in the long term, Highways England should deliver a net gain in biodiversity across its broader range of works. Highways England published a Biodiversity Plan (HEBP) in 2015 to show how it will work with service providers to halt overall biodiversity loss, and maintain and enhance habitats and ecological networks. The Government requires Highways England to demonstrate progress against the HEBP,

to secure an ongoing annual reduction in the loss of net biodiversity due to its activities. The HEBP provides a general plan to protect and increase biodiversity.

1.4 Sample Sites

1.4.1 The survey sample sites were all situated within areas of land anticipated to be lost or potentially impacted by the proposed scheme. Survey sample site locations were selected within the impacted areas, and included those areas considered to be the most species diverse invertebrate habitat; focusing upon free flying and/ or pollinating species.

1.4.2 A map showing the sampling locations at the Kingsway and Markeaton junctions is presented in Figure 4, whilst the sampling locations at the Little Eaton Junction are presented in Figure 5 (Appendix A).

1.4.3 The samples site locations and habitats are as follows (refer to site details below):

A. Kingsway junction south island semi-improved grassland;

B. Kingsway junction north island semi-improved grassland;

C. Sturgess Field semi-improved grassland;

D. Markeaton Park lakeside semi-improved grassland;

E. Talbot Turf Farm west of Little Eaton junction semi-improved grassland (two areas);

F. Semi-improved grassland east of Little Eaton junction; and

G. Kingsway Hospital semi-improved grassland (substitute for site A).

Site A – Kingsway Junction South Island

1.4.4 Kingsway junction south island (Centroid: SK 32603 35967) lies between the north and southbound carriageways of the A38. It is enclosed by roads, but does have some habitat connectivity to areas east and west of the carriageways and to the north island via culverts carrying watercourses through the island.

1.4.5 The south island is dominated by semi-natural broadleaved woodland and dense scrub with a small area of semi-improved grassland. This grassland is diverse in plant species; however, due to a lack of management, the grassland area is diminishing in size as sallow and hawthorn seedlings encroach upon it.

1.4.6 The site supports a range of ferns, other herbaceous plants and grasses which provide a diverse range of larval and adult food resources for invertebrate species. Within the island, a large stands of Himalayan balsam (*Impatiens glandulifera*) are growing. Despite being a non-native invasive species, this plant does provide an excellent source of nectar for many native invertebrates, particularly bees.

Site B – Kingsway Junction North Island

1.4.7 Kingsway junction island north (Centroid: SK 32804 36089) is completely enclosed by the A38 roundabout with limited habitat connectivity. The open stream channels are connected via a culvert which passes under the roundabout. The stream then flows through the south island central reservation area. A culverted section of the stream extends for over 1 km downstream from the north of the Kingsway junction island.

1.4.8 The north island is dominated by semi-natural broadleaved woodland and dense scrub with a small area of semi-improved grassland on the eastern side of the island. This grassland patch is regularly mown by Highways England and supports a good range of food sources, such as umbellifers (plants belonging to the carrot family),

which provide a nectar resource for invertebrates. Within the island large stands of Himalayan balsam are growing.

Site C – Sturgess Field

1.4.9 Sturgess field (Centroid: SK 33827 37315) is an improved grassland field with a border of species rich semi-improved grassland, tall ruderal herbs and mature native broadleaved tree species

1.4.10 The site is mown and used by the University of Derby Archery Club; however, the mature native broadleaved trees and the surrounding strip of species-rich grassland provide a wide range of habitats and food resources for invertebrates. This site also has connectivity to grassland and woodland habitats to the east of the A38.

Site D – Markeaton Park Lakeside

1.4.11 Markeaton Park is represented by large areas of amenity grassland with a high number of veteran status trees. Surrounding the lake, at the eastern extent of the park near to the existing A38 carriageway, patches of unmanaged grassland exist. This habitat provides a good feeding resource for terrestrial invertebrates.

1.4.12 The lakeside supports a variety of emergent macrophytes such as common reed *Phragmites australis* and reedmace *Typha latifolia* along with dense scrub and tall ruderal herbs. Himalayan balsam is present throughout.

Site E – Talbot Turf Farm

1.4.13 Talbot Turf Farm (Centroid: SK 36048 39930) is located adjacent to the A38, west of the existing Little Eaton junction. Land use is predominately improved grassland. The section of Talbot Turf Farm located on the east bank of the River Derwent was dominated by tall ruderal herbs and umbellifers at the time of the June survey visit and provided good foraging resources for pollinating species.

1.4.14 This area had been flailed between the June and August survey visits and was subsequently assessed as being less suitable for pollinating species as many of the food resources had been removed.

Site F – Grassland East of Little Eaton Junction

1.4.15 East of Little Eaton junction (Centroid: SK 36518 40013) is a semi-improved grassland field used for hay cropping. This field is bordered by unmanaged mature hedgerows dominated by hawthorn.

Site G – Kingsway Hospital

1.4.16 The grounds of Kingsway Hospital (Centroid: SK 32788 35968) were chosen as a substitute site for the Kingsway junction south island after safety concerns were raised over access to the south island being compromised by dense vegetation growth.

1.4.17 The sampling locations at Kingsway Hospital comprise a strip of semi-improved grassland separated from the A38 southbound carriageway by a line of native broadleaved trees and a strip of mixed native broadleaved and ornamental species which both provide screening for the hospital buildings and the associated car park. These screening strips result in the grassland being sheltered from wind and consequently of greater potential value to invertebrates.

1.4.18 This semi-improved grassland in this location is unmanaged and has large patches of dense bramble and tall ruderal herbs. Himalayan balsam is present along Bramble Brook which flows through the southern extent of this survey area.

2. METHODOLOGY

2.1 Desk Based Study

2.1.1 Invertebrate records from the last ten years were requested from Derbyshire and Nottinghamshire Entomological Society (DaNES) (up to 1 km from the proposed scheme boundary) and Derbyshire Wildlife Trust (DWT) (up to 2 km from the proposed scheme boundary). The Highways England Environmental Information System (EnvIS) was also searched for any records.

2.2 Invertebrate Survey

2.2.1 Three types of invertebrate survey sampling methodology were used on each survey visit in accordance with methodologies described in Drake et al. (2007), namely; walked transects to observe and record Lepidoptera (butterflies and moths) and Odonata (dragonfly) species, with sweep netting and yellow water traps used to record other Orders (see survey details below).

2.2.2 Sampling was undertaken on three separate occasions. These were programmed for one in June, one in July and one in August. The number of survey replicates was reflective of the potential and likelihood of terrestrial invertebrate species present, as determined from the desk study information and habitats surveyed during the Phase 1 walkover. The dates, weather conditions and temperatures at the time of survey are shown in Table 1. Note: two out of the three surveys were undertaken in August due to weather conditions. Refer to Limitations Section 2.4 for details. The timing of these surveys is not considered to have constrained survey results.

Table 1: Survey Dates and Weather Conditions

Date	Cloud cover	Wind	Temperature observations	Previous weather
15/06/2015	40%	F1*	12°Cat start rising to 16°C	Heavy rain over June 13 and 14
21/08/2015	10%	0 – increasing to F4 over day	16°C rising to 24°C	Rain showers in preceding week
24/08/2015	0%	0	18°C rising to 25°C	Previous clear/ warm weekend

* Beaufort Scale (1-12) F0 – Calm, F1 – Light Air, F2 – Light Breeze, F3 – Gentle Breeze, F4 – Moderate Breeze, F5 – Fresh Breeze, F6 – Strong Breeze, F7 – High Wind, F8 – Gale , F9 – Strong Gale, F10 – Storm, F11 – Violent Storm, F12 – Hurricane.

Walked Transects

2.2.3 Walked transects were undertaken based upon methodologies developed by the Butterfly Conservation Trust BCT (1993) and the British Dragonfly Society BDS (2010). Whilst walking transects, butterfly and dragonfly species are recorded within 5 m directly in front and to the sides of the surveyor. Transects should be walked based upon the following guidance:

- Transects should be undertaken when air temperatures are 13°C or greater, with at least 60% sunshine (<40% cloud cover) over the route. If the temperature is 17°C or greater, the amount of sunshine/ cloud cover is not relevant;
- Wind speed no greater than F5 on the Beaufort scale (i.e. no more than a fresh breeze);
- Butterfly and dragonfly species recorded within 5 m in front and to the sides of the observer; and
- Transect should be walked between 10:45 and 15:45, and during weeks beginning April 1, through to September 29, in any one year.

2.2.4 Transects were walked once per survey and were chosen to sample the range of habitats and management within the survey site(s). Transects were then repeated during each visit to ensure the sampling effort was even and comparable across each survey. A map showing the areas where the transects were walked is presented in Figures 4 and 5 (Appendix A).

