A Survey of
Two areas in Rural Northamptonshire
For Invertebrate Interest

Aricia agestis [Brown Argus] butterflies *in copula* near a disused railway cutting south of Roade

Survey carried out by Andrew Grayson on Friday 5th to Sunday 7th August 2016

Draft Report submitted on Friday 11th November 2016

To

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NB: The Spreadsheets [pages 46 to 56] are not paginated

INTRODUCTION

Andrew Grayson (invertebrate consultant) was instructed by Marcus Wainwright-Hicks (Ecology Associate of FPCR Environment and Design Ltd.) and Andy Godfrey (Andy Godfrey Associates), to carry out an investigation into the invertebrate assemblages and habitats on two areas of land in rural Northamptonshire. The survey included sampling invertebrates from representative habitats within the two areas.

As per pre-survey protocol, and for convenience, this report will refer to these two areas as the Main Site and the Bypass Route. Both areas are subject to planning proposals. The Main Site is subject to a proposed rail freight terminal. The extents of the proposed Bypass Route are the likely preferred option for a bypass for the village of Roade.

The vast majority of land in the Main Site is owned by the Courteenhall Estate, as too is the land in the northern part of the proposed Bypass Route. The Courteenhall Estate has attributed names to all their fields and blocks of woodland; therefore, this report uses some of these local names for convenience when referring to the survey compartments etc.

AIMS OF THE SURVEY

The survey aimed to discover and assess the conservation value of habitats and features which occur within the Main Site and Bypass Route, and assess whether any habitats or features present were likely to be of sufficient invertebrate interest to warrant additional targeted surveying, or protection from development.

KEY INVERTEBRATES AND KEY HABITATS

Of primary importance was an investigation and assessment of whether statutorily protected invertebrates were present, or could potentially occur given the habitats and features available. Any potentially key habitats were those which may prove vital to the ecology of any statutorily protected species.

Of secondary importance was the assessment of habitats based upon their invertebrate quality, i.e. presence of any species which may have some genuine significance according to national or regional criteria aside from those species which are currently statutorily protected.

Notes on conservation criteria etc. can be found in the Results section on pages 4 to 7.

THE SURVEY AREAS

LOCATION

The extents of the Main Site and Bypass Route survey areas are shown on the plans in Appendix 1 on pages 11 and 12.

On a wider aspect, these two survey areas were located southwards of the county town of Northampton, and were fairly adjacent to each other, being circa 500 metres apart.

More specifically, the Main Site was located immediately adjacent to, and westwards of, Junction 15 on the M1 motorway, being enclosed on all sides by roads or railway lines, except for at its southern margin, which ran 200 metres north of, and parallel to, a track which connects Courteenhall West Lodge and West Lodge Cottages.

The Bypass Route was located to the west of the village of Roade, and therefore running through countryside between the A508 road to the north and south of the village.

LAND USE AND TOPOGRAPHY

Most of the Main Site consisted of arable fields [photograph 2: page 41] divided by hedgerows. The other major land use in the Main Site related to shooting. A shooting range was located in the woodland adjacent to the Courteenhall Shooting School at Rectory Farm, and the woodlands known as Highgate [survey compartment M8] and The Moors [compartment M14] were used for rearing pheasants.

Most of the land along the proposed Bypass Route consisted of arable fields or pastureland [photographs 5 and 6: page 43], only some of which were grazed at the time of the survey.

An active railway line passes via cuttings at the western margin of the Main Site, and through the northern section of the Bypass Route. These railway cuttings were steep-sided and generally lined with dense scrub. Photograph 1 [page 41] shows the deep railway cutting at the point where the active railway line cuts through the Bypass Route.

The topography of both the Main Site and Bypass Route was a rather uniformly gently rolling landscape, being neither particularly flat, nor particularly hilly. Soil exposures such as the sides of ditches and bare arable fields indicated a rather uniformly clay-based soil.

HABITATS AND FEATURES

MAIN SITE

Over 90% of the Main Site consisted of arable fields, some of which had margins which had not been cultivated recently, and had been allowed to develop as strips of grassland with a few intermixed flowering plants. The fields were divided by hedgerows, some of which had adjacent plantations of broadleaved and evergreen seedlings and saplings. Most hedgerows were principally *Crataegus monogyna* [Hawthorn].

Some hedgerows contained mature and semi-mature broadleaved trees, including *Quercus* [oaks] and *Fraxinus excelsior* [Ash]. These trees were scattered throughout the Main Site.

Many of the hedgerows in the Main Site were along fairly shallow ditches which were quite dry at the time of the survey. The only ditch retaining any water was situated towards the south of the Main Site, running through survey compartments M12 and M13 [see plan on page 11]. The only other piece of wetland habitat within the Main Site was a pond near its centre [compartment M5: see plan on page 11: description and notes on page 23]. Descriptions etc. of all the survey compartments are on pages 19 to 40.

There was a small amount of 'brownfield' type habitat within the Main Site. This principally comprised the shooting range located in the woodland adjacent to the Courteenhall Shooting School at Rectory Farm [compartment M4 of this survey], and a mound of rubble [compartment M7], which was situated immediately north of the wood known as Highgate [compartment M8].

The Main Site included some accessible blocks of fairly well-established woodland which contained a wide variety of broadleaved and evergreen trees; predominantly broadleaved. The survey included sampling the invertebrate fauna of these blocks of woodland [compartments M1, M2, M4, M8 and M14].

BYPASS ROUTE

Approximately 90% of the proposed Bypass Route consisted of arable fields and grazed pastureland. Arable fields in the northern part of the Bypass Route generally had wide grassland margins, by far the best of which was a flower-rich strip [compartment B4] situated to the west of the railway which passes through the northern section of the Bypass Route. The fields and hedgerows in the central part of the Bypass Route were relatively bland as invertebrate habitats, and not worthy of targeted investigation.

A disused railway cutting [compartment B8] in the southern part of the proposed Bypass Route was an interesting feature, although not an outstanding example of its type.

There were no interesting wetlands within the Bypass Route. Here instead were seasonally-wet areas which were almost entirely dry at the time of the survey; including three ponds, and the ditch which runs almost parallel to and perhaps 50 metres eastwards of compartment B6 [see plan on page 12].

Potentially the most important invertebrate habitats in the Bypass Route area were its *Quercus* [oaks] and *Fraxinus excelsior* [Ash] trees, which had more significant decay than similar trees in the Main Site. From an invertebrate point of view, the better examples of these decaying trees occurred in the northern part of the Bypass Route, and also towards the southern part of the Bypass Route [photographs 7, 8 and 9: pages 44 and 45]; although it is fair to point out that the trees in the southern part of the Bypass Route were situated either side of the planned Bypass Route [denoted by a red boundary line on the plan on page 12] rather than in the direct path of the Bypass Route.

THE SURVEY

INTRODUCTION

Surveying was carried out by Andrew Grayson on Friday 5th, Saturday 6th and Sunday 7th August 2016. The weather conditions were conducive for invertebrate sampling and recording; therefore, the resultant species list is a good representation of the invertebrates that were present on the days of the survey, and is a full record for conspicuous sun-loving assemblages such as the butterflies and dragonflies. The weather conditions for all three survey days were rather similar, being generally hot and sunny, with warm light to moderate southerly breezes.

The survey considered all habitats, but focussed on habitats or features likely to be of at least secondary invertebrate value.

METHODOLOGY

As far as access would allow, the two areas were surveyed on foot, including the sampling of invertebrates from representative habitats throughout the two survey areas. As per pre-survey instructions, the sampling of invertebrates in the Main Site was restricted to within the Main Site boundaries, but the sampling of invertebrates along the proposed Bypass Route included some areas which lie just outside the current suggested boundaries of the Bypass Route.

The survey methods and protocol were adapted from Drake *et al.* (2007), and principally involved the recording of invertebrates in the field; and the collection of invertebrates for critical examination. The collecting methods were mainly sweep-sampling, spot-sampling, and ground-searching. Descriptions of these methods were given by Drake *et al.* (2007).

SURVEY COMPARTMENTS

The vast majority of land included within the Main Site and Bypass Route consisted of arable fields or grazed pasture. These habitats were largely devoid of invertebrates and not worthy of targeted surveying. Much of the remaining land was compartmentalized by the surveyor, and subjected to surveying using the aforementioned methodology in order to facilitate the report. A total of 22 compartments were created, 14 within the Main Site, and 8 in the general area of the Bypass Route. Details of these 22 compartments are given in Appendix 3 [pages 19 to 40].

RESULTS

INTRODUCTION – NATIONAL CRITERIA

The results section of an invertebrate report is principally an analysis of the data resulting from the survey, giving particular attention to any species found which may be of any national conservation importance. Of primary importance are species which are currently statutorily protected. Other species which may be considered are those currently listed in the UK BAP [United Kingdom Biodiversity Action Plan]; and, more particularly, those which are currently attributed a national conservation status by JNCC [Joint Nature Conservation Committee], or an international conservation status by IUCN [International Union for Conservation of Nature].

Statutorily protected species were listed in Schedule 5 of the Wildlife and Countryside Act 1981. The list is updated in quinquennial reviews, and is available via www.legislation.gov.uk .

UK BAP resulted from the UK Government signing the CBD [Convention on Biological Diversity] at the Rio Earth Summit in 1992. The current list of 1,150 UK BAP Priority Species is readily available via the UK BAP website www.ukbap.org.uk . The most recent UK BAP review was in August 2007.

JNCC has allocated national conservation statuses to many British invertebrates. These statuses are based upon the collective expert opinion of many specialists. Explanations of JNCC conservation statuses, and listings of the species to which they are currently allocated, are readily available via the JNCC website www.jncc.gov.uk .

Nationally rare and threatened invertebrates were listed in the Red Data Books (Shirt, 1987; Bratton, 1991) and have been updated by JNCC in national reviews.

