

Statutory Consultation 2022

# **Preliminary Environmental Information Report**

Volume 3: Appendix 8.1

**Ecological Baseline Report**





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# 1 INTRODUCTION

## 1.1 Background

- 1.1.1 This report has been prepared by Luton Rising (as trading name for London Luton Airport Limited ('the Applicant')) to inform the Environmental Impact Assessment (EIA) in support of the application for Development Consent Order (DCO) for the expansion of London Luton Airport (the airport) to accommodate 32 million passengers per annum (mppa), (hereby referred to as the 'Proposed Development').
- 1.1.2 The Proposed Development is centred at London Luton Airport, Bedfordshire and adjacent lands, at approximate OS grid reference TL 12478 21377 and shown at **Appendix A** to this report (Development Areas Plan).
- 1.1.3 The Main Application Site (as defined in **Chapter 2** in Volume 2 and shown on **Figure 2.2** in Volume 4 of the PEIR), covers approximately 480ha which in addition to the airport infrastructure comprises previously undeveloped, predominantly arable land, with hedgerows, trees and shrub-lined margins. Occasional woodland blocks, copses, tree belts, areas of scrub, rough grassland, ruderal vegetation, conservation headlands and game cover adjacent to field edges. The existing airport is dominated by hardstanding with amenity grassland and small patches of scrub. The Proposed Development also includes highway interventions, car park works and mitigation planting areas outside of the Main Application Site. The highway interventions are restricted to within existing highway boundaries. The proposed off-site car parks are located to the west of the existing airport within brownfield areas, comprising access roads, temporary buildings, area of ephemeral/short perennial vegetation, grassland margins and areas of landscaping comprising scrub and trees. The off-site mitigation planting areas are located to the north east of the Main Application Site, comprising grassland field margins and hedgerows.
- 1.1.4 The surveys detailed within this report consider the whole Application Site of the Proposed Development as well as any additional areas relevant to the habitats and species concerned, defined within the respective sections as Study Areas.

## 1.2 Purpose of this report

- 1.2.1 This report describes the ecological surveys that have been undertaken between 2016 and 2021 and their findings to inform the design and environmental impact assessment of the Proposed Development, including:
- a. Habitat classification (Phase 1/UK habitat);
  - b. Hedgerow survey;
  - c. Badger (*Meles meles*);
  - d. Bats;
  - e. Hazel dormouse (*Muscardinus avellanarius*);
  - f. Riparian mammals;
  - g. Breeding birds;

- h. Wintering birds;
- i. Reptiles;
- j. Amphibians;
- k. Roman snails (*Helix pomatia*);
- l. Terrestrial invertebrates; and
- m. National Vegetation Classification (NVC).

- 1.2.2 The following **Sections 2-12** relate to the ecological surveys listed above undertaken between 2016 and 2021. Each section details the scope of survey, methodologies used, and summarises the subsequent results. Detailed survey data/results are included as appendices to this report where applicable. **Section 13** provides photos relevant to each of these sections, referenced where appropriate throughout the report.
- 1.2.3 Independent ecologists were employed to undertake detailed botanical (NVC) and terrestrial invertebrate surveys. The reports for these surveys are included as **Appendix Y** and **Appendix Z** to this report respectively and are not discussed in the main report.

## 2 EXTENDED PHASE 1 HABITAT SURVEY

### 2.1 Introduction

2.1.1 This section sets out the methodology and results of the extended Phase 1 Habitat Surveys undertaken in relation to the Proposed Development during 2018, 2019 and 2020.

2.1.2 The Phase 1 Habitat Survey identified habitats present within the Proposed Development boundary and potential for the presence of protected or notable species. As surveys for protected or notable species were undertaken between 2018 and 2020 and have been reported in **Sections 4-12**, this section focusses on any protected or notable flora, habitats present and an assessment against the criteria for habitats of principal importance.

### 2.2 Study area

2.2.1 The study area of the Phase 1 Habitat Survey covers land within the Proposed Development boundary, as shown on the Phase 1 Habitat Survey Plan in **Appendix B**. The majority of the works associated with the highways interventions would occur in existing habitats within the highway boundary that largely comprise areas of hard standing. As such, a full Phase 1 Habitat Survey has not been undertaken at these locations, only a site walkover. The exception to this is the proposed highways intervention works at junction 10 of the M1, where vegetation clearance would be required – this area was included within the Phase 1 Habitat Survey Study Area.

2.2.2 The study area was split into 11 survey areas (A-K) for the purposes of information recording and reporting. These are referenced in the results section below and shown on the Phase 1 Habitat Survey Plan in **Appendix B**.

### 2.3 Survey scope

2.3.1 The purpose of the extended Phase 1 Survey work was to:

- a. identify known and potential protected or otherwise notable habitats and plant species present within the study area;
- b. identify further botanical and habitat surveys required to inform the assessment of the Proposed Development within the Environmental Statement (ES);
- c. identify recommendations for avoidance of habitats or plant species; and
- d. identify recommendations should impacts be identified for the species and habitats present within the study area, to inform scheme design, outline design of mitigation, compensation and ecological enhancement measures, to be further refined on the basis of additional ecological surveys.

2.3.2 This section has been prepared in accordance with BS42020:2013: Biodiversity – Code of Practice for Planning and Development (BSI, 2013) (Ref. 1) and should be read in conjunction with the Phase 1 Habitat Survey Plan provided at

**Appendix B**, the Phase 1 Habitat Survey Target Notes provided at **Appendix C**, the Botanical Species List provided at **Appendix D** and the NVC Report provided at **Appendix Y**.

## 2.4 Legislation and local biodiversity context

### Designated sites

- 2.4.1 The national site network (formerly Natura 2000) is the name given to the network of nature conservation sites established under the EC Habitats (Ref. 2) and Birds Directives (Ref. 3) and comprises Special Areas of Conservation (SACs) and Special Protection Areas (SPAs). Ramsar sites are designated under the Convention on Wetlands of International Importance, agreed in Ramsar, Iran, in 1971.
- 2.4.2 Originally notified under the National Parks and Access to the Countryside Act 1949 (Ref. 4), Sites of Special Scientific Interest (SSSIs), National Nature Reserves (NNRs) and Local Nature Reserves (LNRs) were re-notified under the Wildlife and Countryside Act 1981 (Ref. 5) (as amended). Improved provisions for the protection and management of these sites were also introduced by the Countryside and Rights of Way (CRoW) Act 2000 (Ref. 6).

### Habitats and species of principal importance

- 2.4.3 Habitats and Species of Principal Importance for the conservation of biodiversity in England are listed under the provisions of Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 (Ref. 7). These include all the habitats and species in England that were identified as requiring action in the now succeeded UK Biodiversity Action Plan (UK BAP), which continue to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework.
- 2.4.4 Section 40 of the NERC Act 2006 places a general duty on all public authorities to pay due regard to conservation and enhancement of biodiversity within their decision making, particularly with reference to those habitats and species listed within Section 41 of the Act.

### Notable plants

- 2.4.5 A range of notable plants, as listed in Schedule 8 of the Wildlife and Countryside Act 1981 (as amended), are afforded legal protection making it an offence to:
- a. intentionally pick, uproot or destroy any wild plant listed in Schedule 8; and
  - b. not being an authorised person, intentionally uproot any wild plant not included in Schedule 8;

### Invasive plants

- 2.4.6 A range of invasive plant species, including Japanese knotweed, are listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) making it an



offence to plant or otherwise cause to grow in the wild any invasive plant species listed on Schedule 9 of the Act.

- 2.4.7 The Invasive Alien Species (Enforcement and Permitting) Order 2019 allows for the enforcement of the EU Invasive Alien Species Regulation 1143/2014 on the prevention and management of invasive alien plant and animal species in England and Wales, including the relevant licenses, permits and rules for keeping invasive alien species. Species on this list are no longer listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended).

### **Local Biodiversity Action Plans**

- 2.4.8 The following Local Biodiversity Action Plans (LBAPs) list habitats and species which are county conservation priorities. The lists include Habitats and Species of Principal Importance, as well as those of county importance.

#### ***Bedfordshire and Luton Local Biodiversity Action Plan***

- 2.4.9 Actions for maintaining or enhancing the conservation status of certain habitats and species listed on the Bedfordshire and Luton Local Biodiversity Action Plan (BLBAP) (Ref. 8) have been prepared. Those listed that are likely to be relevant include (but not necessarily limited to):

- a. Lowland meadow and calcareous grassland;
- b. Hedgerows;
- c. Arable field margins;
- d. Ponds;
- e. Woodland;
- f. Great crested newt (*Triturus cristatus*);
- g. Hazel Dormouse;
- h. European Otter (*Lutra lutra*); and
- i. Water Vole (*Arvicola amphibius*).

#### ***Hertfordshire Local Biodiversity Action Plan***

- 2.4.10 Actions for maintaining or enhancing the conservation status of certain habitats and species listed on the Hertfordshire Local Biodiversity Action Plan (HLBAP) (Ref. 9) have been prepared. Those listed that are likely to be relevant include (but not necessarily limited to):

- a. Woodland;
- b. Farmland;
- c. Neutral grassland;
- d. Chalk grassland;
- e. Farmland;
- f. Urban;

- g. Natterer's bat (*Myotis nattereri*);
- h. Tree sparrow (*Passer montanus*);
- i. Song thrush (*Turdus philomelos*);
- j. Great crested newt;
- k. Hazel dormouse;
- l. European Otter; and
- m. Water Vole.

## 2.5 Methodology

### Desk study

- 2.5.1 Information about non-statutory designated nature conservation sites and protected or otherwise notable species, recorded from within the last 10 years, were obtained from Bedfordshire and Luton Biodiversity Recording and Monitoring Centre (BRMC) and Herts Environmental Records Centre in February 2018 and updated in November 2020 within a 2km radius of the Main Application Site.
- 2.5.2 Information about statutory designated nature conservation sites within 2km of the Main Application Site was obtained from the government's MAGIC website (Ref. 10), on 14 September 2021. Maps and aerial photographs were also reviewed to ascertain the location of habitats likely to support species of conservation concern and/or subject to the provisions of legislation.

### Field Survey

- 2.5.3 An extended Phase 1 Habitat Survey including initial protected species assessment, was undertaken following standard methods as described in the Guidelines for Preliminary Ecological Appraisal (Ref. 11) and the Phase 1 Habitat Survey Methodology (Ref. 12).
- 2.5.4 The initial survey was conducted by two experienced ecologists in suitable weather conditions over six days between 21 May and 29 June 2018 with a small additional area surveyed on 18 May 2019. Additional land for off-site mitigation planting was incorporated into the Proposed Development in late 2019 (Area C). This area was subject to survey between 7 November and 13 November 2019. All surveys included:
  - a. Mapping of the habitats present on site and recording characteristic plant species, with target notes used to identify particular areas, potentially important or otherwise notable habitats or plant species;
  - b. Identification of features which have the potential to support protected and/or notable species; and
  - c. Searches for non-native invasive plant species listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended).
- 2.5.5 An updated extended Phase 1 Habitat Survey was conducted on land within the Main Application Site on four dates between 21 May and 2 June 2020. This

report reflects the most up to date habitat survey information available, and where discrepancies are identified between the original surveys and the 2020 updates, these are clearly outlined within the appropriate sections.

2.5.6 Additionally, to account for alterations to the Proposed Development incorporating previously un-surveyed areas, extended Phase 1 Habitat Surveys were conducted at the M1 Junction 10 compound and areas impacted by the inclusion of the Airport Access Road. These surveys were conducted on the 8 August and 16 September 2020 respectively.

2.5.7 All extended Phase 1 Habitat Surveys conducted in 2020 were carried out by pairs of experienced surveyors in suitable weather conditions during the optimal period for botanical survey. All surveys were conducted utilising the same methodology as previous surveys.

### **Assessment methodology**

2.5.8 The nomenclature used in this report follows Stace (2019) New Flora of the British Isles Fourth edition (Ref. 13). A collated botanical species list, which includes common and scientific names, is provided within **Appendix D**. As such, scientific names for botanical species have been removed from the body text of this report.

2.5.9 Plant species found within the site during the field survey were reviewed against the following National and County Rare Plant Registers:

- a. Red Data List for Bedfordshire (Ref. 14): This list aligns with The England Red List, (Ref. 15) and provides details of key known sites within the county.
- b. Herts Plant List and Statuses (Ref. 16): This register details the list of plants present in Hertfordshire VC20, concurring with those listed in JNCC Red List, Cheffings and Farrell (2005) and species considered as locally rare for Hertfordshire, with their respective status' taken from Trevor James's Flora of Hertfordshire (2008).
- c. The England Red List, P.A. Stroh et al. (2014) (Ref. 15): This list details the rarity status of England's flora using International Union for the Conservation of Nature (IUCN) rarity criteria and provides the rarity of these plants in Great Britain.
- d. The GB Red List for Vascular Plants (2018) (Ref. 17): This lists the current GB rarity status using IUCN criteria and gives the component countries of England Wales or Scotland to which the criteria apply e.g. for Scots pine (*Pinus Sylvestris*) there is only reference to the IUCN criteria applying for Scotland and not elsewhere in GB.

2.5.10 Fungi species found were reviewed against:

- a. Red Data List of Threatened British Fungi (2006) (Ref. 18). This gives a rarity status for fungi species within Great Britain.

2.5.11 In addition to the extended Phase 1 Habitat Survey, all 2020 habitat surveys were followed by conversion to UK Habitat Classification (UK Hab) codes to

allow for subsequent Biodiversity Net Gain evaluation and assessment to inform mitigation proposals. Conversion of Phase 1 habitat data to UK Hab codes was conducted using the Defra Biodiversity Metric 2.0 calculation tool (Ref. 19), which contains conversion tables for all Phase 1 habitat codes. Where conversion using these habitat tables does not align with habitat types identified during the field survey (e.g. variant botanical communities or physical features), professional judgement has been used to identify the correct habitat type using UK Hab. Where possible, information gained from the 2020 surveys has been used to identify UK Hab codes to a greater classification level than provided by the conversion tables.

## Survey limitations

- 2.5.12 Some areas within the Proposed Development boundary were not able to be surveyed due to access restrictions and/or health and safety concerns, these are listed below and shown on the Phase 1 Habitat Survey Plan in **Appendix B**:
- a. Within the main airport due to restricted security access/safety issues (Area D);
  - b. Industrial units and associated compounds outside of public access to the north and west of the airport associated with local businesses (Area E);
  - c. The allotment within Wigmore Park (Area G); and
  - d. Land to the west of the airport complex associated with the construction of the Luton DART (Direct Air-Rail Transit) project (Areas A and B).
- 2.5.13 Whilst access was granted to the enclosed Dairyborn Scarp District Wildlife Site (DWS), the majority of this site was inaccessible for survey given the extremely steep gradient of the escarpment, as well as impenetrable vegetation covering many other areas. Where possible, inaccessible habitats were viewed from multiple angles, using binoculars and through site fencing at suitable viewpoints. This is considered a significant limitation and accordingly habitats have consequently been assessed conservatively to support a worst case scenario assessment of potential impacts.
- 2.5.14 The weather conditions during the 2018 surveys were variable and during the year extremes of weather were experienced. Spring was very wet and summer had prolonged dry periods. Some grass species may not have been as evident due to burn-off effects of the prolonged summer. However, this is not anticipated to have significantly affected the results or professional judgements made in this report, particularly as updated surveys during 2020 were conducted within optimal survey conditions.
- 2.5.15 The survey of the mitigation planting areas was undertaken in November 2019, outside of the optimum survey period for botanical surveys which is broadly taken as being April to mid-October (Ref. 12). This period was used in order to gather baseline information as access allowed. Whilst outside of the optimal period for botanical identification, woody species and most key hedgerow features were still clearly identifiable, with approximately half (9 of 20) of hedgerows surveyed within the area identified as Important based on their

biodiversity and landscape value. This is therefore not considered to be a significant limitation.

- 2.5.16 Desk study data supplied for Herts Environmental Records Centre did not yield any plant records under ten years old, with records over ten years of age deemed to be no longer relevant, so these are omitted from the results.
- 2.5.17 The rare plant register for Hertfordshire is based on the International Union for Nature Conservation (IUCN) categories of rarity stated within the Joint Nature Conservation Committee's Red Data List by Cheffings and Farrell (Ref. 20), this information is now out of date. Changes to this list have been made (by the species statement Assessment Group in 2018) and this is available as an excel file via the BSBI website (Ref. 21) and the findings are discussed in this report where relevant.
- 2.5.18 Hedgerow checks were made from the field facing sides in general due to health and safety constraints posed by narrow undulating country lanes and relatively frequent traffic, therefore some species may have been missed. However, further detailed hedgerow surveys were conducted, the results of which can be found within **Section 3** of this report.
- 2.5.19 A number of cotoneaster species have been identified to species level during the Phase 1 habitat survey including three of the invasive cotoneaster species; wall cotoneaster, small-leaved cotoneaster and Himalayan cotoneaster. Additional areas of invasive cotoneaster may be present within areas of amenity planting or may be present and potentially overlooked within other semi-natural habitats.
- 2.5.20 Desk study records obtained relating to designated sites which were last updated in November 2020 relate to the Main Application Site, excluding the off-site highway interventions. This is not considered to be a significant limitation given that highway interventions are restricted to areas of existing hardstanding and fall comfortably within the 2km buffer of the Main Application Site boundary.

## 2.6 Results

### Desk study

#### *Designated nature conservation sites*

- 2.6.1 There are no national site network sites ((i.e. Special Areas of Conservation (SACs), candidate SACs (cSACs), Special Protection Areas (SPAs), potential SPAs (pSPAs) or Ramsar sites within 10km of the Main Application Site, and no sites designated for bat species within 30km.
- 2.6.2 The closest international designated site is Chiltern Beechwoods SAC, designated for its beech forests (*Asperulo-Fagetum*), which is located approximately 13km south west of the Main Application Site. The closest international designated site designated for its bird assemblage is Lea Valley SPA, located approximately 24km south east of the Main Application Site.
- 2.6.3 There are a further 21 statutory designated sites within 10km of the Main Application Site. Thirteen of these sites are Sites of Special Scientific Interest



(SSSIs), one of which is also designated as a National Nature Reserve (NNR), another is also designated as a Local Nature Reserve (LNR). Eight are LNRs, as detailed in **Table 2.1**. None of these lie within the Main Application Site. The closest is Galley and Warden Hills at 4.5km to the north west of the Main Application Site. This is a SSSI and LNR comprising chalk downland which supports a huge variety of wildflowers and associated assemblage of butterflies and other invertebrates.

Table 2.1: Statutory designated nature conservation sites within 10km of the Main Application Site.

Site Name	Distance and orientation from Main Application Site	Reason for Designation
<b>Sites of Special Scientific Interest (SSSIs)</b>		
Dallow Downs and Winsdon Hill SSSI	2.9km west	Unimproved calcareous grassland supporting a characteristic downland flora, including many locally uncommon species and nationally rare plants.
Cowslip Meadow SSSI	4.1km north west	Unimproved neutral grassland supporting a characteristic downland flora, including many locally uncommon species and nationally rare great pignut.
Wain Wood SSSI	4.3km north east	An ancient semi-natural oak/hornbeam woodland, approaching the northern limit of its natural range, it represents an example of a habitat now much reduced in extent nationally.
Galley and Warden Hills SSSI/LNR	4.5km north west	Unimproved neutral and calcareous grassland supporting a characteristic downland flora, including many locally uncommon species and nationally rare plants, both within Bedfordshire and nationally. Chalk downland is a habitat that has been greatly reduced in extent and quality through changes in agriculture.
Deacon Hill SSSI	6.8km north	Remnant of chalk downland with a characteristic species rich, calcareous grassland flora. Many of the plants are now uncommon in Bedfordshire. Nationally this is a habitat that has been greatly reduced in extent and quality through changes in agriculture.
Blow's Down SSSI	7.0km west	A rich and varied site with a large area of open, unimproved grassland. Such sites have declined nationally and this site is a fine example of what little remains of this important habitat.
Knebworth Woods SSSI	7.2km east	This woodland site is of a type nationally rare, but well represented in Hertfordshire. It is a most

Site Name	Distance and orientation from Main Application Site	Reason for Designation
		important woodland in the north of the county, almost all ancient in origin and is ecologically diverse with rides, ponds and small areas of both acidic and neutral grassland.
Barton Hills SSSI	7.7km north	Chalk escarpment retaining an extensive cover of unimproved chalk grassland supporting many species of grasses and flowering plants. Opposite, a small ancient beech wood.
Kensworth Chalk Pit SSSI	7.8km west	Designated for its geological interest.
Oughtonhead Lane SSSI	8.0km north east	Designated for its geological interest.
Knocking Hoe SSSI/NNR	8.1km north	Lower Chalk escarpment retaining areas of unimproved calcareous grassland supporting a downland flora, which includes several nationally rare plants and other species rare in Bedfordshire.
Smithcombe, Sharpenhoe and Sundon Hills SSSI	8.3km north west	Lower Chalk escarpment with areas of unimproved calcareous grassland with a rich assemblage of characteristic plants. Many of the plants associated with this site are now uncommon in Bedfordshire and nationally. This is a habitat that has been greatly reduced in extent and quality through changes in agriculture.
Sundon Chalk Quarry SSSI	8.5km north west	Part of a large disused complex of chalk pits just to the west of Upper Sundon in Bedfordshire. Within the quarries is found a range of habitats including small areas of fen, lakes, chalk grassland. Species-rich scrub and developing woodland. The variety of habitat has enabled a rich and varied insect fauna to develop.
Dunstable and Whipsnade Down SSSI	10km west	A steep escarpment extending three kilometres between Dunstable and Whipsnade. The steep slopes support a typical chalk downland flora, a habitat greatly reduced in extent both within Bedfordshire and nationally.
Houghton Regis Marl Lakes SSSI	10km west	A large disused quarry within the Lower Chalk north of Dunstable. A mosaic of wetland communities have developed associated both with open water and water-logged areas surrounding the lakes including examples of base

Site Name	Distance and orientation from Main Application Site	Reason for Designation
		rich fen. Supports a notable assemblage of dragonfly and is an important ornithological site.
<b>Local Nature Reserves (LNR)</b>		
Batford Springs LNR	5.6km south	Fresh springs that serve a small network of chalk lined streams and ponds. The River Lea flows through the site and there is open grassland and a small wooded area.
Marshalls Heath LNR	6km south	A small fragment of acid grass heath dominated by secondary woodland and scrub, with more than 1,300 species of plant and animal recorded in recent years, including more than 40 species now on national lists of threatened species. The site is well-known locally for its large anthills constructed by yellow hill ants.
Cottage Bottom Fields LNR	6.5km west	Flower-rich grassland rich in wildlife and full of colour with areas of scrub providing shelter for birds and insects. The slopes are home to possibly the largest population of great pignut in the country.
Oughtonhead Common LNR	7.9km north east	Supports a range of riverside habitats including reed, sedge beds, wet grassland, ditches, dry grassland, woodland and hedgerows. These habitats support a range of invertebrates and birds.
Wheathampstead LNR	8.6km south	Secondary ash woodland grades with mature hedgerow bounding the western edge of the site and areas of rough unimproved neutral grassland, ruderal habitat and a pond/scrape area.
Purwell Meadows LNR	9.2km north east	A series of wet grassland and marsh in the Purwell Valley. Supports a population of wetland birds and water voles.
Danesbury Park LNR	9.3km south east	Historic parkland supporting a species rich neutral to acidic semi-improved grasslands under a low intensity grazing regime. The site also supports mature parkland trees, plantation woodland and hedgerows. These habitats support a diverse range of invertebrates and birds.
Singlers Marsh LNR	9.4km south east	A site adjacent to the River Mimram that supports a range of habitats including species-rich neutral



Site Name	Distance and orientation from Main Application Site	Reason for Designation
		grassland, wet grassland, marsh, mixed scrub, hedgerows and stands of willow.

### *Non-statutory designated sites*

2.6.4 There are 30 non-statutory designated sites within 2km of the Main Application Site. These include County Wildlife Sites (CWS), District Wildlife Sites (DWS) and Local Wildlife Sites (LWS), details of which are included in **Table 2.2**. Of these, three are within the Application Site (Wigmore Park, Winch Hill Wood and Dairyborn Scarp) and one is immediately adjacent (Burnt Wood).

Table 2.2: Non-statutory designated nature conservation sites within 2km of the Main Application Site.

Site Name	Distance, connectivity and orientation from Main Application Site	Reason for Designation
Wigmore Park CWS	Within	This site, which covers the southern half of Wigmore Park (15.4ha), has species rich neutral grassland with scattered scrub, ruderal vegetation and a length of green lane. The site is recognised for its neutral grassland, calcareous grassland and hedgerows. The northern part of the park is comprised of amenity grassland with public facilities and is not covered by the designation.
Winch Hill Wood CWS/LWS	Within	Winch Hill Wood CWS and Local Wildlife Site (LWS) straddles the Bedfordshire and Luton/Hertfordshire border. This site is designated within both Bedfordshire (as a CWS) and Hertfordshire (as a LWS). It comprises ancient semi-natural broadleaved woodland with ancient woodland indicator species and hedgerows of value. The site is a remnant (less than 2ha) of a larger ancient semi-natural woodland comprising Pedunculate Oak /Hornbeam with birch species woodland with ground flora dominated by bluebell.
Dairyborn Scarp DWS	Within	This site was formerly part of a larger site called Dairyborn Scarp CWS which had additional grassland interest (no longer present within this designation). It comprises a steep chalk scarp dominated by ruderal vegetation

Site Name	Distance, connectivity and orientation from Main Application Site	Reason for Designation
		and scrub, with a small remnant of ancient woodland to the north of the site. The site is a habitat mosaic likely to be of value for invertebrates, based on the diversity of habitat features.
Burnt Wood LWS	Immediately adjacent	Ancient Woodland Inventory site; remnant semi-natural canopy; ancient physical features; woodland indicators. Ancient semi-natural pedunculate/hornbeam woodland largely replanted with conifers. Old pits, wood banks and quite diverse ground flora, including bluebells, add to interest.
Luton Parkway Verges DWS	120m west (but immediately adjacent to the new off-site car park)	This site is recognised for its calcareous and neutral grassland with several calcareous /neutral grassland indicators recorded.
River Lea CWS	220m south west (but immediately adjacent to the highway intervention on the A1081)	River with associated riparian habitats with fen, marsh and swamp in addition to neutral grassland, scrub, hedgerows and trees. The river supports a population of water vole.
Slaughter's Wood and Green Lane CWS	370m north (within 200m of the Affected Road Network (ARN))	Ancient semi-natural woodland with an understorey of coppiced hazel. The site is recognised for ancient woodland and hedgerows with historical importance. Also present are neutral grassland, scrub and bracken.
Diamondend Springs, Limekiln Wood, Pondcroft LWS	450m south east	Ancient woodland with a semi-natural canopy suggesting ancient origin; woodland indicators. Ancient semi-natural pedunculate oak with hornbeam, beech and wild cherry to the east and ash, hornbeam and hazel to the west with a ground flora dominated by bluebell and dog's mercury.
Withstocks Wood LWS	560m south	Ancient Woodland Inventory site; woodland indicators. Ancient semi-natural pedunculate oak/hornbeam coppice woodland. Dense growth of silver birch with some wild cherry. Planted Scots pine, European larch and a few

Site Name	Distance, connectivity and orientation from Main Application Site	Reason for Designation
		old Norway spruce. Quite diverse ground flora with a number of ferns recorded.
Sloughs Wood LWS	680m south	Former oak/hornbeam coppice woodland. Small area of hornbeam coppice to the west, mainly replanted with conifers. Small area of hornbeam coppice. Main area has been replanted with conifers.
George Wood CWS	740m south (within 200m of the ARN)	Ancient semi-natural woodland with mixed plantation and coniferous plantation.
Sewett's Wood and Sellbarn's Dell LWS	770m south east	Ancient Woodland Inventory site; woodland indicators. Ancient semi-natural pedunculate oak/hornbeam coppice with standards woodland. Part replanted with conifers and mixed plantation. Ground flora dominated by bluebell and bramble aggregate <i>Rubus fruticosus</i> agg.
River Lea DWS	900m west	Undeveloped floodplain associated with the river. Also present are neutral grassland, scrub, trees, hedgerows and allotments.
Kidney and Bull Woods CWS	940m south west (within 200m of the ARN)	Ancient semi-natural woodland with conifer and mixed plantation and neutral and marshy grassland.
Church Cemetery CWS	990m west	The cemetery is recognised for its neutral grassland with trees and shrubs.
Watkins Wood and Lords Wood LWS	1100m east	Ancient Woodland Inventory site with areas of semi-natural canopy and ancient physical features. Ancient semi-natural pedunculate oak/ hornbeam coppice with standards woodland largely replanted with broadleaved and coniferous species. Ground flora dominated by bluebell.
Haringdell and Fernell's Wood CWS	1150m south	The majority of the site is ancient woodland with broadleaved woodland and plantation.
Hurst Wood LWS	1160m south east	Ancient Woodland Inventory site; woodland indicators. Ancient semi-natural pedunculate oak/hornbeam coppiced woodland with wild cherry and ash. Species rich ground flora with bluebell.