2.2.5 During the walked transects, species recorded included butterflies, dragonflies, damselflies and moths (day flying, resting nocturnal species or larva).

Sweep Netting

2.2.6 Sweep netting was chosen as a sampling technique as it can collect insects representing a wide range of insect Orders. A 14" wide sweep net with a fixed one metre long handle was used to collect insects from vegetation up to a height of three metres. This method was employed between 10:00 and 15:00 hours of the day of each survey visit.

2.2.7 The sweep netting procedure involved the sweeping back and forth of the net at a moderate pace for ten minutes with the catch then transferred to a collection tube via a pooter (a device used for "sucking" insects into a collecting tube).

2.2.8 Sweep netting locations were chosen within the sample sites to reflect the range of forb species in flower and therefore target flower visiting species. Where large numbers of invertebrates could be observed feeding on flower heads, these were specifically targeted in the sweep effort.

2.2.9 Specimens captured by sweep netting were identified to species level in the field where possible and released, with specimens that could not be identified to species level collected for later laboratory identification.

Yellow Water Traps

2.2.10 Yellow water traps were chosen as a sampling technique as they are an established and effective method of collecting flower visiting insects such as Hymenoptera (bees and wasps) and Diptera (true flies).

2.2.11 Yellow plastic bowls 20 cm in diameter were located in pairs spaced 2 m apart throughout the survey sites. The traps were filled with slightly soapy water to a depth of 5 cm (approx. 1 litre). The traps were set up upon arrival on site at 08:00 hours to ensure they had sufficient time to attract insects during the course of the day.

2.2.12 The traps were located in sheltered, sunny locations throughout the habitat types in each sampling location.

2.2.13 The contents of the traps were carefully sieved and washed with clean water before being decanted into 70% isopropyl alcohol for later species identification.

2.3 Identification of Samples

2.3.1 Identification of the invertebrates was undertaken using the following methods:

- **Field observation:** Specimens from the Orders Lepidoptera and Odonata were identified whilst on the wing by a suitably experienced entomologist;
- **Field observation:** Specimens from the Orders Hymenoptera and Diptera captured during sweep netting were identified to species level by eye where possible and released. Species that could not be reliably identified in the field were transferred to a collection tube using a pooter and then killed immediately using 70% isopropyl alcohol for later identification; and
- **Laboratory Identification:** Collected samples were sorted and identified to species level where possible using hand lenses or a mid-powered dissection microscope.

2.4 Limitations

2.4.1 The survey undertaken on June 15, 2015 was sub-optimal in terms of minimum temperature for butterfly transects. However, earlier weather conditions were good despite a short period of heavy rain and the forecast indicated that the weather conditions would improve and become optimal for terrestrial invertebrate surveys. Consequently, although the temperature was below the recommended 13°C at the start of the survey, transects were delayed until the temperatures reached 13°C.

2.4.2 There is potential for the mid-June survey to have missed grizzled skipper (*Pyrgus malvae*), as the flight period of this species is May to early June. However, grizzled skipper prefers woodland clearings and food plants such as wild strawberry (*Fragaria vesca)*, creeping cinquefoil (*Potentilla reptans*) and tormentil (*Potentilla erecta*) which are limited within the site boundary. Therefore, the habitats on site are considered unlikely to be suitable for this species. This is corroborated by the findings of the desk study. Therefore, the timing of the survey is not considered to be a constraint to survey results as grizzled skipper are considered unlikely to be present on site.

2.4.3 The survey undertaken within the Kingsway junction south island semi-improved grassland on June 15, 2015 could not be repeated due to safety concerns relating to site access in this location (due to the overgrown vegetation at the preventing safe access). Consequently, the area of semi-improved grassland located within the grounds of Kingsway Hospital to the east of the A38 southbound carriageway was identified as an appropriate substitute sampling site. The lack of access to the Kingsway junction south island semi-improved grassland is therefore not considered to represent a constraint to the surveys as detailed in this report.

2.4.4 Surveys programmed for July 2015 were not undertaken as scheduled owing to poor weather conditions. These surveys were re-scheduled for August when weather conditions were favourable for invertebrate survey. Consequently, re-scheduling of the July sampling visits is not considered to represent a constraint to the surveys as detailed in this report.

2.4.5 Late August is considered to be towards the end of the standard terrestrial invertebrate sampling season, with fewer insects on the wing in their adult form compared to earlier in the year. Consequently, although two August sampling visits were undertaken, this was not considered to be a significant limitation to the assessment given that samples were also collected in mid-June.

2.4.6 Not all of the habitats on site were sampled owing to their impenetrable nature and/ or safety concerns e.g. woodland within the Kingsway junction islands, and along water course embankments. However, the locations at which samples were collected were diverse and are considered to provide a good representation of the invertebrate species present on site and in the general locality.

2.4.7 Identification of the invertebrates collected was undertaken using a mid-powered dissecting microscope and cold light source. This is adequate to identify a large number of species; however, some specimens were not identified to species level as certain small features are not visible without higher magnification. Similarly, identification keys for some groups of invertebrates refer only to the males of the species, leaving the females either unidentifiable or only identifiable to genus level. However, this is not considered to represent a significant constraint to the surveys given the habitats present and the species they potentially support.

2.4.8 The location of construction compounds and flood attenuation areas is yet to be determined; these areas have not been included in the terrestrial invertebrate survey.

2.5 Assessment of Rarity

2.5.1 Invertebrate rarity is based on the following Joint Nature Conservation Committee categories:

- Red Data Book Category 1. RDB 1 – Endangered:

  Taxa in danger of extinction in UK;
- Red Data Book Category 2. RDB 2 – Vulnerable:

  Taxa believed to be moving into endangered status in UK;
- Red Data Book Category 3. RDB 3 – Rare:

  Taxa with small populations in UK;
- Red Data Book Category 4. RDB 4 – Out of danger:

  Taxa thought to be relatively secure;
- Red Data Book Category K. RDB K – Insufficiently known:

  Taxa that are suspected of belonging to the above groups but lack of knowledge does not permit their classification as such;
- Nationally Scarce (Notable):

  Species which are estimated to occur in 16 to 100 10 km squares in the UK;
- Local:

  The term Local is not rigidly defined, but loosely means species confined to a particular habitat, but which are too widespread to be termed Nationally Scarce (Notable).

3. RESULTS

3.1 Desk Study

3.1.1 Data provided by DaNES comprised 2,656 records representing 419 species. These records included one species listed on Schedule 5 of the WCA (White Letter Hairstreak (*Satyrium (Strymonidia) w-album*), 33 species that are listed on NERC Section 41, 36 species that are listed on the LBAP and included one invasive species (see Table 2). Records from within 500 m of the proposed scheme are presented in Figure 2 (Appendix A).

Table 2: DaNES Desk Study Records for Protected or Notable Invertebrate Species

Terrestrial Invertebrate Desk Study Records from the Last 10 Years				
Type	**Binomial**	**Common name**	**LDBAP**	**Section 41**
Moth	*Acronicta psi/tridens*	Grey/Dark Dagger agg	yes	yes
Moth	*Allophyes oxyacanthae*	Green-brindled Crescent	yes	yes
Moth	*Amphipoea oculea/lucens/etc*	Ear Moth agg	yes	yes
Moth	*Amphipyra tragopoginis*	Mouse Moth	yes	yes
Moth	*Apamea remissa*	Dusky Brocade	yes	yes
Moth	*Aporophyla lutulenta*	Deep-brown Dart	yes	yes
Moth	*Atethmia centrago*	Centre-barred Sallow	yes	yes
Moth	*Brachylomia viminalis*	Minor Shoulder-knot	yes	yes
Moth	*Caradrina morpheus*	Mottled Rustic	yes	yes
Moth	*Diarsia rubi*	Small Square-spot	yes	yes
Moth	*Watsonalla (Drepana) binaria*	Oak Hook-tip	yes	yes
Moth	*Ecliptopera silaceata*	Small Phoenix	yes	yes
Moth	*Ennomos fuscantaria*	Dusky Thorn	yes	yes
Moth	*Eulithis mellinata*	Spinach	yes	yes
Moth	*Euxoa nigricans*	Garden Dart	yes	yes
Beetle	*Harmonia axyridis*	Harlequin Ladybird	Invasive	Invasive
Moth	*Hemistola chrysoprasaria*	Small Emerald	yes	yes
Moth	*Hepialus humuli*	Ghost Moth	yes	yes
Moth	*Hoplodrina blanda*	Rustic	yes	yes
Moth	*Hydraecia micacea*	Rosy Rustic	yes	yes
Moth	*Lomographa bimaculata*	White-pinion Spotted	yes	no
Moth	*Lycia hirtaria*	Brindled Beauty	yes	yes
Moth	*Melanchra persicariae*	Dot Moth	yes	yes
Moth	*Melanchra pisi*	Broom Moth	yes	yes
Moth	*Mesoligia literosa*	Rosy Minor	yes	yes
Moth	*Mythimna comma*	Shoulder-striped Wainscot	yes	yes
Moth	*Orthosia gracilis*	Powdered Quaker	yes	yes
Moth	*Scotopteryx chenopodiata*	Shaded Broad-bar	yes	yes
Moth	*Spilosoma lubricipeda*	White Ermine	yes	yes
Moth	*Spilosoma luteum*	Buff Ermine	yes	yes
Butterfly	*Satyrium (Strymonidia) w-album*	White letter Hairstreak	yes	yes
Moth	*Tethea ocularis octogesimea*	Figure of Eighty	yes	no