Nationally scarce species are listed under various terms in JNCC national reviews. These species are often termed 'Notable' or sub-divided into 'Notable A' and 'Notable B' categories. IUCN categorisation has been adopted for several recent JNCC reviews of species status. Much invertebrate conservation evaluation is based around species which have been categorized in JNCC publications.

Internationally rare and threatened invertebrates are listed in The IUCN Red List of Threatened Species, which is readily accessible via www.iucnredlist.org .

INTRODUCTION - REGIONAL CRITERIA

Northamptonshire's Red Data Book (Colston *et al*., 1996), gives annotated lists of all invertebrates which are considered to be of some county significance. These regionally-important invertebrates are taken into consideration when assessing the designation of Local Wildlife Sites in Northamptonshire.

The following statements relate to invertebrates only, and present the criteria used to designate Wildlife Sites in Northamptonshire. The statements are quoted verbatim from page 27 of *Wildlife Site Selection Criteria: Northamptonshire* (Local Wildlife Sites Panel, 2007 [last updated 05.02.2014]).

"Sites meeting or exceeding any one of the following thresholds will be considered to be Wildlife Sites in Northamptonshire:

a) Any site supporting confirmed populations of nationally rare or scarce butterfly species

NB – records must have been made within the last ten years. Recent deliberate introductions should not be included, with the exception of introductions made under the Biodiversity Action Plan process in Northamptonshire.

b) Macro moths:
   i) Any site supporting breeding populations of nationally rare species.
   ii) Any site supporting probable breeding populations of two or more species listed in the Northamptonshire's Red Data Book and that are associated with the relevant habitat.
   iii) Any site supporting a probable breeding population of five county rarity species of macro moth associated with the relevant habitat.

NB. Records must have been made within the last ten years. Recent deliberate introductions should not be included. Probability or [sic = of] breeding should be based on the suitability of habitats and the availability of foodplants.

c) Dragonflies:
   i) Any site supporting populations of nationally rare species of dragonfly.
   ii) Any site supporting breeding populations of national, or county, scarce species of dragonfly.
   iii) Any site supporting twelve or more confirmed breeding species of dragonfly

NB – records must have been made within five years of the designation date.

d) Saproxylic beetles
   i) Any site with an ecological continuity index greater than ten.

NB – records must have been made since 1945.

e) Any site supporting 35 or more species of water beetle.

f) Any site supporting a population of white-clawed crayfish within a stretch of water not below 50m in length.

g) All Invertebrates:
   i) Any site supporting a breeding population of RDB1 (endangered) or RDB2 (vulnerable) species of invertebrate recorded since 1980.
   ii) Any site with over one hundred species recorded and where two or more species are of national RDB or Na / Nb status and where those species are associated with the relevant habitats.

RESULTS – NATIONAL CRITERIA

STATUTORILY PROTECTED INVERTEBRATES

No statutorily protected invertebrates were found during the survey.

It is highly unlikely than any current statutorily protected invertebrates could occur given the location of the Main Site and Bypass Route and absence of unusual habitats or features in the areas surveyed.

JNCC-LISTED INVERTEBRATES

One current JNCC-listed invertebrate was found during the survey.

It is highly unlikely that any <u>significant</u> JNCC-listed species could be present in the Main Site or Bypass Route given the absence of particularly unusual habitats or features.

The survey of the Main Site produced one current JNCC-listed species, viz. the large picture-winged fly *Merzomyia westermanni* which has apparently become more frequent and widespread in Britain since its JNCC

designation a quarter of a century ago. A female of this fly was found in the woodland used as a shooting range by Courteenhall Shooting School [survey compartment M4: see plan on page 11].

Merzomyia westermanni was categorized as nationally Notable in Falk (1991) under the name *Icterica westermanni*. Falk (1991) stated that larvae have been reared from the flower-heads of *Senecio erucifolius* [Hoary Ragwort] and *Senecio jacobaea* [Common Ragwort]. The British range given by Falk (1991) was a wide dispersal of about twenty post-1960 sites in south-east England, from Kent to Hampshire, and as far north as Cambridgeshire and Norfolk. *Merzomyia westermanni* has become more widespread and common in Britain since its Notable categorization in Falk (1991), but it could possibly still retain nationally Notable status if currently reviewed, although any decision to retain such categorization would be borderline. The current grid map of records on the NBN Gateway shows a wide distribution in southern Britain, as far north as South Yorkshire.

It is quite possible that other current JNCC-listed species may be present within the Main Site and Bypass Route, but it is not likely that any significant species will occur.

UK BAP PRIORITY SPECIES

One current UK BAP Priority Species was found during the survey.

This species, *Tyria jacobaeae* (The Cinnabar Moth), is common and widespread in Britain, and of no actual conservation value when assessing wildlife habitats. It is highly unlikely that any significant UK BAP Priority Species could be present in the Main Site or Bypass Route due to the fairly ordinary nature of their habitats.

Tyria jacobaeae (The Cinnabar Moth) was found during the survey of the Main Site. Mature larvae were present on its main foodplant, *Senecio jacobaea* (Common Ragwort), in the woodland used as a shooting range by Courteenhall Shooting School [survey compartment M4: see plan on page 11]. According to the JNCC website www.jncc.gov.uk, The Cinnabar moth is included on the UK BAP list on the basis of Rothamsted Insect Survey data from 1968 to 2002 providing evidence to support its inclusion under the criteria of showing a 'Marked decline in the UK'. UK BAP 'Evidence for Criteria' [last updated on 15.12.2010] states "common and widespread, but rapidly declining moths – research needed; Declined by 83% over the last 35 years". According to the UK moths website www.ukmoths.org.uk, *Tyria jacobaeae* remains "a fairly common moth in much of Britain". The current grid map of records on the NBN Gateway www.nbn.org.uk shows it to be distributed throughout Britain, with records for the vast majority of 10km National Grid squares in southern Britain, becoming far more restricted to coastal regions northwards of Yorkshire in the east, and northwards of Cumbria in the west.

It is quite likely that several other insignificant current UK Bap Priority Species, particularly certain common moths, will be present and breeding within both the Main Site and the Bypass Route. This likelihood is because the current list of UK BAP Priority Species contains a good number of common and widespread British invertebrates and vertebrates which were merely listed for research purposes as a result of recent declines in some areas of Britain, principally southern England. Prior to recent declines, many such species were among the most abundant and widespread of invertebrates. Many are still currently common and widespread in Britain.

RESULTS – REGIONAL CRITERIA

NORTHAMPTONSHIRE RED DATA BOOK INVERTEBRATES

One Northamptonshire Red Data Book invertebrate was found during the survey.

This species, *Chorthippus albomarginatus* (Lesser Marsh Grasshopper), was included on page 40 of *Northamptonshire's Red Data Book* (Colston *et al*., 1996) with the comments "The lesser marsh grasshopper is

a species found along rivers in lowland England as well as well as on road verges. It has previously not been recorded in the county and is represented by a single record. Nationally the species appears to be undergoing a range expansion." This range expansion has continued during the two decades since publication of Colston *et al*. (1996), and *Chorthippus albomarginatus* would doubtlessly be excluded from any current review of Northamptonshire Red Data Book category invertebrates, as it is currently widespread in the county according to the current grid map of records on the NBN Gateway www.nbn.org.uk., indeed, the NBN Gateway currently holds nearly 9,000 records of *Chorthippus albomarginatus*, showing a range expansion with records for most 10km National Grid squares south-east of a line between the Severn and Humber estuaries.

The survey of the Main Site produced two female *Chorthippus albomarginatus* which were swept from the grassy strips surrounding the hedgerow at Crisp's West [survey compartment M10: see plan on page 11].

CONCLUSIONS

SIGNIFICANT INVERTEBRATES

The survey failed to find any invertebrates of great significance, albeit, a few local invertebrates were found.

If any invertebrates of any significance were to be present, they would be associated with the saproxylic (deadwood etc.), or seasonally-wet habitats. There was no indication that any of the saproxylic or seasonally-wet habitats within the Main Site and Bypass Route are significant habitats of their type.

THE HABITATS

ARABLE AND PASTURE

Over 90% of the Main Site and Bypass Route is arable land and pastureland which is of no invertebrate value. Many arable fields have grassland margins, but the majority are of very little invertebrate value. By far the best of these is a flower-rich strip [compartment B4] situated to the west of the railway which passes through the northern section of the Bypass Route; however, this is of secondary invertebrate interest at best.

HEDGEROWS

Many of the hedgerows which divide the fields in the Main Site and Bypass Route are of little invertebrate value. The real interest within the hedges involves the mature *Quercus* [oaks] and *Fraxinus excelsior* [Ash] trees, which are generally scattered throughout both the Main Site and Bypass Area. The better examples, i.e., those with the most significant decay, occur in the northern part of the Bypass Route, and also towards the southern part of the Bypass Route; although, those towards the southern part of the Bypass Route are situated slightly outside the current Bypass Route extents [denoted by a red boundary on the plan on page 12]. A few of the better trees are shown in the photographs on pages 33, 44 and 45.

WETLANDS

Wetland habitats were quite scarce within both the Main Site and Bypass Route, the majority being seasonally-wet areas which were dry at the time of the survey. All ditches and ponds within the proposed Bypass Route boundaries were fairly dry at the time of the survey, and can be considered to be seasonally-wet habitats. Many hedgerows in the Main Site were situated along ditches, all but one of which was dry at the time of the survey. The only ditch in the Main Site which retained any visible water, was the main ditch which runs in part through survey compartments M12 and M13 [see plan on page 11].

The only other permanently-wet habitat was the pond situated at the south-east corner of the Courteenhall Shooting School shooting range [compartment M5: see plan on page 11]. This pond provides useful wetland habitats for local wetland invertebrates, but is likely to fall short of meeting the criteria necessary to be classified as a Wildlife Site according to *Northamptonshire's Red Data Book* (Colston *et al*., 1996).