<b>Site Name</b>	<b>Distance, connectivity and orientation from Main Application Site</b>	<b>Reason for Designation</b>
Chiltern Green CWS	1180m south	Lowland mixed-deciduous woodland with ancient semi-natural woodland, neutral grassland scrub and standing water.
Luton Hoo Park CWS	1,250m south west	This site is recognised for its ancient woodland, special woodland interest and diversity of habitats. Habitats present include lowland mixed deciduous woodland, standing open water, plantation, neutral grassland, parkland, ruderal vegetation and bracken.
Stubbock's Wood LWS	1280m north (within 200m of the ARN)	Ancient Woodland Inventory site (part); remnant semi-natural canopy; ancient physical features; woodland indicators. Ancient semi-natural woodland part replanted with broadleaved and coniferous species. Thought to be oak and hornbeam in origin with hazel, ash and elm species. Further woody species and a field layer of bluebell and dog's mercury.
Laysbury Dells LWS	1320m south east	Semi-natural broadleaved woodland supporting oak, ash, hazel and beech. Hazel dormouse has been recorded.
Horsley's Wood CWS	1430m south	Ancient semi-natural woodland largely replanted with conifers. Mixed plantation with tall herb and fern.
Wandon End Park CWS	1530m north	The site is recognised as meeting the criteria for a hedgerow system and containing biologically significant trees.
Whiteway Bottom Copse LWS	1700m south east	Ancient woodland with a semi-natural canopy. Ancient semi-natural pedunculate oak/hornbeam woodland with beech. Field layer dominated by bluebell.
The Chase CWS	1840m north west	A belt of broadleaved woodland grading into dense scrub to the north. The woodland contains coppiced hazel and field maple and has a grassland ground flora in its more open areas.
Hitchin Road Spinney DWS	1870m north west	Semi-natural broadleaved woodland with veteran trees.
Long Lane LWS	1860m east	Wooded green lane with features and structure indicative of ancient origins; woodland indicators. Old hedgerows and open areas of



Site Name	Distance, connectivity and orientation from Main Application Site	Reason for Designation
		grassland with scattered trees and scrub. Hedges comprise range of woody species including field maple, hazel, hawthorn, ash, holly. A good diversity of woodland indicators recorded including bluebell, moschatel and dog's mercury.
Stockwood Park DWS/CWS	2000m south west	A public park within the grounds of a former stately home, the site comprises formal gardens, golf course and areas of broadleaved woodland, lowland meadow and parkland with mature trees.
Great Hayes Wood DWS	2000m north	A site comprising semi-natural broadleaved woodland and wood pasture at the edge of Luton.

### ***Botanical species records***

2.6.5 The data search revealed a range of protected and/or notable plant species within 2km of the Main Application Site as summarised within **Table 2.3**.

Table 2.3: Protected and/or otherwise notable plant species records

Common and Scientific Name	Reason notable	Location and National Grid Reference (NGR) (per year)	Date	Proximity/ connectivity to study site
Bluebell	WCA Sch 8	1 record from The Chase CWS (east) TL1023	24/04/2016	Outside Main Application Site boundary and not connected.
Bluebell	WCA Sch 8	1 record from Chiltern Green CWS TL136192	15/06/2013	Outside Main Application Site and not connected.
Bluebell	WCA Sch 8	1 record from Wigmore Park CWS TL1221	18/07/2016	Within Main Application Site and connected.
Box	Notable where native populations found	1 record from Luton Occasional plants TL105235	21/07/2010	Outside Main Application Site and not connected.

Common and Scientific Name	Reason notable	Location and National Grid Reference (NGR) (per year)	Date	Proximity/ connectivity to study site
Bee orchid	Of local interest only but forms part of the reason for designation of Wigmore Park CWS	3 records for Luton Parkway Verges DWS 1 no. TL106202 (2011) 3 no. TL10612032 (2013) 15 no. TL10612031 (2014)	2011-2014	Immediately adjacent to Main Application Site.
Bee orchid	Of local interest only but forms part of the reason for designation of Wigmore Park CWS	19 records for Wigmore Park 3 no. TL127217 (2010) 1 no. TL126216 (2013) 2 no. TL12572153 (2013) 2 no. TL12672173 (2013) 1 no. TL12522174 (2013) 7. no. TL12822163 (2013) 8 no. TL12572153 (2013) 1 no. TL126215 (2013) 2 no. TL12362184 (2013) 1 no. TL12392200 (2014) 3 no. TL12432207 (2014) 22 no. TL12382202 (2014) 1 no. TL12512173 (2014) 1 no. TL12572153 (2014) 1 no. TL126215 (2014)	2010-2016	Within Main Application Site and connected.

Common and Scientific Name	Reason notable	Location and National Grid Reference (NGR) (per year)	Date	Proximity/ connectivity to study site
		1 no. TL12672164 (2014) 4 no. TL12512173 (2014) 40 no. TL1221 (2016) Unknown number TL1221 (2016)		
Bee orchid	Of local interest only but forms part of the reason for designation of Wigmore Park CWS	2 records for Luton Airport Unknown number TL1221 (2014) 6 no. TL1221 (2016)	2014-2016	Within Main Application Site and connected.
Bee orchid	Of local interest only but forms part of the reason for designation of Wigmore Park CWS	5 records for Luton Unknown number TL1221 (2014) Unknown number TL1020 (2014) 1 no. unknown number TL101232 (2014) 6 no. TL1222 (2014)	2014-2016	Within Main Application Site and connected.
Galingale	Nationally threatened	Large patch in damp area of Wigmore Park. TL12442176	18/07/2016	Within Main Application Site and connected.
<b>Invasive non-native species</b>				
Few-flowered garlic	WCA Sch 9	1 record from Luton Bradgers Hill Rd TL0923	24/04/2016	Outside Main Application Site and not connected.
Giant hogweed	WCA Sch 9	1 record from Manor Park Rd, Luton TL109202	12/06/2013	Adjacent to Main Application Site but not connected.
Indian balsam	WCA Sch 9	1 record from Manor Park Rd, Luton from stream at top of park TL098210	12/06/2013	Outside Main Application Site and not connected.

<b>Common and Scientific Name</b>	<b>Reason notable</b>	<b>Location and National Grid Reference (NGR) (per year)</b>	<b>Date</b>	<b>Proximity/ connectivity to study site</b>
Japanese Knotweed	WCA Sch 9	1 record from Dairyborn Scarp DWS, steep scarp south of car park occasional presence on scarp TL111212.	01/08/2012	Within Main Application Site and connected.
Japanese Knotweed	WCA Sch 9	4 records from 2013 at Wigmore Park CWS all have had prior treatment at TL12292194; TL128216; TL127217; and TL127218.	2013	Within Main Application Site and connected.
Japanese Knotweed	WCA Sch 9	12 records from Luton: Large stand Bute Street Car Park, treated, TL0939921470 (2013); Stand in scrub habitat on London Rd adjacent to Matalan, TL0913820846 (2013); Silver Street at corner of building/pavement, treated, TL0921621352 (2013); Vauxhall Way adjacent to 12 Saywell Rd, TL1050922627 (2013); Vauxhall / Stopsley Roundabout within scrub habitat, treated, TL10172308 (2013); Ashcroft, in bushes at lady Zia Werner	2013-2014	One location within Main Application Site and connected, others outside and not connected.



Common and Scientific Name	Reason notable	Location and National Grid Reference (NGR) (per year)	Date	Proximity/ connectivity to study site
		<p>School, treated, TL105231 (2013);            Chapel Street, roadside in front of private parking area, treated, TL090209 (2013);            Crawley Rd/Vauxhall Way Roundabout on subway bank, treated, TL109222 (2013);            Wenlock Street, rear of Highton Rd Church, treated, TL093218 (2013);            Wigmore park near Eaton Green Roundabout on bank adjacent to fencing, treated, TL122221 (2013);            Windmill Roundabout in centre of roundabout, treated, TL097211 (2013);            and            Midland Rd, re-growth from prior treated stand, TL0929321684 (2013).</p>		
Japanese rose	WCA Sch 9	1 record from Wigmore park large bush on bank (white flowered). TL12432177	18/07/2016	Within study area
Variegated yellow archangel	WCA Sch 9	2 records for Luton: Hart Lane Reservoir field layer of woodland in south-	2012-2016	Outside Main Application Site and not connected.

Common and Scientific Name	Reason notable	Location and National Grid Reference (NGR) (per year)	Date	Proximity/ connectivity to study site
		west corner TL099218 (2012); Bradgers Hill Rd, Luton TL1923 (2016).		

## Field study

### *Habitats*

- 2.6.6 The Study Area includes all areas of the Proposed Development as shown on the Development Areas Plan in **Appendix A**, which comprises London Luton Airport, the Airport Access Road two off-line areas to the east of Luton Airport Parkway Train Station, industrial estates, outdoor public space at Wigmore Park, arable farmland surrounding Winch Hill, arable fields to the north of the Main Application Site for offsite planting and the off-site compound. The western edge of the airport is demarcated by a steep sided valley and the landscape to the east of the airport is undulating with an uneven topography.
- 2.6.7 The proposed highway intervention works would be largely restricted to within the existing highway boundaries. Each of these locations comprised hard standing associated with the road and associated pavement, with verges of amenity grassland with ornamental shrub and tree planting or backing directly onto boundary fencing or the walls of adjacent properties. No ecological constraints were identified, and these locations are not discussed further within this report.
- 2.6.8 A description of Areas A-K is provided below, with the habitat's present mapped in accordance with Phase 1 Habitat Survey codes (Ref. 12) on the Phase 1 Habitat Survey Plan within **Appendix B** and associated target notes provided within **Appendix C**:
- 2.6.9 Area A is east of Luton Airport Parkway train station and comprises access roads, temporary buildings, car park and rail tunnels, with areas of ephemeral/ short perennial vegetation, semi-improved grassland, tall ruderal and areas of landscaping comprising scrub and trees to be used for off-line car parks.
- 2.6.10 Area B comprises businesses and highways, ephemeral/ short perennial vegetation, calcareous grassland, tall ruderal and areas of landscaping comprising dense ivy cover or scrub and trees.
- 2.6.11 Area C comprises arable fields and existing field margins which contain intact and defunct hedgerows varying in species composition, with some stretches qualifying as species rich hedgerow. The field layer and grass margins in these areas is dominated by species poor semi-improved grassland
- 2.6.12 The main body of the study area, referred to as the Main Application Site, can be further described by Areas D to J below.

- 2.6.13 Area D comprises London Luton Airport airfield and associated infrastructure (airside complex, terminal and other ancillary buildings, hard standing and managed and unmanaged areas of grassland, tall ruderal, wetland and hedgerow habitats), with habitats of short calcareous grassland, semi-improved calcareous grassland, tall ruderal, semi-improved neutral grassland and bare soils some with ephemeral short perennial vegetation. Some areas of the active airfield were inaccessible for survey.
- 2.6.14 Area E comprises industrial hangars and structures associated with the airport, these are situated largely to the north and west of London Luton Airport and comprise buildings, hardstanding (pavements, roadways and car parks) with areas of amenity planting, relict semi-natural scrub and grassland habitats and bare soils some with ephemeral short perennial vegetation.
- 2.6.15 Area F comprises Wigmore Valley Park including buildings, hardstanding car park and play area, a large area of amenity grassland, amenity planting, scattered broad-leaved and coniferous trees, mixed plantation and more natural areas with semi-natural woodland, plantation woodland, dense and scattered scrub, tall ruderal, rank semi-natural calcareous and neutral grassland.
- 2.6.16 Area G comprises Wigmore Allotment, which was not accessible for survey and was viewed from external areas, but contains temporary buildings, allotment plots with areas of managed planting and areas of relict semi-natural habitats of tall ruderal and semi-improved neutral grassland.
- 2.6.17 Area H comprise fields east of Winch Hill which are large, open undulating arable fields and wide field margins of neutral to calcareous grassland and hedgerows. A large buffer strip/set aside area with scattered broad-leaved trees and rank semi-improved neutral grassland, with valley areas of damper neutral grassland divides the fields. There are two semi-natural woodlands and one plantation. There are also occupied and unoccupied dwellings, with associated garden habitats.
- 2.6.18 Area I comprises fields west of Winch Hill which are large, open undulating arable fields, bordered by intact native species-rich hedgerows to species-poor defunct hedges. In this location the field edge habitats are narrower or take the place of gaps in the hedgerows comprising neutral grassland with occasional areas of calcicoles. There are also occupied dwellings with associated garden habitats and unoccupied farm buildings (sheds).
- 2.6.19 Area J comprises the land to the north west of the Main Application Site. This area is to the north west of the airport and comprises a number of businesses, highways and hardstanding areas, as well as a large section of Dairyborn Scarp DWS.
- 2.6.20 Area K is the location for the proposed compound, west of Junction 10 of the M1. The area comprises of a fallow field bordered by the vegetated motorway verge to the east, a country road to the south and wooded areas to the west and north.
- 2.6.21 Following completion of the updated 2020 extended Phase 1 Habitat Surveys, each major Phase 1 habitat area was converted to the most appropriate

UKhabs code (Ref. 19). The full list of these conversions can be found in **Appendix D**.

### ***Woodland***

2.6.22 The Main Application Site incorporates 15 wooded parcels that vary from native semi-natural woodland to replanted woodland to plantation woodlands (mixed, broadleaved and coniferous). Only two appear to have relatively natural and undisturbed habitats. Each of the 15 wooded parcels are described below and are numbered as shown on the accompanying Phase 1 Habitat Survey Plan in **Appendix B**. These habitats are likely to have interest for faunal species (bird species, bat species, badger, hedgehog and for invertebrate species).

### **Broadleaved semi-natural woodland**

2.6.23 Woodland 1 comprises ash woodland on a slight north east facing hill. To the eastern end, the wood is relatively undisturbed and has a wet flush, making this woodland slightly damper than the others within the Main Application Site.

2.6.24 This woodland canopy is dominated by hornbeam, with abundant ash, with the following in canopy and understorey: occasional dog rose aggregate, English elm, field maple, cherry laurel, hawthorn and hazel. Wild cherry and holly are frequent and field rose is rare. Honeysuckle and ivy are locally frequent as climbers through the understorey and canopy.

2.6.25 The ground flora to the east has a greater grass presence with frequent stands of wood melick and wood false brome and giant fescue. Forbs include locally abundant ground-ivy and cleavers, with occasional herb-Robert. To the central and western end of the wood the ground flora is dominated by pignut with frequent to occasional patches of three-nerved sandwort and cow parsley.

2.6.26 This woodland is listed within desk data available via the MAGIC website (Ref. 10) as the habitat of principal importance 'lowland mixed deciduous woodland' and is likely to still qualify as the habitat of principal importance 'lowland mixed deciduous woodland'.

2.6.27 In addition, at least five regionally (South East/East) and UK listed ancient woodland indicator species (Ref. 22) are present including hornbeam, field maple, holly, pignut and wood melick are present, together with an apparent lack of recent disturbance.

2.6.28 This woodland has been subject to detailed NVC surveys as reported in **Appendix Y**.

2.6.29 Woodland 5 has patches of replanted semi-natural woodland with infill plantation woodland. The replanted semi-natural woodland comprises hornbeam, oak, elder and hazel. The ground here is very flat but the ground flora in patches is reminiscent of semi-natural woodland. To the periphery are locally abundant patches of common hemp nettle.

2.6.30 Undisturbed areas of this woodland are likely to qualify as the habitat of principal importance 'lowland mixed deciduous woodland'. Three regionally (South East/ East) and UK listed ancient woodland species (Ref. 22) are

present: hornbeam, bluebell and dog's mercury. In 2020 pignut was additionally identified within the undisturbed areas of this woodland, another indicator species of ancient woodland (Ref. 22).

- 2.6.31 Woodland 6, called Winch Hill Wood, is an area of ancient and semi-natural woodland in the eastern section of the Main Application Site, north of the airside complex adjacent to the country road through Winch Hill. The broadleaved woodland found here varies in its composition from east to west; the most western section is replanted with hornbeam but is of sufficient age to have developed into semi-natural woodland.
- 2.6.32 The canopy is dominated by pedunculate oak with abundant hornbeam, frequent silver birch, with rare Dutch elm. The understorey comprises frequent elder with occasional hawthorn and holly. The ground flora comprises dominant bluebell, bracken, bramble aggregate., and common nettle, with abundant yellow archangel and dog's mercury, with frequent creeping bent, cow parsley, hornbeam saplings, ground ivy, three-nerved sandwort, smooth meadow-grass, and greater stitchwort, with occasional holly saplings, honeysuckle, and oak saplings, with rare wild arum and hawthorn saplings.
- 2.6.33 This woodland is listed on the MAGIC website (Ref. 10) as the habitat of principal importance 'lowland mixed deciduous woodland', the field survey supports this. Winch Hill Wood is the only ancient woodland inventory site within the Main Application Site. Only part of the woodland is shown as being on the ancient woodland inventory, potentially due to the replanted area, however the whole woodland is designated as a CWS and LWS. This woodland is likely to still qualify as the habitat of principal importance 'lowland mixed deciduous woodland'.
- 2.6.34 This woodland was noted during the survey to be characteristic of NVC (Ref. 23) W10 oak dominated woodland with the typical associated understorey and field layer and retained presence of at least six regionally (South East/East) and UK listed ancient woodland indicator species (Ref. 22): hornbeam, field maple, holly, bluebell, yellow archangel and greater stitchwort.
- 2.6.35 This woodland has been subject to detailed NVC surveys as reported in **Appendix Y**.
- 2.6.36 Woodland 7 is located to the south east of Wigmore Park it is a small area of woodland, which to the north is adjacent to Woodland 8 plantation habitat and adjoins arable habitat to the east.
- 2.6.37 Woodland 7 canopy is locally dominated by pedunculate oak and ash, with occasional wild cherry and field maple. The understorey is well developed and at times dense with abundant hawthorn, elder and blackthorn, frequent hazel and occasional beech, domestic apple, ash, holly and cherry sp. The ground flora is locally dominated by common nettle, cleavers, with locally abundant patches of the ancient woodland indicator species dog's mercury, hedge garlic, bluebell and three-nerved sandwort.
- 2.6.38 Woodland 7 is likely to qualify as the habitat of principal importance 'lowland mixed deciduous woodland'. At least five regionally (South East/East) and UK



listed ancient woodland indicator species (Ref. 22) are present: holly, wild cherry, field maple, dog's mercury and bluebell.

- 2.6.39 This woodland has been subject to detailed NVC surveys as reported in **Appendix Y**.
- 2.6.40 Woodland 10 is located within the northern area of Wigmore Park, the central area of which (surrounding Pond 2) is also comprised of semi-natural broadleaved woodland. This woodland is enclosed by a fence to prevent access and is clearly separate in age and composition from the surrounding broadleaved plantation woodland, though the canopies are connected and the semi-natural woodland extends beyond the fence for approximately 10m to the west. The canopy is dominated by ash, with frequent pedunculate oak and wild cherry. There is an understorey of bramble, and elder. This habitat supports the non-native invasive species Japanese knotweed that is listed within Schedule 9 part II of the Wildlife and Countryside Act 1981 (as amended).
- 2.6.41 The central area of Woodland 10 is likely to qualify as the habitat of principal importance 'lowland mixed deciduous woodland'.
- 2.6.42 Woodland 11 is a small parcel of woodland located south of Woodland 5 immediately south of the runway approach lights. The canopy comprises of abundant hornbeam, frequent oak, blackthorn and elder with occasional hazel. There is an understorey of bramble, blackthorn and hazel. The ground flora includes bluebell, false oat-grass, soft brome and cock's-foot, hedge garlic, common hemp-nettle, bracken and common nettle.
- 2.6.43 Woodland 11 is likely to qualify as the habitat of principal importance 'lowland mixed deciduous woodland'. Two regionally (South East/East) and UK listed ancient woodland indicator species (Ref. 22) are present: hornbeam and bluebell.
- 2.6.44 Woodland 12 is a small parcel of broadleaved woodland approximately 0.36ha in size, located on the periphery of the Main Application Site, due north east of Woodland 3. The connected canopy comprises of abundant oak frequent hornbeam, holly and silver birch with occasional cherry species and poplar trees. There is an understorey of bramble, and hazel.
- 2.6.45 Woodland 12 is likely to qualify as the habitat of principal importance 'lowland mixed deciduous woodland'. At least four regionally (South East/East) and UK listed ancient woodland indicator species (Ref. 22) are present: hornbeam, holly, bluebell, wood millet.
- 2.6.46 Woodland 14 is an area of broad-leaved semi-natural woodland within the boundary of the Dairyborn Scarp DWS. No access was available to this wooded strip and it was only viewed from external areas, including from the eastern boundary (top of slope) and a limited view at the base of the slope adjacent to the Cougar Accident Repair shop. The following canopy species were recorded present (with omitted abundance scores): goat willow, hazel, hawthorn, a cherry species, sycamore and field maple. This woodland is interspersed by patches of scrub habitat of wild privet and dogwood, with climbers including ivy, dog rose and clematis.

2.6.47 Woodland 14 may qualify as the habitat of principal importance 'lowland mixed deciduous woodland', with the presence of four regionally (South East/East) and UK listed ancient woodland indicator species referenced in the DWS citation. Further survey to confirm the presence of these species was not possible due to the extremely steep gradient of the escarpment, as well as impenetrable vegetation covering many other areas as detailed within the survey limitations.

### **Mixed plantation woodland**

2.6.48 This woodland type was associated with historic areas of amenity planting within Wigmore Park. Woodland 8 comprises locally frequent pedunculate oak, Scots pine, Norway maple, wild cherry, Italian alder, silver birch, larch and ash, with occasional red oak, horse chestnut, blackthorn and dogwood.

2.6.49 Woodland 4 is situated at the eastern extent of the Main Application Site, east of Winch Hill. The woodland is mixed in species composition. Towards the western end species comprise abundant larch, a cedar species, whitebeam, beech, Norway maple and rare large-leaved lime. At the eastern end the woodland becomes more broadleaved in species composition where frequent field maple, hawthorn and beech is recorded. Within the woodland there is an understorey of elder, with occasional field rose and dog rose although where dominated by cedars then this becomes less apparent. Climbers include travellers joy and ivy. The field layer is dominated with nettles with frequent herb-Robert and occasional wood false brome, rough meadow grass, red campion and common dog violet. At the southern wood edge there are species more commonly associated with species-poor grassland such as perennial rye grass, daisy, dandelion aggregate (which may have self-seeded from the area adjacent to the landing strip infrastructure area to the south of this location) and an area of bare chalk with ox-eye daisy, wild basil and field scabious.

2.6.50 Woodland 4, in part qualifies as the habitat of principal importance 'lowland deciduous woodland'. At least two ancient woodland indicator species field maple and field rose are recorded present. In addition, large-leaved lime is nationally scarce (Ref. 24).

2.6.51 Woodland 15, the woodland at the northern periphery of Dairyborn Scarp DWS is noted to have a high coniferous content and appears more like deliberate ornamental/landscape planting (potentially screening). Cypress species dominate this area, with larch and other coniferous species and areas with sycamore, hawthorn, hazel and goat willow.

2.6.52 Mixed plantation woodland does not qualify as a habitat of principal importance.

### **Broadleaved plantation**

2.6.53 Woodland 5 has patches of replanted semi-natural woodland with infill broadleaved plantation woodland. The plantation here is of silver birch, hawthorn, hazel and blackthorn. It is very dense and with a dark ground layer, where light penetrates and at peripheries there are patches of ground-ivy and cleavers. Areas of tall ruderal and dense to scattered scrub vegetation are also present at the peripheries.

- 2.6.54 A further area of broadleaved plantation is present to the southern end of the amenity grassland at Wigmore Park, near to Target Notes 4 and 5. This has abundant field maple, blackthorn, elder, Italian alder, wild cherry and goat willow, with occasional wayfaring tree, a whitebeam aggregate, grey poplar and a few stands of the invasive species Japanese rose. Beneath the plantation the soils are largely bare but with frequent patches of hedge garlic, cleavers, common chickweed and occasional patches of red campion, pignut and ground-ivy. Rare are field forget-me-not and wild arum.
- 2.6.55 Woodlands 9 and 10 are areas of broad-leaved plantation within the northern area of Wigmore Park. Woodland 9 supports a range of native and ornamental species both with sparse ground flora. The canopy and understorey species include wild cherry, horse chestnut, field maple, blackthorn, goat willow, Wilson's honeysuckle, dogwood, silver birch, wayfaring tree, holly, pedunculate oak, alder species, rowan, western hemlock, and roble beech. Woodland 10 supports dominant wild cherry, with frequent horse chestnut and hawthorn and occasional ash, poplar species., Norway maple and a variegated variety of holly.
- 2.6.56 Woodland 13 is an area of young plantation woodland located to the south west of the airport. This woodland is comprised of immature to semi-mature sycamore, beech, pedunculate oak, lime, hazel and Norway maple planted in straight rows. There is no significant understorey or ground flora present within this woodland.
- 2.6.57 Woodland 13 also supports the non-native invasive species Japanese rose that is listed within Schedule 9 part II of the Wildlife and Countryside Act 1981 (as amended).
- 2.6.58 Small areas of Woodland 14 at Dairyborn Scarp DWS supported broad-leaved plantation habitats. One area was to the south of the eastern sliver of Dairyborn Scarp DWS, with a narrow section of plantation dominated by ash, with abundant sycamore, hawthorn and occasional dogwood and a cherry species. A more extensive area of broad-leaved plantation is to the west of the Cougar Accident Repair Centre on the west facing slope down to the airport car park (currently used by Easy-Jet staff). These were dominated by sycamore, with abundant hawthorn and elder and a locally frequent balsam poplar variety. The field layer is dominated by bramble and ivy, with white dead-nettle and ground elder. Vestiges of calcicoles are also present, where the soils are thin including blue fleabane and rare occurrences of ploughman's spikenard.
- 2.6.59 Broad-leaved plantation habitat does not qualify as a habitat of principal importance.

### **Coniferous plantation**

- 2.6.60 Woodland 2 is located to the east of Wigmore Park, beyond an arable field, and is dominated by a mix of coniferous species including Norway spruce, a cedar. and Scot's pine, with rare beech. The understorey is limited and largely comprises Wilson's honeysuckle within a band through the central part of the wood (likely game cover for pheasant, with rearing pens noted inside the southern part of the wood). The understorey also includes very occasional to



rare stands of elder and holly, towards the wood edge are rare wild cherry, pedunculate oak with traveller's joy and ivy cover. The ground flora is sparse to non-existent but where present it is dominated by common nettle and rough meadow grass. This woodland is highly disturbed. This habitat is likely to have interest for faunal species (bird species and bat species).

2.6.61 Woodland 3 is located to the south east of Winch Hill. It has a tall canopy of cypress species with occasional beech trees and rare pedunculate oak. The shrub layer is largely absent except for a few remnant elder shrubs in the centre of the woodland and stands of introduced Wilson's honeysuckle, as likely game cover. The ground flora is largely bare or composed of leaf litter within which are a few small stands of common nettle. Dead wood habitat is also lacking and only a few pieces present. This woodland is highly disturbed.

2.6.62 Woodlands 2 and 3 do not qualify as a habitat of principal importance, due to their disturbed nature and lack of typical canopy species or ground flora.

### **Scattered broadleaved trees**

2.6.63 Scattered broadleaved trees are found within areas of defunct hedgerows with pedunculate oak and ash trees left as semi-mature to mature standards.

2.6.64 Further scattered broadleaved trees are present throughout the scrub dominated areas surrounding the area where the derelict Winch Hill House had previously stood. Mature scattered trees within this area include horse chestnut, ash, pedunculate oak and walnut.

2.6.65 There are also amenity tree belts at the western edge of Wigmore Park, roadside amenity tree planting to the north of Wigmore Park, and other roadside planting and amenity areas within the industrial areas of the airport. Amenity planting includes the following species ash, Italian alder, field maple, silver birch, walnut, wild cherry, rowan, goat willow, London plane, and small leaved lime.