Terrestrial Invertebrate Desk Study Records from the Last 10 Years				
Type	**Binomial**	**Common name**	**LDBAP**	**Section 41**
Moth	*Tholera decimalis*	Feathered Gothic	yes	yes
Moth	*Tyria jacobaeae*	Cinnabar	yes	yes
Moth	*Xanthia icteritia*	Sallow	yes	yes
Moth	*Xanthorhoe ferrugata*	Dark-barred Twin-spot Carpet	yes	yes

3.1.2 Desk study records from DWT were sparse comprising 32 records representing nine species, all of which are included in both NERC Section 41 and the LBAP (see Table 3). However, the majority of these records were over ten years old, with only one record of Wall brown butterfly *Lasiommata megera* having been made within the last ten years. Records from within 500 m of the proposed scheme are presented in Figure 3 (Appendix A).

3.1.3 No records were found on EnvIS.

Table 3: DWT Desk Study Records for Protected or Notable Invertebrate Species

Terrestrial Invertebrate Desk Study Records within Last 10 Years				
Type	**Binomial**	**Common name**	**LBAP**	**Section 41**
Moth	*Spilosoma luteum*	Buff Ermine	yes	yes
Moth	*Acronicta rumicis*	Knot Grass	yes	yes
Moth	*Chiasmis clathrata*	Latticed Heath	yes	yes
Moth	*Eulthis mellinata*	Spinach	yes	yes
Moth	*Graphiphora augur*	Double Dart	yes	yes
Moth	*Mesoligia literosa*	Rosy Minor	yes	yes
Moth	*Mythimna comma*	Shoulder-striped Wainscot	yes	yes
Butterfly	*Lasiommata megera*	Wall brown	yes	yes
Moth	*Tyria jacobaeae*	Cinnabar	yes	yes

3.2 Invertebrate Survey - Transects: Kingsway and Markeaton Junctions

3.2.1 Full details of the surveys undertaken, species caught and abundance are included in Appendix B. Results of the transect surveys for Kingsway and Markeaton junctions and Little Eaton junction are shown in Table 4.

Table 4: Results of Transect Surveys for Lepidoptera and Odonata

Date	**June 15, 2015**			**August 21, 2015**			**August 24, 2015**			**Total no of Lepidoptera species identified across the three survey visits**	**Total no of Odonata species identified across the three survey visits**
Site	**Lepidoptera**	**Odonata**	**Notable**	**Lepidoptera**	**Odonata**	**Protected/ notable**	**Lepidoptera**	**Odonata**	**Protected/ notable**		
A	4	0	No	N/A	N/A	N/A	N/A	N/A	N/A	4	0
B	6	2	No	2	2	No	0	3	No	7	4
C	2	1	No	1	0	No	5	0	No	7	1

D	2	1	No	2	3	No	5	3	No	8	4
E	2	0	No	5	2	No	7	3	No	13	4
F	1	1	No	10	0	No	2	0	Yes	12	1
G	N/A	N/A	N/A	13	2	No	19	3	Yes	23	4
Total Number of Lepidoptera species recorded across all survey sites = 27											
Total Number of Odonata species recorded across all survey sites = 7											

3.2.2 **Site A - Kingsway Junction South Island**: This transect recorded a low number of species, only four species of Lepidoptera (butterflies and moths) were observed during the survey. These four species are common and widespread in lowland Britain.

3.2.3 **Site B - Kingsway Junction North Island:** These transects recorded 11 species from two orders, Lepidoptera (seven) and Odonata (four). All eleven of these species are common and widespread in lowland Britain.

3.2.4 **Site C - Sturgess Field**: This transect recorded few species with only seven species from the Lepidoptera observed, and one species of Odonata (dragonflies and damselflies). These eight species are common and widespread.

3.2.5 **Site D - Markeaton Park Lakeside:** This transect recorded eight species of Lepidoptera and four species of Odonata. All 12 of these species are common and widespread.

3.2.6 **Site G - Kingsway Hospital Grassland:** This site was chosen as a substitute site for the Kingsway junction south island after safety concerns over access prevented further surveys within the road island. Transects on this site were conducted on August 21, and 24, 2015 during which, 23 species of Lepidoptera and four species of Odonata were recorded.

3.2.7 Two of these species, the small heath butterfly *Ceononympha pamphilus* and the wall brown butterfly *Lasiommata megera* are NERC Section 41 species, included in the Post 2001 IUCN Red List and are listed on the LBAP. The remaining species are common and widespread.

3.3 Invertebrate Survey - Transects: Little Eaton Junction

3.3.1 **Site E - Talbot Turf Farm:** These transects recorded 13 species of Lepidoptera and four species of Odonata. All 16 of these species are common and widespread. The records included banded demoiselle *Calopteryx splendens*, which suggests that the nearby River Derwent has good water quality, as this species is sensitive to poor water quality.

3.3.2 **Site F - East of Little Eaton Junction Grassland:** These transect recorded 12 species of Lepidoptera and one species of Odonata. One of the species that was recorded, the small heath butterfly, is a NERC Section 41 Species and listed on the LDBAP. The remaining species are all common and widespread.

3.3.3 **Sites summary**

3.3.4 During the butterfly and dragonfly transects, 27 species of Lepidoptera and seven species of Odonata were identified. Refer to Appendix B.

3.4 Invertebrate Survey - Sweep Netting and Water Trapping: Kingsway and Markeaton Junctions

3.4.1 Two methods of trapping invertebrates were utilised during the survey effort, sweep netting and water trapping. The full details of species caught and abundance are included in Appendix B. Results from these two methods were combined for each site and presented in Table 5 for Kingsway and Markeaton and Little Eaton junctions.

Table 5: Results of Sweeping and Trapping Surveys

Date	June 15, 2015			August 21, 2015			August 24, 2015		
Site	Species	Orders	Protected/ notable species	Species	Orders	Protected/ notable species	Species	Orders	Protected/ notable species
A	22	6	No	N/A	N/A	N/A	N/A	N/A	N/A
B	12	6	Yes	13	3	No	16	3	No
C	9	5	Yes	16	4	Yes	23	4	Yes
D	9	4	Yes	20	3	Yes	18	3	Yes
E	4	2	No	14	4	Yes	11	2	Yes
F	14	3	Yes	19	6	No	25	7	No
G	N/A	N/A	N/A	50	8	No	47	8	Yes

3.4.2 The results of the sweep netting and water trapping surveys at the Kingsway and Markeaton Junctions are described below.

3.4.3 **Site A - Kingsway Junction South Island:** The sweeping and trapping at this site recorded 22 species comprising six Orders. No protected or notable invertebrate species were recorded using these methods.

3.4.4 **Site B - Kingsway Junction North Island:** The sweeping and trapping at this site recorded 29 species from six Orders, with the large cuckoo-bee species *Bombus rupestris* being recorded. This species is listed as Notable.

3.4.5 **Site C - Sturgess Field:** The sweeping and trapping at this site recorded 29 species from six Orders. The large cuckoo-bee species *Bombus rupestris* and the wasp mimic hoverfly species *Volucella inanis* were recorded at this site. Both of these species are listed as Notable.

3.4.6 **Site D - Markeaton Park Lakeside:** The sweeping and trapping at this site recorded 31 species from six Orders. The hornet-mimic hoverfly species *Volucella zonaria*, the wasp-mimic hoverfly species *Volucella inanis*, and the Cuckoo-bee species *Bombus rupestris* were recorded. All of these species are listed as Notable.

3.4.7 **Site G - Kingsway Hospital Grassland:** This site was chosen as a substitute site for the Kingsway junction south island after safety concerns over access prevented further surveys within the road island. Sweep netting and water trapping on this site were conducted on August 21 (visit 2) and 24, 2015 (visit 3).