RAILWAY CUTTINGS AND OTHER BROWNFIELD HABITATS

Brownfield type habitats were of quite limited extent, although the two mentioned in the next paragraph are probably of secondary interest as invertebrate habitats.

A disused railway cutting [compartment B8: see plan on page 12] in the southern part of the proposed Bypass Route provides habitat which supports several local invertebrates, although it is not an outstanding example of its type. Local invertebrates also occur in the open woodland used as a shooting range by Courteenhall Shooting School near Rectory Farm in the Main Site [compartment M4 of this survey]; although, once again, this useful invertebrate habitat is no more than an average example of its type.

The Main Site contained two areas with mounds of excavated material that attracted such invertebrates as mining bees. The main mound of rubble [compartment M7] was situated immediately north of the wood known as Highgate [compartment M8]. The other mound was adjacent to the small patch of woodland shown in the photograph of compartment 1 on page 19. These mounds were of no special invertebrate interest.

An active railway line passes at the western margin of the Main Site, and through the northern section of the Bypass Route. At both these points, the railway line is set in deep cuttings, the sides of which are steep and generally lined with dense scrub, or sparsely-grassed with relatively few flowers. These active railway cuttings appear rather bland for invertebrate interest. Photograph 1 [page 41] shows the railway cutting which passes through the northern section of the Bypass Route.

The aforementioned brownfield habitats at least in part contain the UK BAP Priority Habitat known as Open Mosaic Habitats on Previously Developed Land [OMHPDL]. Buglife (2009) defined this habitat as being characterized by unmanaged, flower-rich grasslands with sparsely-vegetated areas on nutrient-poor substrates. Buglife (2009) also stated that this habitat may contain features which add to habitat diversity, e.g. bare ground, seasonally-wet areas and patches of scrub.

WOODLANDS

The Main Site contains several blocks of well-established woodland which include a wide variety of broadleaved and evergreen trees, including mature and potential veteran trees. The Bypass Route contains a couple of minor blocks of woodland around the two railway cuttings. As with the hedgerows, the invertebrate interest within the woodlands lies in their older trees, which are mainly on the woodland peripheries.

NOTES ON VETERAN TREES

In the context of trees, the term 'veteran' describes a tree with habitat features such as wounds or decay, including fungal bodies. Such veteran tree features provide habitat for saproxylic and other invertebrates. Not all veteran trees are old enough to be ancient; indeed, a fairly young tree can be termed veteran if it bears the scars of age such as decay in the trunk, branches or roots, fungal fruiting bodies or dead wood, but these features, which are developing on some trees, typically start to appear in mature trees in their pre-ancient stage. Such habitat features are essential to the ecology of a wide variety of invertebrates, but principally beetles [Coleoptera] and flies [Diptera] (The Woodland Trust & Ancient Tree Forum, post 2004, post 2005, post 2008).

RECOMMENDATIONS

The proposed developments of the Main Site and Bypass Route will inevitably result in the loss of much of their rural landscape. From an invertebrate interest point of view, the vast majority of the land surveyed is of virtually no, or rather little, importance; and can be developed without any real impact on the invertebrate assemblages which currently inhabit the remainder of the Main Site and Bypass Route.

Mature trees are the principal invertebrate habitats with conservation value in both the Main Site and the Bypass Route. Some trees have wounds or decay. The majority of trees that possess such features in the Main Site and Bypass Route are *Quercus* [oaks] and *Fraxinus excelsior* [Ash]. Such trees are scattered throughout the Main Site, and present in the northern and southern regions of the Bypass Route. None of these trees is considered potentially important enough to warrant additional targeted surveying such as flight-interception trapping etc., descriptions of which can be found in Drake *et al.* (2007).

The proposed developments of the Main Site and Bypass Route will inevitably involve the loss of some mature trees; however, there are sufficient numbers within the areas outlined for development, and in adjacent areas, that the loss of a few trees will have little environmental impact; however, it is recommended that as many of the mature trees as is viably possible are retained within the plans for development. Some of the better examples occur in the centre of the northern part of the proposed Bypass Route, and could be lost; however, overall, the proposed Bypass Route for Roade has been well chosen as it avoids all the better examples which occur around the southern section of the Bypass Route. The surveyor is unaware of whether or not any are protected by Tree Preservation Orders (TPO), but given their rural location within arable landscapes, this would probably be unlikely. If any veteran trees are already protected by a TPO, then they will obviously have to be retained.

Other habitats of secondary invertebrate interest which could conceivably be considered for retention within the development plans are: the open woodland currently used as a shooting range by Courteenhall Shooting School and its pond [compartments M4 and M5]; and the main blocks of woodland within the Main Site [compartments M2, M8 and M14]; although none of these woodland habitats are of primary importance.

ACKNOWLEDGEMENTS

I am indebted to two gentlemen without whom my successful completion of the field surveying would have proved somewhat problematic.

Marcus Wainwright-Hicks of FPCR Environment and Design Ltd. provided excellent and copious plans prior to the survey, a couple of which are used within this report [see pages 11 and 12]; furthermore, Marcus also promptly forwarded Colston *et al.* (1996) and Local Wildlife Sites Panel (2007), which were necessary for the satisfactory completion of this report.

Charlie Reynolds of The Estate Office at Courteenhall enabled me to gain access to the Main Area by being considerate enough to offer his personal gate key when the key I should have received was unexpectedly unavailable. Charlie also provided a plan of the Courteenhall Estate, which proved extremely useful, both for the survey fieldwork, and for the nomenclature used for some field and woodland names within this report.

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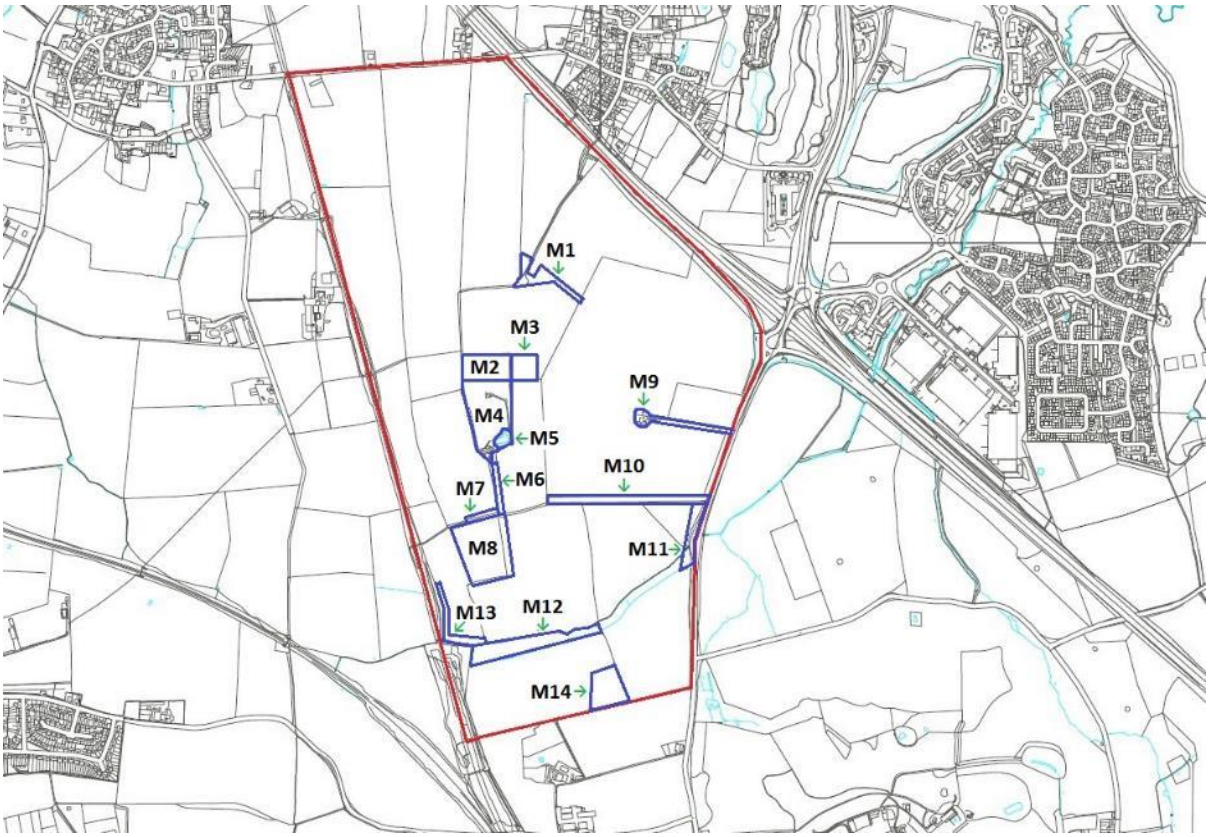
APPENDIX 1: PLANS