2.6.66 This habitat does not qualify as a habitat of principal importance, but mature trees are of importance and may qualify as veteran/ancient trees. Scattered trees are shown on the Phase 1 Habitat Survey Plan in **Appendix B** to this report, and an assessment of the trees within the Proposed Development is provided in the Arboricultural Impact Assessment report within **Appendix 14.3** in Volume 3 of this PEIR. This habitat is likely to have interest for faunal species (bird and bat species).

### **Scattered coniferous trees**

2.6.67 This habitat is present within garden habitats east and west of Winch Hill and within amenity woodland planting within Wigmore Park. There are also some examples within amenity planting to the north of the airport, surrounding industrial developments and examples of planted conifers in between hedgerows gaps around Darley Road.

2.6.68 Within Wigmore Park these trees are dominated by Scots pine with some larch. Amenity garden planting includes various cultivars of cypress species. and occasional spruces.

- 2.6.69 This habitat does not qualify as a habitat of principal importance. This habitat is likely to have interest for faunal species (bird species).

## **Scrub**

### **Dense scrub**

- 2.6.70 Dense scrub is found within areas of Wigmore Park where a lack of management has resulted in stands of dense hawthorn, blackthorn, willow or bramble scrub. It is likely these are formed over soils that may have a good seed bank of neutral to calcareous loving grassland species.
- 2.6.71 Dense scrub is found within areas of derelict farmland, either outgrown from hedgerows or adjacent to derelict farm buildings (east of Winch Hill) adjacent to the derelict houses (and associated gardens) to the west of Winch Hill.
- 2.6.72 Extensive patches of dense scrub dominated by low growing bramble are also present within open areas immediately east of Woodlands 1 and 2 respectively.
- 2.6.73 There are patches of dense scrub within a small area that is maintained as part of the airstrip lighting infrastructure at the end of the runway adjacent to Woodland 5 to the east of the site. This is dominated by either bramble aggregate or raspberry.
- 2.6.74 Dairyborn Scarp DWS has extensive areas of dense scrub mostly dominated by hawthorn, elder and bramble on the steep areas of west facing escarpment. Occasionally this also includes young hazel, dogwood and wild privet.
- 2.6.75 This habitat does not qualify as a habitat of principal importance and is of low value. This habitat is likely to have interest for faunal species (bird species, bat species, hedgehog, or for concealment of setts for badger).

### **Scattered scrub**

- 2.6.76 Scattered scrub is found within areas of Wigmore Park where a lack of management has resulted in areas of scattered scrub of either hawthorn, blackthorn, willow species or bramble.
- 2.6.77 Scattered scrub is found within farmland set aside and areas of derelict farmland, either as relicts of former hedgerows, outgrown from unmanaged hedgerows or adjacent to derelict farm buildings (east of Winch Hill). It is also found adjacent to the derelict houses (and associated gardens) to the west of Winch Hill. These areas have the following species present: hawthorn, willow species or bramble aggregate. but are dominated by blackthorn, bramble aggregate or elder.
- 2.6.78 There are patches of scattered scrub within a small area that is maintained as part of the airstrip lighting infrastructure at the end of the runway adjacent to the woodland to the east of the site. Scattered scrub is dominated by bramble aggregate or raspberry.
- 2.6.79 Scattered scrub is also present as outgrowth and colonised from adjacent amenity tree planting on highway verges surrounding the airport and particularly evident on the soft chalk cuttings that have been replanted in the recent past.

- 2.6.80 Scattered scrub is also found within damp habitats both within and to the north of Wigmore Park around pond 2. These areas are typically dominated by goat willow, with occasional crack willow and osier. Guelder rose is rare.
- 2.6.81 Small patches of scattered bramble scrub are present within the grassland dominating the off-site compound in Area J.
- 2.6.82 This habitat does not qualify as a habitat of principal importance. This habitat is likely to have interest for faunal species (bird species or for concealment of setts for badger, hedgehog, brown hare, foraging areas for bat species and for invertebrate species).

### ***Hedgerows***

- 2.6.83 Hedgerows are a habitat of principal importance and some may be classed as important under the Hedgerow Regulations 1997 (Ref. 26). A summary of the hedgerow habitats identified during the Phase 1 habitat survey is provided below. Detailed hedgerow surveys have also been undertaken the results of which are provided within **Section 3** of this report.
- 2.6.84 Hedgerows can offer important foraging, shelter and dispersal opportunities for a range of faunal species (bird species, bat species, brown hare, hedgehog and for invertebrate species).

### **Native species-rich intact hedge**

- 2.6.85 There are 12 identified locations of this habitat within the surveyed areas, five of which are within the Main Application Site. Whilst these hedgerows are intact, some sections of hedgerow are defunct in areas.
- 2.6.86 Hawthorn is the dominant species with locally dominant elder and frequent presence of ash, blackthorn, field maple, hazel, wild cherry, dogwood, holly, dog rose aggregate and bramble agg, with rare to occasional spindle.
- 2.6.87 These hedges have an associated ground flora typically composed of rough grassland to tall ruderal ground flora and occasionally including ancient woodland indicator species. Species present include; common nettle, creeping thistle, cow parsley, upright hedge parsley, cock's-foot, dog's mercury, hedge garlic, hedge woundwort, wood dock, woody nightshade, white dead nettle, with ivy, white bryony and clematis as climbers. In one location there is presence of a more diverse ground flora including species such as hairy violet.

### **Native species-rich defunct hedge**

- 2.6.88 There are five identified locations of this habitat within and adjacent to the Main Application Site, these are mostly located west of Winch Hill and a few adjacent to Winch Hill.
- 2.6.89 Hawthorn is the dominant species with variable content of the following species ash, blackthorn, dogwood, elder, field maple, hazel, holly, dog rose aggregate and bramble aggregate.
- 2.6.90 To the north of the Main Application Site at Darley Road the defunct hedge was surveyed from the field edge only, but the ground flora appeared to be relatively

species-rich with greater stitchwort, ladies' bedstraw, wild strawberry, lesser hop trefoil, meadow vetchling and smooth tare. Several of these hedges have an associated ground flora typically composed rough grassland to tall ruderal ground flora including common nettle, creeping thistle, cow parsley, upright hedge parsley, cock's-foot, dog's mercury, hedge garlic, hedge woundwort, wood dock, woody nightshade, white dead nettle, with ivy, white bryony and clematis as climbers.

### **Native species-poor intact hedge**

- 2.6.91 A total of 23 hedgerows were surveyed which are classed as intact species-poor. Typical ground flora includes false-oat grass, soft brome, common nettle, cleavers and hogweed.

### **Native species-poor defunct hedge**

- 2.6.92 There are four identified locations of this habitat within the Main Application Site and the mitigation planting areas to the north east.
- 2.6.93 One is located adjacent to the southern boundary of Darley Road and consists of short hedge sections with three woody species present; pedunculate oak, blackthorn and field maple, with a varied ground flora including wild strawberry. The hedgerow is raised from the roadside on a bank. The wider area of this same old hedge line is native species-rich.
- 2.6.94 The second is between the large fields due east of Wigmore Park and the Airfield. This is very much defunct and restricted to a few areas where large outgrown shrubs and trees are present with deadwood resource.
- 2.6.95 The third divides large fields between Darley road and Brownings Lane, between Area C and Area H. This is an unconnected hedge with one mature oak tree along its length. Within the hedge gaps there is remaining evidence of hedge root-balls which were likely removed during management of this hedgerow.
- 2.6.96 The fourth hedge is located due east of Tankard's Farm within Area C. It is an unconnected hedgerow with gaps, there are four mature trees within the length of the hedgerow.
- 2.6.97 A short hedgerow section of this type present to the south of Woodland 5 comprises of frequent hornbeam, hazel, oak, hawthorn and bramble. Ground flora include false oat-grass, soft brome and cock's-foot.

### **Native species-rich hedge with trees**

- 2.6.98 There are 17 sections of native species-rich hedgerows with trees, scattered within the area surveyed. most near to or flanking Winch Hill and the others along Darley Road to the north-east of and to the very eastern peripheries of the Main Application Site.
- 2.6.99 These hedges are often dominated by hawthorn or locally dominated by hawthorn and field maple, with abundant dog rose aggregate and frequent holly and hazel. Ash or pedunculate oak as mature or semi-mature standards and

some younger trees of field maple or pedunculate oak. The ground flora contains abundant red fescue, false oat-grass and common bent, with abundant cow parsley, white dead nettle and locally frequent common knapweed, dog's mercury and greater stitchwort. Tall ruderal stands are also present adjacent to this habitat typically dominated by common nettle.

### **Species-poor hedge with trees**

- 2.6.100 There are three locations of species -poor hedge with trees recorded on site, one flanks Winch Hill and leads up to the disused farm buildings. This hedge is dominated by hawthorn, with frequent ash, occasional hazel and abundant bramble. The second location is found behind domestic dwelling, between the properties' gardens and the adjacent arable field along Darley road, in Area C. This hedge is dominated by hawthorn, with frequent ash and occasional willow species. The third hedge location is east of Tankards Farm, the hedge is dominated by ash and hazel, there are four mature ash trees along its length.

### ***Introduced shrub***

- 2.6.101 Introduced shrub habitats are found in abundance to the north of the airport within areas of amenity planting at the airport business park, roadside planting and at Wigmore Park adjacent to Wigmore Hall. This habitat is also present within the gardens of occupied and unoccupied properties due east and west of Winch Hill. Introduced shrub is also present within sections of hedgerow across the surveyed area.
- 2.6.102 In Wigmore Park the planting includes locally dominant stands of the following shrubs; Oregon-grape, firethorn species, a barberry species, wall cotoneaster, Himalayan cotoneaster, small-leaved cotoneaster, a hebe species, dogwood, wiegela, Wilson's honeysuckle, cherry laurel, white-stemmed bramble, a gorse species, Duke of Argyll's teaplant, orange-ball-tree, Evergreen spindle and garden lavender.
- 2.6.103 Garden shrubs include Waterer's cotoneaster (a non-invasive species of cotoneaster), a barberry species, buddleia, spindle and snowberry.
- 2.6.104 There is a short roadside hedge of barberry species at Winch Hill, adjacent to the unoccupied housing at the brow of the hill.
- 2.6.105 To access Dairyborn Scarp DWS there is an access gate at the southern end of Prospect Way, leading to parking for Luton Borough Council staff. Within this fenced area are old chalk grassland habitats dominated by dense to scattered cover of buddleia scrub, some areas have been cleared to show once again the chalk grassland beneath, but during the survey in 2020 it was considered that the buddleia is threatening to invade these habitats and become the dominant species and has therefore been mapped as an area of introduced shrub (although not ornamental in origin).
- 2.6.106 There is an area of an unidentified ornamental shrub species (suspected False-spirea) within native scrub habitats, adjacent to the neutral grassland habitats at Dairyborn Scarp DWS, and due south of the Shell Petrol Station on Eaton Green Rd.

- 2.6.107 This habitat does not qualify as a habitat of principal importance. This habitat is likely to have interest for faunal species (bird species, hedgehog, and for invertebrate species). In addition, this habitat supports several non-native invasive species that are listed within Schedule 9 part II of the Wildlife and Countryside Act 1981 (as amended): wall cotoneaster, Himalayan cotoneaster, and small-leaved cotoneaster.

### ***Tall ruderal***

- 2.6.108 Tall ruderal habitat is found adjacent to areas of scrub habitats, woodland, hedgerows and over grassland habitats where a lack of management is apparent or where soils have been recently disturbed.
- 2.6.109 Whilst most stands of tall ruderal vegetation within the Main Application Site are associated with the edges of larger dominant habitats, significant areas of ruderal vegetation are located to the south of Winch Hill, within Wigmore park around grassland 9, within grassland 16 and to the southern extent of the runway.
- 2.6.110 This habitat typically has stands of monospecific to mixed species but in most cases within the study area it is dominated by common nettle, hemlock, cow parsley, rosebay willowherb or creeping thistle.
- 2.6.111 Where more scattered and forming small patches within other habitats, tall ruderal species include broad-leaved, hedge garlic, black horehound, hedge woundwort, spear thistle, upright hedge parsley, sweet cicely or rarely welled thistle.
- 2.6.112 Within Dairyborn Scarp areas of tall ruderal habitat are again dominated by common nettle, hemlock, cow parsley, rosebay willowherb or creeping thistle, with abundant ground-ivy and occasionally mixed with frequent teasel and spear thistle. In mixed areas of this habitat perennial sow-thistle, prickly sow-thistle, great mullein and great willowherb are occasional, and rare are common figwort and red bartsia.
- 2.6.113 This habitat does not qualify as a habitat of principal importance. This habitat is likely to have interest for faunal species (bird species, brown hare, hedgehog, reptile species and for invertebrate species). In addition, this habitat supports the non-native invasive species Japanese knotweed that is listed within Schedule 9 part II of the Wildlife and Countryside Act 1981 (as amended).

### ***Bracken***

- 2.6.114 There are a few areas of hedgerows where bracken is evident and forms the dominant vegetation, most notably along the lower field edge leading from Woodland 1 to Darley Road and along the hedgerow at the top of Darley Road. There is also an extensive bank of bracken between two arable fields in Area C.
- 2.6.115 Bracken dominated habitat with common nettle, bramble aggregate, saplings of hazel, oak, blackthorn and scattered semi-mature trees of hawthorn is found west of Woodland 6 and a strip of bracken is present in the field margin within the off-site planting area to the north of Darley road.



- 2.6.116 This habitat does not qualify as a habitat of principal importance. This habitat may have interest for faunal species (bird species, brown hare, hedgehog reptile species and for invertebrate species).

### ***Grassland habitats***

#### **Semi-improved neutral grassland**

- 2.6.117 This grassland habitat is the dominant grassland habitat type within the Main Application Site and surrounding areas within the Proposed Development and covers a variety of grasslands from species-rich to species-poor. This habitat is likely to have interest for faunal species (bird species, foraging habitat for bat species, brown hare, hedgehog, reptile species, amphibian species and for invertebrate species).
- 2.6.118 The largest areas of this habitat are associated with the southern part of Wigmore Park and four set aside areas within arable fields. Elsewhere this habitat is fragmented and present adjacent to hedgerows, roadside verges, set aside or headlands, or areas of unmanaged habitat within the airfield.
- 2.6.119 Grassland 1 is a thin strip at the base of a small chalk slope between two large arable fields. Barren brome is the dominant grass, characteristic of the bare earth patches along the slope, as well as frequent red fescue and common bent. Forbs are characterised primarily by scattered ruderal patches, with frequent white dead nettle, cow parsley, hedge mustard, common nettle, creeping thistle and common fumitory.
- 2.6.120 Grassland 2 is a small section of set-aside with a moderate diversity. It is characterised by dominant false oat grass, with occasional red fescue, smooth meadow-grass, crested dogs-tail, barren brome, soft brome and Yorkshire fog. Frequent forbs include dove's-foot cranesbill, bird's-foot trefoil and smooth tare, with occasional cow parsley, meadow buttercup, creeping buttercup and greater stitchwort.
- 2.6.121 Grassland 3 is a widened strip of set-aside with a moderate to low diversity. It is dominated by red fescue aggregate., with abundant Yorkshire-fog, frequent rough meadow-grass and common bent. Soft brome and barren brome are occasional. The forbs include some arable weeds and species typical of this habitat including abundant cut-leaved crane's-bill, creeping buttercup, and frequent field forget-me-not, common mouse-ear, bristly ox-tongue, cow parsley, hogweed, common knapweed, occasional meadow buttercup, spear thistle, hoary ragwort and rare brown sedge. This area of grassland has been subject to detailed NVC surveys as described within **Appendix Y**.
- 2.6.122 Grassland 4 is a small area of agricultural set aside to the immediately south of Darley road. It is characterised by a low diversity and is suffering significant encroachment by early successional scrub, particularly towards the eastern end. Dominant grass species are cock's foot and rough meadow-grass, with frequent red fescue and common bent. Frequently occurring forbs include ribwort plantain, creeping buttercup, and creeping thistle.

- 2.6.123 Grassland 5 is a relatively species-rich area of grassland with a damp flush at the eastern end which may be due to over ground flow from the adjacent woodland flush (Woodland 1) or a further spring or flush from the grassland itself. The dominant species is red fescue aggregate. and rough meadow-grass with abundant meadow buttercup and Yorkshire fog. Common bent, wild carrot, red clover and creeping buttercup are locally abundant. Cock's-foot, dandelion aggregate and hogweed are frequent with locally frequent broad-leaved dock, wood dock, common spotted orchid and hoary ragwort. Occasional are cut-leaved crane's-bill, remote sedge, crested dog's-tail, willow saplings, false-oat grass, goat's-beard, smooth tare, field mouse ear, lesser hop trefoil, ribwort plantain. Yellow-rattle and daisy are rare. This area of grassland has been subject to detailed NVC surveys as described within **Appendix Y**.
- 2.6.124 Grassland 6 is slowly becoming encroached by scattered and dense scrub habitat but is formed within a slightly damp hollow with undulating topography and many ant hills. The area is dominated by red fescue aggregate, with abundant false-oat grass, smooth meadow-grass and Yorkshire-fog. Abundant are cleavers and creeping bent with locally abundant common nettle, cock's-foot, yarrow and common mouse-ear. Occasional are cut-leaved crane's-bill, hogweed, broad-leaved dock, cow parsley, white dead nettle, common knapweed, ribwort plantain and field scabious. This area of grassland has been subject to detailed NVC surveys as described within **Appendix Y**.
- 2.6.125 Grassland 8 is a small area of grassland that appears to have had some recent scrub removal it is dominated by red fescue aggregate, with locally dominant cock's-foot, abundant are lesser hop trefoil, red clover, wild carrot, yellow rattle and hawthorn saplings. Creeping cinquefoil is locally abundant and frequent are Yorkshire-fog, rough meadow-grass and bramble aggregate. Ribwort plantain, white clover and cock's-foot are locally frequent with occasional smooth tare, hoary ragwort, goat's-beard, common spotted orchid and dog rose aggregate. Common mouse-ear and common sorrel are rare. This area of grassland has been subject to detailed NVC surveys as described within **Appendix Y**.
- 2.6.126 Grassland 9 is species-rich and typifies much of the grassland habitat at the southern part of Wigmore Park. This grassland is reduced due to scrub encroachment and encroachment from tall ruderal species.
- 2.6.127 It is dominated by red fescue, with abundant smooth meadow grass and Yorkshire-fog. Rough meadow grass and cock's-foot are frequent with occasional barren brome. Forb species are diverse with abundant to locally abundant common knapweed, common spotted orchids (over 140 flowering spikes), perforate St John's-wort, birds-foot trefoil, wild carrot, smooth tare, field forget-me-not, colt's-foot, red clover, white clover, yarrow, yellow-rattle. Goat's-beard, meadow vetchling and common teasel are frequent. There are also frequent presence of calcicolous forb species including hoary ragwort, bladder campion, fragrant agrimony and wild parsnip. This area of grassland has been subject to detailed NVC surveys as described within **Appendix Y**.
- 2.6.128 Grassland 10 is a species-rich area to the west of Wigmore Park with rank and unmanaged neutral grassland with abundant common spotted orchids (80 spikes). This area is dominated by red fescue aggregate, with abundant false-



oat grass, smooth meadow-grass and Yorkshire-fog and occasional timothy. The forbs include abundant wild carrot, ox-eye daisy, yarrow, common knapweed, creeping buttercup, mugwort, wild parsnip, field mouse-ear, cut-leaved crane's-bill, smooth tare, ribwort plantain, creeping cinquefoil with locally frequent meadow vetchling and spear thistle and occasional hard rush.

- 2.6.129 On a bank further west of the narrow well-worn path running north-south through this area is a small open area with a south-east facing bank and ant hills. This has abundant yellow-rattle, frequent goat's-beard and common spotted orchid (11 spikes). Occasional lucerne, grass vetchling is rare here. This area of grassland has been subject to detailed NVC surveys as described within **Appendix Y**.
- 2.6.130 Grassland 12 forms a band along a ridge running north-south in the central section of Wigmore Park. It is becoming scrub encroached but has areas with species-rich grassland and ant-hills. It is dominated by red fescue and false oat-grass, with locally dominant patches of common bent and cock's-foot. Cleavers, Yorkshire-fog, creeping bent and cow parsley are abundant with locally abundant colt's-foot. Field bindweed, creeping buttercup, rough meadow-grass, smooth tare, cut-leaved crane's-bill, germander speedwell, white dead nettle, hedge woundwort are frequent with occasional yarrow, ribwort plantain, hogweed, broad-leaved dock, cow parsley, ribwort plantain and common knapweed. Meadow buttercup, ground-ivy and thyme-leaved speedwell are rare.
- 2.6.131 Grassland 15 is present as a narrow and very steep embankment adjacent to the roadside. It is not known if this is natural or planted but contains a relatively high species diversity for a small area and retains some calcicolous species. The adjacent scrub and plantation belt is shading parts of this habitat, with bramble aggregate encroachment in places.
- 2.6.132 Species present include dominant red fescue, with abundant false oat-grass, creeping cinquefoil, wild carrot, bird's-foot trefoil, hairy violet, common centaury and frequent couch grass, Yorkshire-fog, common knapweed, daisy, common teasel, ladies bedstraw, lesser hop trefoil, large-flowered evening primrose and field forget-me-not. Goat's-rue, smooth tare, wild parsnip, hoary willowherb, musk mallow, yellow-wort and spear thistle are occasional. Great mullein and dark mullein are rare.
- 2.6.133 Grassland 18 is a narrow strip of grassland adjacent to a species rich hedgerow (Hedgerow 57). It appears to be a planted strip of neutral grassland with a relatively high species diversity when compared to grasslands within the wider area. It is likely that grassland 18 is managed as part of an agricultural stewardship scheme. The sward height varies throughout the grassland and sustains an average height of approximately 25 cm.
- 2.6.134 Species present include dominant Yorkshire-fog, cock's foot, and red fescue, with abundant false oat-grass, crested dog's tail, creeping cinquefoil, bird's-foot trefoil, common centaury and frequent, common knapweed, daisy, a bedstraw species, field forget-me-not, bush vetch, smooth tare, a willowherb species and spear thistle, creeping thistle and common teasel are occasional.

- 2.6.135 Grassland 19 is a wide area of managed grassland south of the airport complex but is mown as part of management by the airport, though not as regularly as the runway itself. Scrub encroachment was noted along the eastern extent of this grassland.
- 2.6.136 Despite being mown on a semi-regular basis, this grassland shows a moderate diversity of grasses. Dominant species include perennial rye and Yorkshire fog, though cock's foot, downy oat grass, rough and smooth meadow-grass are all occasional throughout the sward. Forb diversity is lower and representative of the level of management, with creeping buttercup, ribwort plantain, hogweed and curled dock all frequent.
- 2.6.137 Grassland 20 is to the immediate east of the Wigmore Park allotments, surrounded by Woodland 8. Though it is directly connected to Grassland 11 which makes up the majority of Wigmore Park and is heavily managed as amenity grassland for recreational purposes, Grassland 20 is clearly distinct in botanical composition resulting from less intensive management, with a sward height of approximately 30cm.
- 2.6.138 Dominant grass species include Yorkshire fog, cock's foot and smooth meadow-grass, with occasional soft brome and barren brome mostly towards the grassland peripheries. Forb diversity is relatively low, characterised by occasional creeping thistle, common vetch, ribwort plantain, hogweed and meadow buttercup.
- 2.6.139 Grassland 21 is a small area of likely agricultural set aside directly north east of Woodland 12, with several mature standard trees within the grassland.
- 2.6.140 It has a relatively low species diversity in comparison to other grasses in the area, with a tall sward dominated by false oat grass and frequent cock's foot, smooth meadow-grass and Yorkshire fog. Forbs diversity is also relatively reduced, with frequent common cat's ear, ox-eye daisy, and creeping buttercup.
- 2.6.141 Grasslands 22 and 23 make up the majority of Area G and are located to the east of Wigmore Park and the north of the runway respectively. These extensive fields were originally mapped as arable land during 2018, but in the interceding years have been taken out of commission and allowed to become vegetated, with the species present indicating a mixture of sown seed mix and natural colonisation from adjacent habitats. As a result, the floral communities are relatively diverse, with a large diversity and proportion of forbs to grasses and numerous bare earth patches. Many of the colonising forbs, particularly on the bare earth where the seed mix has not taken, also reflect the lands recent prior arable nature.
- 2.6.142 Grasses are relatively sparse but include abundant red fescue and Yorkshire fog, with more occasional sweet vernal and soft brome. Barren brome and annual meadow-grass are more frequent in bare patches. Frequent forbs include common knapweed, meadow buttercup, bulbous buttercup, spear thistle, broad-leaved dock, bristly ox-tongue, groundsel and ribwort plantain, with arable associated species such as fat hen, charlock and American winter cress also present. Species found occasionally to frequently indicating a sown seed mix include yellow rattle, cowslip and common poppy.

- 2.6.143 Grassland 24 lies to the north of Dairyborn Scarp and is a large area of neutral grassland. No access was available to this grassland, but from the periphery appeared to be rank and un-managed and a mesotrophic grassland from the dominance of false oat-grass, abundant cock's-foot. In the absence of detailed survey, this grassland is currently and precautionarily classed as semi-improved neutral grassland, due to areas where bare earth prevailed immediately bordering this grassland but outside the boundary of Dairyborn Scarp, being more reflective of species-rich calcareous grasslands, so it is thought that this habitat could contain more species when studied in detail and in an earlier season. It also implies suitable management such as winter grazing may help this return to calcareous grassland habitat.
- 2.6.144 Grassland 25 comprises the field for the off-site compound area to the west of M1 Junction 10. The field appears largely unmanaged with significant patches of encroaching scrub into the grassland, and areas of ruderal vegetation around the fringes of the field.
- 2.6.145 Dominant grass species consist false oat grass and cock's foot, with occasional common bent, red fescue with patches of rare common couch. Forbs are abundant throughout the sward but limited in diversity, with abundant rose bay willowherb, creeping thistle, hogweed and ox-eye daisy, occasional common ragwort and curled dock, and rare short fruited willowherb. Encroachment of scrub is predominantly low growing bramble, with a single willow species. Ruderal vegetation on the grassland fringes is sparse and comprised of common nettle, hemlock and hedge mustard.
- 2.6.146 Grasslands 5, 6, 8, 9, 10, 15, 18, 19, 20 and 25 qualify as a habitat of principal importance 'neutral grassland'. Grassland 24 may also qualify as a habitat of principal importance 'neutral grassland'.

### **Calcareous grassland**

- 2.6.147 Calcareous grassland was less apparent than anticipated within the study area which was mostly restricted to small areas of disturbed ground/calcareous exposures, including highway cutting embankments where not scrubbed over (latter observed during 2018 surveys). The exceptions were a restricted grassland area east of Dairyborn Scarp DWS, at a rabbit grazed south-facing slope within arable land and at the south-western periphery of the airport runway. Elsewhere evidence of prior calcareous grassland habitats is reflected in occasional presence of calcicolous plants across the study area. Calcareous grassland habitats were anticipated to the south of Wigmore Park (based on the citation for this area received through desk data review but these areas have not been under recent management and are not grazed. It is likely that the build-up of plant litter has resulted in a more neutral sward being present in this location. This habitat is likely to have interest for faunal species (bird species, foraging habitat for bat species, brown hare, hedgehog, reptile species, amphibian species and for invertebrate species).
- 2.6.148 Grassland 7 is a small area of south-facing chalk exposure with good diversity of calcareous species present it appears to be grazed by rabbits and generally has a low sward height.