3.4.8 The sweeping and trapping at this site recorded 58 species from eight Orders, including the large Cuckoo-bee species *Bombus rupestris*, this species is listed as Notable.

3.5 Invertebrate Survey – Sweeping and Water Trapping: Little Eaton Junction

3.5.1 **Site E - Talbot Turf Farm:** The sweep netting and water trapping at this site recorded 24 species from five Orders, including the bumblebee mimic hoverfly

species *Pocota personata.* This species is listed as Nationally Scarce and is the fifth record of the species for the County.

3.5.2 **Site F - East of Little Eaton Junction grassland:** The sweep netting and water trapping at this site recorded 40 species from eight Orders including the large Cuckoo-bee species *Bombus rupestris*, this species is listed as Notable.

3.6 Invertebrate Community Analysis

3.6.1 Invertebrates recorded have been assessed using the current version of the Invertebrate Species-habitat Information System (ISIS) originally published by Drake et al. (2007). This system provides information on those invertebrate assemblages of particular importance, with a focus upon assemblages rather than national status of individual species. These assemblages are expressed in two ways:

- **Broad Assemblage Types (BATs)** which characterise the assemblages using species that are more widespread and are not considered stenotopic (restricted habitat requirements); and
- **Species Assemblage Types (SATs)** includes stenotopic species that are considered to have value in terms of nature conservation, these species are normally only recorded on sites with nature conservation value.

3.6.2 Tables 6 to 15 below express the results of ISIS analysis, as follows:

- BAT code and BAT description indicates a specific habitat type;
- Representation expresses the percentage of species related to a specific habitat type in an assemblage;
- Rarity score expresses the stenotopic value of rare and/ or notable species which is then used in calculating the conservation value of the habitat;
- Condition Threshold combines the rarity score of stenotopic species, where values equalling the threshold or above would indicate that the site is important at a National scale;
- BAT species richness expresses the number of species in an assemblage by habitat type; and
- SAT code and SAT name identifies a specific habitat type and the species directly related to it. i.e. the species would not be expected to be recorded without the habitat being present

Site A

3.6.3 The species recorded at Site A, Kingsway junction south island are normally associated with maturing grassland with trees and permanent wet conditions. The analysis using ISIS (Drake *et al*. 2007) supports this. Table 6 lists the BATs.

3.6.4 The BATs of highest significance (i.e. highest species diversity) are those dependent upon maturing grassland and scrub with unshaded early successional mosaic habitats (12 species).

Table 6: Assessment of BATs at Site A

BAT code	BAT description	Representation (1-100%)	Rarity score	Rarity Score threshold	BAT species richness
F2	Grassland & scrub matrix	35	-	160	7
F1	Unshaded early successional mosaic	25	-	160	5
A1	Arboreal canopy	10	-	170	2
W1	Flowing water	5	-	150	1
W3	Permanent wet mire	5	-	180	1

3.6.5 The assemblage analysis indicates that the grassland and scrub mosaic at Site A is the most important habitat though none of the BATs included any stenotopic species (i.e. those with specific habitat requirements) and so from the data collected, this site is of low significance in invertebrate terms.

3.6.6 Care must be taken when using these results however, as the site was only visited once in June after a period of heavy rain and therefore the results are not conclusive in assessing the importance to invertebrates.

Site B

3.6.7 The species recorded at Site B, Kingsway junction north island, are normally associated with mosaic grassland and scrub with permanent wet conditions. The analysis using ISIS (Drake *et al*. 2007) supports this. Table 7 lists the BATs.

3.6.8 The BATs of highest significance (i.e. highest species diversity) are those dependent upon unshaded early successional mosaic with grassland and scrub habitats (10 species).

Table 7: Assessment of BATs at Site B

BAT code	BAT description	Representation (1-100%)	Rarity score	Rarity score threshold	BAT species richness
F1	Unshaded early successional mosaic	20	-	160	5
F2	Grassland & scrub matrix	20	-	160	5
W2	Mineral marsh & open water	16	-	150	4
W3	Permanent wet mire	8	-	180	2
F3	Shaded field & ground layer	4	-	150	1
A1	Arboreal canopy	4	-	170	1

3.6.9 The assemblage analysis indicates that the unshaded early successional mosaic and grassland and scrub matrix are the most important habitats, though none of the BATs included any stenotopic species. The data collected therefore suggests the site is of low significance with regard to terrestrial invertebrates.

3.6.10 Care must be taken when using these results (for this and other sites), however, as the number of site visits and sampling methodologies used may cause some bias (enhancing or detracting) to the results.

Site C

3.6.11 The species recorded at Site C, Sturgess Field are normally associated with grassland and scrub mosaics. The analysis using ISIS (Drake *et al*. 2007) supports this. Table 8 lists the BATs.

3.6.12 The BATs of highest significance (i.e. highest species diversity) are those dependent upon grassland and scrub mosaic habitats (10 species).

Table 8: Assessment of BATs at Site C

BAT code	BAT description	Representation (1-100%)	Rarity score	Rarity score threshold	BAT species richness
F2	grassland & scrub matrix	33	-	160	10
F1	unshaded early successional mosaic	20	-	160	6
W3	permanent wet mire	13	-	180	4
F3	shaded field & ground layer	3	-	150	1
A1	arboreal canopy	3	-	170	1
W1	flowing water	3	-	170	1

W2	mineral marsh & open water	3	-	150	1

3.6.13 The assemblage analysis indicates that the grassland and scrub mosaic habitat is the most important with regard to terrestrial invertebrates, though none of the BATs included any stenotopic species. The data collected, therefore, suggests the site is of low significance with regard to terrestrial invertebrates.

Site D

3.6.14 The species recorded at Site D, Markeaton Park are normally associated with grassland and scrub mosaic habitats. The analysis using ISIS (Drake *et al*. 2007) supports this. Table 9 lists the BATs.

3.6.15 The BATs of highest significance (i.e. highest species diversity) are those dependent upon grassland and scrub mosaics (7 species) with a secondary BAT significance of unshaded early successional mosaic. These significances are likely to reflect the management techniques employed at this site.

Table 9: Assessment of BATs at Site D

BAT code	BAT description	Representation (1-100%)	Rarity score	Rarity score threshold	BAT species richness
F2	Grassland & scrub matrix	35	-	160	7
F1	Unshaded early successional mosaic	25	-	160	5
A1	Arboreal canopy	10	-	170	2
W1	Flowing water	5	-	150	1
W3	Permanent wet mire	5	-	180	1

3.6.16 The assemblage analysis indicates that the grassland and scrub mosaic and unshaded early successional mosaic habitats are the most important with regard to terrestrial invertebrates, though none of the BATs included any stenotopic species. The data collected, therefore, suggests the site is of low significance with regard to terrestrial invertebrates.

Site E

3.6.17 The species recorded at Site E, Talbot Turf Farm are normally associated with grassland and scrub mosaic habitats. The analysis using ISIS (Drake *et al*. 2007) supports this. Table 10 lists the BATs.

3.6.18 The BATs of highest significance (i.e. highest species diversity) are those dependent upon grassland and scrub mosaic habitats (10 species) with a secondary BAT significance of unshaded early successional mosaic (6 species). These significances are likely to reflect the management techniques employed at this site.

Table 10: Assessment of BATs at Site E

BAT code	BAT description	Representation (1-100%)	Rarity score	Rarity score threshold	BAT species richness
F2	Grassland & scrub matrix	31	-	160	10
F1	Unshaded early successional mosaic	16	-	160	6
W2	Mineral marsh & open water	9	-	150	4
W3	Permanent wet mire	6	-	180	1
A1	Arboreal canopy	3	-	170	1
A2	Wood decay	3	16	190	1
W1	Flowing water	3	-	150	1

3.6.19 The assemblage analysis indicates that the grassland and scrub matrix and unshaded early successional mosaic habitats are the most important with regard to terrestrial invertebrates.

3.6.20 This site produced a record of the Nationally Scarce *Pocota personata*, a bumblebee-mimic hoverfly species with a SAT which is of significance as the species is stenoptopic, in this case requiring rot holes in ancient trees. *Pocota personata* records are mainly from the south of England, but there are occasional records extending to Devon and Nottinghamshire (Shirt 1989). *Pocota personata* breed in rot holes at height in old trees and overwinter as larvae. Adults can generally be seen investigating rot holes and feeding upon hawthorn blossom and umbellifers during their short flight period (Falk, 1991). The single specimen observed at Site E, Talbot Turf Farm, was feeding on a flower head. The lack of veteran trees indicates that this is a casual record and not an indication of a breeding population at the site.