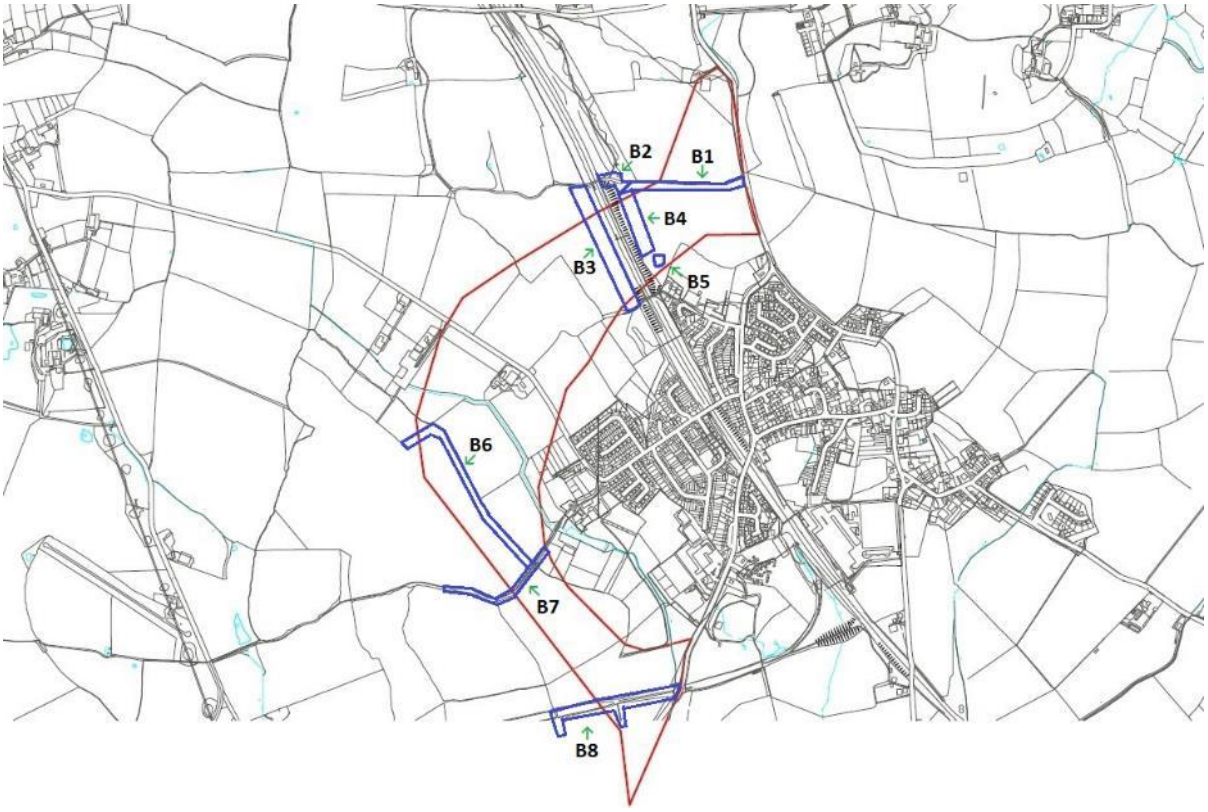
PLAN 1: MAIN SITE



The red line marks the strict boundary of the Main Site; the blue lines mark the boundaries of the conceptual compartments which were sampled for invertebrate interest [compartments M1 to M14].

APPENDIX 1: PLANS

PLAN 2: BYPASS ROUTE



The red line marks the rough boundary of the proposed Roade Bypass Route; the blue lines mark the boundaries of the conceptual compartments which were sampled for invertebrate interest [compartments B1 to B8]

APPENDIX 2: TABLE

The table below gives a full list of invertebrates recorded as a result of the survey carried out by Andrew Grayson in Northamptonshire from Friday 5th to Sunday 7th August 2016. The list is arranged by alphabetical order of scientific orders, families, genera and species. The status codes 'C' and 'L' refer to national statuses of Common and Local respectively. The 'M' and 'B' numbers refer to the Main Site and Bypass Route compartments in which species were recorded during the survey.

Three species in the invertebrate list have categorization which causes their inclusion in the results section [pages 4 to 7], viz. *Chorthippus albomarginatus*, the Lesser Marsh Grasshopper, which was included in *Northamptonshire's Red Data Book* (Colston *et al*., 1996); *Tyria jacobaeae*, The Cinnabar Moth, which is a current UK BAP Priority Species; and *Merzomyia westermanni*, a picture-winged fly, which was categorized as nationally Notable in Falk (1991).

TABLE 1: INVERTEBRATE SPECIES LIST

Scientific name	Vernacular Name	Status	Main Site	Bypass Route
Class: Gastropoda	**Slugs & Snails etc.**			
Family: Arionidae	**Terrestrial slugs**			
Arion ater (Linnaeus)	Black Slug	C	M2, M4, M8, M13	
Family: Helicidae	**Terrestrial snails**			
Cepaea nemoralis (Linnaeus)	Brown-lipped Snail	C	M4	
Cornu aspersum (Müller)	Garden Snail	C		B4
Order: Isopoda	**Woodlice & Water-lice etc.**			
Suborder: Oniscidea	**Woodlice**			
Family: Armadillidiidae	**Pill woodlice**			
Armadillidium vulgare (Latreille)	Common Pill Woodlouse	C	M9	
Order: Odonata	**Dragonflies & damselflies**			
Suborder: Anisoptera	**Dragonflies**			
Family: Aeshnidae	**Hawkers**			
Aeshna cyanea (Müller)	Southern Hawker	C	M2, M4, M7, M14	
Aeshna grandis (Linnaeus)	Brown Hawker	C	M4, M13, M14	
Aeshna mixta (Latreille)	Migrant Hawker	C	M4	
Family: Libellulidae	**Skimmers, darters, etc.**			
Sympetrum striolatum (Charpentier)	Common Darter	C		B8
Order: Orthoptera	**Grasshoppers, Crickets etc.**			
Family: Tettigoniidae	**Bush-crickets etc.**			
Conocephalus discolor (Thunberg)	Long-winged Conehead	L	M12	
Leptophyes punctatissima (Bosc)	Speckled Bush-cricket	L	M5	
Family: Tetrigidae	**Groundhoppers**			
Tetrix undulata (Sowerby)	Common Groundhopper	C	M10	B4
Family: Acrididae	**Grasshoppers**			
Chorthippus albomarginatus (De Geer)	Lesser Marsh Grasshopper	L	M10	
Chorthippus brunneus (Thunberg)	Common Field Grasshopper	C	M1, M3, M4, M10, M11, M13	
Omocestus viridulus (Linnaeus)	Common Green Grasshopper	C	M3, M4, M8, M9, M10, M11, M12, M13	B1, B2, B3, B4, B7, B8

APPENDIX 2: INVERTEBRATE SPECIES LIST

Scientific name	Vernacular Name	Status	Main Site	Bypass Route
Order: Dermaptera	**Earwigs**			
Family: Forficulidae	**Earwigs**			
Forficula auricularia Linnaeus	Common Earwig	C	M6	
Order: Hemiptera	**True bugs etc.**			
Suborder: Heteroptera	**True bugs**			
Family: Coreidae	**Squashbugs, leatherbugs etc.**			
Coreus marginatus (Linnaeus)	Dock Bug	C	M12	
Family: Pentatomidae	**Shieldbugs**			
Palomena prasina (Linnaeus)	Green Shieldbug	C	M13	
Family: Rhopalidae	**Plant bugs**			
Stictopleurus punctatonervosus (Goeze)	a plant bug	L	M13	
Family: Miridae	**Grass bugs, plant bugs etc.**			
Capsus ater (Linnaeus)	a plant bug	C	M8	
Closterotomus norwegicus (Gmelin)	Potato Capsid	C	M1, M9	B6
Dicyphus epilobii Reuter	a plant bug	C	M5	
Heterotoma planicornis (Pallas)	a plant bug	C	M6	
Oncotylus viridiflavus (Goeze)	a plant bug	L	M12	B1, B4
Stenodema laevigata (Linnaeus)	a grass bug	C		B1
Suborder: Auchenorrhyncha	**Froghoppers, leafhoppers etc.**			
Family: Aphrophoridae	**Froghoppers**			
Philaenus spumarius (Linnaeus)	Common Froghopper	C	M1, M3, M5, M6, M9, M10, M12, M13	B2, B4, B6, B7
Order: Mecoptera	**Scorpion flies etc.**			
Panorpidae	**Scorpion flies etc.**			
Panorpa germanica Linnaeus	a scorpion-fly	C	M13	
Order: Lepidoptera	**Butterflies & moths**			
Suborder: Heterocera	**Moths**			
Family: Geometridae	**Thorn, Pug & Carpet moths etc.**			
Camptogramma bilineata (Linnaeus)	Yellow Shell	C		B2
Family: Erebidae	**Tiger, Ermine & Footman moths etc.**			
Orgyia antiqua (Linnaeus)	The Vapourer	C	M8	
Tyria jacobaeae (Linnaeus)	The Cinnabar	UK BAP	M4	
Family: Noctuidae	**Owlet moths**			
Autographa gamma (Linnaeus)	Silver Y	C	M12	B1, B6, B8
Suborder: Rhopalocera	**Butterflies**			
Family: Hesperiidae	**Skippers**			
Thymelicus sylvestris (Poda)	Small Skipper	C	M4, M11, M12	B6, B7
Family: Pieridae	**Whites & Yellows etc.**			
Pieris brassicae (Linnaeus)	Large White	C	M8, M13	B7, B8
Pieris napi (Linnaeus)	Green-veined White	C	M2, M4, M6, M10, M11, M12, M13	B2, B4, B6, B7, B8