- 2.6.149 The grassland is typified with circumneutral grass species. It is dominated by red fescue aggregate with locally abundant common bent, with frequent Yorkshire-fog, crested dog's-tail and cock's-foot. Timothy is rare. The forbs have more calcareous influences and include locally dominant yarrow and common mouse-ear, abundant lesser trefoil, perforate St John's-wort, meadow buttercup and locally abundant ladies' bedstraw. Thyme-leaved speedwell is frequent and occasional species include red clover, fairy flax, wild carrot and cut-leaved crane's-bill. Rare are agrimony, great mullein and hop trefoil. This area of grassland has been subject to detailed NVC surveys as described within **Appendix Y**.
- 2.6.150 Grassland 14 has moderate species diversity for a small area and is found within Area A. Calcareous grassland is present at a levelled section at the base of the southern face of the slope (possible old cliff fall) but it also has some more circumneutral species present in the sward. Species present include dominant red fescue, with abundant ground-ivy, creeping cinquefoil, wild carrot, bird's-foot trefoil, black medick, hairy violet, common centaury and frequent Yorkshire-fog, common knapweed, daisy, biting stonecrop, perforate St John's-wort, common teasel, ladies bedstraw, yellow-wort, lesser hop trefoil, yellow toadflax, large-flowered evening primrose and field forget-me-not. Goat's-rue, false oat-grass, smooth tare, wild parsnip, musk mallow, common figwort and spear thistle are occasional. Great mullein is rare.
- 2.6.151 Elsewhere this embankment has been modified to stabilise it and is covered with a geotextile material. Small sections of chalk are visible on the eastern slopes of Area A, between areas of scattered and dense scrub with similar species present to those described within Grassland 14.
- 2.6.152 Grassland 26 this is an area of west/south west facing slope and open level ground due south-west of Percival Way as it approaches the easternmost strip of Dairyborn Scarp DWS. This area is becoming encroached by buddleia with obvious small areas of recent management to the buddleia, exposing the species-rich calcareous grassland beneath. Grassland 26 is characterised by a dominance of red fescue aggregate, with abundant creeping bent, birds-foot trefoil, rough hawkbit, locally abundant salad burnet, creeping cinquefoil, ladies bedstraw, ground-ivy and self-heal. Frequent are scarlet pimpernel and a campion species, locally frequent are wild basil, field scabious, small scabious, thyme-leaved speedwell. Occasional are creeping buttercup, fairy-flax, yellow-wort, harebell, cowslip, common centaury, common figwort, daisy, perforate St John's-wort and yarrow. Rare are basil thyme, common teasel and common nettle.
- 2.6.153 There are subtle differences between the areas of this habitat within sloping west facing ground and flat ground with no aspect, but this may be due to dryness and any vegetation being more interspersed with bare chalk substrate on the slopes. Further detailed NVC survey is recommended of these areas in a suitable season to determine the community type and extent to inform impact assessment, mitigation and any habitat restoration (scrub clearance/soil exposure) proposed through mitigation actions.

- 2.6.154 At the base of the slope a waxcap fungus was found and was determined by a waxcap fungus expert (David Harries, Pembrokeshire Fungus Recording Network) to be Persistent waxcap *Hygrocybe autoconica*. This is not listed as important on a national scale under IUCN guidelines, but due to a paucity of local records for the county of Bedfordshire, it may be valued up to county significance.
- 2.6.155 During 2020 large areas of previously identified calcareous grassland (previously referred to as Grassland 13) outside the western extent of the airport complex was encompassed by the construction footprint of the Luton Dart. Whilst access to this active construction area was restricted, it appeared unlikely that significant areas of the calcareous grassland remain due to the scale of the works, though representative species could persist on and around the steep exposed chalk slopes to the north and west of this construction area.
- 2.6.156 This habitat (Grasslands 7, 14, 26 and any persisting areas of 13) qualifies as a habitat of principal importance 'calcareous grassland'. Several noteworthy species are present within this habitat including basil thyme and a fungus: Persistent waxcap potentially of up to county significance.

### **Species-poor grassland**

- 2.6.157 Species-poor grassland forms most of the grassland habitats within the airport complex and at the bases of the hedgerows within Area C, areas of low diversity grassland associated with fallow fields or areas of set aside. These areas are either dominated with perennial rye grass, false oat-grass or smooth meadow grass; or are dominated by red fescue and/or false oat-grass but are relatively species-poor examples. This habitat is likely to have interest for faunal species (bird species, foraging habitat for bat species, brown hare, hedgehog, reptile species, amphibian species and for invertebrate species).
- 2.6.158 The grasslands within the active airstrip are heavily mown in order to maintain a low sward height, whilst also creating large patches of bare earth amongst the grassland. Species tolerant of such intensive management dominate, particularly perennial rye grass, rough meadow-grass and red fescue. Scattered occasional forbs include creeping thistle, ribwort plantain, creeping buttercup, red clover, shepherds purse and curled dock, with rare patches of common vetch and bird's-foot trefoil present on the slopes around Ponds 5 and 6. The steep slopes towards the southern edge of the runway complex and towards the outer extents of the runway complex are less intensively managed, with a greater sward height with similar dominant grasses and occasional soft brome, Yorkshire fog and barren brome. Additional forbs within these areas include occasional scarlet pimpernel, weld, scented mayweed, white dead nettle and white campion.
- 2.6.159 Grassland 16 is a large expanse of undulating set-aside between arable fields due west of Winch Hill. It is fenced with stock proof wire but in a few locations this is breached by mammal pathways. There are what appear to be deliberately planted trees including two willow trees and a red leaved variety of hazel, with additional natural encroachment of tall ruderal and scattered/dense



scrub within this grassland. The mid-section has damper grassland but does not qualify as marshy grassland.

- 2.6.160 The grassland is dominated by red fescue aggregate with abundant false oat-grass, Yorkshire-fog and creeping bent. Forbs include abundant wild carrot, hogweed, lesser hop trefoil and cut-leaved crane's-bill with locally abundant patches of cleavers, rosebay willowherb and great willowherb. Mugwort, dandelion aggregate and creeping thistle are frequent.
- 2.6.161 The damper central areas have locally dominant Yorkshire-fog and soft brome, with abundant wild carrot and hoary ragwort and locally abundant mugwort. Smooth hawk's-beard is rare.
- 2.6.162 This area of grassland has been subject to detailed NVC surveys as described within **Appendix Y**.
- 2.6.163 Grassland 17 is an area of set-aside located to the east of Winch Hill within the Main Application Site. This grassland appears to be frequently disturbed and bare in places, grass species dominate with presence of tall ruderal species and scattered/fewer patches of forbs, many of which are likely to have colonised from Woodland 4 to the south. Cock's-foot is dominant with frequent rough meadow-grass and occasional false wood brome and barren brome. Broad-leaved dock, common nettle and bristly ox-tongue are frequent with locally frequent creeping buttercup, hemlock and clematis. Occasional are germander speedwell, field forget-me-not, field mouse-ear, tufted vetch, cut-leaved crane's-bill, bird's-foot trefoil and hoary ragwort. Male fern is rare.
- 2.6.164 The grassland strip, that follows the runway approach lights, forms a boundary between two arable wheat fields and comprises of abundant false oat-grass, soft brome and cock's-foot.
- 2.6.165 This habitat does not qualify as a habitat of principal importance. This area of grassland has been subject to detailed NVC surveys as described within **Appendix Y**.

### **Amenity grassland**

- 2.6.166 Grassland 11 forms a large expanse within Wigmore Park, it is largely amenity grassland though the species list within it (likely from historic disturbance and soil mixing) yields occasional presence of a slightly more diverse flora.
- 2.6.167 This grassland is locally dominated by perennial rye-grass and rough meadow-grass, with abundant cock's-foot and locally frequent patches of Yorkshire-fog and meadow foxtail. Forbs include dandelion aggregate, daisy, white clover, greater plantain and shepherd's purse.
- 2.6.168 There are patches of amenity grassland scattered throughout the hardstanding areas of the airport terminal buildings, within the airside complex, and an area that is maintained as part of the airstrip lighting infrastructure at the end of the runway. Some areas managed as amenity grassland are labelled as neutral or calcareous grassland rather than amenity as this reflects their species composition and condition rather than management.



- 2.6.169 Typically this habitat is dominated by perennial rye-grass or smooth meadow-grass, with abundant to locally frequent red fescue aggregate., creeping bent, smooth meadow-grass, with frequent meadow foxtail, common daisy, Yorkshire-fog and greater plantain, bird's-foot trefoil, and white clover, with occasional common mouse-ear, cut-leaved crane's-bill, ribwort plantain and dandelion aggregate, with rare black medick.
- 2.6.170 This habitat does not qualify as a habitat of principal importance.

### **Arable**

- 2.6.171 Large arable fields are present to the east and west of Winch Hill. The fields east of Winch Hill were all sown with wheat with patches of black grass during the most recent survey in 2020.
- 2.6.172 The three fields south of Woodland 5 in proximity to the runway approach lights comprise of wheat.
- 2.6.173 Fields north of Woodland 12 which are encompassed by Darley Road and Browning's Lane had been recently ploughed when surveyed during the November 2019 site walk over. However, there are approximately 2m x 2m wide semi-improved grassland strips in between fields which currently serve as a public right of way.
- 2.6.174 Fields south west of Woodland 12 were also recently ploughed when surveyed during the November 2019 site walk over. However, within the margins of these fields are several mature oak trees which are included on the Phase 1 Habitat Survey Plan in **Appendix B**.
- 2.6.175 Several of the fields have been left fallow and support a mixture of grassland species, which have been mapped as species-poor grassland, or are sown with wild radish. As previously described, several of the larger fields west of Winch Hill have been taken out of agricultural use from 2018 to 2020, with several sown and now establishing as Grasslands. The field to the north of Woodland 1 and Grassland 5 has also been taken out of agricultural use and has been colonised by a range of agricultural associated species with patches of bare ground, described in a later section. The fields east of Winch Hill and some of the fields west of Winch Hill, support a less diverse range of arable weeds due to herbicide application at the field edges but a few locations of field madder and wild pansy were observed.
- 2.6.176 In general the arable fields to the east of Winch Hill support a diverse range of arable weed species including bristly ox-tongue, swine-cress, soft brome, smaller cat's-tail, Timothy Italian rye-grass, barren brome, Yorkshire-fog, wild oat, crested dog's-tail, common field speedwell, thyme-leaved speedwell, smooth tare, curled dock, common orache, fat hen, red bartsia, pale persicaria, a winter cress species, parsley piert, redshank, red dead nettle, scarlet pimpernel, cut-leaved crane's-bill, woody nightshade, prickly sow thistle, common mallow, wild carrot, mugwort, common fumitory, field forget-me-not, shepherd's-purse, charlock and common sorrel.
- 2.6.177 While at least two of the arable fields appears to have been sown with wildflower seeds, a number of the arable fields supported notable plant species,

particularly at their margins; these habitats may qualify in part as the habitat of principal importance 'arable field margins'. In addition, this habitat supports the notable species cornflower listed within the England Red List (Ref. 17) (BSBI, 2018). This is further described in Table 2.3. A survey of arable plants was undertaken during the detailed NVC survey as reported within **Appendix Y**.

### ***Standing water (eutrophic)***

- 2.6.178 Within the Main Application Site there are ten named pond habitats (Ponds 1, 2, 5, 6, 8, 9, 12, 13, 14 and 15), with a further ten ponds located within 500m of the Main Application Site as detailed in **Section 11**.
- 2.6.179 Two Thames Water surface water attenuation ponds are present to the north west of Wigmore Park (Pond 1) and north of Wigmore Park (Pond 2). These ponds have no apparent aquatic vegetation and limited marginal vegetation, including a mint species and woody nightshade. They are both surrounded by scrub and broadleaved plantation habitats.
- 2.6.180 Ponds 5, 6, 8, 9, 13, 14 and 15 are present within the airport infrastructure and are associated with airfield drainage or used as fire training pools. Ponds 5 and 6 are lined and have limited vegetation restricted to a few stands of a willowherb species. Pond 8 is a deep brick and concrete walled drainage pond overgrown with macrophytes. Pond 9 is a dry pond with representative early colonising vegetation species, with Ponds 13, 14 and 15 also holding water extremely infrequently and appearing in the early stages of succession. Consequently, these ponds have been described and mapped as short ephemeral/perennial vegetation.
- 2.6.181 Pond 12 is situated within semi-improved neutral grassland habitat at the western side of Wigmore Park. In mid-2018, this appeared to be very shallow, recently formed and regularly dries, with only stands of terrestrial species present; including clustered dock, creeping buttercup and creeping bent.
- 2.6.182 None of the pond habitats present qualify as the priority habitat due to the absence of diverse macrophytes, and a lack of notable plant or faunal species.

### ***Marshy grassland***

- 2.6.183 There is a small damp area adjacent to willow scrub at the western side of Wigmore Park which includes a stand of flag iris adjacent to its margins. This area has held a small amount of standing water at various times. A few other damp loving species are present in the immediate vicinity including water mint, spiked sedge and a small stand of galingale.
- 2.6.184 This habitat does not qualify as a habitat of principal importance. The presence of galingale as a notable species, is further discussed in Table 2.4 of this report. This habitat may have interest for faunal species (reptile species and for invertebrate species).

### ***Marginal***

- 2.6.185 Marginal vegetation was very poorly represented within the waterbodies present and limited to a mint species *Mentha* sp., common figwort and woody nightshade.
- 2.6.186 This habitat does not qualify as a habitat of principal importance.

### ***Wet ditch***

- 2.6.187 There is a damp ditch or swale to the east of the airfield car park, west of Wigmore park, with a small stand of bulrush.
- 2.6.188 There are also wet ditches present along some of the hedgerow bases which are adjacent to byways in Area C, particularly hedgerows which run alongside Darley Road and Brownings Lane.
- 2.6.189 This habitat does not qualify as a habitat of principal importance. This habitat may have interest for faunal species (invertebrate species).

### ***Dry ditch***

- 2.6.190 Dry ditch habitat is present at the road-side peripheries and hedge lines of a number of arable fields, notably through Winch Hill and along Darley Road. There is also a dry ditch that likely forms an outfall from the Thames Water surface water attenuation pond, situated to the north of Wigmore Park. No specific species are associated with this habitat, but contains a mix of bracken, grassland, tall ruderal and short ephemeral/perennial species where these species are adjacent to ditch habitats.
- 2.6.191 This habitat does not qualify as a habitat of principal importance. This habitat may have interest for faunal species (reptile species and for invertebrate species).

### ***Short ephemeral/perennial***

- 2.6.192 Short ephemeral perennial habitat is found in areas of recent or high disturbance across the site on a variety of soil types. Within the Airfield an area of recently disturbed grassland was shown to support abundant annual meadow-grass, red fescue aggregate, American willowherb, broad-leaved willowherb, white clover, red clover, dandelion aggregate, creeping buttercup, meadow buttercup, cut-leaved crane's-bill, common field speedwell, grey field speedwell, perforate St John's-wort, red dead nettle, shepherd's purse, field pansy, mugwort, pineapple weed, scentless mayweed and occasional spear thistle, field bindweed, scarlet pimpernel, along with rare presence of rat's-tail fescue, round-leaved fluellen, sun spurge and small toadflax.
- 2.6.193 This early colonisation vegetation had also shown significant encroachment into the basins associated with Ponds 9, 13, 14 and 15 within the airport complex when observed in 2020.
- 2.6.194 One section of short ephemeral/perennial vegetation on disturbed ground to the north of Ponds 13, 14 and 15 was represented by a different community to that throughout the majority of the airport complex. This area was characterised by a

scarcity of grasses, with spear thistle, creeping thistle, bristly ox-tongue, curled dock, great mullein and annual sowthistle all abundant. Occasional to rare species include opium poppy, hemlock, American winter cress, common cat's ear and pendulous sedge.

- 2.6.195 As previously described, the large arable field south of Darley road, has been left fallow as have Grasslands 22 and 23, although the latter for a shorter period of time. This has led to colonisation primarily by agricultural weeds and ruderal vegetation, with virtually no grasses colonising the bare earth patches between the previous planting lines. Cultivated barley dominates as an indication of recent land use, with frequent spear thistle, creeping thistle, frequent prickly sowthistle and groundsel, with rarely occurring common ragwort.
- 2.6.196 This habitat does not qualify as a habitat of principal importance. Some of the plant species found within this habitat are noteworthy. This habitat may have interest for faunal species (invertebrate species).

### ***Bare ground***

- 2.6.197 Bare ground is found in areas of recent or high disturbance across the site on a variety of soil types. Large areas within the airport are subject to current works such as the area between the airfield and the northern-eastern car parks. Within Area C strips of bare ground are present along public rights of way (PRoW) where footfall has prevented a vegetation community from developing.
- 2.6.198 A significant area of bare ground is present outside of the airport complex to the west, associated with construction of the Luton DART. Whilst access to this active construction area was extremely limited, clear views through fencing enabled assessment from outside the construction boundary. It is assumed that the vast majority of this area is currently occupied by bare earth created by construction activities, though it is recognised that limited patches of the previous calcareous grassland habitat could persist on and around the steep exposed chalk slopes to the north and west of this construction area.
- 2.6.199 Additionally, further patches of bare earth associated with construction are present within the runway complex to the east, between Pond 8 and 15, which had previously been occupied by the short sward species poor grassland found throughout the runway area.
- 2.6.200 This habitat does not qualify as a habitat of principal importance.

### ***Fence***

- 2.6.201 Fences are present surrounding the airport and these are metal chain link fences for security purposes. There are also fences surrounding the derelict housing to the west of Winch Hill and surrounding the Thames Water surface water attenuation pond to the north of the study area.
- 2.6.202 This habitat does not qualify as a habitat of principal importance.

### ***Wall***

- 2.6.203 Wall habitats are present in the following locations:

- a. to the bases of highway cutting embankments often as gabion baskets and surrounding areas of more formal planting to the north of Wigmore Park;
- b. a walled garden is present adjacent to housing to the mid-section of Winch Hill;
- c. wall habitats are present within the offline area at Area A, which was an old car park with concrete walled tiered parking bays; and
- d. to the northern boundary of the off-line area at Area A associated with the raised railway line.

2.6.204 This habitat does not qualify as a habitat of principal importance. In limited areas this habitat may have interest for faunal species (reptile species and for invertebrate species).

### ***Buildings***

2.6.205 There are many buildings within the study area, mainly associated with airport infrastructure, businesses, farm buildings or private dwellings (occupied and unoccupied). These have a range of structural components and none have value for or appear to support plant species not described elsewhere in this report.

2.6.206 The vast majority of land within Area J (excluding Dairy borne Scarp DWS) is comprised of relatively modern buildings associated with airport infrastructure.

2.6.207 This habitat does not qualify as a habitat of principal importance. This habitat has been appraised for interest for faunal species e.g. bat species and bird species as detailed in **Section 5** and **Section 8** below respectively.

### ***Protected and notable plant and fungi species***

2.6.208 **Table 2.4** below includes the national, regional and local rarity statuses for plant species of interest, and notable plant species, recorded during the field study. While the orchid species identified are not rare, they are of considerable local interest and form part of the reason for the designation of Wigmore Park CWS, hence their inclusion within **Table 2.4**.

2.6.209 To describe the origin of a vascular plant the following four terms are used: archaeophyte, native, neophyte and casual, the terms archaeophyte and native are used in **Table 2.4** below. Archaeophyte refers to a plant species not native to the UK which has become established/naturalised prior to AD1500. Native species are those that have arrived in the UK naturally without any human intervention.

2.6.210 Bluebell recorded in association with woodland sites throughout the Main Application Site is consistent with the widespread desk study records, as are records of bee orchid and galingale from within Wigmore Valley Park.

2.6.211 Invasive non-native species identified within the Main Application Site also largely align with desk study records, including records of Japanese knotweed and Japanese rose from Wigmore Valley Park. Japanese knotweed was further recorded within Woodland 8 during the field survey. Various invasive

cotoneaster species were also identified within the Main Application Site, especially as an introduced shrub to the north of Wigmore Valley Park.

2.6.212 **Table 2.5** below includes the national, regional and local rarity statuses for fungal species of interest, and notable fungal species, recorded during the field study.

Table 2.4: Protected and/or otherwise notable plant species (field records) checked against national, regional and local rarity status reports.

<b>Common and Scientific Name Habitat, Location</b>	<b>Vascular Plant and Rarity Status</b>	<b>Phase 1 Plan Target Note, and Date</b>	<b>Location (NGR) and Proximity/ Connectivity to Study Area</b>
Cornflower  One plant in one location. Arable (but may have been sown as part of a wildflower mix).	Archeophyte S41 Priority Species GB status (2018) Least Concern GB status (2014) Least Concern England status (2014) Least Concern RPB Appendix 6c Endangered Herts BAP listed species	Target Note 13  21.05.18	TL1305722116 Within Main Application Site.
Hoary plantain  Many plants in one location.  Calcareous grassland	Native GB status (2018) Least Concern GB status (2014) Least Concern England status (2014) Near threatened RPB not listed HPL&S listed and null local status	Target Note 19  21.05.18	TL1308722130 Within Main Application Site.
Wild strawberry Several plants in one location.  Hedgerow along Darley Road near junction with Winch Hill.	Native GB status (2018) Least Concern GB status (2014) Least Concern England status (2014) Near Threatened RPB not listed HPL&S listed and null local status	Target Note 16  21.05.18	TL1375122209 Within Main Application Site.



<b>Common and Scientific Name Habitat, Location</b>	<b>Vascular Plant and Rarity Status</b>	<b>Phase 1 Plan Target Note, and Date</b>	<b>Location (NGR) and Proximity/ Connectivity to Study Area</b>
<p>Basil thyme</p> <p>Few plants in one location.</p> <p>Edge of arable</p> <p>Calcareous Grassland 26 within CPAR land.</p> <p>Multiple plants present at each location.</p>	<p>Native</p> <p>S41 Priority Species</p> <p>GB status (2018) Vulnerable</p> <p>GB status (2014) Vulnerable</p> <p>England status (2014) Vulnerable</p> <p>RPB status Vulnerable native</p> <p>HPL&amp;S listed and null local status</p>	<p>Target Note 5</p> <p>21.05.18</p>	<p>TL1267821806</p> <p>TL1232121912</p> <p>TL1400021487</p> <p>Within Main Application Site</p> <p>TL1122221088</p> <p>TL1118621013</p> <p>TL1122321045</p> <p>TL1120621045</p>
<p>Field scabious</p> <p>Multiple plants in multiple locations.</p> <p>Neutral grassland both open and areas beneath hedgerows.</p> <p>Calcareous Grassland 26 within CPAR land.</p>	<p>Native</p> <p>GB status (2014) Least Concern</p> <p>GB status (2014) Least Concern</p> <p>England status (2014) Near threatened</p> <p>RPB not listed</p> <p>HPL&amp;S listed and null local status</p>	<p>Target Note 18</p> <p>21.05.18</p>	<p>TL1427322022</p> <p>TL1432321904</p> <p>TL1397721490</p> <p>TL1307822177</p> <p>Within Main Application Site.</p> <p>TL1119121017</p> <p>TL1121921084</p>
<p>Galingale</p> <p>One clump in one location.</p> <p>Large patch in damp area of Wigmore Park.</p>	<p>Native</p> <p>GB status (2014) Near threatened</p> <p>England status (2014) Near threatened</p> <p>RPB listed but no local status</p> <p>HPL&amp;S listed and null local status</p>	<p>Target Note 20</p> <p>21.05.18</p>	<p>TL1244421747</p> <p>Within Main Application Site.</p>
<p>Common twayblade (orchid)</p> <p>17 flowering spikes in one location.</p>	<p>Native</p> <p>GB status (2018) Least Concern</p> <p>GB status (2014) Least Concern</p>	<p>Target Note 6</p> <p>21.05.18</p>	<p>TL1268621686</p> <p>Within Main Application Site.</p>

<b>Common and Scientific Name Habitat, Location</b>	<b>Vascular Plant and Rarity Status</b>	<b>Phase 1 Plan Target Note, and Date</b>	<b>Location (NGR) and Proximity/ Connectivity to Study Area</b>
Dense scrub	England status (2014) Least Concern RPB not listed HPL&S listed and null status		
Bee orchid  11 flowering spikes  Neutral grassland habitat and species- poor semi-improved grassland	Native GB status (2018) Least Concern GB status (2014) Least Concern England status (2014) Least Concern RPB not listed HPL&S listed and null status	Grassland 11  21.05.2018	TL 12343 22012  Within Main Application Site.
Common spotted orchid  Over 200 flowering spikes within rank neutral grassland habitat at the western areas and southern areas of Wigmore Park.	Native GB status (2018) Least Concern GB status (2014) Least Concern England status (2014) Least Concern RPB not listed HPL&S listed and null status	No specific Target Note as covers a large area, but over 80 spikes in Grassland 10.  21.05.18	Covers large area between Grasslands 10 and 12. Within Main Application Site.
Pyramidal orchid  Neutral grassland habitat	Native GB status (2018) Least Concern GB status (2014) Least Concern England status (2014) Least Concern RPB not listed HPL&S listed and null status	No Target Note as not found during field surveys, but reported present adjacent to bee orchid locations	Unknown, further checks required.
Wild basil  A few plants in a few locations.	Native GB status (2018) Least Concern GB status (2014) Least Concern	Target Note 4  21.05.18	TL1267321802 TL1408921531 Within Main Application Site.

<b>Common and Scientific Name Habitat, Location</b>	<b>Vascular Plant and Rarity Status</b>	<b>Phase 1 Plan Target Note, and Date</b>	<b>Location (NGR) and Proximity/ Connectivity to Study Area</b>
Calcareous and neutral grassland	England status (2014) Least Concern RPB not listed HPL&S no local status		
Rat's-tail fescue  One plant in one location.  Short/ephemeral perennial	Archeophyte GB status (2018) Least Concern GB status (2014) Least Concern England status (2014) Least Concern RPB not listed HPL&S listed and null status	Target Note 21  21.05.18	TL1190020993 Within Main Application Site.
Small toadflax  A few plants in a few locations.  Short/ephemeral perennial	Archeophyte GB status (2018) Least Concern GB status (2014) Least Concern England status (2014) Least Concern RPB not listed HPL&S listed and null status	Target Note 10  21.05.18	TL1163620796 TL1212121962 Within Main Application Site.
Round-leaved fluellen One plant in one location. Calcareous grassland/short/ephemeral perennial	Archeophyte GB status (2018) Least Concern GB status (2014) Least Concern England status (2014) Least Concern RPB not listed HPL&S listed and null status	Target Note 11  21.05.18	TL1114520448 Within Main Application Site.
Large-leaved lime  One tree in one location.	Native GB status (2018) Least Concern GB status (2014) Least Concern	Target Note 19  21.05.18	TL1383221538 Within Main Application Site.

<b>Common and Scientific Name Habitat, Location</b>	<b>Vascular Plant and Rarity Status</b>	<b>Phase 1 Plan Target Note, and Date</b>	<b>Location (NGR) and Proximity/ Connectivity to Study Area</b>
Coniferous plantation	England status (2014) Least Concern RPB Appendix 6B Nationally scarce HPL&S not listed.		
<b>Invasive non-native species</b>			
Japanese knotweed  Several stands in a few locations Dense scrub	Schedule 9 part II non-native invasive RPB not listed HPL&S listed and null status Dense scrub	Target Note 7  21.05.18	TL1221622190 TL1221222188 TL1278521841 TL1277721824 TL1277021806 TL1276621787 TL1277721751 TL1279521741 TL1281021731 TL1282921719 Within Main Application Site.
Japanese rose  Understorey within plantation habitat	Schedule 9 part II non-native invasive RPB not listed HPL&S listed and null status	Target Note 1  21.05.18	TL1267521822 TL1123921279 TL1261621782 TL1254921808 Within Main Application Site.
Cotoneaster species, including the invasive species: Wall Cotoneaster Himalayan Cotoneaster Small leaved Cotoneaster  Many plants in several locations.  Amenity planting/ introduced shrub	Noting some Cotoneaster species are Schedule 9 part II non-native invasive species RPB not listed HPL&S listed and null status	Target Note 12  21.05.18	TL1305722116 TL1237022236 TL1241422235 TL1241922225 TL1239522243 TL1243722242 TL1244822232 TL1245022251 TL1236222235 Within Main Application Site.

Table 2.5: Protected and/or otherwise notable fungal species (field records) checked against national, regional and local rarity status reports.

Common and Scientific Name Habitat, Location	Fungal Rarity Status	Target Note, and Date	Location (NGR) and Proximity/Connectivity to Study Area
Persistent Waxcap  Several fruiting bodies within calcareous grassland due east of Dairyborn Scarp DWS.	Red Data List of Threatened British Fungi (2006) - not listed.  Noting paucity of county records via NBN Atlas data searches.	Target Note 23  16.09.2020	TL1119121017 Within Main Application Site.

### ***Mature trees***

- 2.6.213 There are at least five mature pedunculate oak trees within the Main Application Site (including those immediately adjacent and for which root spread could likely be within the Main Application Site) that appear to have significant diameter at breast height (DBH) and may potentially qualify as ancient or veteran trees. These are primarily located within hedgerow habitats and are listed in **Table 2.6** below.