3.6.21 The SAT assessment is shown in Table 11.

Table 11: SAT Assemblage Types for Site E

SAT code	SAT name	No. spp.	Percentage of national species pool	Related BAT rarity score
A211	Heartwood decay	1	1	16

3.6.22 The assemblage analyses reveal an important relationship with the grassland and scrub mosaic at Site E. The record of *Pocota personata* is indicative of the ancient trees in the vicinity. However, none of the rarity thresholds published in Drake *et al.* (2007) have been reached that would otherwise represent 'favourable status' if the area were to be monitored as a statutory site.

Site F

3.6.23 The species recorded at Site F, grassland east of Little Eaton junction are normally associated with grassland and scrub mosaic habitats (14 species). The analysis using ISIS (Drake *et al*. 2007) supports this. Table 12 lists the BATs.

3.6.24 The BATs of highest significance (i.e. highest species diversity) are those dependent upon grassland and scrub matrix (14 species) with a secondary BAT significance of unshaded early successional mosaic (seven species). These significances are likely to reflect the management techniques employed at this site.

Table 12: Assessment of BATs at Site F

BAT code	BAT description	Representation (1-100%)	Rarity score	Rarity score threshold	BAT species richness
F2	Grassland & scrub matrix	35	-	160	14
F1	Unshaded early successional mosaic	18	-	160	7
W3	Permanent wet mire	12	-	180	5
F3	Shaded field & ground layer	2	-	150	1
A1	Arboreal canopy	2	-	170	1
A2	Wood decay	2	-	190	1
W2	Mineral marsh & open water	2	-	150	1

3.6.25 The assemblage analysis indicates that the grassland and scrub mosaic habitats and the unshaded early successional mosaic habitats are the most important with regard to terrestrial invertebrates.

3.6.26 This site produced records of species with SATs which are of significance as the species are stenoptopic.

3.6.27 One species that is associated with open, short-sward habitat, the small heath butterfly *Coenonympha pamphilus* was recorded at this site. This species is listed as a NERC section 41 species for research only due to recent declines.

3.6.28 One species that is associated with heartwood decay, the hoverfly species *Myathropa florea,* was recorded at this site. Despite being common and widespread, this species requires rot holes in trees as breeding habitat.

3.6.29 The SAT assessments are detailed in Table 13.

Table 13: SAT Assemblage Types for Site F

SAT code	SAT name	No. spp.	Percentage of national species pool	Related BAT rarity score
A211	heartwood decay	1	1	-
F112	open short sward	1	1	-

3.6.30 Despite the presence of these stenotopic species, none of the rarity thresholds published in Drake et al. (2007) have been reached that would otherwise indicate 'favourable status' if the area were to be monitored as a statutory site.

Site G

3.6.31 The species recorded at Site G, Kingsway Hospital grassland are normally associated with grassland and scrub mosaic habitats (20 species recorded in total). The analysis using ISIS (Drake *et al*. 2007) supports this. Table 14 lists the BATs.

3.6.32 The BATs of highest significance (i.e. highest species diversity) are those dependent upon grassland and scrub mosaic habitats (14 species) with a secondary BAT significance of unshaded early successional mosaic habitat (12 species). These significances are likely to reflect the lack of management employed at this site.

Table 14: Assessment of BATs at Site G

BAT code	BAT description	Representation (1-100%)	Rarity score	Rarity score threshold	BAT species richness
F2	Grassland & scrub matrix	32	100	160	20
F1	Unshaded early successional mosaic	19	-	160	12
W3	Permanent wet mire	8	-	180	5
W2	Mineral marsh & open water	6	-	150	4
F3	Shaded field & ground layer	3	-	170	2
A1	Arboreal canopy	3	-	190	2
A2	Wood decay	2	-	150	1
W1	Flowing water	2	-	150	1

3.6.33 The assemblage analysis indicates that the grassland and scrub mosaic habitats and unshaded early successional mosaic habitats in this location are the most important with regard to terrestrial invertebrates.

3.6.34 This site produced records of species with SATs which is of significance as the species are stenoptopic.

3.6.35 Two species that are associated with open, short-sward habitat: the small heath butterfly and wall brown butterfly *Lasiommata megera* were recorded at this site. These species are listed as NERC section 41 species for research only due to recent declines. A further species, the yellow meadow ant *Lasius flavus*, also associated with short-sward habitat, was also recorded at this site.

3.6.36 Two species that are associated with scrub edge habitat were recorded: the gatekeeper butterfly *Pyronia tithonus* and speckled wood butterfly *Pararge aegeria*.

3.6.37 One species that is associated with heartwood decay, the hoverfly species *Myathropa florea*, was recorded at this site. Despite being common and widespread the species requires rot holes in trees as breeding habitat.

3.6.38 The SAT assessment is shown in Table 15.

Table 15: SAT Assemblage Types for Site G

SAT code	SAT name	No. spp.	Percentage of national species pool	Related BAT rarity score
F112	open short sward	3	32	100
A211	heartwood decay	1	1	-
F001	scrub edge	1	1	-

3.6.39 Despite the presence of these stenotopic species, none of the rarity thresholds published in Drake et al. (2007) have been reached that would otherwise indicate 'favourable status' if the area were to be monitored as a statutory site.

3.6.40 The BAT species association with short-sward habitat was the highest at Site G (100), however, this represents 60% of the value required to rate the site important at a National level for invertebrates, in accordance with threshold values published in Drake *et al*. (2007). The sampling effort and techniques used may have omitted species that would further the BAT value. However, it should be considered that this site may be important at the local level for invertebrates.

4. SUMMARY

4.1.1 Sampling sites were selected for survey based on the number of habitats and their relative distribution. Sampling efforts were focussed upon areas of habitat mosaic as well as areas that are likely to be directly impacted by the proposed scheme.

4.1.2 In all, 106 species representing ten Orders were recorded from across the seven sampling sites. The grassland at Kingsway Hospital (Site G) was by far the most species diverse, with a peak count of 70 species recorded during visit 3, conducted on August 24, 2015. This diversity reflects the undisturbed and unmanaged nature of this site. This site had the highest Broad Assemblage Types (BAT) score of those grassland and scrub mosaic habitats at which sampling surveys were undertaken.

4.1.3 The grassland at Talbot Turf Farm (Site E) was the least species diverse, with a peak count of 22 species. However, this site also produced the record of the Nationally Scarce hoverfly *Pocota personata*; though the rarity of this species may be an artefact of its short flight period (Ball & Morris 2010).

4.1.4 The range of Orders represented amongst the samples collected from across the sampling locations was limited (peak count of eight) and several groups which are commonly found on sites with grasslands and waterbodies were completely missing i.e. Trichoptera (no Caddis flies were seen).

4.1.5 The range of families within Orders collected from across the sampling locations was also limited. Although many Diptera families were represented, several commonly found Diptera families associated with grasslands were absent (for example Conopidae).

4.1.6 The range of species within families was also poor for the most part; however, the hoverflies were well represented in terms of species diversity as were the butterflies. Few craneflies were found from across the sampling locations and the number of damselfly and dragonfly species recorded was also poor for locations where they might normally be expected e.g. sites with extensive grasslands, associated waterbodies and watercourses.

4.1.7 The range of species collected using the two trapping and sampling techniques was noticeably different, justifying the use of both techniques. The yellow water traps collected several species groups which were not represented in any of the sweep net samples, including Sphaeroceridae, Sarcophagidae and Tachinidae.

4.1.8 Many of the species recorded were associated with the three main habitats on site, namely: standing water, woodlands and dry grassland.

4.1.9 Six notable species were recorded during the survey visits comprising two butterfly (Lepidoptera) species: wall brown butterfly and small heath, both listed on NERC Section 41, the Post 2001 IUCN Red List and the Lowland Derbyshire BAP; two Notable species of hoverfly: *Volucella inanis* and *Volucella zonaria* were recorded at Sturgess Field and Markeaton Park grasslands (these species feed on nectar as adults and require social wasp nests for breeding success); one species of bumblebee (Hymenoptera, Aculeata) *Bombus rupestris* that is listed as Notable and was recorded amongst various grassland habitats across the proposed scheme; and, one species of hoverfly (Syrphidae) listed as Nationally Scarce (Ball and Morris 2014) which is included on the pre-1994 Red Data Book for Insect Species and which is dependent on flowers for foraging as well as rot holes in ancient trees for breeding success.