APPENDIX 2: INVERTEBRATE SPECIES LIST

Scientific name	Vernacular Name	Status	Main Site	Bypass Route
Pieris rapae (Linnaeus)	Small White	C	M8, M11	
Family: Nymphalidae	**Brush-footed butterflies including Browns etc.**			
Aglais io (Linnaeus)	Peacock	C	M4, M7	
Aphantopus hyperantus (Linnaeus)	Ringlet	C	M4, M8	
Maniola jurtina (Linnaeus)	Meadow Brown	C	M2, M4, M6, M8, M10, M11, M12, M13	B1, B4, B6, B8
Pararge aegeria (Linnaeus)	Speckled Wood	C		B8
Pyronia tithonus (Linnaeus)	Gatekeeper	C	M4, M6, M7, M8, M10, M11, M13	B4, B6, B7, B8
Vanessa atalanta (Linnaeus)	Red Admiral	C	M8	B1, B7, B8
Vanessa cardui (Linnaeus)	Painted Lady	C	M4	B7
Family: Lycaenidae	**Blues, Coppers & Hairstreaks etc.**			
Aricia agestis (Denis & Schiffermüller)	Brown Argus	L		B8
Celastrina argiolus (Linnaeus)	Holly Blue	C	M13	B7
Order: Coleoptera	**Beetles**			
Suborder: Adephaga	**Ground & water beetles, etc.**			
Family: Carabidae	**Ground beetles**			
Anchomenus dorsalis (Pontoppidan)	a ground beetle	C	M10	
Bembidion aenuem Germar	a ground beetle	C		B5
Pterostichus madidus (Fabricius)	a ground beetle	C		B8
Suborder: Polyphaga	**Beetles and weevils**			
Family: Cantharidae	**Soldier beetles**			
Rhagonycha fulva (Scopoli)	a soldier beetle	C	M3, M8, M10, M11, M12, M13	B4
Family: Oedemeridae	**False blister beetles**			
Oedemera lurida (Marsham)	a false blister beetle	C		B7
Oedemera nobilis (Scopoli)	Fat-legged Flower Beetle	L	M3	B6
Family: Cerambycidae	**Longhorn beetles**			
Rutpela maculata (Poda)	a longhorn beetle	C	M13	
Family: Chrysomelidae	**Leaf beetles**			
Oulema melanopus (Linnaeus)	Cereal Leaf Beetle	C	M3	
Order: Hymenoptera	**Wasps, bees, sawflies etc.**			
Suborder: Symphyta	**Sawflies**			
Family: Tenthredinidae	**Sawflies**			
Athalia rosae (Linnaeus)	Turnip Sawfly	L	M1, M9, M12	B5
Tenthredo amoena Gravenhorst	a sawfly	L		B4
Suborder: Apocrita	**Bees, wasps, ichneumons etc.**			
Superfamily: Aculeata	**Ants, bees and wasps**			
Family: Mutillidae	**Velvet ants etc.**			
Myrmosa atra Panzer	Black-headed Velvet Ant	C		B4
Family: Formicidae	**Ants**			
Lasius niger (Linnaeus) [sensu stricto]	Black Garden Ant	C	M4, M8, M12	

APPENDIX 2: INVERTEBRATE SPECIES LIST

Scientific name	Vernacular Name	Status	Main Site	Bypass Route
Family: Vespidae	**Social wasps**			
Vespula germanica (Fabricius)	German Wasp	C	M1	
Vespula vulgaris (Linnaeus)	Common Wasp	C	M5, M7	
Family: Crabronidae	**Solitary wasps**			
Crossocerus podagricus (Vander Linden)	a solitary wasp	C		B8
Passaloecus singularis Dahlbom	a solitary wasp	C	M4	
Family: Colletidae	**Mining bees**			
Hylaeus communis Nylander	Common Yellow-face Bee	C		B8
Family: Andrenidae	**Mining bees**			
Andrena flavipes Panzer	Yellow-legged Mining Bee	L	M4	
Family: Halictidae	**Mining bees etc.**			
Halictus tumulorum (Linnaeus)	Bronze Furrow Bee	C		B6
Lasioglossum fulvicorne (Kirby)	Chalk Furrow Bee	C		B4, B6
Lasioglossum leucopus (Kirby)	White-footed Furrow Bee	C	M7	
Lasioglossum villosulum (Kirby)	Shaggy Furrow Bee	C		B8
Family: Megachilidae	**Mason bees etc.**			
Anthidium manicatum (Linnaeus)	Wool Carder Bee	L		B8
Family: Anthophoridae	**Nomad bees**			
Nomada flavoguttata (Kirby)	Little Nomad Bee	C	M7	
Family: Apidae	**Bumblebees, Honey Bee etc.**			
Apis mellifera Linnaeus	Honey Bee	C	M3, M4, M8, M12, M13	B2, B4, B5, B6, B7, B8
Bombus hortorum (Linnaeus)	Small Garden Bumblebee	C	M13	
Bombus hypnorum (Linnaeus)	Tree Bumblebee	C	M14	
Bombus lapidarius (Linnaeus)	Red-tailed Bumblebee	C	M2, M3, M4, M8, M11, M12, M13	B1, B3, B4, B6, B7, B8
Bombus lucorum (Linnaeus)	White-tailed Bumblebee	C	M4, M8, M14	B7
Bombus pascuorum (Scopoli)	Common Carder-bee	C	M2, M3, M4, M7, M8, M10, M11, M12, M13, M14	B1, B4, B7, B8
Bombus terrestris (Linnaeus)	Buff-tailed Bumblebee	C	M9	B4, B7, B8
Bombus vestalis (Geoffroy)	Vestal Cuckoo-bee	C	M4, M8	B4
Order: Diptera	**True flies**			
Suborder: Nematocera	**Thread-horns**			
Family: Tipulidae	**Crane-flies**			
Nephrotoma cornicina (Linnaeus)	a crane-fly	L	M6, M14	
Tipula paludosa Meigen	a crane-fly	C	M4, M8	
Family: Limoniidae	**Crane-flies**			
Limonia nubeculosa Meigen	a crane-fly	C	M2	B5
Metalimnobia quadrinotata (Meigen)	a crane-fly	L	M5	
Rhipidia maculata Meigen	a crane-fly	C	M14	
Family: Anisopodidae	**Wood gnats**			
Sylvicola punctatus (Fabricius)	a wood gnat	C		B8
Suborder: Brachycera	**Short-horns**			
Family: Rhagionidae	**Snipeflies**			
Chrysopilus asiliformis (Preyssler)	Little Snipefly	C	M12	

APPENDIX 2: INVERTEBRATE SPECIES LIST

Scientific name	Vernacular Name	Status	Main Site	Bypass Route
Family: Tabanidae	**Horseflies**			
Haematopota pluvialis (Linnaeus)	Notch-horned Cleg	C	M1, M13	B7
Family: Asilidae	**Robberflies**			
Leptogaster cylindrica (De Geer)	Striped Slender Robberfly	C	M4	
Family: Hybotidae	**Dance flies**			
Hybos culiciformis (Fabricius)	a dance fly	C	M2, M8, M14	
Ocydromia glabricula (Fallén)	a dance fly	C	M2	
Family: Empididae	**Dance flies**			
Empis livida Linnaeus	a dance fly	C	M4, M8, M9	
Family: Dolichopodidae	**Long-legged flies**			
Chrysotus gramineus (Fallén)	a long-legged fly	C	M2, M6	
Dolichopus festivus Haliday	a long-legged fly	C	M2, M8, M12, M13	
Dolichopus griseipennis Stannius	a long-legged fly	C	M6	
Dolichopus trivialis Haliday	a long-legged fly	C	M2, M14	B8
Dolichopus wahlbergi Zetterstedt	a long-legged fly	L	M2	
Rhaphium appendiculatum Zetterstedt	a long-legged fly	C	M14	
Syntormon bicolorellum (Zetterstedt)	a long-legged fly	L	M8	
Family: Lonchopteridae	**Pointed-winged flies**			
Lonchoptera lutea Panzer	a pointed-winged fly	C	M5, M8, M14	B2, B5
Family: Syrphidae	**Hoverflies**			
Anasimyia contracta Claussen & Torp	a hoverfly	L	M4	
Cheilosia latifrons (Zetterstedt)	a hoverfly	L	M10	
Cheilosia pagana (Meigen)	a hoverfly	C		B2
Cheilosia soror (Zetterstedt)	a hoverfly	L		B8
Dasysyrphus albostriatus (Fallén)	a hoverfly	C		B8
Episyrphus balteatus (De Geer)	a hoverfly	C	M2, M4, M6	B1, B4
Eristalis interruptus (Poda)	a hoverfly	C	M12, M13	
Eristalis intricarius (Linnaeus)	a hoverfly	C		B2
Eristalis pertinax (Scopoli)	a hoverfly	C	M4, M8, M12, M13	
Eristalis tenax (Linnaeus)	Drone-fly	C	M4, M11, M12	B4
Helophilus pendulus (Linnaeus)	a hoverfly	C	M4, M7	B2, B4
Melangyna labiatarum/compositarum indet.	a hoverfly	C	M13	
Melanostoma mellinum (Linnaeus)	a hoverfly	C	M3, M9, M10, M12, M14	B1, B4, B6, B7, B8
Melanostoma scalare (Fabricius)	a hoverfly	C	M6, M8, M13, M14	B2, B8
Myathropa florea (Linnaeus)	a hoverfly	C		B4
Neoascia podagrica (Fabricius)	a hoverfly	C		B8
Platycheirus albimanus (Fabricius)	a hoverfly	C	M4, M5	
Platycheirus clypeatus (Meigen)	a hoverfly	C	M4	B4
Platycheirus manicatus (Meigen)	a hoverfly	C		B1, B8
Platycheirus rosarum (Fabricius)	a hoverfly	L	M4	
Platycheirus scutatus (Meigen) [sensu stricto]	a hoverfly	C	M14	