Table 2.6: Mature Trees with significant DBH

Common and Scientific Name Habitat, Location	Rarity Status	Target Note, and Date	Location (NGR) and Proximity/Connectivity to Main Application Site
Pedunculate oak Species-rich hedge with trees. Adjacent to Grassland 3, due east of Winch Hill.	Potentially veteran or ancient	Mature Oak 21.05.18	TL1413921769, within the Main Application Site
Pedunculate oak Arable field edge as a standard. Adjacent to Woodland 3, due east of Winch Hill.	Potentially veteran or ancient	Mature Oak 21.05.18	TL1422321570, within the Main Application Site
Pedunculate oak Species-rich hedge with trees.	Potentially veteran or ancient	Mature Oak 21.05.18	TL1319722364, within the Main Application Site



Common and Scientific Name Habitat, Location	Rarity Status	Target Note, and Date	Location (NGR) and Proximity/ Connectivity to Main Application Site
Darley Road			
Pedunculate oak Tree at western edge of Woodland 2.	Potentially veteran or ancient	Mature Oak 21.05.18	TL1332921943, within the Main Application Site
Oak Species Tree adjacent to workshop/garage at Winch Hill house	Potentially veteran or ancient	Mature Oak (23) 12.11.19	TL1380921589 East of the Main Application Site, near Winch Hill house

2.6.214 Since the Phase 1 Habitat Surveys were completed a full arboricultural assessment of the trees within the Proposed Development has been undertaken. The Arboricultural Impact Assessment is provided as **Appendix 14.3** in Volume 3 of this PEIR.

## 2.7 Conclusions and recommendations

2.7.1 The Phase 1 Habitat Survey of the study area identified several protected or otherwise notable habitats or species. The following further surveys have been conducted between 2016 and 2021 based on the findings of the Phase 1 Habitat Survey, informing any potential development proposals to allow a full assessment of the Proposed Development:

- a. NVC surveys of grassland and woodland habitats to identify the plant communities present to further determine their ecological status including their validity as habitats of principal importance, or ancient woodland. The results of these surveys are included within **Appendix Y** of this report;
- b. Further arboriculture surveys to map significant trees, including those which may qualify as ancient or veteran trees. The Arboricultural Impact Assessment is provided as **Appendix 14.3** in Volume 3 of the PEIR; and
- c. Further surveys of faunal species of interest which include the following: bird surveys, bat surveys, badger surveys, hazel dormouse surveys, otter surveys, water vole surveys, reptile surveys, amphibian surveys, invertebrate surveys including specific Roman snail surveys. The results of these surveys are presented within **Sections 4-12** of this report.

2.7.2 Given the significant limitations to survey of Dairyborn Scarp DWS and its immediate environs, a precautionary approach has been made in determination of the type, extent and condition of habitats present. Further liaison with the Wildlife Trust and County Ecologist is required to provide an appreciation of



these limitations upon findings and ensure appropriate mitigation is achieved for all potential biodiversity receptors that may be present within the DWS.

## 3 HEDGEROWS

### 3.1 Introduction

3.1.1 This section sets out the methodology and results of the hedgerow survey work undertaken in relation to the Proposed Development during 2019.

#### Study area

3.1.2 The study area for Hedgerow surveys is limited to the Main Application Site and the off-site mitigation planting areas given that qualifying hedgerows within the Proposed Development are largely confined across the arable areas to the east. The Hedgerow Survey Plan in **Appendix E** should be referenced in the reading of this section.

#### Survey scope

3.1.3 A detailed Hedgerows Regulations assessment was undertaken between 02 and 18 July 2019 and 07 and 11 November 2019.

3.1.4 The aim of the survey was to identify any hedgerows which would qualify as 'important' under the criteria of the Hedgerow Regulations 1997 (Ref. 26) with an objective to provide sufficient information to inform an assessment of the potential impacts to important hedgerows as a result of the Proposed Development and allow the design of appropriate mitigation measures.

#### Legislation and local biodiversity context

3.1.5 For the purposes of this report and in accordance with the Hedgerow Survey Handbook (Ref. 25), a hedgerow has been defined as:

*“Any boundary line of trees or shrubs over 20m long and less than 5m wide at the base, provided that at one time the trees or shrubs were more or less continuous”.*

3.1.6 To qualify as 'Important' under the Hedgerows Regulations 1997 (Ref. 26), a hedgerow must be at least 30 years old and meet at least one of the following three wildlife and landscape criteria, which identify hedgerows of particular wildlife value:

- a. The hedgerow contains a species listed in the Wildlife and Countryside Act 1981 (as amended) (Ref. 5), either in Part I of Schedule 1 (birds protected by special penalties), or Schedule 5 (other animals) or Schedule 8 (plants). In addition, species listed in British Red Data Books qualify;
- b. A 30m length of hedgerow includes, on average, one of the following:
  - i. at least seven 'woody' species; or
  - ii. at least six 'woody' species and has at least three associated features; or
  - iii. at least six 'woody' species including a black poplar, large-leaved lime, small-leaved lime or wild service tree; or
  - iv. at least five 'woody' species and has at least four features

And the following are considered as associated features:

- i. a bank or wall supporting the hedgerow along at least half of its length;
  - ii. less than 10% gaps within the hedgerow;
  - iii. on average, at least one tree per 50m of hedgerow;
  - iv. at least three species from a list of 57 herbaceous 'woodland' plant species are noted as being present;
  - v. a ditch along at least a half of the length of the hedge;
  - vi. a number of connections with other hedgerows, ponds or woodland; and
  - vii. a parallel hedge within 15m of the hedgerow.
- c. The hedgerow runs alongside a bridleway, footpath, road used as a public path or as a byway open to all traffic, and includes at least four 'woody' species, on average, and has at least two associated features.

3.1.7 Subject to exceptions outlined in regulation 6 of The Hedgerows Regulations 1997 (Ref. 26), the removal of a hedgerow to which these Regulations apply is prohibited.

3.1.8 Hedgerows are a priority habitat of the Luton and Bedfordshire LBAP.

## 3.2 Methodology

### Field survey

3.2.1 All hedgerows surveyed and included within this report are referred to by their hedgerow identification number, as shown in **Appendix E**.

3.2.2 Detailed Hedgerows Regulations assessment were undertaken based on field survey data collected by experienced ecologists between 02 July and 18 July and 07 and 11 November 2019. The survey recorded information on the botanical composition of the hedgerows and their associated habitat features in accordance with the current legislation.

3.2.3 Of the 66 hedgerows identified from the Phase 1 Habitat survey, eight were found not to meet the criteria for Hedgerow Regulations assessment due to being less than 20m in length or greater than 5m in width. These were therefore scoped out leaving a total of 58 hedgerows which were subject to a detailed Hedgerows Regulations assessment.

### Survey limitations

3.2.4 This Hedgerows Regulations assessment only takes into consideration the wildlife and landscape criteria (criteria 6, 7 and 8 as outlined in Section 1.3), in order to define a hedgerow as 'Important' or 'Non-Important'. An assessment of the historic value of a hedgerow does not form part of the scope of this report.

3.2.5 Surveys within the Main Application Site were undertaken in July, which is within the recommended survey period for hedgerow assessments (Ref. 27), however there is the potential that vernal species of ground flora may not be apparent and therefore under recorded.

3.2.6 Surveys of the hedgerows within the proposed habitat creation and offsite planting areas were undertaken in November, which is a sub-optimal period for botanical survey therefore the diversity of ground flora may be under recorded. These hedgerows will not be subject to direct loss as a result of the Proposed Development, they will be subject to enhancement; therefore the timing of these surveys is not considered to be a significant limitation.

### 3.3 Results

#### Field Survey - important hedgerows

3.3.1 Hedgerow 20 is west of Winch Hill House and is approximately 150m in length. Two sections were sampled, and the average number of woody species was seven. The hedgerow is comprised of field maple blackthorn crab apple pedunculate dogwood and rose, spindle, elder, hazel and holly. The ground flora is dominated by false oat-grass, bramble, white bryony and common nettle. Hedgerow 20 is considered 'Important' according to the wildlife criteria of The Hedgerows Regulations 1997 for the following reasons:

- a. it has seven woody species present;
- b. it is intact (hedgerow where gaps in aggregate do not exceed 10% of the length of the hedgerow) ; and
- c. it is adjacent to a parallel hedge (within 15m).

3.3.2 Hedgerow 27 is north of the runway approach lights and is approximately 120m in length. Two sections were sampled, and the average number of woody species is five. The hedgerow is comprised of hawthorn, hornbeam, hazel, silver birch and holly. Ground flora is dominated by false oat-grass, common nettle and barren brome. Hedgerow 27 is considered 'Important' according to the wildlife criteria of The Hedgerows Regulations 1997 for the following reasons:

- a. it has five woody species present;
- b. there is a bank >50% of its length;
- c. it is intact;
- d. it contains one standard tree per 50m; and
- e. it has a parallel hedge (within 15m)..

3.3.3 Hedgerow 31 is south of Darley Road and is approximately 100m in length. It is comprised of blackthorn, hazel, ash and pedunculate oak. The ground flora is dominated by cleavers, hogweed and cock's-foot. Hedgerow 31 is considered 'Important' according to the wildlife criteria of The Hedgerows Regulations 1997 for the following reasons:

- f. it has four woody species present;
- g. it is adjacent to a footpath;
- h. it is intact;
- i. it contains at least one standard tree per 50m; and

- j. there is a ditch running at least half its length.

3.3.4 Hedgerow 33 is located south west of Darley Road and is approximately 200m in length. Two sections of the hedgerow were sampled, and the average number of species were 4. The hedgerow is comprised of ash, hawthorn, rose, holly and elm. The ground flora is dominated by false oat-grass, soft-brome and bramble. Hedgerow 33 is considered 'Important' according to the wildlife criteria of The Hedgerows Regulations 1997 for the following reasons:

- a. it has four woody species present;
- b. it is adjacent to a footpath;
- c. there is a bank running more than half its length;
- d. it is intact;
- e. it contains at least one standard tree per 50m; and
- f. there is a parallel hedge (within 15m)..

3.3.5 Hedgerow 34 is located alongside Darley Road and is approximately 100m in length. It is comprised of blackthorn, rose, hazel and field maple. The ground flora is dominated by false oat-grass, hogweed and Yorkshire fog. Hedgerow 34 is considered 'Important' according to the wildlife criteria of The Hedgerows Regulations 1997 for the following reasons:

- a. it has four woody species;
- b. it is adjacent to a footpath;
- c. it is intact; and
- d. there is a parallel hedge (within 15m)..

3.3.6 Hedgerow 37 is located to the south west of Darley Road and is approximately 90m in length. The hedgerow is comprised of dogwood, hazel, pedunculate oak, hawthorn, rose, holly and blackthorn. The ground flora is dominated by false oat-grass, cock's-foot and spear thistle. Hedgerow 37 is considered 'Important' according to the wildlife criteria of The Hedgerows Regulations 1997 for the following reasons:

- a. it has seven woody species;
- b. it is intact;
- c. there is at least one standard tree per 50m; and
- d. there is a parallel hedge (within 15m)..

3.3.7 Hedgerow 38 is located to the south west of Darley Road and is approximately 100m in length. The hedgerow is comprised of hawthorn, field maple, hazel, rose, blackthorn, dogwood, elder and ash. The ground flora is dominated by false oat-grass, cleavers and knapweed. Hedgerow 38 is considered 'Important' according to the wildlife criteria of The Hedgerows Regulations 1997 for the following reasons:

- a. it has eight woody species;

- b. there is a bank >50% of its length;
- c. it is intact;
- d. there is at least one standard tree per 50m; and
- e. there is a parallel hedge (within 15m)..

3.3.8 Hedgerow 46 is located at the northern end of Brownings Lane and is approximately 110m in length. It is an intact managed hedgerow comprising of hawthorn, elm, field maple, hazel, blackthorn, and holly. The ground flora is dominated by Yorkshire fog, false oat-grass, cleaver and occasional dog's mercury. Hedgerow 46 is considered 'Important' according to the wildlife criteria of The Hedgerows Regulations 1997 for the following reasons:

- a. it has at least seven woody species along the average of sections;
- b. it is adjacent to a footpath;
- c. it is intact; and
- d. there is a parallel hedge (within 15m)..

3.3.9 Hedgerow 47 is located at Heath Road, opposite to the junction of Church Road and is approximately 34m in length. It is a managed hedgerow comprising of ash, blackthorn, elm, field maple and oak. The ground flora is dominated by Yorkshire fog, false oat-grass, cleaver and occasional dog's mercury. Hedgerow 46 is considered 'Important' according to the wildlife criteria of The Hedgerows Regulations 1997 for the following reasons:

- a. it has at least four woody species along the average of sections;
- b. It is adjacent to a footpath;
- c. It contains one standard tree per 50m; and
- d. gaps along the hedgerow do not aggregate exceed 10%;
- e. it is intact; and
- f. there is a parallel hedge (within 15m)..

3.3.10 Hedgerow 49 is located along Darley Road, adjacent to Mill Way, opposite to the junction of Church Road and is approximately 119m in length. It is a managed hedgerow with a wet ditch running along its length. The species comprise of alder, hazel, blackthorn, dogwood, elm, field maple, rose and oak. The ground flora is dominated by Yorkshire fog and hogweed. Hedgerow 49 is considered 'Important' according to the wildlife criteria of The Hedgerows Regulations 1997 for the following reasons:

- a. it has at least four woody species along the average of sections;
- b. it is adjacent to a footpath;
- c. it contains a ditch running over half its length;
- d. it is intact; and
- e. there is a parallel hedge (within 15m)..



- 3.3.11 Hedgerow 50 is located along Darley Road, south of the Fox Public House and is approximately 85m in length. It is an intact managed hedgerow. The species present comprise of ash, hornbeam, hazel, dogwood, field maple, rose and oak. The ground flora is dominated by Yorkshire fog. Hedgerow 50 is considered 'Important' according to the wildlife criteria of The Hedgerows Regulations 1997 for the following reasons:
- it has at least seven woody species along the average of sections;
  - It contains a bank supporting at least half its length; and
  - it is intact.
- 3.3.12 Hedgerow 51 is located along Darley Road, south of the Fox Public House and is approximately 85m in length. It is an intact managed hedgerow. The species present comprise of ash, hazel, blackthorn, field maple, rose and oak. The ground flora is dominated by Yorkshire fog. Hedgerow 51 is considered 'Important' according to the wildlife criteria of The Hedgerows Regulations 1997 for the following reasons:
- it has at least six woody species along the average of sections;
  - it contains at least one standard tree per 50m;
  - It contains a bank supporting at least half its length; and
  - it is intact.
- 3.3.13 Hedgerow 56 is located along Darley Road, south of the Fox Public House and is approximately 58m in length. It is a "gappy" managed hedgerow. The species present comprise of ash, hazel, holly, and hornbeam. The ground flora is dominated by Yorkshire fog. Hedgerow 56 is considered 'Important' according to the wildlife criteria of The Hedgerows Regulations 1997 for the following reasons:
- it has at least four woody species along the average of sections;
  - it is adjacent to a footpath;
  - it contains at least one standard tree per 50m; and
  - It contains a bank supporting at least half its length.
- 3.3.14 Hedgerow 60 is located along a bridleway south of Coleman's Road, and is 67m in length. It is a managed hedgerow with occasional shrubs along its length. The species present comprise of ash, hazel, blackthorn, dogwood, field maple and oak. The ground flora is dominated by Yorkshire fog. Hedgerow 60 is considered 'Important' according to the wildlife criteria of The Hedgerows Regulations 1997 for the following reasons:
- it has at least six woody species along the average of sections;
  - it is adjacent to a footpath;
  - It is intact;
  - it contains at least one standard tree per 50m; and
  - It has hedgerow connection points scoring 4 or more.

- 3.3.15 Hedgerow 61 is located approximately 50m south of Hedgerow 61 and is approximately 78m in length. It is a managed hedgerow with mature trees. The species present comprise of hornbeam, wild cherry, hazel, blackthorn, hawthorn, dogwood, field maple, rose and oak. The ground flora is dominated by Yorkshire fog. Hedgerow 61 is considered 'Important' according to the wildlife criteria of The Hedgerows Regulations 1997 for the following reasons:
- it has at least seven woody species along the average of sections;
  - it is adjacent to a footpath; and
  - it is intact.
- 3.3.16 Hedgerow 62 is located approximately 30m west of Hedgerow 61 and is 98m in length. It is a managed hedgerow with mature trees. The species present comprise of ash, hazel, blackthorn, hawthorn, spindle, rose and oak. The ground flora is dominated by perennial rye grass. Hedgerow 62 is considered 'Important' according to the wildlife criteria of The Hedgerows Regulations 1997 for the following reasons:
- it has at least seven woody species along the average of sections; and
  - it is adjacent to a footpath; and
  - it is intact.
- 3.3.17 Hedgerow 66 is located along at the back of the properties along Lye Hill. It is approximately 363m in length and is classified as a managed hedgerow with mature trees. The species present comprise of ash, elm, hazel, blackthorn, holly, spindle dogwood, field maple and oak. The ground flora is dominated by Yorkshire fog, cock's foot and cleavers. Hedgerow 66 is considered 'Important' according to the wildlife criteria of The Hedgerows Regulations 1997 for the following reasons:
- it has at least seven woody species along the average of sections; and
  - It is intact.

### **Field Survey – non-important hedgerows**

- 3.3.18 The remaining hedgerows were assessed as 'Non-Important' from the field survey of their botanical composition and associated features. These hedgerows are summarised below.
- 3.3.19 Hedgerow 1 is located south of Darley Road, north of Winch Hill and is approximately 140m in length. Two sections were sampled, and the average number of woody species is five. The hedgerow is comprised of pedunculate oak, rose, holly, hazel, field maple, blackthorn and hawthorn. The ground flora is dominated by false oat-grass, common nettle and soft-brome. Notable features include the hedgerow is intact and include a bank >50% of its length.
- 3.3.20 Hedgerow 2 is in Winch Hill, north of Winch Hill farm barns and is approximately 100m in length. The hedgerow is comprised of blackthorn and hawthorn. The ground flora is dominated by common nettle, soft-brome and barren brome. Notably, the hedgerow is intact.

- 3.3.21 Hedgerow 3 is located east of hedgerow 2 in Winch Hill and is approximately 90m in length. The hedgerow is comprised of blackthorn and hawthorn. The ground flora is dominated by common nettle, cock's-foot and cleavers. Notably, the hedgerow is intact.
- 3.3.22 Hedgerow 4 is located north of Winch Hill farm barns and is approximately 130m in length. Two sections were sampled and the average number of woody species is four. The hedgerow is comprised of hawthorn, blackthorn, ash, hazel, elm and rose. The ground flora is dominated by common nettle, false oat-grass, cock's-foot and soft-brome. Notable features include the hedgerow is intact, contains at least one standard tree per 50m and is adjacent to a parallel hedge.
- 3.3.23 Hedgerow 5 is located east of Winch Hill farm barns and is approximately 55m in length. The hedgerow is comprised of hawthorn and elder. The ground flora is dominated by common nettle, false-brome and barren brome. Notably, the hedgerow contains at least one standard tree per 50m.
- 3.3.24 Hedgerow 6 is located west of hedgerow 2 in Winch Hill and is approximately 55m in length. The hedgerow is comprised of elder and hawthorn. The ground flora is dominated by false oat-grass, common nettle and barren brome. Notably, the hedgerow is intact.
- 3.3.25 Hedgerow 7 is located east of Winch Hill farm barns and is approximately 360m in length. Three sections were sampled and the average number of woody species is four. The hedgerow is comprised of blackthorn, hazel, silver birch, pedunculate oak, hawthorn and hazel. Ground flora is dominated by common nettle, barren brome, false oat-grass, soft-brome and creeping thistle. Notable features include the hedgerow is intact, a bank >50% of its length and contains at least one standard tree per 50m.
- 3.3.26 Hedgerow 8 is connected to hedgerow 7 in Winch Hill and is approximately 80m in length. The hedgerow is comprised of blackthorn, hazel, elder, field maple and holly. Ground flora is dominated by common nettle, broad-leaved dock and false oat-grass. Notably, the hedgerow is intact.
- 3.3.27 Hedgerow 9 is connected to the east of hedgerow 8 and is approximately 100m. The hedgerow is comprised of pedunculate oak, blackthorn, hazel and crab apple. Ground flora is dominated by common nettle, broad-leaved dock and scentless false mayweed. There are no additional hedgerow features.
- 3.3.28 Hedgerow 10 is connected to hedgerow 8 and is approximately 80m in length. Two sections were sampled and the average number of woody species is five. The hedgerow is comprised of blackthorn, hazel, hornbeam, hawthorn, pedunculate oak, elder and field maple. The ground flora is dominated by soft-brome, bramble, common nettle, cock's-foot and creeping thistle. Notably, the hedgerow contains at least one standard tree per 50m.
- 3.3.29 Hedgerow 12 is the eastern boundary of a small coniferous woodland plantation in Winch Hill and is approximately 145m in length. Two sections were sampled and the average number of woody species is comprised of field maple, blackthorn, elder, hazel, ash and beech. The ground flora is dominated by

barren brome, soft-brome and bracken. Notable features include the hedgerow is intact and contains at least one standard tree per 50m.

- 3.3.30 Hedgerow 13 connects two coniferous woodland plantations in Winch Hill and is approximately 60m in length. The hedgerow is comprised of blackthorn, elder, hazel, holly and field maple. The ground flora is dominated by false oat-grass, common nettle and broad-leaved dock. Notable features include the hedgerow is intact and contains at least one standard tree per 50m.
- 3.3.31 Hedgerow 14 is south east of Winch Hill farm barns and is approximately 130m in length. Two sections were sampled and the average number of woody species is three. The hedgerow is comprised of elder, blackthorn, hawthorn and hazel. The ground flora is dominated by common nettle, barren brome, white bryony and hogweed. Notable features include the hedgerow is intact and contains at least one standard tree per 50m.
- 3.3.32 Hedgerow 15 is north east of Winch Hill farm barns and is approximately 130m in length. Two sections were sampled and the average number of woody species is four. The hedgerow is comprised of blackthorn, elder, hazel, hornbeam and rose. The ground flora is dominated by common nettle, barren brome and cleavers. Notably, the hedgerow contains at least one standard tree per 50m.
- 3.3.33 Hedgerow 16 is north of Winch Hill House and is approximately 150m in length. Two sections were sampled and the average number of woody species is five. The hedgerow is comprised of pedunculate oak, elder, blackthorn and hazel. The ground flora is dominated by common nettle, scentless false mayweed, spear thistle, common comfrey and barren brome. Notable features include the hedgerow is intact and contains at least one standard tree per 50m.
- 3.3.34 Hedgerow 17 is south west of Winch Hill farm barns and is approximately 100m in length. The hedgerow is comprised of blackthorn, elder, field maple, hazel and holly. The ground flora is dominated by common nettle, false oat-grass and hemlock. Notable features include the hedgerow is intact, contains at least one standard tree per 50m and is adjacent to a parallel hedge.
- 3.3.35 Hedgerow 18 is north west of Winch Hill farm barns and is approximately 30m in length. The hedgerow is comprised of wild cherry, elder and hawthorn. The ground flora is dominated by hemlock, common nettle and false oat-grass. Notable features include the hedgerow is intact, a bank >50% of its length and at least one standard tree per 50m.
- 3.3.36 Hedgerow 19 is north of the runway approach lights in Winch Hill and is approximately 175m in length. Two sections were sampled and the average number of woody species is four. The hedgerow is comprised of hawthorn, hazel, elder, field maple, spindle and ash. The ground flora is dominated by common nettle, bracken, false oat-grass and barren brome. Notably, the hedgerow contains at least one standard tree per 50m.
- 3.3.37 Hedgerow 21 is south-west of Winch Hill House and is approximately 130m in length. Two sections were sampled and the average number of woody species is five. The hedgerow is comprised of blackthorn, dogwood, rose, pedunculate

oak, field maple, elder and hazel. The ground flora is dominated by false oat-grass, hogweed, bramble, barren brome and common nettle. Notable features include the hedgerow is intact and a bank >50% of its length.

- 3.3.38 Hedgerow 23 is north of the runway approach lights and is approximately 180m in length. Two sections were sampled and the average number of woody species is two. The hedgerow is comprised of blackthorn and hawthorn. The ground flora is dominated by cleavers, common nettle, hogweed, false oat-grass, barren brome and soft brome. Notable features include the hedgerow is intact and there is a parallel hedge.
- 3.3.39 Hedgerow 24 is south of the runway approach lights and is approximately 150m in length. Two sections were sampled and the average number of woody species is two. The hedgerow is comprised of blackthorn and hawthorn. The ground flora is dominated by false oat-grass, bramble, soft-brome, cleavers and cock's foot. Notable features include the hedgerow is intact and there is a parallel hedge.
- 3.3.40 Hedgerow 25 is located south of the runway approach lights and is approximately 160m in length. Two sections were sampled and the average number of woody species is four. The hedgerow is comprised of hawthorn, holly, hazel, pedunculate oak and blackthorn. The ground flora is dominated by common nettle, bramble, barren brome, cock's-foot and yarrow. Notable features include the hedgerow is intact and there is a parallel hedge.
- 3.3.41 Hedgerow 26 is located north of the runway approach lights and is approximately 30m in length. The hedgerow is comprised of hawthorn and hazel. The ground flora is dominated by bramble, common nettle and barren brome. The hedgerow is intact and there is a parallel hedge.
- 3.3.42 Hedgerow 28 is located north of the runway approach lights and is approximately 210m in length. Three sections were sampled and the average number of woody species is four. The hedgerow is comprised of holly, blackthorn, hawthorn, field maple, rose, elder and hazel. The ground flora is dominated by false oat-grass, mugwort, hogweed, barren brome, wild carrot and rye grass. There are no notable features associated with this hedgerow.
- 3.3.43 Hedgerow 29 is located south-west of Winch Hill farm barns and is approximately 115m in length. The hedgerow is comprised of rose, blackthorn and field maple. The ground flora is dominated by false oat-grass, bramble and mugwort. Notable features include the hedgerow is intact and there is one standard tree at least every 50m.
- 3.3.44 Hedgerow 30 is north-west of Winch Hill farm barns and is approximately 100m in length. The hedgerow is comprised of hawthorn and elder. The ground flora is dominated by false oat-grass, common nettle and bramble. Notable features include an adjacent footpath and at least one standard tree every 50m.
- 3.3.45 Hedgerow 32 is located south-west of Darley Road and is approximately 60m in length. The hedgerow comprises of elm and willow. The ground flora is dominated by common nettle, hogweed and creeping thistle. Notably, there is at least one standard tree every 50m.

- 3.3.46 Hedgerow 35 is located along Darley Road, north-west of Winch Hill farm barns and is approximately 60m in length. The hedgerow is comprised of hazel, pedunculate oak, blackthorn, field maple and silver birch. The ground flora is dominated by false oat-grass, bramble and hogweed. Notable features include the hedgerow is intact and there is a standard tree at least every 50m.
- 3.3.47 Hedgerow 36 is located along Darley Road, north-west of Winch Hill farm barns, and is approximately 110m in length. Two sections were sampled and the average number of woody species is three. The hedgerow is comprised of pedunculate oak, hazel, blackthorn and field maple. The ground flora is dominated by false oat-grass, bracken, soft-brome and bramble. Notably, there is a footpath which runs alongside the hedgerow.
- 3.3.48 Hedgerow 39 is located north-west of Winch Hill farm barns and is approximately 70m in length. The hedgerow is comprised of hazel, holly, elder and hawthorn. The ground flora is dominated by common nettle, false-oat grass and bramble. Notable features include a bank and a ditch which runs along >50% of the hedgerow, at least one standard tree every 50m, a parallel hedgerow and the hedgerow is intact.
- 3.3.49 Hedgerow 43 is located north of the runway approach lights and is approximately 30m in length. The hedgerow is comprised of hazel, pedunculate oak, hawthorn and hornbeam. The ground flora is dominated by bramble, false oat-grass and common nettle. Notable features include at least one standard tree every 50m and >4 connection points.
- 3.3.50 Hedgerow 44 is located along Darley Road and is approximately 64m in length. It is an intact managed hedgerow with small gaps within the woody species which have become colonised by patches of scrub. Species comprise hawthorn, willow (*Salix* sp.) holly, and ash. The ground flora is dominated by false oat-grass and cleavers. There are semi-mature trees within the hedgerow.
- 3.3.51 Hedgerow 45 is located west of Darley Road, but east of the village of Breachwood Green. The hedgerow is approximately 63m in length. It is a managed 'gappy' with one mature oak along its length. Species within the hedgerow comprise alder, dogwood, oak, rose, and field maple. The ground flora is dominated by false oat-grass, Yorkshire fog, cow parsley and cleavers.
- 3.3.52 Hedgerow 48 is located along the north end of Darley Road, adjacent to the Windmill Road junction. The hedgerow is approximately 34m in length. It is a managed hedgerow with no trees along its length. Species within the hedgerow comprise blackthorn, and ash. The ground flora is dominated by false oat-grass, cow parsley and cleavers.
- 3.3.53 Hedgerow 52 is located along the north end of Darley Road, adjacent to the Windmill Road junction. The hedgerow is approximately 303m in length. It is a managed hedgerow dominated by hornbeam, although hazel, hawthorn and blackthorn are also present within the hedge. The ground flora is dominated by false oat-grass, cow parsley and cleavers.
- 3.3.54 Hedgerow 54 is located west of Stony Lane. The hedgerow is approximately 100m in length. It is a managed hedgerow with semi mature trees spread



throughout its length, dominant species include hazel, hawthorn and blackthorn. The ground flora is dominated by false oat-grass and nettle.