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Appendix A Figures

N

M1 JUNCTION 28

A38/A61 LITTLE EATON JUNCTION

A38/A6 PALM COURT JUNCTION

A38/A52 MARKEATON JUNCTION

A38/A5111 KINGSWAY JUNCTION

A50/A38 JUNCTION

2 0 2 4 6 8 Kilometres

Project Title/Drawing Title

A38 DERBY JUNCTIONS SCHEME LOCATION PLAN

Project Number 47071319		
Drawn GB	Checked SW	Approved SW
Date 04/02/2016	Scale @ A3 1:100,000	Purpose of issue FINAL
Drawing Number Figure 1		Rev 3F

Highways England
Major projects
Piccadilly Gate
Store Street
Manchester
M1 2WD

AECOM
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
+44 (0) 1246 209221
+44 (0) 1246 209229
www.aecom.com

File Name:\\ch-wip-001\CH_Roads\A38 Derby Jcns - PO1339\12 CAD\12.1 WIP\FIGURE 1.1 - LOCATION PLAN F1.mxd

25 different LBAP moth species

Legend

- Site boundary
- 50 m buffer
- 500 m buffer
- 1000 m buffer

Terrestrial invertebrates records provided by DaNES

- LBAP Beetle
- LBAP Butterfly
- LBAP Moth

Terrestrial invertebrates records provided by DWT

- LBAP Butterfly
- LBAP Moth

200 0 200 400 600 800 1000 Metres

Project Title/Drawing Title

A38 DERBY JUNCTIONS
MARKEATON AND KINGSWAY
DESK STUDY
TERRESTRIAL INVERTEBRATES RECORDS

Project Number 47071319		
Drawn GSB	Checked SR	Approved OB
Date 24/02/2016	Scale @ A3 1:12,000	Purpose of issue FINAL
Drawing Number Figure 2		Rev 3F

Highways England
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File Name:X:\Highways Agency\47071390 A38 Derby Jcns - Environment\Technical\Ecology\GIS_Chesterfield\project_files\Kingsway\Terrestrial invert\Fig2_A38_Kingsway_DeskStudy_TerrestInvert_201602024.mxd

N

Little Eaton

Burley Hill

Burleyhill Farm

The Bungalow

Roundabout

Fields Farm

Allestree Park Golf Course

Gorses' Wood

Path

St Peter's Park

Elms Farm

Bsns Pk

Works

Wks

Ppg Sta

Little Eaton Junction

Air

Water Treatment

Garden Centre

Moor End Farm

Moor End Farm Bungalow

Meter House

The Bungalow

Reservoirs

Cotter Wood

Bleak House

Camp Wood

Broadsall Lodge

Globe Farm

Boosemoor Brook

Knoll Side Farm

Breadsall Manor

Allestree Ford Bridge

Mobile Home Park

Peg Low

Rectory Farm

Brookside Farm

Frog Hall

Dam Brook

Church Farm

Breadsall

Holme Nook Farm

Holme Nook

Croft Wood

Warehouse

Nooney's Pond

Nut Wood

Darley Abbey

Trav Cs

Superstore

Breadsall Hilltop

Manor Farm

The Retreat

Hall

Recn Gd

Mill Plantation

The Slip

Willow Holt Plantation

Mill House

Rugby Ground

The Meteor Centre

Park & Ride

Factory

Toll

Vic

School

Sch

PW

PO

200 0 200 400 600 800 1000 Metres

Legend

- Site boundary
- 50 m buffer
- 500 m buffer
- 1000 m buffer

Terrestrial invertebrates records provided by Derbyshire Wildlife Trust

- NERC Section 41 Moth
- NERC Section 41 Butterfly

Project Title/Drawing Title: A38 DERBY JUNCTIONS LITTLE EATON DESK STUDY TERRESTRIAL INVERTEBRATES RECORDS	Project Number 47071319	
	Drawn GSB	Checked SR / Approved OB
	Date 24/02/2016	Scale @ A3 1:10,000 / Purpose of issue FINAL
	Drawing Number Figure 3	Rev 3F

Highways England
Major projects
Piccadilly Gate
Store Street
Manchester
M1 2WD

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File Name:X:\Highways Agency\47071390 A38 Derby Jcns - Environment\Technical\Ecology\GIS_Chesterfield\project_files\Little Eaton\Terrestrial invert\Fig3_A38 LittleEaton_TerrestInvert_Records_20160224.mxd

Site C

Site D

Site B

Site A

Site G

N

Legend

- Site boundary
- 50 m buffer
- 250 m buffer
- 500 m buffer
- Terrestrial invertebrates survey area

Habitats

- Semi-natural broad-leaved woodland
- Coniferous woodland
- Mixed plantation woodland
- Dense scrub
- Parkland
- Semi-improved grassland
- Tall ruderal
- Open water
- Amenity grassland
- Introduced shrub
- Building
- Bare ground
- Hard standing
- Invasive non-native species
- No access

100 0 100 200 300 400 500 Metres

File Name: J:\Derby-Jobs\Highways Agency\47071390 A38 Derby Jcns - Environment\Technical\Ecology\GIS_Chesterfield\project_files\Kingsway\Terrestrial invert\Fig4_A38_Kingsway_Survey_TerrestInvert_20160205.mxd

Project Title/Drawing Title

A38 DERBY JUNCTIONS MARKEATON AND KINGSWAY TERRESTRIAL INVERTEBRATES SURVEY

Project Number 47071319		
Drawn GSB	Checked SR	Approved OB
Date 05/02/2016	Scale @ A3 1:7,000	Purpose of issue FINAL
Drawing Number Figure 4		Rev 3F

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N

Site E

Site E

Site F

Legend

- Site boundary
- 50 m buffer
- 250 m buffer
- 500 m buffer
- Terrestrial invertebrates survey area

Habitats

- Plantation broad-leaved woodland
- Dense scrub
- Semi-improved grassland
- Improved grassland
- Open water
- Boulders
- Arable
- Amenity grassland
- Building
- Bare ground
- Hard standing
- Invasive non-native species

100 0 100 200 300 400 500 Metres

File Name:X:\Highways Agency\47071390 A38 Derby Jcns - Environment\Technical\Ecology\GIS_Chesterfield\project_files\Little Eaton\Terrestrial invert\Fig5_A38 LittleEaton_TerrestInvert_Survey_20160205.mxd

Project Title/Drawing Title

A38 DERBY JUNCTIONS
LITTLE EATON
TERRESTRIAL INVERTEBRATES SURVEY

Project Number
47071319

Drawn	Checked	Approved
GSB	SR	OB
Date	**Scale @ A3**	**Purpose of issue**
24/02/2016	1:5,000	FINAL
Drawing Number		**Rev**
Figure 5		3F

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Appendix B Species Records by Site