APPENDIX 2: INVERTEBRATE SPECIES LIST

Scientific name	Vernacular Name	Status	Main Site	Bypass Route
Sphaerophoria scripta (Linnaeus)	a hoverfly	C	M4	B4
Syritta pipiens (Linnaeus)	a hoverfly	C	M4, M8, M13	B4, B6
Syrphus ribesii (Linnaeus)	a hoverfly	C	M5	
Syrphus vitripennis Meigen	a hoverfly	C	M13	
Volucella pellucens (Linnaeus)	a hoverfly	C	M14	B2
Xylota segnis (Linnaeus)	a hoverfly	C	M13	
Xylota sylvarum (Linnaeus)	a hoverfly	L	M8	
Family: Tephritidae	**Picture-winged flies**			
Merzomyia westermanni (Meigen)	a picture-winged fly	Notable	M4	
Tephritis formosa (Loew)	a picture-winged fly	C	M10, M12	
Tephritis hyoscyami (Linnaeus)	a picture-winged fly	L	M1	B8
Family: Sciomyzidae	**Marsh flies**			
Coremacera marginata (Fabricius)	a marsh fly	L	M10	
Limnia unguicornis (Scopoli)	a marsh fly	C	M4	
Pherbellia cinerella (Fallén)	a marsh fly	C	M3	B4
Tetanocera elata (Fabricius)	a marsh fly	C	M13	
Family: Sepsidae	**Black scavenger flies**			
Sepsis cynipsea (Linnaeus)	a black scavenger fly	C		B4
Sepsis fulgens Meigen	a black scavenger fly	C	M7	
Sepsis orthocnemis Frey	a black scavenger fly	C	M4	
Sepsis punctum (Fabricius)	a black scavenger fly	C		B5
Sepsis violacea Meigen	a black scavenger fly	C	M3	
Family: Opomyzidae	**Cereal flies**			
Opomyza florum (Fabricius)	Yellow Cereal Fly	C	M2, M5, M8	B5
Opomyza germinationis (Linnaeus)	a cereal fly	C	M1, M4, M14	B6, B8
Opomyza petrei Mesnil	a cereal fly	L		B6
Family: Scathophagidae	**Dung flies**			
Scathophaga furcata (Say)	a dung fly	C		B5
Scathophaga stercorea (Linnaeus)	Yellow Dung Fly	C	M1, M2, M8, M14	B1, B4, B6, B7, B8
Family: Muscidae	**Houseflies, sweat flies etc.**			
Coenosia tigrina (Fabricius)	a muscid fly	C		B1
Mesembrina meridiana Linnaeus	Noon Fly	C		B7
Stomoxys calcitrans (Linnaeus)	Stable-fly	C		B7
Family: Calliphoridae	**Bluebottles, green-bottles etc.**			
Lucilia illustris (Meigen)	a green-bottle	C	M9	
Lucilia richardsi Collin	a green-bottle	L	M12	
Lucilia silvarum (Meigen)	a green-bottle	L	M4	
Pollenia angustigena Wainwright	a cluster fly	C	M9, M11	B6
Pollenia rudis (Fabricius)	a cluster fly	C	M1, M6	B2, B7
Family: Sarcophagidae	**Flesh flies**			
Sarcophaga haemorrhoa Meigen	a flesh fly	C	M6	
Sarcophaga subvicina Rohdendorf	a flesh fly	C	M10	
Family: Tachinidae	**Parasitic flies**			
Epicampocera succincta (Meigen)	a parasitic fly	C		B8
Eriothrix rufomaculata (De Geer)	a parasitic fly	C	M4, M9, M12	B4, B6
Eurithia anthophila (Robineau-Desvoidy)	a parasitic fly	C	M13	
Phryxe vulgaris (Fallén)	a parasitic fly	C		B1

APPENDIX 3: SURVEY COMPARTMENTS: MAIN SITE

N. B. The extents of the survey compartments in the Main Site are shown on page 11

M1: hedges east of Slade Springs.

Central **longitudinal and latitudinal co-ordinates**: 52°18’71.96”N, 0°90’77.61”W
Central 1m² **National Grid reference**: SP74766 54891

Basic description: A small patch of woodland plus adjacent wooded hedgerows. The trees and bushes were a mixture of broadleaved and evergreen species including *Quercus* [oaks], *Pinus sylvestris* [Scots Pine], *Fagus sylvatica* [Beech] and *Sambucus nigra* [Elder]. The undergrowth was dominated by *Urtica dioica* [Common Nettle]. *Cirsium* [thistles] were in flower at the time of the survey. The survey compartment included small mounds of excavated material, and the remnants of felled trees which had been burned nearby.

Invertebrate interest: A very ordinary patch of woodland and wooded hedgerows with no apparent special invertebrate interest. Any interest will be of secondary importance at best.

Nomenclature: Slade Springs is an arable field named and owned by the Courteenhall Estate.

APPENDIX 3: SURVEY COMPARTMENTS: MAIN SITE

M2: Churchills (wood)

Central **longitudinal and latitudinal co-ordinates**: 52°18’45.32”N, 0°90’98.75”W
Central 1m² **National Grid reference**: SP74627 54591

Basic description: A small patch of well-established woodland featuring a variety of broadleaved and evergreen trees and bushes, many approaching full maturity, and some afflicted with *Hedera helix* [Ivy]. The range of trees included *Quercus* [oaks] with minor rot. The woodland was almost devoid of flowers during the day of the survey, aside from conspicuous *Senecio jacobaea* [Common Ragwort] on the periphery. The undergrowth of the peripheral fringe of the woodland was dominated by *Urtica dioica* [Common Nettle].

Invertebrate interest: No apparent special invertebrate interest. Any interest would be of secondary importance at best.

Nomenclature: Churchills is a block of woodland named and owned by the Courteenhall Estate.

APPENDIX 3: SURVEY COMPARTMENTS: MAIN SITE

M3: meadow east of Churchills

Central **longitudinal and latitudinal co-ordinates**: 52°18’44.99”N, 0°90’84.59”W
Central 1m² **National Grid reference**: SP74724 54589

Basic description: A small patch of grassland which is effectively a recently-established wildlife meadow. The grasses were a mixture of fine and coarse species. *Lotus uliginosus* [Greater Bird’s-foot Trefoil] was the dominant flowering plant on the day of the survey. *Echium vulgare* [Viper’s Bugloss] was also in flower.

Invertebrate interest: No special invertebrate interest. The meadow proved quite poor in invertebrate interest.

Nomenclature: Churchills is a block of woodland named and owned by the Courteenhall Estate.

APPENDIX 3: SURVEY COMPARTMENTS: MAIN SITE

M4: Courteenhall Shooting School

Central **longitudinal and latitudinal co-ordinates**: 52°18'31.90"N, 0°90'97.03"W
Central 1m² **National Grid reference**: SP74642 54442

Basic description: A patch of open woodland used as a shooting range; hence, the ground was littered with debris from clay pigeons etc. Aside from such debris, much of the ground was covered in gravel-based debris typical of ex railway land. This mixture of gravel and clay pigeon debris had helped to create areas of habitat referable to the UK BAP Priority Habitat known as 'Open Mosaic Habitats on Previously Developed Land'.

The wooded areas were plantations of semi-mature trees of a wide variety of broadleaved and evergreen species; predominantly broadleaved, and predominantly *Fraxinus excelsior* [Ash]. The range of other broadleaved trees included *Quercus* [oaks], *Fagus sylvatica* [Beech] and *Betula* [birches]. Open areas within the plantations included patches of *Epilobium angustifolium* [Rose-bay Willow-herb], *Cirsium* [thistles], *Rubus fruticosus* [Bramble], *Senecio jacobaea* [Common Ragwort] and *Leucanthemum vulgare* [Ox-eye Daisy].

This open woodland included a pond, but for the purposes of the survey, the pond and its immediate surrounds have been treated as a separate compartment [M5].

Invertebrate interest: This is an area of secondary importance for invertebrates, but is of no actual special invertebrate interest.

Nomenclature: Courteenhall Shooting School comprises the building at Rectory Farm on the Courteenhall Estate and adjacent open woodland to the north which is used as shooting range.

APPENDIX 3: SURVEY COMPARTMENTS: MAIN SITE

M5: pond

Central **longitudinal and latitudinal co-ordinates**: 52°18’24.08”N, 0°90’91.78”W
Central 1m² **National Grid reference**: SP74679 54356

Basic description: A small pond in the south-west corner of open woodland [compartment M4] which is used as a shooting range by Courteenhall Shooting School. The pond was well-vegetated with emergent *Typha latifolia* [Reedmace] etc., yet still featured plenty of clear open water. The wider periphery of the pond was lushly-vegetated and fully sheltered by surrounds of semi-mature trees of a variety of species.

Invertebrate interest: The pond is unlikely to be of any special invertebrate interest. It is, however, likely to be of secondary importance. A number of local invertebrates taken in the surrounding woodland [compartment M4] are likely to have bred in the margins of this pond.

Nomenclature: Courteenhall Shooting School comprises the building at Rectory Farm on the Courteenhall Estate and adjacent open woodland to the north which is used as shooting range.

APPENDIX 3: SURVEY COMPARTMENTS: MAIN SITE

M6: hedge at east of Hilly Field

Central **longitudinal and latitudinal co-ordinates**: 52°18'11.05"N, 0°90'94.35"W
Central 1m² **National Grid reference**: SP74663 54211

Basic description: A well-maintained wooded strip, consisting of a plantation of young to semi-mature trees between two hedgerows. Overall, the wooded strip contained a mixture of broadleaved and evergreen trees and bushes, but principally broadleaved. The immediate surrounds and undergrowth were mainly grasses, *Urtica dioica* [Common Nettle] and *Rumex* [docks]. The hedgerow at the eastern side was along a dry ditch, and was dominated by *Crataegus monogyna* [Hawthorn], with a row of emergent semi-mature trees.

Invertebrate interest: No special invertebrate interest. Probably of less than secondary invertebrate interest at best.

Nomenclature: Hilly Field is an arable field named and owned by the Courteenhall Estate.

APPENDIX 3: SURVEY COMPARTMENTS: MAIN SITE

M7: mound of rubble

Central **longitudinal and latitudinal co-ordinates**: 52°18'02.58"N, 0°91'02.72"W
Central 1m² **National Grid reference**: SP74608 54115

Basic description: A linear mound of rubble located at the northern edge of a block of woodland known as Highgate [compartment M8]. The mound was quite well vegetated with fine grasses and plants such as *Senecio jacobaea* [Common Ragwort], *Leucanthemum vulgare* [Ox-eye Daisy], *Epilobium angustifolium* [Rose-bay Willow-herb], *Carduus* [thistles], *Cirsium* [thistles], *Urtica dioica* [Common Nettle], *Papaver rhoeas* [Field Poppy] and *Rumex* [docks]. This mound is more-or-less referable to the UK BAP Priority Habitat known as 'Open Mosaic Habitats on Previously Developed Land'.

Invertebrate interest: No special invertebrate interest, indeed of less than secondary importance, but a useful resource for invertebrates which require bare ground and sparsely-vegetated well-drained habitats.