- 3.3.55 Hedgerow 55 is located on the edge of arable field north of Darley Wood, west of Stony Lane. The hedgerow is approximately 67m in length. It is a managed intact hedgerow dominated by dogwood and blackthorn.
- 3.3.56 Hedgerow 56 is located along Darley Road, south of the Fox Public House and is approximately 58m in length. It is an “gappy” managed hedgerow. The species present comprise of ash, hazel, holly, and hornbeam.
- 3.3.57 Hedgerow 57 is located on the edge of arable field north of Darley Wood, west of Stony Lane. The hedgerow is approximately 85m in length. It is a managed “gappy” hedgerow dominated by dogwood.
- 3.3.58 Hedgerow 58 is located along a farm access within Tankards Farm. The hedgerow is approximately 53m in length. It is a managed intact hedgerow dominated by hawthorn and hazel.
- 3.3.59 Hedgerow 59 is located on the edge of arable field within Tankards Farm. The hedgerow is approximately 116m in length. It is a managed intact hedgerow dominated by hawthorn.
- 3.3.60 Hedgerow 64 is located behind a domestic property along Colemans Road. The hedgerow is approximately 34m in length. It is a managed intact hedgerow dominated by ash and hawthorn.

### **Field Survey – linear boundaries not assessed**

- 3.3.61 Field survey noted that the following linear boundaries are not hedgerows as they are <20m in length and/or >5m width, and/or a treeline or garden hedge:
- a. Hedgerow 11;
  - b. Hedgerow 22;
  - c. Hedgerow 40;
  - d. Hedgerow 41;
  - e. Hedgerow 42;
  - f. Hedgerow 53;
  - g. Hedgerow 63; and
  - h. Hedgerow 65.

## **3.4 Conclusions and recommendations**

- 3.4.1 Based on the field survey of the botanical composition and associated features, 16 hedgerows meet the wildlife and landscape criteria of The Hedgerows Regulations 1997 for an ‘Important’ Hedgerow, as detailed in **Table 3.1** below.
- 3.4.2 The 42 remaining hedgerows do not meet the wildlife criteria of The Hedgerows Regulations 1997 for an ‘Important’ Hedgerow, based on their botanical composition and associated features. The remaining eight features identified as

hedgerows from aerials and maps were found to not meet the criteria of a hedgerow when surveyed on the ground. **Table 3.1** Below summaries each hedgerow status as recorded on site

Table 3.1. Summary table of hedgerows recorded on site

Hedgerow Number	Species Rich/Species Poor	Important/Not Important	Not Assessed
1	Species Rich	Not Important	
2	Species Poor	Not Important	
3	Species Poor	Not Important	
4	Species Poor	Not Important	
5	Species Poor	Not Important	
6	Species Poor	Not Important	
7	Species Poor	Not Important	
8	Species Rich	Not Important	
9	Species Poor	Not Important	
10	Species Rich	Not Important	
11	-	-	Not a hedge
12	Species Rich	Not Important	
13	Species Rich	Not Important	
14	Species Poor	Not Important	
15	Species Rich	Not Important	
16	Species Rich	Not Important	
17	Species Rich	Not Important	
18	Species Poor	Not Important	
19	Species Rich	Not Important	
20	Species Rich	Important	
21	Species Rich	Not Important	
22	-	-	Not a hedge
23	Species Poor	Not Important	
24	Species Poor	Not Important	
25	Species Poor	Not Important	
26	Species Poor	Not Important	
27	Species Rich	Important	
28	Species Rich	Not Important	
29	Species Poor	Not Important	
30	Species Poor	Not Important	
31	Species Poor	Important	

Hedgerow Number	Species Poor	Rich/Species	Important/Not Important	Not Assessed
32	Species Poor		Not Important	
33	Species Rich		Important	
34	Species Poor		Important	
35	Species Rich		Not Important	
36	Species Poor		Not Important	
37	Species Rich		Important	
38	Species Rich		Important	
39	Species Poor		Not Important	
40	-		-	Not a hedge
41	-		-	Not a hedge
42	-		-	Not a hedge
43	Species Poor		Not Important	
44	Species Poor		Not Important	
45	Species Rich		Important	
46	Species Rich		Important	
47	Species Rich		Not Important	
48	Species Rich		Not Important	
49	Species Poor		Important	
50	Species Poor		Important	
51	Species Rich		Important	
52	Species Poor		Not Important	
53	Species Poor		-	Not a hedge
54	Species Poor		Not Important	
55	Species Poor		Not Important	
56	Species Poor		Not Important	
57	Species Poor		Not Important	
58	Species Poor		Not Important	
59	Species Poor		Not Important	
60	Species Rich		Important	
61	Species Rich		Important	
62	Species Rich		Important	
63	-		-	Not a hedge
64	-		Not Important	
65	-		-	Not a hedge

<b>Hedgerow Number</b>	<b>Species Rich/Species Poor</b>	<b>Important/Not Important</b>	<b>Not Assessed</b>
66	Species Rich	Important	

## 4 BADGER

### 4.1 Introduction

4.1.1 This section sets out the methodology and results of badger survey work undertaken in relation to the Proposed Development during 2018, 2019 and 2020.

4.1.2 It should be noted that, due to the persecution of badgers, any reference to the precise location of badger setts has been removed from this publicly accessible version of the report. A non-redacted version of the report and accompanying plans will be made available to the appropriate statutory bodies where required.

#### Study area

4.1.3 The study area of the badger survey covers land within the Main Application Site, encompassing parkland, woodlands and arable land to the eastern extent. However, with the exception of junction 10 of the M1, the highway intervention and car parking locations do not include suitable habitats for badger and were therefore scoped out of further survey.

4.1.4 The Main Application Site is set within a largely agricultural landscape context, with arable land bordering to the north, south and east; and residential areas of Luton to the north and west of the existing airport.

4.1.5 For the purposes of the badger territory mapping exercise the study area was extended into the suitable habitats within the arable landscape to the east and north, to identify the extent of the territories of the badger groups that may extend beyond the boundary of the Main Application Site.

4.1.6 A Badger Survey Plan is included within **Appendix F** and a Badger Territory Mapping Plan is provided within **Appendix G** (removed from this report for confidentiality).

#### Survey scope

4.1.7 A series of badger surveys were undertaken between May 2018 and November 2020.

4.1.8 The objectives of the survey were to:

- a. undertake a desk-based review of badger records within 2km of the Main Application Site to identify those that may be relevant to the development proposals;
- b. determine the presence or likely absence of badgers within the study area;
- c. identify the presence, classification and activity levels of any badger setts within or directly adjacent to the study area;
- d. determine badger activity levels and identify the extent of the territories of any badger groups present; and

- e. provide sufficient information to inform an assessment of the potential impacts to badgers as a result of the Proposed Development and allow the design of appropriate mitigation measures.

4.1.9 Surveys covered all accessible areas of suitable badger habitat within the study area of the Main Application Site and immediately adjacent land.

### **Legislation**

4.1.10 Badgers (*Meles meles*) and their setts are afforded legal protection under the Protection of Badgers Act 1992 (Ref. 28), which states that it is an offence to wilfully kill, injure or take (capture) or to cruelly ill-treat a badger. It is also an offence to damage, destroy or obstruct access to a badger sett or to disturb a badger when it is occupying a sett.

4.1.11 A licence can be obtained from Natural England to permit activities that would otherwise cause an offence under the legislation, including for the purpose of development. A licence can usually only be granted where the development is in receipt of full planning permission (with relevant conditions discharged).

## **4.2 Methodology**

### **Desk study**

4.2.1 A desk study exercise was undertaken in February 2018 (and updated in November 2020) to obtain existing records of legally protected and notable species, including badgers. Species records within 2km of the Main Application Site and Luton Biological Recording and Monitoring Centre (BRMC) and Herts Environmental Records Centre (HERC). Badger records are provided to BRMC by the Bedfordshire Badger Network. Badger records are provided to HERC by the Hertfordshire Badger Group (HBG).

4.2.2 Results from surveys undertaken by Capita in 2017 (Ref. 29), in relation to the New Century Park development at Luton airport, were also used to inform the planning of further surveys required within 2018/19.

### **Field survey**

#### ***Badger field signs survey***

4.2.3 All surveys were undertaken by experienced ecologists in line with current best-practice guidance produced by The Mammal Society (Ref. 30) and Natural England (Ref. 31).

4.2.4 Suitable habitats for badger were recorded during the desk study and extended Phase 1 Habitats Survey, with knowledge of some badger setts from the Capita 2017 reports (Ref. 29).

4.2.5 To record the current evidence of badgers within the study area, eight survey visits were undertaken between 3 May 2018 and 12 November 2019. Each visit involved a systematic walkover of the survey area, during which habitats were assessed for their suitability for badgers and any signs of badger activity noted.

4.2.6 The following field signs were recorded where found:



- a. dung pits and latrines; these are characteristic features created by badger, they are often found near to setts and are also used by badger to demarcate their territories;
- b. foraging signs such as snuffle holes;
- c. paths and tracks created by badgers passing through vegetation;
- d. badger footprints;
- e. badger hairs snagged on fences or vegetation; and
- f. badger setts.

4.2.7 Where badger setts were identified the number and level of usage (well used, partially used or disused) of each entrance hole was recorded. Any setts identified were recorded and considered against the criteria laid out in The Mammal Society guidance (Ref. 30), as either a 'main', 'annexe', 'subsidiary' or 'outlier' sett as summarised below:

- a. **Main sett:** these usually have a large number of holes, conspicuous spoil heaps, and well-worn used paths into the main sett area and between entrance holes, these setts will appear very active;
- b. **Annexe sett:** these usually have multiple holes and are within close proximity (<150m) of the main sett with well-worn paths to the main sett;
- c. **Subsidiary sett:** usually with 3-5 entrance holes and located greater than 150m from a main sett with no well-worn path to the main sett, these setts are not continuously active;
- d. **Outlier sett:** usually with 1 or 2 entrance holes, little spoil apparent outside the holes, usually located at a distance from, and with no obvious connection to, another sett, these setts are only used sporadically throughout the year.

4.2.8 A resurvey was undertaken on 29 and 30 September 2020 prior to the updated territory mapping exercise, covering all areas within the Main Application Site. The resurvey followed the same methodology, recording field signs including checking the activity level of all previously recorded setts, as well as identifying new signs where present. The results of this resurvey supersede those of previous years and are shown on the Badger Survey Plan in **Appendix F**.

### ***Territory mapping***

4.2.9 A number of badger field signs were identified across the survey area including main setts. To understand how badgers are utilising the Main Application Site, in order to assess the impact of the Proposed Development, it is necessary to identify the number of badger groups and extent of their territories within the survey area. To achieve this a territory mapping exercise was undertaken within the Main Application Site and accessible adjacent lands to the east and north up to 500m.

4.2.10 Territory mapping is dependent on the discovery of active dung pits, known as latrines, in use by each clan of badgers. The latrines are identified in the initial surveys and 'bait-marking' reveals which latrines belong to which clan (Ref. 32).

- 4.2.11 A mixture of peanuts, peanut butter and golden syrup was placed outside each of the 'Main' badger setts. Each sett also had a designated colour of indigestible, food-safe plastic pellets mixed into the food source (red, blue, yellow or green). As badger 'clans' mark the extent of their territories with aggregations of latrines, it is possible to map the latrines with the undigested coloured pellets present, and subsequently interpret the range of the clans associated with each main sett.
- 4.2.12 Bait marking methods are most effective in spring (between late February and early April) and autumn (October to November) as badgers are active and exhibit a peak in territorial behaviour during these periods.
- 4.2.13 To map current territories of badgers within the Main Application Site and adjacent land, specific survey visits were undertaken every weekday between 18th March and 12th April 2019 (with an additional visit on 6th April 2019). **Table 4.1** summarises the dates of all visits in 2019, with further detail regarding each survey provided below.
- 4.2.14 In order to capture any changes to the use of the site by badger clans, a resurvey was conducted from 9th to the 30th November 2020, informed by the updated field sign survey in September 2020. **Table 4.2** summarises the dates of all visits in 2020, with further detail regarding each survey provided below.
- 4.2.15 All surveys were undertaken by experienced ecologists in line with current best-practice guidance produced by The Mammal Society (Ref. 30) and Scottish Badgers (Ref. 33).

Table 4.1: Territory mapping dates (2019)

Visit number	Date	Survey
1	18/03/2019	Bait marking food deployment
2	19/03/2019	Bait marking food deployment
3	20/03/2019	Bait marking food deployment
4	21/03/2019	Bait marking food deployment, site walkover to check latrines
5	22/03/2019	Bait marking food deployment
6	25/03/2019	Bait marking food deployment
7	26/03/2019	Bait marking food deployment
8	27/03/2019	Bait marking food deployment, site walkover to check latrines
9	28/03/2019	Bait marking food deployment

Visit number	Date	Survey
10	29/03/2019	Bait marking food deployment
11	01/04/2019	Bait marking food deployment
12	02/04/2019	Bait marking food deployment
13	03/04/2019	Bait marking food deployment
14	04/04/2019	Bait marking food deployment, site walkover to check latrines
15	05/04/2019	Bait marking food deployment
16	06/04/2019	Bait marking food deployment, site walkover to check latrines
17	08/04/2019	Bait marking food deployment
18	09/04/2019	Bait marking food deployment
19	10/04/2019	Bait marking food deployment
20	11/04/2019	Site walkover to check latrines within the Main Application Site
21	12/04/2019	Site walkover to check latrines within the wider area

Table 4.2: Territory mapping dates (2020)

Visit number	Date	Survey
1	09/11/2020	Bait marking food deployment
2	10/11/2020	Bait marking food deployment
3	11/11/2020	Bait marking food deployment
4	12/11/2020	Bait marking food deployment, site walkover to check latrines
5	13/11/2020	Bait marking food deployment
6	14/11/2020	Bait marking food deployment
7	15/11/2020	Bait marking food deployment

Visit number	Date	Survey
8	16/11/2020	Bait marking food deployment
9	17/11/2020	Bait marking food deployment
10	18/11/2020	Bait marking food deployment
11	19/11/2020	Bait marking food deployment, site walkover to check latrines
12	20/11/2020	Bait marking food deployment
13	21/11/2020	Bait marking food deployment
14	22/11/2020	Bait marking food deployment
15	23/11/2020	Bait marking food deployment
16	24/11/2020	Bait marking food deployment
17	25/11/2020	Bait marking food deployment
18	26/11/2020	Bait marking food deployment
19	27/11/2020	Bait marking food deployment
20	30/11/2020	Site walkover to check latrines

### Survey limitations

- 4.2.16 Surveyors were able to access the vast majority of suitable habitats within the study area, including areas of dense scrub, where clear mammal paths into such vegetation were followed. However, in some instances vegetation was impenetrable and surveyors were limited to survey of the outer edge of the vegetation. Given that surveyors were able to note any signs of activity around or entering these limited number of patches, this is not considered a significant limitation.
- 4.2.17 An additional main sett was discovered after the commencement of the first feeding visits during the 2020 territory mapping. This sett had previously been recorded as a single hole outlier, indicating an alteration in the use of this area by the occupying clan, expanded upon in the results section. This sett was fed using green pellets for the remainder of the exercise, totalling seven days of feeding, ten prior to the final check. Given that the feed mixture was taken up on each day and green pellets recovered from the latrine associated with the sett, this is not considered a significant limitation.

- 4.2.18 The updated territory mapping exercise in 2020 was conducted during November. For establishing sett ownership, this is considered a secondary peak in territory marking compared to the optimal spring period, as male badgers may move between social groups during this period. Given that no latrines were found with pellets fed at multiple main setts, the timing is not considered a limitation in itself. However, dense leaf litter did impede survey effort in wooded areas, with several latrines marked during the September field sign resurvey not located during the territory marking, though additional latrines were found within these woodlands.
- 4.2.19 Two areas falling within the 500m buffer of the Main Application Site that were accessed during the 2019 territory mapping exercise were not granted access for the 2020 resurvey. The northern area consists of a small field and a collection of modern farm buildings, with surveyors able to search the full perimeter, identifying an outlier sett and several dung pits with no evidence (e.g. push throughs) of badger entering the area itself. The southern area consists of a large arable field and a conifer plantation at the southern extent; with this land being on the periphery of the extended study area. For the above reasons, omission of these areas from the 2020 resurvey is not considered a significant limitation. Inaccessible areas are highlighted on the Badger Territory Mapping Plan in **Appendix G** (redacted from this version of the report for confidentiality).
- 4.2.20 Badgers are a territorial species and their activity is known to be dynamic, with the use of setts and foraging areas subject to change over time. As such, the use of the site by badgers may change prior to the commencement of the Proposed Development. This may include the creation of new setts, abandonment of currently active setts or the re-occupation of previously inactive setts. As a result, the findings of the surveys are robust but additional survey work would be required prior to the commencement of any construction works.

## 4.3 Results

### Desk study

- 4.3.1 Species records returned from BRMC and HBG identified a number of badger setts and records of badger activity within the local area. This included some badger activity and badger setts within the study area.
- 4.3.2 The exact locations of these records are confidential; however, all records are from within the 2km search area surrounding the Main Application Site. In summary, the desk study included;
- a. fourteen records of badger setts;
  - b. seven records of badger observations;
  - c. thirty one records of dead badger (mostly associated with roads); and
  - d. two other records of badger field signs.



## Field survey

### *Badger field signs survey*

- 4.3.3 Survey work identified evidence of badgers within the study area and immediately adjacent land, including a variety of setts and signs of badger activity. The findings of these surveys are outlined on the Badger Survey Plan in **Appendix F** (redacted from this version of the report).
- 4.3.4 The exact location of these records are confidential; however in summary, the field survey identified;
- a. Five active main setts, one of which was outside of the Main Application Site within the territory mapping study area;
  - b. Two active and one disused annexe setts;
  - c. Three active and one disused subsidiary setts; and
  - d. Sixteen active and seven disused outlier setts.
- 4.3.5 No evidence of badger activity was found within the off-site car park areas.

### *Territory mapping*

- 4.3.6 The results of the badger bait-marking surveys are shown on the Badger Territory Mapping Plan in **Appendix G** (redacted from this version of the report).
- 4.3.7 Five main setts were identified and attributed a colour reference for identification (red, yellow, blue, green and purple) based on the colour of the pellets used to bait these setts.
- 4.3.8 Red pellets were recorded regularly from numerous locations providing a defined picture of the clans core territory. This incorporates the plantation and semi-natural woodland immediately north of the sett, dense scrub east of Winch Hill, arable land and hedgerows south of the sett, as well as the ancient woodland assumed to form the southern extent of this territory. Given the several latrines along the arable field margin, Winch Hill Lane is assumed to form the eastern territory boundary, distinct of clans to the east of the road.
- 4.3.9 Yellow pellets were only recovered from the latrine associated with the yellow main sett, though only within the first week of feeding despite continued uptake of bait. This indicates a reduced level of activity associated with this sett. Numerous latrines containing no pellets or bait were located throughout Wigmore Valley Park to the west, as well as along the field boundary along Darley road to the east.
- 4.3.10 The numerous large active latrines located throughout Wigmore Valley Park, particularly within the relatively undisturbed dense scrub and woodland belt, indicate activity of a clan separate to the red clan to the east. However, despite several intensive searches no setts considered main were located within the park, with the largest a two-hole subsidiary. Given the reduced activity at the yellow main sett itself, it is considered likely that this is the clan present



throughout the park, though the lack of yellow pellets recovered makes this difficult to confirm.

- 4.3.11 The dung pits without pellets along the field margin south of Darley road were of varying activity levels. Clear mammal paths led from each location to each side of Darley road, indicating crossing of badger at several points across Darley road to incorporate the field immediately north.
- 4.3.12 Further north of here numerous active latrines without pellets were located along field margins and roads, along with several outlier setts. This indicates this as being the boundary of another clan, likely within arable land and woodland north of the extended study area and outside of the main application site.
- 4.3.13 Whilst numerous well used latrines were recovered for the blue sett, these present a less defined boundary. This is assumed to include the majority of arable land, field margins and woodland blocks west and north of the sett to Darley road, as well as some way south and east as indicated by two active latrines. The eastern latrine is located 200m from the purple main sett and assumed to constitute the territory boundary between the two clans.
- 4.3.14 Green pellets were only recovered from the latrine associated with this sett. However, numerous clear paths made by badger lead directly from this sett to outliers along the northern length of Winch Hill House woodland immediately to the south. Therefore, core territory for the green clan is assumed to incorporate this woodland and further arable land to the south, with Winch Hill Lane forming the western boundary abutted by the red clan. The core territory of the green clan is also assumed to extend into the arable land to the north and east, abutted by the blue clan.
- 4.3.15 No purple pellets were recovered from latrines, indicating that the core territory of the clan associated with this sett is positioned east of the sett, or extending south into the inaccessible area. This is somewhat ratified by several outlier setts found along the vegetated boundary at the rear of properties along Lye Hill.
- 4.3.16 In summary; two badger clans (red and yellow) territories are thought to have core territories entirely encapsulated within the Main Application Site. The core territories of the blue and green clans encapsulate land both within and outside the Main Application Site, with the purple clan considered to have a core territory entirely outside of the Main Application Site. The territory of a further clan is assumed to occupy land to the north of Darley road outside of the Main Application Site, forming the northern extent of the yellow clan and western extent of the blue clan.

## **4.4 Conclusions and recommendations**

- 4.4.1 Suitable habitats for badger exist within the Main Application Site and wider arable landscape. The badger surveys have identified active main, subsidiary and outlier setts across several locations within the study area and adjacent land. Habitats within the Main Application Site form part of the territories for at least two badger groups.

- 4.4.2 Badgers are protected from killing or injury and their setts are protected from damage, obstruction or disturbance under the Protection of Badgers Act 1992. Any works which intentionally or recklessly caused harm to badgers or caused the destruction of their setts would be illegal.
- 4.4.3 Update survey would be required prior to the commencement of any works, including vegetation clearance. Setts showing signs of use by badgers will require closure under licence from Natural England should they fall within the land required for construction of the Proposed Development. A 'buffer zone' of at least 30m radius should be established surrounding any active or partially used setts that will not be removed, and disused setts should be confirmed and closed under the direction of a suitably qualified ecologist.
- 4.4.4 Main setts requiring closure will require provision of an alternative artificial sett, as mitigation for those lost. These artificial setts must show signs of use by the badger group which will be displaced prior to any closure works commencing.

## 5 BATS

### 5.1 Introduction

5.1.1 This section sets out the methodology and results of specific bat survey work undertaken in relation to the Proposed Development between 2016 and 2020.

#### Study area

5.1.2 The study area of the Bat Survey is limited to the Main Application Site and the off-site mitigation planting areas as habitats within the highway intervention works and car park locations are not considered suitable for roosting bats and were scoped out of further survey.

5.1.3 The Main Application Site primarily consists of amenity grassland (Wigmore Park), with woodland blocks, arable land and several residential buildings. It is set within a largely agricultural landscape context, with arable land bordering to the north east, south and east; and residential areas of Luton to the north and west of the existing airport.

5.1.4 The off-site mitigation planting areas are located to the north east of the Main Application Site, comprising arable fields, grassland field margins and hedgerows.

5.1.5 A Bat Tree and Building Roost Potential Survey Plan is included in **Appendix H** and a Bat Activity Survey Plan in **Appendix I**; both of which should be referenced in the reading of this section.

#### Survey scope

5.1.6 The objectives of the surveys were to:

- a. assess the potential of trees and buildings within the study area to support bat roosts and identify the locations of any roosts;
- b. identify the assemblage of bat species present within the study area;
- c. record the relative levels of bat activity within the study area; and
- d. identify any key foraging areas and commuting routes for bats within the study area.
- e. Provide sufficient information to inform an assessment of the potential impacts on the local bat assemblage as a result of the Proposed Development and allow the design of appropriate mitigation measures.

#### Legislation and biodiversity context

5.1.7 All native bat species and the sites that they use for breeding or resting are afforded protection through the provisions within Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) (Ref. 5) and Schedule 2 of the Conservation of Species and Habitat Regulations 2017 (as amended) (Ref. 34). It is therefore an offence, without a licence from Natural England, to intentionally or recklessly kill or injure bats; to disturb, obstruct, damage or destroy their

roosts (including when those roosts are empty) or to take, possess or trade in bats and their parts (alive or dead).

5.1.8 Species of principal importance for the purpose of conserving biodiversity in England are listed in accordance with the provisions of Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 (Ref. **Error! Bookmark not defined.**). These include species in England that were previously identified as requiring action in the UK Biodiversity Action Plan (UK BAP) and continue to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework. The following bat species are classified as 'UK Priority Species' requiring conservation action within the UK:

- a. greater horseshoe bat (*Rhinolophus ferrumequinum*);
- b. lesser horseshoe bat (*Rhinolophus hipposideros*);
- c. Bechstein's bat (*Myotis bechsteinii*);
- d. noctule (*Nyctalus noctula*);
- e. soprano pipistrelle (*Pipistrellus pygmaeus*);
- f. brown long-eared bat (*Plecotus auritus*); and
- g. barbastelle (*Barbastella barbastellus*).

## 5.2 Methodology

### Desk study

5.2.1 Information about statutory designated nature conservation sites within 2km of the Main Application Site, and international sites designated for bat species within 30km, was obtained from the Government's MAGIC website (Ref. 35). Ordnance Survey maps and aerial photographs were reviewed to provide an indication of the habitat types likely to occur on adjacent land. The ecological connectivity of habitats within the site to off-site areas of semi-natural habitats was considered. This information was used to provide context for the assessment of the importance of the site for bat species.

5.2.2 A desk study exercise was undertaken in May 2018 to obtain existing records of legally protected and notable species, including bats. Species records from within 2km of the Main Application Site were requested from the Bedfordshire and Luton Biological Recording and Monitoring Centre (BRMC) and Herts Environmental Records Centre (HERC). This exercise was repeated in November 2020 to capture any additional records.

### Field study

#### ***Ground based assessment of potential roost features***

5.2.3 Preliminary ground level roost assessments of buildings and trees were undertaken on 12 August 2016 by two experienced ecologists to identify their suitability to support roosting bats in accordance with the Bat Conservation Trust (BCT) Good Practice Guidelines (Ref. 36). All ground level assessments of trees were updated in June 2020 to reconfirm roosting potential and identify

andy additional trees. Potential roosting features in trees are shaped by mechanisms including disease, decay and damage, all of which are variable and can change features over time (Ref. 37).

5.2.4 Buildings that fall within the footprint of the Airport Access Road were subject to external inspection to identify their suitability to support roosting bats on 09 September 2020.

5.2.5 Roost assessments of buildings, structures and trees were carried out to identify and assess any features that bats could use for roosting and inspect them for any evidence of bats (e.g. live or dead bats, droppings, fur-oil or urine staining, feeding remains and odour). In accordance with BCT guidelines (Ref. 36), all surveyed buildings and trees were classified as having negligible, low, moderate or high bat roosting potential, or as a confirmed roost, based on the following characteristics:

- a. **Negligible:** Structure or tree does not support any features likely to be used by bats;
- b. **Low:** A structure with one or more potential roost features that would be used by individual bats opportunistically; or a tree of sufficient size and age to contain potential roost features but with none seen from the ground, or features seen with only very limited roosting potential;
- c. **Moderate:** A structure or tree with one or more potential roost features that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat, but unlikely to hold a roost of high conservation status;
- d. **High:** A structure or tree with one or more potential roost features that are obviously suitable for the use by large numbers of bats on a more regular basis and potentially for longer periods of time, due to their size, shelter, protection, conditions and the surrounding habitat; or
- e. **Confirmed roost:** A feature which has evidence of roosting bats, such as observation of a live or dead bat in situ, bat feeding remains or bat droppings.