B1. Butterfly and Dragonfly Transect Results

		Transects - 15/06/2015						Transects - 21/08/2015						Transects - 24/08/2015						Total Number of Lepidoptera and Ordonata species identified across the three survey visits						
Order/Family/Species	Vernacular	A	B	C	D	E	F	B	C	D	E	F	G	B	C	D	E	F	G	A	B	C	D	E	F	G
Lepidoptera - Adelidae Nemophora degeerella	*Nemophora degeerella*		3					3							7				6		✓	✓				✓
Lepidoptera - Choreutidae Anthophila fabriciana	*Anthophila fabriciana*					4													4					✓		✓
Lepidoptera - Crambinae (Grass moths) Crambus spp.	*Crambus spp.*	3											2		3			5	7	✓		✓			✓	✓
Lepidoptera - Geometridae Eupethica abbreviata	*Eupethica abbreviata*																1		1					✓		✓
Lepidoptera - Hesperiidae Ochlodes sylvanus	*Ochlodes sylvanus*											2	1												✓	✓
Lepidoptera - Hesperiidae Thymelicus lineola	*Thymelicus lineola*																		2							✓
Lepidoptera - Hesperiidae Thymelicus sylvestris	*Thymelicus sylvestris*	1	1										1							✓	✓					✓
Lepidoptera - Lasiocampidae Euthrix potatoria	*Euthrix potatoria*		2																1		✓					✓
Lepidoptera - Lycaenidae Lycaena phlaeas	*Lycaena phlaeas*												3						1							✓
Lepidoptera - Lycaenidae Polyomattus icarus	*Polyommatus icarus*											2	4		3				1			✓			✓	✓
Lepidoptera - Noctuidae Noctus pronuba	*Noctus pronuba*																1							✓		
Lepidoptera - Noctuidae Xestia c-nigrum	*Xestia c-nigrum*												1						1							✓
Lepidoptera - Nymphalidae Aglais io	*Aglais (Inachis) io*								2	1	3				1	3	1		1			✓	✓	✓		✓
Lepidoptera - Nymphalidae Aglais urticae	*Aglais urticae*											2	1			2							✓		✓	✓
Lepidoptera - Nymphalidae Aphantopus hyperantus	*Aphantopus hyperantus*											7							6						✓	✓
Lepidoptera - Nymphalidae Coenonympha pamphilus	*Coenonympha pamphilus*											3	4						3						✓	✓
Lepidoptera - Nymphalidae Lasiommata megera	*Lasiommata megera*												3						2							✓
Lepidoptera - Nymphalidae Maniola jurtina	*Maniola jurtina*										2	1				2			1				✓	✓	✓	✓
Lepidoptera - Nymphalidae Pararge aegeria	*Pararge aegeria*		1								1		2						1		✓			✓		✓
Lepidoptera - Nymphalidae Pyronia tithonus	*Pyronia tithonus*							2				1	3			3			4		✓		✓		✓	✓
Lepidoptera - Nymphalidae Vanessa atalanta	*Vanessa atalanta*																1							✓		
Lepidoptera - Nymphalidae Vanessa cardui	*Vanessa cardui*									1	1	3						2	2				✓	✓	✓	✓
Lepidoptera - Pieridae Gonepteryx rhamni	*Gonepteryx rhamni*	3		1	1						2									✓		✓	✓	✓		
Lepidoptera - Pieridae Pieris Anthocharis cardamines	*Anthocharis cardamines*	2	1	3	3	2	4													✓	✓	✓	✓	✓	✓	
Lepidoptera - Pieridae Pieris brassicae	*Pieris brassicae*		2														2		2		✓			✓		✓
Lepidoptera - Pieridae Pieris napi	*Pieris napi*											3	2				1							✓	✓	✓
Lepidoptera - Pieridae Pieris napi	*Pieris rapae*											2	2		3	4	1		9			✓	✓	✓	✓	✓
Odonata - Damselfly Lestes sponsa	*Lestes sponsa*		1					1						1							✓					
Odonata - Dragonfly Sympetrum sanguineum	*Sympetrum sanguineum*									4				4		3					✓		✓			
Odonata - Dragonfly Anax imperator	*Anax imperator*						1							1		2	1		5		✓		✓	✓	✓	✓
Odonata - Enallagma cyathigerum	*Enallagma cyathigerum*		3	3	3			3		3	4		4			2					✓	✓	✓	✓		✓
Odonata - Dragonfly Aeshna grandis	*Aeshna grandis*												2						2							✓
Odonata - Dragonfly Aeshnea cyanea	*Aeshna cyanea*									3							1		3				✓	✓		✓
Odonata - Damselfly Calopteryx virgo	*Caleopteryx virgo*										1						2							✓		
	Total spp.	4	8	3	3	2	2	4	1	5	7	10	15	3	5	8	10	2	22	4	11	8	12	17	13	27
	Lepidoptera	4	6	2	2	2	1	2	1	2	5	10	13	0	5	5	7	2	19	4	7	7	8	13	12	23
	Odonata	0	2	1	1	0	1	2	0	3	2	0	2	3	0	3	3	0	3	0	4	1	4	4	1	4