Nomenclature: Highgate is a block of woodland named and owned by the Courteenhall Estate.

APPENDIX 3: SURVEY COMPARTMENTS: MAIN SITE

M8: Highgate (wood)

Central **longitudinal and latitudinal co-ordinates**: 52°17'91.84"N, 0°91'02.18"W
Central 1m² **National Grid reference**: SP74613 53996

Basic description: A small wood which contained a wide variety of mature and semi-mature broadleaved and evergreen trees, the majority being broadleaved, including *Quercus* [oaks], *Fraxinus excelsior* [Ash] and *Acer pseudoplatanus* [Sycamore]. The undergrowth contained a lot of *Rubus fruticosus* [Bramble] and *Urtica dioica* [Common Nettle]. The woodland was generally enclosed by hedgerows with peripheral grassy strips featuring flowering plants such as *Cirsium* [thistles], *Centaurea nigra* [Common Knapweed], *Ranunculus* [Buttercups], *Senecio jacobaea* [Common Ragwort], *Trifolium pratense* [Red Clover], *Trifolium repens* [White Clover] and *Lotus uliginosus* [Greater Bird's-foot Trefoil]. The hedgerows enclosing the woodland at its northern and western side were dominated by *Crataegus monogyna* [Hawthorn]. A young *Prunus spinosa* [Blackthorn] hedgerow was planted on the eastern side of the wood. At the time of the survey, the wood was being used for rearing pheasants.

Invertebrate interest: No indication of any special invertebrate interest. Overall invertebrate interest will likely be of secondary importance at best.

Nomenclature: Highgate is a block of woodland named and owned by the Courteenhall Estate.

APPENDIX 3: SURVEY COMPARTMENTS: MAIN SITE

M9: Collingtree Lodge Farm

Central **longitudinal and latitudinal co-ordinates**: 52°18'30.39"N, 0°90'23.97"W
Central 1m² **National Grid reference**: SP75141 54433

Basic description: The vicinities of a derelict farm and an access track leading to the farm from the west. The surrounds of the farm were basically the UK BAP Priority Habitat known as 'Open Mosaic Habitats on Previously Developed Land', and featured plants such as *Sambucus nigra* [Elder], *Urtica dioica* [Common Nettle], *Cirsium* [thistles], *Rubus fruticosus* [Bramble] and *Senecio jacobaea* [Common Ragwort]. The northern edge of the access track was lined by a tall hedgerow comprising a mixture of bushes such as *Crataegus monogyna* [Hawthorn], *Prunus spinosa* [Blackthorn], *Fagus sylvatica* [Beech] and *Rosa canina* [Dog Rose]; with emergent mature *Fraxinus excelsior* [Ash] and *Aesculus hippocastanum* [Horse Chestnut]; undergrowth of *Rubus fruticosus* [Bramble] and *Cirsium* [thistles]; and marginal flowers including *Centaurea nigra* [Common Knapweed] and *Senecio jacobaea* [Common Ragwort].

Invertebrate interest: No apparent special invertebrate interest, but the hedgerow does have a good range of plants. Any invertebrate interest should be of secondary importance at best.

Nomenclature: Collingtree Lodge Farm is on the Courteenhall Estate.

APPENDIX 3: SURVEY COMPARTMENTS: MAIN SITE

M10: Crisp's West

Central **longitudinal and latitudinal co-ordinates**: 52°18'05.72"N, 0°90'20.22"W
Central 1m² **National Grid reference**: SP75171 54159

Basic description: A linear strip of hedgerow and plantation. The hedgerow was dominated by *Crataegus monogyna* [Hawthorn] and contained a few young and semi-mature emergent broadleaved trees. Bushes in the *Crataegus monogyna* [Hawthorn] dominated hedgerow included *Prunus spinosa* [Blackthorn], *Fagus sylvatica* [Beech] and *Rosa canina* [Dog Rose]. The undergrowth and fringe of the hedgerow included *Urtica dioica* [Common Nettle], *Cirsium* [thistles] and *Senecio jacobaea* [Common Ragwort].

The hedgerow was alongside a shallow dry ditch. On the northern side of the hedgerow was a mown strip followed by a linear plantation of seedlings and saplings, planted in regimented rows, three to four wide. These young trees were a mixture of broadleaved and evergreen species, principally broadleaved.

Invertebrate interest: No special invertebrate interest. This was a rather ordinary strip of land with little invertebrate conservation value.

Nomenclature: Crisp's West is a linear block of hedgerow and adjacent plantation named and owned by the Courteenhall Estate.

APPENDIX 3: SURVEY COMPARTMENTS: MAIN SITE

M11: Crisp's South (east end)

Central **longitudinal and latitudinal co-ordinates**: 52°17'97.56"N, 0°90'03.37"W
Central 1m² **National Grid reference**: SP75288 54070

Basic description: A linear strip of hedgerow and plantation. The hedgerow was dominated by *Crataegus monogyna* [Hawthorn] and *Fagus sylvatica* [Beech], with a dry ditch and grassy verge at its eastern side, and a plantation of young and semi-mature trees at its western side. The trees were a variety of broadleaved and evergreen species, but principally broadleaved, and included *Quercus* [oaks] and *Malus sylvestris* [Crab Apple]. The undergrowth was mainly *Urtica dioica* [Common Nettle] and *Cirsium* [thistles]. Plants in flower in the grassy areas were typical of disturbed ground, these being principally *Senecio jacobaea* [Common Ragwort] and *Cirsium* [thistles].

Invertebrate interest: No special invertebrate interest. This was a rather ordinary strip of hedgerow and plantation with very little invertebrate conservation value.

Nomenclature: Crisp's South is a linear block of hedgerow and adjacent plantation named and owned by the Courteenhall Estate.

APPENDIX 3: SURVEY COMPARTMENTS: MAIN SITE

M12: Crisp's South (west end)

Central **longitudinal and latitudinal co-ordinates**: 52°17'63.57"N, 0°90'83.35"W
Central 1m² **National Grid reference**: SP74746 53684

Basic description: A linear strip of hedgerow and plantation. The hedgerow was dominated by *Crataegus monogyna* [Hawthorn], and contained emergent veteran and semi-mature trees, including *Quercus* [oaks], spaced at roughly equal intervals along the hedgerow. To the northern side of the hedgerow was a deep ditch with some running water at the time of the survey, and a grassy strip with typical plants of disturbed ground such as *Rumex* [docks] and *Cirsium* [thistles]. To the southern side of the hedgerow was a broad linear plantation of seedlings and saplings, planted in multiple regimented rows. These young trees were a mixture of broadleaved and evergreen species, but principally broadleaved. The southern side of the hedgerow also featured a dry ditch and mown areas.

Invertebrate interest: No apparent special invertebrate interest. Any invertebrate interest will involve the veteran trees and wet ditch, and would almost certainly be of secondary importance at best.

Nomenclature: Crisp's South is a linear block of hedgerow and adjacent plantation named and owned by the Courteenhall Estate.

APPENDIX 3: SURVEY COMPARTMENTS: MAIN SITE

M13: Highgate Hill (south end)

Central **longitudinal and latitudinal co-ordinates**: 52°17’65.46”N, 0°91’14.09”W
Central 1m² **National Grid reference**: SP74536 53702

Basic description: A broad grassy strip at the southern end of an arable field, situated adjacent to a patch of woodland containing veteran trees, a ditch with some running water, and scrubby areas. The principal veteran trees were *Quercus* [oaks]. The grassland included plants typical of disturbed ground, including *Centaurea nigra* [Common Knapweed], *Rumex* [docks], *Cirsium* [thistles], *Senecio jacobaea* [Common Ragwort] and *Echium vulgare* [Viper’s Bugloss].

Invertebrate interest: No apparent special invertebrate interest. Any interest will relate to the patch of woodland beyond a security fence, and possibly the ditch, and will likely be of secondary interest at best.

Nomenclature: Highgate Hill is an arable field named and owned by the Courteenhall Estate.

APPENDIX 3: SURVEY COMPARTMENTS: MAIN SITE

M14: The Moors (wood)

Central **longitudinal and latitudinal co-ordinates**: 52°17’51.38”N, 0°90’43.60”W
Central 1m² **National Grid reference**: SP75020 53552

Basic description: A small wood situated up a slope and featuring a range of broadleaved and evergreen trees and bushes including *Fraxinus excelsior* [Ash], *Acer pseudoplatanus* [Sycamore] and *Sambucus nigra* [Elder]. The northern and western margins of the woodland were lined by a hedgerow dominated by tall mature *Crataegus monogyna* [Hawthorn]. Adjacent hedgerows featured *Crataegus monogyna* [Hawthorn] and *Fagus sylvatica* [Beech]. The undergrowth of the woodland and nearby hedgerows was dominated by *Urtica dioica* [Common Nettle] and *Rubus fruticosus* [Bramble], and also included plants such as *Rumex* [docks] and *Rosa canina* [Dog Rose]. At the time of the survey, the wood was being used for rearing pheasants.

Invertebrate interest: No apparent special invertebrate interest. Any interest would be of secondary importance at best and would be associated with saproxylic assemblages on some of the trees, although little rot was in evidence apart from the trunk of a veteran *Fraxinus excelsior* [Ash] at the south-west corner of the wood [photograph 10: page 45].

Nomenclature: The Moors is a block of woodland named and owned by the Courteenhall Estate.