5.2.6 An internal inspection of buildings was not possible due to access constraints. Therefore, the roost potential was determined based on external surveys only, taking a precautionary approach to account for this, as detailed within the survey limitations section below.

5.2.7 Two derelict buildings at Winch Hill Farm (refer to Winch Hill Farm North Farmhouse and Winch Hill Farm South Farmhouse on the Bat Tree and Building Roost Potential Survey Plan in **Appendix H**) were demolished in October/November 2019, preceding the commencement of the Proposed Development, and therefore they do not form part of the baseline for the DCO application.

### ***Tree climbing inspections***

5.2.8 Tree climbing surveys were carried out in 2018 to inspect the potential roosting features on all trees classified as having moderate or high potential for roosting

bats. As per BCT guidelines, trees considered to have negligible or low potential were not subject to further survey and were therefore not climbed for inspection.

- 5.2.9 Tree climbing inspections were carried out between 21 and 25 May 2018 by suitably qualified ecologists (both holding at least a Level 2 bat licence) trained and certified in tree climbing and aerial rescue. A rope and harness climbing technique was used, allowing further investigation of potential roosting features which may be obscured from ground-level view. Torches and endoscopes were used for close investigation of any roosting features, and to search for evidence of bats.
- 5.2.10 Tree climbing is an effective way to access and investigate features that cannot be inspected from ground level. However, these surveys may be constrained by health and safety issues, for example where trees are deemed unsafe to climb.
- 5.2.11 The results of the tree climbing surveys were used to refine the results of the initial ground-based assessment of tree potential, with trees re-categorised as low, moderate or high potential once inspected by the climber. Where trees had multiple features of mixed roosting potential (i.e. moderate and high), the tree was treated according to the feature(s) with the highest potential.

### ***Emergence and re-entry surveys***

- 5.2.12 Following the identification of buildings and trees within the Main Application site boundary with potential to support roosting bats, dusk emergence and dawn re-entry surveys were undertaken at buildings between 2016 and 2019 and at trees between 2016 and 2018, which were subsequently updated in 2020, to ascertain the presence or absence of any bat roosts. The number of surveys were planned in accordance with BCT guidelines, as follows:
- a. Any buildings with low roosting potential were subjected to one emergence and/or re-entry survey;
  - b. Any buildings and trees with moderate roosting potential were subjected to two emergence and/or re-entry surveys;
  - c. Any buildings and trees with high roosting potential were subjected to three emergence and/or re-entry surveys; and,
  - d. Where a bat roost was confirmed within a building or tree, additional surveys were undertaken as required to allow characterisation of the type of roost present.
- 5.2.13 All emergence/re-entry surveys were carried out during the peak bat activity period between May and September. Weather conditions and survey dates are summarised within **Table 5.1** and locations of trees and buildings are shown in **Appendix H**.



Table 5.1: Weather conditions for emergence and re-entry surveys (2016 - 2020 surveys).

Date	Feature	Start temp.(°C)	End temp.(°C)	Other weather observations (cloud cover, precipitation, wind)*
<b>Buildings</b>				
12/09/2016 (Emergence)	Pillbox	21	21	7/8 cloud, dry, 2/12 wind
19/05/2017 (Re-entry)	Pillbox	8	8	8/8 cloud, light rain, 2/12 wind
27/06/2018 (Re-entry)	Pillbox	14	13	1/8 cloud, dry, 1/12 wind
25/07/2018 (Emergence)	Pillbox	27	27	6/8 cloud, dry, 1/12 wind
23/05/2019 (Emergence)	Winch Hill House and garage	20	20	2/8 cloud, dry, 3/12 wind
17/06/2019 (Emergence)	Winch Hill Cottage (1) and (2), Winch Hill House (garage only)	16	14	2/8 cloud, dry, 1/12 wind
18/06/2019 (Re-entry)	Winch Hill House	12	9	3/8 cloud, dry, 0/12 wind
15/07/2019 (Emergence)	Winch Hill Cottage (1) and (2)	18	14	1/8 cloud, dry, 1/12 wind
16/07/2019 (Re-entry)	Winch Hill House (garage only)	13	12	0/8 cloud, dry, 1/12 wind
21/08/2019 (Re-entry)	Winch Hill Cottage (1) and (2)	13	10	0/8 cloud, dry, 2/12 wind
<b>Trees</b>				
31/08/2016 (Re-entry)	T120, T122, T124	14	14	0/8 cloud, dry, 2/12 wind
13/09/2016 (Re-entry)	T124	17	18	2/8 cloud, dry, 2/12 wind
27/09/2016 (Re-entry)	T172	12	12	7/8 cloud, dry, 3/12 wind
18/05/2017 (Emergence)	T103, T105	12	12	8/8 cloud, light rain, 3/12 wind
19/05/2017 (Re-entry)	T120, T122	8	8	8/8 cloud, light rain, 2/12 wind

Date	Feature	Start temp.(°C)	End temp.(°C)	Other weather observations (cloud cover, precipitation, wind)*
24/05/2017 (Emergence)	T120, 122, T124 and T172	13	13	1/8 cloud, dry, 2/12 wind
25/05/2017 (Re-entry)	T103, T105, T172	11	11	0/8 cloud, dry, 0/12 wind
05/07/2018 (Emergence)	T130	25	25	1/8 cloud, dry, 0/12 wind
19/07/2018 (Emergence)	T172, T173	22	22	3/8 cloud, dry, 2/12 wind
08/08/2018 (Emergence)	T122	21	17	6/8 cloud, dry, 3/12 wind
09/08/2018 (Re-entry)	T124	14	14	6/8 cloud, brief light rain, 0/12 wind
15/08/2018 (Re-entry)	T172, T173	19	17	6/8 cloud, dry, 3/12 wind
22/08/2018 (Emergence)	T159	18	18	7/8 cloud, dry, 3/12 wind
05/09/2018 (Re-entry)	T130	12	12	7/8 cloud, dry, 3/12 wind
05/09/2018 (Emergence)	T122	19	19	7/8 cloud, dry, 3/12 wind
11/09/2018 (Re-entry)	T159	16	16	3/8 cloud, dry, 3/12 wind
10/08/2020 (Emergence)	T106, T122, T120, T105, T119	28	24	2/8 cloud, dry, 3/12 wind
11/08/2020 (Re- entry)	T167, T161, T163, T164	19	21	1/8 cloud, dry, 1/12 wind
17/08/2020 (Emergence)	T103, T104. T107, T124	20	18	7/8 cloud, light rain at start, 1/12 wind
18/08/2020 (Re- entry)	T111, T112	16	15	5/8 cloud, brief light drizzle, 2/12 wind
24/08/2020 (Emergence)	T113, T126, T168, T169, T170	18	16	2/8 cloud, dry, 2/12 wind
26/08/2020 (Emergence)	T171, T172, T174	19	17	3/8 cloud, dry, 1/12 wind
02/09/2020 (Emergence)	T167, T161	16	15	8/8 cloud, light drizzle at start, 3/12 wind

Date	Feature	Start temp.(°C)	End temp.(°C)	Other weather observations (cloud cover, precipitation, wind)*
03/09/2020 (Re-entry)	T105, T106, T107	15	16	8/8 cloud, dry, 3/12 wind
08/09/2020 (Emergence)	T111, T112, T172	20	19	3/8 cloud, dry, 2/12 wind
09/09/2020 (Re-entry)	T119, T122, T124, T174	14	16	2/8 cloud, dry, 3/12 wind
15/09/2020 (Emergence)	T120, T126, T167	22	20	7/8 cloud, dry, 3/12 wind
16/09/2020 (Re-entry)	T113, T168, T169, T170	19	17	2/8 cloud, dry, 2/12 wind
22/09/2020 (Emergence)	T161, T163	18	17	8/8 cloud, dry, 2/12 wind
23/09/2020 (Re-entry)	T122, T172			8/8 cloud, heavy showers, 2/12 wind
29/09/2020 (Emergence)	T105, T106, T124, T164	15	13	1/8 cloud, dry, 1/12 wind
30/09/2020 (Re-entry)	T103, T104, T120, T126	11	10	0/8 cloud, dry, 1/12 wind

\*Cloud cover was recorded in oktas and wind was estimated using the Beaufort scale. Please note that the numbering of all trees has been updated based on 2020 surveys, and results from previous reports are superseded.

- 5.2.14 Dusk emergence surveys of trees and buildings commenced 15 minutes before sunset and extended until 90 minutes after sunset. Dawn re-entry surveys of trees and buildings commenced 90 minutes before sunrise and extended until 15 minutes after sunrise.
- 5.2.15 Surveyors were positioned around buildings and trees to ensure all aspects with suitable features could be observed during the surveys and any bats emerging from or entering access points would be identified.
- 5.2.16 All surveyors were equipped with BatLogger M (Elekon) real-time full spectrum detectors which simultaneously play back, display the call frequency, and record bat calls. The detectors were set to record with an automatic trigger, and high sensitivity, enabling effective detection of any UK bat species.
- 5.2.17 All bats observed or heard on site were recorded, including (where possible) the number of bats, species, and information regarding behaviour (e.g. foraging or commuting) and direction of flight. Following the surveys, the recorded sound files were analysed using BatExplorer software to aid and confirm the identification of bats to species or genus level.

### ***Bat activity transect surveys***

- 5.2.18 In accordance with the BCT guidelines (Ref. 36) for sites of moderate suitability, bat activity transect surveys were undertaken once per month between April and September 2018. As described within BCT guidelines, five transect routes of similar lengths (approximately 3km) were utilised, the locations of which are shown on **Appendix I**, alongside their respective stopping locations. Bat activity transect surveys have not been updated in 2021, given the low level of bat activity recorded. However, bat static surveys have been updated in 2021, the results of which will be reported with the ES, to reconfirm bat activity levels across the site remain at similar levels to those previously recorded in 2018-2020.
- 5.2.19 The transect routes were planned prior to the surveys, focusing on suitable foraging and commuting habitats identified from the site Phase 1 habitat survey. All five transect surveys took place simultaneously each month in order to cover the whole site in each survey incidence. Two experienced surveyors walked each of the transect routes, stopping periodically at specific points along the transect routes to observe bat activity for periods of five minutes. The locations of stopping points were chosen to ensure good coverage of the study area. Dusk transect activity surveys commenced at or before sunset and lasted for at least 90 minutes and dawn transect surveys started 90 minutes before sunrise and lasted until 15 minutes after sunrise, in accordance with the BCT guidelines. Transect start points and directions were alternated each month in order to vary the time at which stopping points were sampled during the survey period.
- 5.2.20 All surveyors were equipped with BatLogger M (Elekon) real-time full spectrum detectors. All bats observed or heard on site were recorded, including (where possible) the species, and information regarding behaviour (e.g. foraging or commuting) and direction of flight. Following the surveys, the recorded sound files were analysed using BatExplorer software for identification of bats to species or genus level.
- 5.2.21 A Bat Activity Index is then established for each night in each location. This provides an index of the amount of use bats make of an area, but it is important to note that this is used to quantify bat activity, not bat abundance, which cannot be inferred from these acoustic recordings.
- 5.2.22 Weather conditions for the transect surveys were suitable for bat activity, as summarised in **Table 5.2**.

Table 5.2: Weather conditions for transect surveys (2018).

<b>Date</b>	<b>Dusk or Dawn</b>	<b>Start temp (°C)</b>	<b>End temp (°C)</b>	<b>Other weather observations (cloud cover, precipitation, wind)*</b>
26/04/2018	Dusk	10	8	3/8 cloud cover, dry, 3/12 wind
22/05/2018	Dusk	12	11	1/8 cloud cover, dry, 3/12 wind



Date	Dusk or Dawn	Start temp (°C)	End temp (°C)	Other weather observations (cloud cover, precipitation, wind)*
26/06/2018	Dusk	21	19	0/8 cloud cover, dry, 1/12 wind
23/07/2018	Dusk	29	26	1/8 cloud cover, dry, 2/12 wind
20/08/2018	Dusk	24	20	3/8 cloud cover, dry, 1/12 wind
21/08/2018	Dawn	18	17	3/8 cloud cover, dry, 2/12 wind
25/09/2018	Dusk	10	10	2/8 cloud cover, dry, 2/12 wind

\* Cloud cover was recorded in oktas and wind was estimated using the Beaufort scale

### ***Bat activity static surveys***

- 5.2.23 To gain longer-term data and increase the likelihood of detecting the species using the site, static detector surveys were also undertaken each month from April to September 2018. A total of ten BatLogger A+ (Elekon) automated static detectors were deployed for each of the six recording periods, at the ten locations shown on the Bat Activity Survey Plan in **Appendix I**. Update static detector surveys have been undertaken from April to October 2021 to reconfirm bat activity levels across the site, the results of which will be reported in the ES.
- 5.2.24 Sampling locations for the static detectors were selected using a subjective approach based on expert knowledge of the site gathered from habitat and bat surveys since 2016 and considering the main areas with potential to be impacted by the Proposed Development. Locations were selected based on likely bat commuting routes, taking into account the connectivity of the site habitats, and its large arable/pasture land areas.
- 5.2.25 For consistency across the sampling, the same model of static bat detector was used across the site, with the same settings and microphone type. Detectors were deployed by experienced ecologists, positioning the unidirectional microphones at appropriate heights and directions to maximise the recorded activity and to avoid obstruction of sound by dense foliage or other potential sound barriers.
- 5.2.26 Each detector was deployed for at least five consecutive nights during each recording period. The detectors were set to start recording from half an hour before sunset and throughout the night until half an hour after sunrise the following day, in line with BCT guidelines (Ref. 36).
- 5.2.27 All acoustic data was downloaded and analysed in BatExplorer software to identify species present and to quantify bat activity levels within the study area. The number of sound files recorded by the detectors each night was taken as a proxy value to the number of bat passes. After sound analysis and species classification in BatExplorer, a summary of the average bat passes per night for

each species/genus group (also known as a Bat Activity Index, as per BCT guidelines) was calculated.

5.2.28 Weather data for temperature, wind speed and precipitation were checked from online records for the nearest weather station in Luton Airport to ensure that the weather was suitable during the sampling period. There was variation in weather conditions over each of the five-day periods, however none of the nights had extended periods of high wind, heavy rain or extreme cold temperatures.

### ***Bat back-tracking surveys***

5.2.29 Two nights of back-tracking surveys were undertaken on 18 and 27 August 2020. The first was carried out in the ridgeline woodland in the centre of the Proposed Development and the second in the ancient woodland (Winch Hill Wood) immediately east of the airport boundary (northern and southern hatched areas on the Bat Activity Survey Plan in **Appendix I**, respectively). The aim of these surveys was to gather visual observations of bats commuting back to their roosts at sunrise and attempt to track them back to their roosts. In accordance with BCT guidelines (Ref. 36), dawn back tracking surveys are carried out under the following principles:

- a. The later a bat is seen before sunrise, the closer it is likely to be to its roost (exact timing dependant on species);
- b. At sunrise, bats fly towards their roosts, so surveyors can follow bats at this time to locate their roosts; and,
- c. At sunrise, some bat species will swarm around roost access points, providing a window of opportunity for surveyors to find and identify roosts.

5.2.30 Surveys were started two hours before sunrise, and continued until source roosts were found, or bats were no longer active. In each survey four surveyors were positioned along commuting routes on the edges of the woodland.

5.2.31 All surveyors were equipped with BatLogger M (Elekon) real-time full spectrum detectors to help detect and identify any observed bats. Any bats seen potentially flying towards roosts in the woodlands were followed and watched carefully for any dawn swarming or roost re-entry.

5.2.32 Weather conditions for the back-tracking surveys were suitable for bat activity, as summarised in **Table 5.3**.

Table 5.3: Weather conditions for back-tracking surveys.

Date	Start temp (°C)	End temp (°C)	Other weather observations (cloud cover, precipitation, wind)*
18/08/2020	16	16	8/8 cloud cover, light rain, 2/12 wind
27/08/2020	12	14	7/8 cloud cover, dry, 1/12 wind



\*Cloud cover is recorded in oktas and wind is recorded using the Beaufort scale

## Bat trapping surveys

- 5.2.33 In line with BCT guidelines (Ref. 36), advanced licenced bat survey techniques can be used to provide additional information needed to fully consider the potential level of impacts from the Proposed Development. The woodland areas on site provide suitable roosting and foraging habitats for elusive species that can be difficult to survey via other methods (i.e. tree-roosting or quiet-echolocating species, and sensitive bat populations such as Annex II bat species). Trapping surveys were undertaken in order to assess bat communities in the woodland areas and to gain further information about the presence of roosts and breeding bats on site.
- 5.2.34 Two nights of bat trapping were undertaken on 04 July and 29 August 2018 by suitably qualified ecologists (lead surveyor holds Natural England Level 3 and 4 Class Licences for bats). Surveys were focused on the ridgeline woodland in the centre of the Proposed Development and the ancient woodland (Winch Hill Wood) immediately east of the airport boundary (northern and southern hatched areas on the Bat Activity Survey Plan in **Appendix I**, respectively).
- 5.2.35 Each survey involved the deployment of four harp traps (in combination with AT100 lures) and a triple-high mist net. Surveys commenced at sunset and continued throughout the night until 3am. The species, sex, age class, weight and breeding status was recorded for all bats captured.
- 5.2.36 Weather conditions for the trapping surveys were suitable for bat activity, as summarised in **Table 5.4**.

Table 5.4: Weather conditions for trapping surveys.

Date	Start temp (°C)	End temp (°C)	Other weather observations (cloud cover, precipitation, wind)*
04/07/2018	18	15	5/8 cloud cover, dry, 2/12 wind
29/08/2018	15	9	2/8 cloud cover, dry, 1/12 wind

\*Cloud cover is recorded in oktas and wind is recorded using the Beaufort scale

## Survey limitations

- 5.2.37 Internal inspection of buildings with potential roost features was not possible due to access being denied and/or not considered essential to support assessment of occupied buildings for the presence of bats. However, the number of nocturnal surveys undertaken is considered suitably robust to establish presence or absence of bats, based on the roost potential assessments undertaken in line with BCT guidelines (Ref. 36).
- 5.2.38 Access for external inspection and emergence/re-entry surveys of Winch Hill Cottage (1) was restricted. Surveyors positioned around Winch Hill Cottage (2) were able to observe most aspects of Winch Hill Cottage (1) during emergence and return surveys because the buildings are located immediately adjacent to

one another. Whilst one aspect of Winch Hill Cottage (1) could not be fully observed, it is considered that the survey effort expended is sufficient to identify any bat roosts within this building. This survey limitation was also compensated for by undertaking a third survey of Winch Hill Cottage, above the minimum requirements for buildings with moderate roosting potential.

- 5.2.39 Where trees of medium and high roost potential from the ground-based assessments were not safe to climb, the roost potential ascertained during the ground-based assessments was used to decide the number of subsequent emergence or return surveys. This approach is in line with the BCT guidelines.
- 5.2.40 Bats exhibit great variation in their calls depending on many factors, including the surrounding habitat, and there is a substantial degree of overlap for some call characteristics between species. Some calls may not be identifiable to species level due to interference from local noise or other bats, or because only a partial call was recorded. As a result, it was only possible to determine the genus of the bat in some recordings, and for some genus (e.g. *Myotis*) which is a main limitation of this methodology.
- 5.2.41 Different bat species have different levels of detectability (e.g. some species may echolocate more frequently than others, some species calls may be quieter than others – making them more difficult to detect), so the Bat Activity Index cannot be assumed to represent the difference in bat activity levels between species. Additionally, as individual bats may pass the detector multiple times, the Bat Activity Index cannot be assumed to represent the actual number of bats present.
- 5.2.42 There are a few surveys where weather conditions were suboptimal, with temperatures slightly below 10°C and light rain or heavy rain showers during periods of the survey. In these situations, the professional judgement of surveyors justified the validity of the surveys based on the activity recorded (including bats re-entering a roost in one suboptimal survey) and the conditions on the ground.
- 5.2.43 Due to very low temperatures in October 2018, transect surveys and static monitoring were terminated in September. The temperatures ranged between 0-8° and were generally below 6°C.
- 5.2.44 Despite the above limitations, the results gathered are considered sufficiently robust to meet the survey objectives and draw the conclusions described within this report.

## **5.3 Results**

### **Desk study**

- 5.3.1 There are no statutory designated sites for bats within 30km of the Main Application Site.
- 5.3.2 There are records of bats in flight within 2km of the Main Application Site from the last 10 years for common pipistrelle only.

## Field study

### *Ground-based assessment of potential roost features -buildings*

- 5.3.3 Six of the 19 buildings on site were initially classified as having moderate potential for roosting bats. Two buildings (Pillbox and Winch Hill Cottage (2)) were subsequently confirmed as roosts.
- 5.3.4 Two derelict buildings at Winch Hill Farm (refer to Winch Hill Farm North Farmhouse and Winch Hill Farm South Farmhouse on the Bat Tree and Building Roost Potential Survey Plan in **Appendix H**) were demolished in October/November 2019, preceding the commencement of the Proposed Development, and therefore they do not form part of the baseline for the DCO application.
- 5.3.5 Survey results for bat surveys at these two buildings were provided separately in a report issued in August 2019 (Winch Hill Farmhouse Demolition Ecology Report) and are therefore not detailed further within this report.
- 5.3.6 Five of the 17 buildings assessed in 2020 within the footprint of the Proposed Development were assessed as having moderate potential for roosting bats. The remaining 12 buildings, which fall within the footprint of the Airport Access Road, were assessed in 2020 as providing either negligible (six buildings) or low (six buildings) roost potential.
- 5.3.7 A summary of each building surveyed and the assessment of their roosting potential based on the initial inspections is provided in **Table 5.5**. The locations and assessment results of all buildings are shown on the Bat Tree and Building Roost Potential Survey Plan in **Appendix H**.

Table 5.5: Buildings with potential roosting features for bats

<b>Building name and code*</b>	<b>Description</b>	<b>Roost potential</b>
Pillbox B001	Red brick WW2 pillbox. Single storey, red-brick structure with 6 small openings that provide potential entry/exit points.	Moderate initially, then confirmed as roost through emergence/re-entry surveys
Winch Hill House B002	1970s-built house. Brick construction partly clad with pebble dash. Pitched tile roof with multiple potential access points for bats, including gaps at gable apex, under soffits, between tiles and under flashing. No evidence of bats (e.g. droppings) noted.	Moderate
Winch Hill House garage B003	Associated (but unconnected) garage/workshop, wood-boarded construction and pitched, corrugated metal roof with plastic lining. Approximately 20 – 30 years old, located within the edge of adjacent conifer	Moderate



Building name and code*	Description	Roost potential
	plantation. Some holes within wooden boards, with small sections of wood cladding missing. There is a small hole near the gable apex at approximately 5m height. No evidence of bats noted externally.	
Winch Hill Cottage (1) B004	1850s semi-detached property. Red-brick construction. The pitched roof is of cross hipped design. Multiple slipped or slightly lifted tiles were observed. Lead flashing between roof and chimney appears to offer some void space for roosting bats. Single storey extension to rear of property with single pitched tile roof. Shared porch structure to the front of the property with wood post and brick construction and single sloped tile roof, lead flashing tie ins to main structure. Due to access restrictions it was not possible to search for evidence of bats.	Moderate
Winch Hill Cottage (2) B005	1850s semi-detached property. Red-brick construction. Pitched cross hipped tile roof with multiple slipped or slightly lifted tiles. Lead flashing between roof and chimney appears to offer some void space for roosting bats. Shared porch structure to the front of the property with wood post and brick construction and single sloped tile roof, lead flashing tie ins to main structure. At the time of the inspection a previous extension had been removed from the southern side of the building to make way for a new brick construction extension. Slot holes associated with the beams of the previous extension were exposed and offered potential access points for bats. No evidence of bats (such as droppings) were noted.	Moderate initially, then confirmed as roost through emergence/re-entry surveys
Winch Hill Farm North Farmhouse B006	Demolished in October/November 2019.	Moderate
Winch Hill Farm South Farmhouse B007	Demolished in October/November 2019.	Low
Building 95 (Halcyon House) B008	Two storey office building, within industrial/business estate forming the wider airport complex. Building of corrugated metal construction, with corrugated metal walls, PVC windows, flat roof (material not visible).	Negligible

Building name and code*	Description	Roost potential
	Appears in good general condition, no obvious features that could be utilised by roosting bats. Negligible suitability for bats also as a result of artificial lighting on all aspects, and buildings location within an industrial estate with foraging opportunities limited to ornamental shrubs and individual trees.	
Building 194 (Rushton House) B009	Two storey office building, within industrial/business estate forming the wider airport complex. Building of corrugated metal construction, with corrugated metal walls, PVC windows, flat roof (material not visible). Generally in a good state of repair; however, metal lip connecting top of walls to flat roof is missing for a c.5m stretch at the western elevation. This could allow an access points for bats beneath roofing material. Some foraging opportunities offered by scrub mosaic to the north of the building, however given the predominance of artificial lighting, and generally denuded foraging opportunities within local landscape, roosting potential for bats is assessed as low.	Low
Building 123 B010	Two storey brick structure office building with attached warehouse with brick and corrugated metal construction. The brick office section of the building has a flat roof (material not visible), wooden framed windows and doors and large corrugated metal shutter doors on the southern side. The building sits within an industrial/business estate forming the wider airport complex. The building is in a good state of repair with no obvious features that could be utilised by roosting bats. The building has artificial lighting on each aspect and limited foraging opportunities in the immediate vicinity.	Negligible
Building 53 B011	Small warehouse style building constructed from corrugated concrete or asbestos panels, forming the walls and roof. The building sits within an industrial/business estate forming the wider airport complex. It is in a poor state of repair with many of the corrugated sheets broken or wholly missing to reveal wooded structure beneath with plastic lining. Gaps present where corrugated sheets overlap.	Low

Building name and code*	Description	Roost potential
	Potential for these features to be utilised by roosting bats. However, given the lack of suitable foraging habitats within the immediate surrounds, and artificial lighting to all elevations, the suitability for roosting bats remains low.	
Building 74 (Alpha LSG) B012	Large, single storey brick building with wooden soffit boxes, PVC windows and a flat roof of roofing felt construction. The building sits within an industrial/business estate forming the wider airport complex. The structure is in a generally good state of repair, however a c.2-5cm gap near the south-east corner between the base of the soffit and the wall could allow access into the soffit box void for crevice dwelling bat species. However, given the lack of suitable foraging habitats within the immediate surrounds, and artificial lighting to all elevations, the suitability for roosting bats remains low.	Low
Building 108 (Monarch) B013	Two storey building, brick structure to the ground floor, corrugated metal cladding surrounding the second floor to the eastern half of the building, flat roof across the whole of the building although material not visible. The building sits within an industrial/business estate forming the wider airport complex. A small area of immature trees are present to the western end of the building and the scrub mosaic of Dairyborn Scarp DWS to the north. The building is in a good state of repair, with no obvious access/egress points for roosting bats. Moreover, the building is subject to artificial lighting from adjacent street lighting and security lights on adjacent buildings.	Negligible
Building 107 (TUI) B014	Two storey office building of brick construction with metal framed windows, flat roof with elevated pitched corrugated metal section. The building sits within an industrial business estate forming the wider airport complex. A small area of immature trees form a landscaped bund along the south and western end of the building and the scrub mosaic of Dairyborn Scarp DWS is present to the north. Metal trade access doors at the western end of the building are damaged allowing potential	Low



Building name and code*	Description	Roost potential
	access point for crevice dwelling bats behind the cladding or into the structure. These habitats provide some foraging opportunities for bats, although there is extensive light spill from security lights on the building and street lighting along the access roads.	
Building 140 (Prospect House Day Nursery) B015	Two storey office building clad with metal panels, with a pitched corrugated metal roof and PVC windows. The building is in a good state of repair with no visible features that could be used by roosting bats. The building sits within an industrial/business estate forming the wider airport complex. A small area of immature trees form a landscaped bund along the south and eastern end of the building and the scrub mosaic of Dairyborn Scarp DWS is present to the north beyond a carpark. These habitats provide some foraging opportunities for bats, although there is extensive light spill from security lights on the building and street lighting along the access roads.	Negligible
Building 133 (Essex House) B016	Two storey office building of brick construction with pitched tiled roof, metal framed windows, and wooded soffit boxes. The building is in a generally good state of repair however the soffit is partially broken on the north eastern corner with a small strip of wood missing forming a c.5-10cm wide gap which could offer access/egress point for crevice dwelling bats. The building sits within an industrial/business estate forming the wider airport complex. The scrub mosaic habitats of Dairyborn Scarp DWS are located immediately to the west, and immature trees form a landscape bund to the east, these habitats may offer suitable foraging habitats for bats. However, given the extensive light spill from street lighting and security lighting adjacent to the building it is considered to have low potential for roosting bats.	Low
Building 137 (Eaton House) B017	Two storey office building of brick construction with pitched tiled roof, metal framed windows, and wooded soffit boxes. The building is in a generally good state of repair however there is a small hole c.5cm in diameter in the soffit box	Low