B2. Sweep Netting and Water Trapping

Order/Family/Species	Species	Further Details	Habitats	UK Status	A	B	C	D	E	F	B	C	D	E	F	G	B	C	D	E	F	G
Arachnid - Opiliones (Harvestmen) Opiliones sp		Harvestman	Occurring in a wide range of habitats	Widespread	1	1					2		2		3	4	4				11	15
Diptera - Acalyptera Section aclcyptera sp		This Section has 40 families of small dark flies (3mm)	Occurring in a wide range of habitats		10																	
Diptera - Bibionidae (March flies) Bibio leucopterus ♀	*Bibio leucopterus*	5mm long stout black flies with leg spurs (5mm)	Grasslands and rotting debris	Common	1	2			4													
Diptera - Chloropidae (Frit flies) Chlorops sp ♀		Yellow fly with black thoracic stripes (3mm)	Grasslands	common						4		2	5			4		2	3			5
Diptera - Culicidae (Mosquitoes) Culicidea sp		Narrow bodied biting insects	Marshes and waterbodies	common	12	5									1	4				3		6
Diptera - Dolichopodidae Dolichopodidae sp ♀ ♂		Metallic green or bronze predatory flies (3mm)	Wet areas and grasslands	common											1	5					2	3
Diptera - Empididae (Dagger flies) Empis tesselata	*Empis tessellata*	Predatory flies (2-4mm)	Grassland and decaying vegetation	common	3	5	7				1	2										1
Diptera - Lonchaeidae (Lance flies) Lonchaeidae sp ♀		Shiny blue metallic flies (3mm)	Decaying animal and vegetation matter	common	3											1						2
Diptera - Muscidae (House flies) Muscidae sp		Robust bristly flies (7-9mm)	Trees and grassland - widespread	common						2		9	7	5	8	17	4	5	10	7	11	14
Diptera - Scathophagidae (Dung flies) Scathophagidae stercoraria ♀♂	*Scathophaga stercoraria*	The common dung fly	Animal faeces	Common	2									4						5		
Diptera - Sciaridae (Fungus gnats) Sciaridae sp ♀		Thin bodied flies similar to midges (2mm)	Grassland and wet habitats	common								2				5						3
Diptera - Drosophilidae (Fruit flies) Drosophilidae sp ♀ ♂		flies (3mm)	waterbodies	Common	3																	3
Diptera - Sciomyzidae (Marsh flies) Tetanocera ♀	*Tetanocera elata*	Spiny flies which parasitise slugs and snails (5mm)	Damp areas especially grasslands	common														6				1
Diptera - Empididae (Dagger flies) Empis tesselata		Predatory fly	decaying vegetation	Common	2	1					4			1		4	2	3				7
Diptera - Sepsidae (Ensign flies) Sepsis sp ♀		3mm long shiny black flies with a black wing spot (3mm)	Decaying matter in grasslands	common	1											2					1	
Diptera - Syrphidae (Hoverflies) Cheilosia bergenstammi ♀	*Cheilosia bergenstammi*	Shiny black fly (6mm)	Waste land with Senecio jacobaea	Local							4						7					
Diptera - Syrphidae (Hoverflies) Cheilosia proxima	*Cheilosis proxima*	Small black hoverfly	Grassland, Thistles	Widespread						1	3						1					2
Diptera - Syrphidae (Hoverflies) Chrysotoxum bicinctum	*Chrytsotoxum bicinctum*	Wasp mimic	Grasslands and wood	Frequent									3									
Diptera - Syrphidae (Hoverflies) Chrysotoxum festivum	*Chrysotoxum festivum*	Wasp mimic (8-12mm) Beaded chrysotoxum	Grasslands	Frequent	2								1					2	2			3
Diptera - Syrphidae (Hoverflies) Episyrphus balteatus	*Episyrphus balteatus*	Marmalade fly	Very common Migrant also	widespread							5	7	3	6	2	26	3	7	10	2	9	32
Diptera - Syrphidae (Hoverflies) Eristalinus sepulchralis	*Eristalinus sepulchralis*	small black hoverfly (6-8mm) spotted eyes	Rotting vegetation	widespread												2						
Diptera - Syrphidae (Hoverflies) Eristalis arbustorum ♀	*Eristalis arbustorum*	Large hymenoptera mimic with banded abdomen (8mm)	Wetlands	Very common			3	1		2	1					2		3	2	2		4
Diptera - Syrphidae (Hoverflies) Eristalis horticola ♀	*Eristalis horticola*	Large hymenoptera mimic with banded abdomen (8mm)	Wetlands	Common											2						1	
Diptera - Syrphidae (Hoverflies) Eristalis pertinax	*Eristalis pertinax*	Large hymenoptera mimic with striped thorax (8mm)	Wetlands	Common	1							2			1	3		1			1	
Diptera - Syrphidae (Hoverflies) Eristalis tenax ♂	*Eristalis tenax*	Large hymenoptera mimic with banded abdomen (8mm)	Wetlands	Common									1			3			2			2
Diptera - Syrphidae (Hoverflies) Helophilus pendulus	*Helophilus pendulus*	Wasp mimic poor (7-12mm) Striped abdomen	Very common	widespread									3		1	2		1			2	5
Diptera - Syrphidae (Hoverflies) Leucozona glaucia	*Leucozona glaucia*	Blue-grey body Yellow scutellum	Wooded areas and hedgerows	Widespread							4		1		1	2					2	4
Diptera - Syrphidae (Hoverflies) Leucozona laternalia	*Leucozona laternaria*	Blue grey body Dark scutellum	Wooded areas and hedgerows	widespread								2				3		3				2
Diptera - Syrphidae (Hoverflies) Melanostoma scalare ♀ ♂	*Melanostoma scalare*	Small metallic black hoverfly with yellow abdominal spots	Grasslands and wastelands	Common												3					1	1
Diptera - Syrphidae (Hoverflies) Merodon equestris	*Merodon equestris*	Bee mimic (12 -14mm) Triangular tibial process	Grasslands and wood	common				3		2		3	1			2		4	1			
Diptera - Syrphidae (Hoverflies) Myathropa florea	*Myathropa florea*	Wasp mimic poor (7-12mm) mark like batman on thorax	wide range of habitats	widespread						2						3						2
Diptera - Syrphidae (Hoverflies) Pipizella viduate ♀	*Pipizella viduata*	Small black hoverfly	Grassland	Common										2							4	
Diptera - Syrphidae (Hoverflies) Pocota persona	*Pocota personata*	Bee mimic (11-13mm) Small head	Veteran trees	Nationally scarce - RDB Pre94										1								
Diptera - Syrphidae (Hoverflies) Sphaerophoria ♀		Bright yellow and black hoverfly (6mm)	Grasslands	common											3	2	2					2
Diptera - Syrphidae (Hoverflies) Sphaerophoria scripta ♂	*Sphaerophoria scripta*	Bright yellow and black hoverfly with long wings (6mm)	Grasslands	Common - edge of UK range																		
Diptera - Syrphidae (Hoverflies) Syrphus ribesii	*Syrphus ribesii*	Medium hoverfly (7-12mm) Wasp mimic	Woodland and grass	widespread			2					2	1			2		1	1		3	2
Diptera - Syrphidae (Hoverflies) Syritta pipiens ♂	*Syritta pipiens*	Small yellow and black fly with enlarged hind femora (4mm)	Grasslands and edge habitats	Common						3					5			3				2
Diptera - Syrphidae (Hoverflies) Tropidia scita	*Tropidia scita*	Toothed femur (6-8mm) Waterbodies - reeds	Wetlands	Frequent									1					2	1			
Diptera - Syrphidae (Hoverflies) Volucella bombylans	*Volucella bombylans*	Variable bee mimic (8-14mm) Plumose arista	woodland edge habitats	widespread								1		2		3		1	2		1	4
Diptera - Syrphidae (Hoverflies) Volucella inanis	*Volucella inanis*	Large conspicuous (12-14mm) Wasp mimic	Associated with wasp nests	Frequent - Notable species								4	3					3	1			
Diptera - Syrphidae (Hoverflies) Volucella pellucens	*Volucella pellucens*	Large species (10- 15mm) Great pied hoverfly	Woodland species	Widespread						3	1		1	2		1		2	3			3
Diptera - Syrphidae (Hoverflies) Volucella zonaria	*Volucella zonaria*	Largest hoverfly Wasp/hornet mimic	Associated with wasp nests	Frequent -Notable species				2														
Diptera - Tabanidae (Horseflies) Haematopota pluvialis	*Haematopota pluvialis*	Notch-horned cleg	Grasslands near livestock	Common										5			1				3	
Diptera - Tephritidae (Fruit flies) Chaetostomelia cylindrica ♀	*Chaetostomella cylindrica*	Picture winged flies (3mm)	Grassland and rough land	Common								2	5		2	1		3	1		1	2
Diptera - Tipulidae (Crane flies) Tipulidae sp.		Crane flies	Wide range of habitats	Common									1		3	5	1				2	1
Hemiptera - True Bugs Heteroptera sp		Sucking plant bugs	Occurring in a wide range of habitats	common	1	2		4		3				3	4	7					7	4
Hemiptera - True Bugs Homoptera sp		Leaf hoppers with wings held in a roof shape	Occurring in a wide range of habitats	common			7									3					3	7
Hymenoptera - Aculeata (Bees and wasps) Andrena fulva	*Andrena fulva*	Tawny mining bee	Wide range of habitats	Common	2											2	4					
Hymenoptera - Aculeata (Bees and wasps) Andrena haemorrhoa	*Andrena haemorrhoa*	Early mining bee	Grasslands	common	2						1					1	2					
Hymenoptera - Aculeata (Bees and wasps) Osmia bicornis	*Osmia rufa*	Red mason bee	Grasslands	Common	1						2						1					
Hymenoptera - Aculeata (Bees and wasps) Anthidium manicatum	*Anthidium maculatum*	wool carder bee	Wide range of habitats	Common												2	1					
Hymenoptera - Aculeata (Bees and wasps) Apis mellifera	*Apis mellifera*	Honey bee	Wide range of habitats	Common - in decline	3						3	1	1	2	4	4	1	2	1	4	1	2
Hymenoptera - Aculeata (Bees and wasps) Bombus campestris	*Bombus campestris*	A cuckoo bee male	Wide range of habitats	Very common	2	1				2	1		2			3	3	2	1			3
Hymenoptera - Aculeata (Bees and wasps) Bombus hortorum	*Bombus hortorum*	Garden bumblebee	Wide range of habitats	Very common		1			2											2		
Hymenoptera - Aculeata (Bees and wasps) Bombus hypnorum	*Bombus hypnorum*	Tree bumblebee	Wide range of habitats	Common - recent UK species (2001)						3						1				2		3
Hymenoptera - Aculeata (Bees and wasps) Bombus lapidarius	*Bombus lapidarius*	Red-tailed bumblebee	Wide range of habitats	Very common			4	1								2				2		3
Hymenoptera - Aculeata (Bees and wasps) Bombus lucorum - sensu lato	*Bombus lucorum*	White-tailed bumblebee	Wide range of habitats	Common -3 species	3		1					2		1		2		3			3	
Hymenoptera - Aculeata (Bees and wasps) Bombus pascorum	*Bombus pascuorum*	Common carder bee	Wide range of habitats	Common				2					2		1	2					1	
Hymenoptera - Aculeata (Bees and wasps) Bombus pratorum	*Bombus pratorum*	Early bumblebee	Wide range of habitats	Common		1		1								1						1
Hymenoptera - Aculeata (Bees and wasps) Bombus rupestris	*Bombus rupestris*	A cuckoo bee	Wide range of habitats	Common - Notable sp		2	2			3									1	2		2
Hymenoptera - Aculeata (Bees and wasps) Bombus terrestris	*Bombus terrestris*	Buff-tailed bumblebee	Wide range of habitats	Common					3							3					1	
Hymenoptera - Aculeata (Bees and wasps) Vespula germanica	*Vespula germanica*	German wasp	Wide range of habitats	Common				1		3						1					2	2
Hymenoptera - Aculeata (Bees and wasps) Vespula vulgaris	*Vespula vulgaris*	Common wasp	Wide range of habitats	Common	2											3						
Hymenoptera - Apocrita (Parasitica) Ichneumonidae sp	*Ichneumonidae sp*	Parasitic wasps	Occurring in a wide range of habitats								1			2		2			1			4
Hymenoptera - Apocrita (Parasitica) Sphecidae sp		Large yellow and black solitary wasps	Usually preferring dry or sandy places												2	1	1			3		3
Hymenoptera - Formacidae (Ants) Lasius flavus	*Lasius flavus*	Yellow meadow ant	Grasslands	Common												Nests						nests
Hymenoptera - Symphyta (Sawflies) Rhogogaster viridis	*Rhogogaster viridis*	Green sawfly	Wide range of habitats	Common						1						2						3
Hymenoptera - Apocrita (Parasitica) Amblyteles armatorius	*Amblyteles armatorius*	Parasitic wasp	Woodlands/grasslands	Frequent					2							2						7
Mecoptera - Panorpidae (Scorpion flies) Panorpa communis	*Panorpa communis*	omnivorous, male has scorpion claspers	Wide range of habitats	Very common	3	1	3	1							3	3					1	2
Neuroptera - Chrysopidae (Lacewings) Chrysoperla carnea (?)	*Chrysopa perla*	Lacewing, likely C. perla ID needs song analysis to be certain	Commonly raised for biocontrol	Very common	1	3									5	2						5
Neuroptera - Sialidae (Alderflies) Sialis lutaria	*Sialis lutaria*	Robust large winged flies	Trees near silty ponds/watercourses	Very common			1					3						2				3
Orthoptera - Chorthippus brunneus	*Chorthippus brunneus*	Common field grasshopper	Grasslands	Common								2		2		4		5	3		3	5
Orthoptera - Tettgioniidae Leptophytes punctatissima	*Leptophyes punctatissima*	Speckled bush cricket	Grassland/woodland edge	Common												1						2
				Number of species - trapping	22	12	9	9	4	14	13	16	20	14	19	50	16	23	18	11	25	47