APPENDIX 3: SURVEY COMPARTMENTS: BYPASS ROUTE

N. B. The extents of the survey compartments in the Bypass Route are shown on page 12

B1: hedgerow at north of The Hoo

Central **longitudinal and latitudinal co-ordinates**: 52°16'55.64"N, 0°90'04.98"W
Central 1m² **National Grid reference**: SP75301 52491

Basic description: A hedgerow with a range of trees and bushes including veteran trees, with a few veteran trees outside the line of the hedgerow. The hedgerow mainly comprised *Crataegus monogyna* [Hawthorn], *Sambucus nigra* [Elder], *Rosa canina* [Dog Rose], *Prunus spinosa* [Blackthorn] and *Fagus sylvatica* [Beech]. The veteran trees were *Quercus* [oaks] and *Fraxinus excelsior* [Ash], with the majority being *Quercus* [oaks]. The southern side of the hedgerow had a grassy verge circa five metres wide which included *Rubus fruticosus* [Bramble], *Cirsium* [thistles] and *Centaurea nigra* [Common Knapweed].

Invertebrate interest: No apparent special invertebrate interest. Any interest would be of secondary importance at best and would be associated with saproxylic assemblages on some of the veteran trees, some of which lie outside the line of the hedgerow or are in an adjacent hedgerow at the east of The Hoo. None of the trees are sufficiently old enough to be vintage trees, but some have rot and dead parts which are useable by saproxylic assemblages, particularly the *Fraxinus excelsior* [Ash]. One of these trees is featured in photographs 7 and 8 on page 44.

Nomenclature: The Hoo is an arable field named and owned by the Courteenhall Estate.

APPENDIX 3: SURVEY COMPARTMENTS: BYPASS ROUTE

B2: vicinity of pond P12

Central **longitudinal and latitudinal co-ordinates**: 52°16'57.41"N, 0°90'43.39"W
Central 1m² **National Grid reference**: SP75038 52507

Basic description: A lushly-vegetated area of woodland and woodland edge, including the following plants: *Quercus* [oaks], *Fraxinus excelsior* [Ash], *Crataegus monogyna* [Hawthorn], *Sambucus nigra* [Elder], *Rosa canina* [Dog Rose], *Prunus spinosa* [Blackthorn], *Centaurea nigra* [Common Knapweed], *Leucanthemum vulgare* [Ox-eye Daisy] and *Echium vulgare* [Viper's Bugloss].

Invertebrate interest: No apparent special invertebrate interest. Any interest will be of less than secondary importance at best. This accessible area of scrub and dense undergrowth was typical of the similar nearby inaccessible habitat alongside the railway.

Nomenclature: The pond, dry at the time of the visit, has been termed P12 on plans prepared by FPCR Environment and Design Ltd.

APPENDIX 3: SURVEY COMPARTMENTS: BYPASS ROUTE

B3: field margin at west of Bailey Brook

Central **longitudinal and latitudinal co-ordinates**: 52°16'38.99"N, 0°90'44.25"W
Central 1m² **National Grid reference**: SP75035 52302

Basic description: A grassy strip circa 20 metres wide, situated between a *Triticum* [wheat] crop and the mature *Crataegus monogyna* [Hawthorn] scrub dominated upper bank of a railway. The scrub of the upper bank of the railway had undergrowth dominated by *Rubus fruticosus* [Bramble], and included *Cirsium* [thistles], *Centaurea nigra* [Common Knapweed] and *Senecio jacobaea* [Common Ragwort]. The grassy strip contained much *Lotus* [bird's-foot trefoils]. There were a few *Fraxinus excelsior* [Ash] trees in an adjacent hedgerow.

Invertebrate interest: No apparent special invertebrate interest. Any interest will be of less than secondary importance at best. The grassy strip and nearby scrub were quite poor in invertebrates. The nearby *Fraxinus excelsior* [Ash] trees were of no great age or invertebrate interest.

Nomenclature: Bailey Brook is an arable field named and owned by the Courteenhall Estate.

APPENDIX 3: SURVEY COMPARTMENTS: BYPASS ROUTE

B4: field margin at east of The Hoo

Central **longitudinal and latitudinal co-ordinates**: 52°16'43.86"N, 0°90'32.98"W
Central 1m² **National Grid reference**: SP75111 52359

Basic description: A flower-rich grassy strip at the western edge of an arable field. The grassy strip was approximately 20 metres wide, and included such flowering plants as *Trifolium repens* [White Clover], *Centaurea nigra* [Common Knapweed], *Leucanthemum vulgare* [Ox-eye Daisy], *Ranunculus* [Buttercups], *Rhinanthus minor* [Yellow Rattle] and *Echium vulgare* [Viper's Bugloss]. The western margin of the grassy strip was the top edge of an active railway cutting, and was lined with *Prunus spinosa* [Blackthorn], *Crataegus monogyna* [Hawthorn] and *Sambucus nigra* [Elder].

Invertebrate interest: No apparent special invertebrate interest. This grassy strip and adjacent scrub is of secondary interest at best, but does provide a flowery natural resource for an abundance of invertebrates.

Nomenclature: The Hoo is an arable field named and owned by the Courteenhall Estate.

APPENDIX 3: SURVEY COMPARTMENTS: BYPASS ROUTE

B5: surrounds of pond P10

Central **longitudinal and latitudinal co-ordinates**: 52°16'31.16"N, 0°90'21.40"W
Central 1m² **National Grid reference**: SP75192 52217

Basic description: A small pond which was almost dry at the time of the survey, plus its surrounds, which principally consisted of dense and tall mature *Crataegus monogyna* [Hawthorn], *Prunus spinosa* [Blackthorn] and *Sambucus nigra* [Elder]. The undergrowth was dominated by *Urtica dioica* [Common Nettle].

Invertebrate interest: No apparent special invertebrate interest. Any interest will probably be of less than secondary importance at best.

Nomenclature: This pond has been termed P10 on plans prepared by FPCR Environment and Design Ltd.

APPENDIX 3: SURVEY COMPARTMENTS: BYPASS ROUTE

B6: hedgerow south-west of Roade

Central **longitudinal and latitudinal co-ordinates**: 52°15’55.29”N, 0°91’00.12”W
Central 1m² **National Grid reference**: SP74667 51365

Basic description: A hedgerow and adjacent grassy strip at the eastern margin of an arable field. The hedgerow contained *Prunus spinosa* [Blackthorn], *Crataegus monogyna* [Hawthorn], *Fagus sylvatica* [Beech], *Quercus* [oaks], *Fraxinus excelsior* [Ash] and *Rosa canina* [Dog Rose], with undergrowth which conspicuously included *Rubus fruticosus* [Bramble]. The grassy strip included the following plants in flower at the time of the survey: *Leucanthemum vulgare* [Ox-eye Daisy], *Lotus uliginosus* [Greater Bird’s-foot Trefoil], *Trifolium pratense* [Red Clover] and *Trifolium repens* [White Clover].

Invertebrate interest: No special invertebrate interest. Any interest will be of less than secondary importance at best. The trees within the hedgerow were of average or less than average invertebrate interest at best.

APPENDIX 3: SURVEY COMPARTMENTS: BYPASS ROUTE

B7: field margin south-west of Roade

Central **longitudinal and latitudinal co-ordinates**: 52°15’38.41”N, 0°90’88.91”W
Central 1m² **National Grid reference**: SP74746 51179

Basic description: A low *Crataegus monogyna* [Hawthorn] dominated hedgerow with an adjacent tall grassy margin, situated between arable fields. The undergrowth of the hedgerow was dominated by *Urtica dioica* [Common Nettle] and *Rumex* [docks]. The grassy margin contained many flowering plants, including *Centaurea nigra* [Common Knapweed], *Leucanthemum vulgare* [Ox-eye Daisy], *Trifolium pratense* [Red Clover], *Trifolium repens* [White Clover] and *Lotus uliginosus* [Greater Bird’s-foot Trefoil].

Invertebrate interest: No special invertebrate interest. The field margin and adjacent hedgerow through which the Bypass Route is planned are of fairly limited invertebrate value.

APPENDIX 3: SURVEY COMPARTMENTS: BYPASS ROUTE

B8: railway cutting south of Roade

Central **longitudinal and latitudinal co-ordinates**: 52°15’02.61”N, 0°90’47.36”W
Central 1m² **National Grid reference**: SP75036 50785

Basic description: Part of a disused railway cutting containing the open area shown in the photograph above, but principally consisting of areas which were sheltered and shaded by trees, scrub and dense undergrowth. The trees and scrub included *Quercus* [oaks], *Fraxinus excelsior* [Ash], *Fagus sylvatica* [Beech], *Sambucus nigra* [Elder], *Rosa canina* [Dog Rose] and *Crataegus monogyna* [Hawthorn]. The undergrowth was dominated by *Urtica dioica* [Common Nettle], and also included *Rubus fruticosus* [Bramble]. Plants in flower in the open area at the time of the survey included *Trifolium repens* [White Clover], *Lotus uliginosus* [Greater Bird’s-foot Trefoil], *Carduus* [thistles] and *Cirsium* [thistles].

Invertebrate interest: No apparent special invertebrate interest, but this disused railway cutting is of secondary invertebrate interest based on the results of the survey which produced a few distinctly local invertebrates.

On a wider aspect, there are several veteran *Quercus* [oaks] trees with noticeable rot, situated close to, but outside the current planned Bypass Route; including two in a field with a crop of *Triticum* [wheat], one of which was hollowed-out at the trunk [photograph 9 on page 45].

APPENDIX 4: GENERAL PHOTOGRAPHS

1: The railway cutting in the northern part of the Bypass Route

2: A typical arable field of the Main Site, with The Moors (wood) [M14] in the right background

3: The Courteenhall Shooting School building at Rectory Farm [M4]

4: A glade in the woodland used as a shooting range by Courteenhall Shooting School [M4]

5: A typical pasture of the central section of the Bypass Route

6: A typical pasture of the southern region of the Bypass Route

7: A veteran *Fraxinus excelsior* [Ash] tree in the northern section of the Bypass Route [B1]

8: A close-up view of decay on the tree in photograph 7 above [B1]

9: Decay on a hollowed-out *Quercus* [oaks] tree just outside the proposed Bypass Route [B8]

10: A *Fraxinus excelsior* [Ash] trunk near the south-west corner of The Moors (wood) [M14]