Building name and code*	Description	Roost potential
	<p>at the south west corner which could offer access/egress point for crevice dwelling bats. The building sits within an industrial / business estate forming the wider airport complex. The scrub mosaic habitats of Dairyborn Scarp DWS are located immediately to the west, and immature trees form a landscape bund to the east, these habitats may offer suitable foraging habitats for bats. However, given the extensive light spill from street lighting and security lighting adjacent to the building it is considered to have low potential for roosting bats.</p>	
<p>Building 146 (Monarch Training Centre) B018</p>	<p>Two storey office building of prefabricated rendered wooden boarding construction, metal framed windows and flat roof likely comprising roofing felt. The building appears no longer in use but is in a good state of repair with no visible features that could be utilised by roosting bats. The building sits within an industrial/business estate forming the wider airport complex. The scrub mosaic habitats of Dairyborn Scarp DWS are located immediately to the west, which may offer suitable foraging habitats for bats. The building is subject to illumination from security lighting on the building and adjacent street lighting.</p>	<p>Negligible</p>
<p>Abandoned caravans within Dairyborn Scarp DWS. B019</p>	<p>Three temporary, caravan/portacabin type temporary building structures are located within Dairyborn Scarp DWS. These dilapidated structures are of largely plastic boarding structure, with metal framed windows which are devoid of glass, and with holes in the roof leave the interior fully exposed to the elements. No obvious crevices or ledges are present which could accommodate roosting bats. The structures are completely surrounded by buddleia dominated scrub.</p>	<p>Negligible</p>

\*Building numbers have been assigned with the exception of those within the industrial estate at Dairyborn Scarp DWS, which have building numbers associated with the estate

### ***Ground-based and tree climbing assessment of potential roost features - trees***

- 5.3.8 All trees (with the exception of those in the ridgeline woodland and the ancient woodland (Winch Hill Wood) found to have low, moderate or high roosting potential during the ground-based assessments in 2018 and 2020, and the tree climbing assessment in 2018 within the Main Application Site are summarised in **Table 5.6**. Also included are trees that have been downgraded to negligible in 2020. The locations of these trees are provided on the Bat Tree and Building Roost Potential Survey Plan in **Appendix H**.
- 5.3.9 The numbering and roosting potential of all trees has been updated based on 2020 surveys, and results from previous surveys are superseded.
- 5.3.10 Of the sixteen trees found to have high or moderate potential roost features during the ground-based assessments in 2018, nine were subjected to tree climbing inspections. The remaining seven trees were deemed unsafe to climb but were re-inspected from ground level. No confirmed bat roosts were identified during the tree climbing surveys. The level of bat roosting potential of several of the trees was re-categorised as a result of the survey.
- 5.3.11 The Main Application Site included eight trees with high potential (of which two were later confirmed as roosts), fourteen with moderate (of which one was later confirmed as a roost) and fourteen with low potential in 2020.
- 5.3.12 The ridgeline woodland is largely coniferous; however it included one tree with moderate potential (later confirmed as a roost) and nine with low in 2020. These trees were not subject to emergence/return surveys; however, this woodland was included in the back-tracking and trapping surveys and will be retained.
- 5.3.13 The ancient woodland (Winch Hill Wood) included three trees with high potential, nineteen with moderate and four with low in 2020. These trees were not subject to emergence/return surveys; however, this woodland was included in the back-tracking and trapping surveys and will be retained.
- 5.3.14 The off-site mitigation areas included four trees with high potential, 18 with moderate and four with low in 2020; however they were not subject to further survey due to the planned retention of these trees in areas not subject to construction works.
- 5.3.15 The land within the footprint of the Airport Access Road included one tree with moderate potential and two with low.

Table 5.6: Ground-based and tree climbing roost potential assessments of trees.

Tree ID	Species	Description	Roost potential - GLTA 2018	Roost potential - tree climbing 2018	Roost potential - GLTA 2020*
T101	Quercus robur	Main Application Site Oak with dead limb on second stem, 1m out from the canopy. Loose bark at 3.5m height, facing north. DBH 0.8m.	-	-	<b>Low</b>
T102	Quercus robur	Main Application Site Dead oak tree with decay feature at 1m height, facing north-east. DBH 0.5m.	-	-	<b>Low</b>
T103	Quercus robur	Main Application Site Oak with woodpecker hole on branch, 9m high and north-west facing. Tree inspection noted that features could provide shelter for low numbers of bats. DBH 0.9m.	Moderate	Moderate	<b>Moderate</b>
T104	Quercus robur	Main Application Site Oak with two features, a hazard beam at 3m height, facing south east, and a branch cavity with small amount of dead wood around it. DBH 1.2m.	-	-	<b>Moderate initially, then confirmed as roost through emergence/ re-entry surveys</b>

Tree ID	Species	Description	Roost potential - GLTA 2018	Roost potential - tree climbing 2018	Roost potential - GLTA 2020*
T105	Quercus robur	<p>Main Application Site</p> <p>Tall oak with dead branch. Features are a woodpecker hole at 5.5m, north-west facing and a knot hole at 5.8m height, north-west facing. DBH 1.2m.</p> <p>Tree inspection noted that features could provide shelter for low numbers of bats.</p>	Moderate	Moderate	<b>High</b>
T106	Quercus robur	<p>Main Application Site</p> <p>Oak with woodpecker hole at 6m height, facing north-east. Callus roll directly above that could extend into cavity. Flies coming in and out of entrance, and possible stain marks. Decay feature present with possible ramshorn between deadwood and heartwood. DBH 1.2m.</p>	-	-	<b>High</b>
T107	Quercus robur	<p>Main Application Site</p> <p>Oak with ramshorn feature extending from</p>	-	-	<b>Moderate</b>



Tree ID	Species	Description	Roost potential - GLTA 2018	Roost potential - tree climbing 2018	Roost potential - GLTA 2020*
		base to top on west facing side. DBH 0.65m.			
T108	Quercus robur	Main Application Site No potential roosting features visible from ground, but limited view from thick foliage. DBH 1.2m.	-	-	<b>Low</b>
T109	Quercus robur	Main Application Site Oak with multiple decay features with fissures and an open wound at 4m height, facing north. DBH 1.2m.	-	-	<b>Low</b>
T110	Quercus robur	Main Application Site Oak with fallen branch now on ground. Small hole from tear out at 3m height, facing west. DBH 1.6m.	-	-	<b>Low</b>
T111	Quercus robur	Main Application Site Oak with difficult access due to dense bramble and blackthorn. Splits in exposed heartwood at 4m height, facing east. DBH 1m.	-	-	<b>Moderate</b>
T112	Quercus robur	Main Application Site	-	-	<b>Moderate</b>

Tree ID	Species	Description	Roost potential - GLTA 2018	Roost potential - tree climbing 2018	Roost potential - GLTA 2020*
		Oak with callus roll at 8m height, facing south east. DBH 1m.			
T113	Quercus robur	Main Application Site Oak with two features – a trunk cavity, and a callus roll at 6m height, facing north west. DBH 0.8m.	-	-	<b>Moderate</b>
T118	Quercus robur	Main Application Site Oak with dead branch, shallow split along length leading to shallow knot hole. 7m west facing. DBH 1m.	Low	N/A	<b>Low</b>
T119	Quercus robur	Main Application Site Oak with two knot holes on limbs at 10m height, facing south west. DBH 1.1m.	-	-	<b>Moderate</b>
T120	Quercus robur	Main Application Site Dead oak with a woodpecker hole in stem at 6m facing south and rot hole on limb. Shallow trunk splits at 3m on north and south aspects making it unsafe to climb. Small knot hole at	Moderate	High	<b>High initially, then confirmed as roost through emergence/re-entry surveys</b>

Tree ID	Species	Description	Roost potential - GLTA 2018	Roost potential - tree climbing 2018	Roost potential - GLTA 2020*
		3m facing north. DBH 0.9m.			
T121	Quercus robur	Main Application Site Ivy clad young oak. No features recorded, but thick ivy coverage is a limitation. DBH 0.4m.	-	-	<b>Low</b>
T122	Fraxinus excelsior	Main Application Site Large ash with multiple features mostly on southern aspect, including trunk cavities and woodpecker holes. Unsafe to climb due to hollow trunk. DBH 1.2m.	Moderate	High	<b>High</b>
T123	Quercus robur	Main Application Site Mature oak adjacent to airport fence. Split at 7m facing north-east but no depth to feature. DBH 1m.	Low	N/A	<b>Low</b>
T124	Quercus robur	Main Application Site Very mature oak tree with several features of moderate bat potential. Knot hole at 7m high, facing west. Branch split at 6m, leading into	Moderate	High	<b>High initially, then confirmed as roost</b>

Tree ID	Species	Description	Roost potential - GLTA 2018	Roost potential - tree climbing 2018	Roost potential - GLTA 2020*
		branch cavity, facing east. DBH 1.5m.			
T125	Fraxinus excelsior	Main Application Site Ash tree with single knot hole at 5.5m, facing north-east. DBH 0.45m.	Low	N/A	<b>Low</b>
T126	Quercus robur	Main Application Site - within ridgeline woodland Very mature oak tree with multiple knot holes and ivy cover. Knot hole at 6m, south-west facing. Knot hole at 8m, south facing. DBH 1.1m. Tree inspection noted that features could provide shelter for low numbers of bats.	Moderate	Moderate	<b>Moderate initially, then confirmed as roost</b>
T127	Prunus avium	Main Application Site - within ridgeline woodland Wild cherry with shallow knot hole at 6m, south-west facing. DBH 0.3m.	Low	N/A	<b>Low</b>
T128	Prunus avium	Main Application Site - within ridgeline woodland Wild cherry with open trunk cavity	Low	N/A	<b>Negligible</b>

Tree ID	Species	Description	Roost potential - GLTA 2018	Roost potential - tree climbing 2018	Roost potential - GLTA 2020*
		at 6m, east facing in 2018. The feature was found to have recently fallen during 2020 survey and no longer suitable for roosting bats. DBH 0.6m.			
T129	Quercus robur	Main Application Site - within ridgeline woodland Oak with shallow callus roll at 1m east. DBH 1.1m.	Low	N/A	Low
T136	Quercus robur	Main Application Site - within ridgeline woodland Cherry with trunk cavity at 1m, north facing. No potential roosting features noted in 2020 survey. DBH 0.25m.	Low	N/A	Negligible
T140	Quercus robur	Main Application Site - within ridgeline woodland Single stem mature oak with multiple dead limbs facing south at around 8m height. DBH 1m.	-	-	Low
T141	Prunus avium	Main Application Site - within ridgeline woodland	-	-	Low



Tree ID	Species	Description	Roost potential - GLTA 2018	Roost potential - tree climbing 2018	Roost potential - GLTA 2020*
		Single stem cherry tree with fork at 2.5m height. Bark split with decay at 1m height, facing south. Light ivy cladding and heavily cobwebbed. DBH 0.5m.			
T144	Fraxinus excelsior	Main Application Site - within ridgeline woodland Ash with low rot cavity (0.5m, west-facing). Decay feature at base of stump on east side. DBH 0.4m.	Moderate	Moderate	<b>Low</b>
T146	Quercus robur	Main Application Site - within ridgeline woodland Single stem mature oak free with decay features on limbs at 8m height. DBH 1.3m.	-	-	<b>Low</b>
T148	Quercus robur	Main Application Site - within ridgeline woodland Oak with shallow knot hole at 7m, facing down towards ground on north-west side. DBH 1.1m.	Low	N/A	<b>Low</b>

Tree ID	Species	Description	Roost potential - GLTA 2018	Roost potential - tree climbing 2018	Roost potential - GLTA 2020*
T154	Prunus avium	Main Application Site - within ridgeline woodland Large cherry tree with hazard beam on fallen main stem at 0.7m height, facing north west. Cobwebs inside feature. DBH 0.4m.	-	-	Low
T159	Quercus robur	Main Application Site - within ridgeline woodland Oak with thick ivy cover. Shallow branch cavity at 12m height, north facing. DBH 1m.	Low	N/A	Low
T160	Fagus sylvatica	Main Application Site Single stem beech forking into two stems at 4.5m height. Upwards facing wound on branch at 11m height, on south facing side. DBH 0.3m.	-	-	Low
T161	Acer campestre	Main Application Site Field maple with woodpecker hole in dead stem where a tearout has occurred, at 6.5m height,	-	-	High

Tree ID	Species	Description	Roost potential - GLTA 2018	Roost potential - tree climbing 2018	Roost potential - GLTA 2020*
		facing east. DBH 0.5m.			
T162	Fagus sylvatica	Main Application Site Beech on woodland edge. Single stem forking at 1m, with decay features in stems at 2.5m height, leaving to cavity in steam on north side. DBH 0.3m.	-	-	<b>Low</b>
T163	Fagus sylvatica	Main Application Site Single stem beech with start of a woodpecker hole at 10m height, facing south west. DBH 0.25m.	-	-	<b>Moderate</b>
T164	Quercus robur	Main Application Site Single stem mature oak with ivy cladding. Branch cavity at 10m height on west side. DBH 1m.	-	-	<b>Moderate</b>
T165	Fagus sylvatica	Main Application Site Beech with small crevice on trunk at 2.2m height, facing east. Was once a fusion weald. DBH 0.6m.	-	-	<b>Low</b>
T166	Fagus sylvatica	Main Application Site	-	-	<b>Low</b>

Tree ID	Species	Description	Roost potential - GLTA 2018	Roost potential - tree climbing 2018	Roost potential - GLTA 2020*
		Single stem beech forking into two stems at 4m height. Knot hole at 6m height, facing west. DBH 0.3m.			
T167	Quercus robur	Main Application Site Mature oak with knot hole on limb at 10m height, facing west, and a woodpecker hole at 10m height on east side. DBH 1.5m.	-	-	<b>High</b>
T168	Quercus robur	Main Application Site Single stem oak on field margin with branch cavity at 3m height, facing north. DBH 1m.	-	-	<b>Moderate</b>
T169	Quercus robur	Main Application Site Single stem mature oak with ivy cladding. Split visible at 7m height on north side. Features may be obstructed by ivy cover. DBH 1.3m.	-	-	<b>Moderate</b>
T170	Quercus robur	Main Application Site Oak with knot hole on branch elbow at 6m	-	-	<b>Moderate</b>

Tree ID	Species	Description	Roost potential - GLTA 2018	Roost potential - tree climbing 2018	Roost potential - GLTA 2020*
		height, facing north. DBH 0.9m.			
T171	Quercus robur	Main Application Site Oak tree with shallow split at 6m, north-east facing. Multiple cavities with split limbs. DBH 1.3m.	Low	N/A	<b>Moderate</b>
T172	Quercus robur	Main Application Site Oak with callus roll and branch cavity at 6m height facing west. Unsafe to climb, re-assessed from ground only. DBH 1.2m.	Moderate	Moderate	<b>High</b>
T173	Quercus robur	Main Application Site Oak with knot hole and hazard beam. Unsafe to climb, re-assessed from ground only. Knot hole shallow. DBH 0.9m.	Moderate	Moderate	<b>Low</b>
T174	Tilia cordata	Main Application Site Dual stem oak with woodpecker hole at 4m height, facing northeast. DBH 0.2m.	-	-	<b>Moderate</b>
T175	Quercus robur	Within mitigation area Multiple features splits and split	-	-	<b>High</b>

Tree ID	Species	Description	Roost potential - GLTA 2018	Roost potential - tree climbing 2018	Roost potential - GLTA 2020*
		branches 4m northeast, 5m southwest, 10m south, knothole 15m south. Hibernation potential. DBH 1.5m.			
T176	Quercus robur	Within mitigation area Large trunk split 8m west, woodpecker holes 8m south and 6m east, branch cavity. DBH 1.5m.	-	-	<b>High</b>
T177	Quercus robur	Within mitigation area Loose bark 3m west, trunk cavity 9m north, broken main stem at crown. DBH 1.5m.	-	-	<b>Moderate</b>
T178	Quercus robur	Within mitigation area Callus roll 5m east, split limb 3m southwest, dead limb with multiple hollows. DBH 1m.	-	-	<b>Moderate</b>
T179	Quercus robur	Within mitigation area Split dead limb 5m southeast. DBH 1.75m.	-	-	<b>Moderate</b>
T180	Quercus robur	Within mitigation area Dead limb with loose bark 4m west, woodpecker hole 6m	-	-	<b>Moderate</b>



Tree ID	Species	Description	Roost potential - GLTA 2018	Roost potential - tree climbing 2018	Roost potential - GLTA 2020*
		southeast, split and twisted limb 8m southwest. DBH 1m.			
T181	Fraxinus excelsior	Within mitigation area Trunk cavity 4m south, woodpecker and rot holes 8m southeast. DBH 2m.	-	-	<b>High</b>
T182	Quercus robur	Within mitigation area Lost limb with splitting at base 8m southeast. DBH 1.5m.	-	-	<b>Moderate</b>
T183	Quercus robur	Within mitigation area Split limbs 8m southwest but very exposed. DBH 1.5m.	-	-	<b>Low</b>
T184	Quercus robur	Within mitigation area Woodpecker holes with rot 6m northwest. DBH 1m.	-	-	<b>Moderate</b>
T185	Quercus robur	Within mitigation area Woodpecker hole with significant staining 6m northeast. DBH 1.5m.	-	-	<b>Moderate</b>
T186	Quercus robur	Within mitigation area Significant ivy cover from 1m,	-	-	<b>Moderate</b>

Tree ID	Species	Description	Roost potential - GLTA 2018	Roost potential - tree climbing 2018	Roost potential - GLTA 2020*
		dead limbs with loose bark and rot holes 6m northeast. DBH 1.5m.			
T187	Quercus robur	Within mitigation area Dead wood but no obvious features. DBH 1m.	-	-	<b>Low</b>
T188	Fraxinus excelsior	Within mitigation area Significant ivy cover from 1m potentially obscuring features. DBH 1m.	-	-	<b>Moderate</b>
T189	Quercus robur	Within mitigation area Branch cavity/rot hole 4m southeast dead limbs with loose bark 4m southeast but fairly exposed. DBH 1.5m.	-	-	<b>Moderate</b>
T191	Quercus robur	Within mitigation area Knot hole with small rot holes 5m south. DBH 1m.	-	-	<b>Moderate</b>
T192	Quercus robur	Within mitigation area Split limb with dead wood at base of stem, loose bark 2m south. DBH 1.5m.	-	-	<b>Moderate</b>
T194	Quercus robur	Within mitigation area	-	-	<b>Moderate</b>

Tree ID	Species	Description	Roost potential - GLTA 2018	Roost potential - tree climbing 2018	Roost potential - GLTA 2020*
		Split limbs at crown break with hollows at base 5m northwest. DBH 1.5m.			
T195	Quercus robur	Within mitigation area Rot hollows, truck cavity 2m south, split in truck with callus roll 4m south. DBH 0.5m.	-	-	<b>High</b>
T196	Quercus robur	Within mitigation area Not possible to fully assess due to foliage. DBH 2m.	-	-	<b>Low</b>
T198	Quercus robur	Within mitigation area Branch cavity and lifted bark 8m east and branch cavity 7m west. DBH 1.5m.	-	-	<b>Moderate</b>
T199	Fraxinus excelsior	Within mitigation area Significant ivy cover. DBH 1.5m.	-	-	<b>Moderate</b>
T201	Fraxinus excelsior	Within mitigation area Unable to inspect due to dense scrub. DBH 1m.	-	-	<b>Low</b>
T202	Fraxinus excelsior	Within mitigation area Significant ivy cover. DBH 2m.	-	-	<b>Moderate</b>
T203	Quercus robur	Within mitigation area	-	-	<b>Moderate</b>

Tree ID	Species	Description	Roost potential - GLTA 2018	Roost potential - tree climbing 2018	Roost potential - GLTA 2020*
		Standing dead tree unable to inspect due to ivy cover and hedgerow. DBH 1m.			
T204	Acer campestre	Within mitigation area Significant ivy cover. DBH 1.5m.	-	-	<b>Moderate</b>
T206	Acer campestre	Main Application Site - within ancient woodland Multi-stemmed coppiced, vertical split/wound 3.5m southwest. DBH 1.5m.	-	-	<b>Moderate</b>
T207	Fagus sylvatica	Main Application Site - within ancient woodland Multi-stemmed coppiced, vertical crack/loose bark 7m southwest. DBH 1m.	-	-	<b>Moderate</b>
T208	Fagus sylvatica	Main Application Site - within ancient woodland Multi-stemmed coppiced, wound next to ramshorn 10m west. DBH 1.2m.	-	-	<b>Moderate</b>
T209	Betula pendula	Main Application Site - within ancient woodland Loose bark and cavity beneath, 2m west, decaying trunk. DBH 0.4m.	-	-	<b>Moderate</b>

<b>Tree ID</b>	<b>Species</b>	<b>Description</b>	<b>Roost potential - GLTA 2018</b>	<b>Roost potential - tree climbing 2018</b>	<b>Roost potential - GLTA 2020*</b>
T210	Betula pendula	Main Application Site - within ancient woodland Decaying tree, woodpecker hole 12m southwest. DBH 0.4m.	-	-	<b>Moderate</b>
T211	Acer campestre	Main Application Site - within ancient woodland Multi-stemmed coppiced, trunk cavity and knot hole 8m west. DBH 1.5m.	-	-	<b>Moderate</b>
T212	Fagus sylvatica	Main Application Site - within ancient woodland Two-stemmed, loose bark and decay/rot all around main stem from 4.5m. DBH 0.75m.	-	-	<b>High</b>
T213	Fagus sylvatica	Main Application Site - within ancient woodland Three vertical wounds from 4.5m, scrub prevented full inspection. DBH 0.3m.	-	-	<b>High</b>
T214	Acer campestre	Main Application Site - within ancient woodland Two-stemmed coppiced, wound on main stem 3m west. DBH 0.5m.	-	-	<b>Moderate</b>

<b>Tree ID</b>	<b>Species</b>	<b>Description</b>	<b>Roost potential - GLTA 2018</b>	<b>Roost potential - tree climbing 2018</b>	<b>Roost potential - GLTA 2020*</b>
T215	Fagus sylvatica	Main Application Site - within ancient woodland Two-stemmed, split 1m northeast. DBH 1.5m.	-	-	<b>Moderate</b>
T216	Fagus sylvatica	Main Application Site - within ancient woodland Multi-stemmed coppiced, split at 1m, loose bark all around, decay. DBH 1m.	-	-	<b>High</b>
T217	Betula pendula	Main Application Site - within ancient woodland Knot hole 3m southeast. DBH 0.5m.	-	-	<b>Moderate</b>
T218	Populus sp.	Main Application Site - within ancient woodland Two-stemmed with split at 0.5m south. DBH 1.2m.	-	-	<b>Moderate</b>
T219	Betula pendula	Main Application Site - within ancient woodland Wound 4.5m south. DBH 0.5m.	-	-	<b>Moderate</b>
T220	Aesculus hippocastanum	Within CPAR Ivy cover from 1m. DBH 1m.	-	-	<b>Low</b>
T223	Betula pendula	Within CPAR Ivy cover with some lifted bark too obscured to fully inspect. DBH 0.8m.	-	-	<b>Low</b>



Tree ID	Species	Description	Roost potential - GLTA 2018	Roost potential - tree climbing 2018	Roost potential - GLTA 2020*
T225	Acer pseudoplatanus	Within CPAR Standing dead trunk with lengths of lifted bark. DBH 0.3m.	-	-	<b>Moderate</b>
T226	Prunus avium	Within ridgeline woodland Wild cherry with split limb at 4m west. Tree found fallen in 2020. DBH 0.3m.	Moderate	Moderate	<b>Negligible</b>
T227	Juglans regia	Main Application Site Walnut with multiple knot holes that don't extend inwards. DBH 1m.	Low	N/A	<b>Negligible</b>

\* The most updated roost potential classification is in bold in the 2020 column.

### ***Emergence and re-entry surveys - buildings***

- 5.3.16 Two buildings were confirmed to support bat roosts: the Pillbox (B001) and Winch Hill Cottage (2) (B005). The Proposed Development does not directly impact these buildings, and both will be retained.
- 5.3.17 No roosts were observed during surveys of the other three buildings: Winch Hill House (B002), Winch Hill House garage (B003) and Winch Hill Cottage (1) (B004). No emergence/return surveys were possible at any of the remaining buildings within Dairyborn Scarp DWS. A summary of these results is provided in **Table 5.7**. Photographs of confirmed roosts are provided in **Section 13**.

Table 5.7: Summary of building emergence and re-entry surveys and confirmed roosts.

Building	Roost (Yes/No)	Details of results and roost type
Pillbox B001	Yes	Confirmed as a bat roost, with one common pipistrelle emerging during dusk survey on 12 September 2016, and one common pipistrelle emerging during dusk survey on 19 May 2017. During further surveys on 27 June and 25 July 2018 no bats were observed emerging from the structure.

Building	Roost (Yes/No)	Details of results and roost type
Winch Hill House B002	No	N/A
Winch Hill House garage B003	No	N/A
Winch Hill Cottage (1) B004	No	N/A
Winch Hill Cottage (2) B005	Yes	Confirmed as a bat roost, with one common pipistrelle emerging during dusk survey on 15th July 2019. During further surveys on 17th June and 21st August 2019 no bats were observed emerging from the structure. Winch Hill Cottage (2) is considered a summer day roost used by low numbers of common pipistrelle bats. Hibernation potential cannot be ruled out, in the absence of an internal inspection; however due to access restrictions this was not possible.

### ***Emergence and re-entry surveys - trees***

- 5.3.18 Four trees were confirmed to support bat roosts in 2020: T104, T120, T124 and T126.
- 5.3.19 No bats were seen to emerge from or return to any other trees during the surveys. A summary of the confirmed tree roosts is provided in **Table 5.8**. Photographs of confirmed roosts in 2020 are provided in **Section 13**.

Table 5.8: Summary of the confirmed tree roosts.

Tree	Details of results and roost type
T104	Confirmed as a bat roost, with three common pipistrelles observed emerging during the survey on 17 August 2020. No bats were observed re-entering the tree on the dawn survey carried out on 20 September 2020. Tree T104 is considered a summer day roost used by low numbers of common pipistrelle bats.
T120	Confirmed as a bat roost, with one common pipistrelle observed emerging from the tree during the survey on 24 May 2017. No bats were observed emerging from or re-entering the tree on other surveys carried out on 31 August 2016, 19 May 2017, 10 August 2020, 9 September 2020, and 30 September 2020.

	Tree T120 is considered to support an occasional summer day roost used by low numbers of common pipistrelle bats.
T124	Confirmed as a bat roost, with two common pipistrelles observed emerging from the tree during the survey on 24 May 2017. No bats were observed emerging from or re-entering the tree on other surveys carried out on 31 August 2016, 13 September 2016, 17 August 2020, 9 September 2020 and 29 September 2020. Tree T124 is considered to support an occasional summer day roost used by low numbers of common pipistrelle bats.
T126	Confirmed as a bat roost with one common pipistrelle observed emerging from the central area of tree during the survey on 24 August 2020. Exact feature was not located due to ivy growth. One common pipistrelle was observed re-entering the tree during the dawn back-tracking survey on 27 August 2020. No bats were observed re-entering the tree on the dawn re-entry surveys on the 15 and 30 September 2020. Tree T126 is considered to support an occasional summer day roost used by low numbers of common pipistrelle bats.

### ***Bat activity transect surveys***

5.3.20 Bat activity along each of the five transect routes, which are illustrated on the Bat Activity Survey Plan in **Appendix I**, is discussed in detail below.

#### ***Transect 1***

5.3.21 Transect 1 covers the perimeter of Wigmore Park, Wigmore Park Local Wildlife Site (LWS) and the area immediately to the south. During the April survey of this area, no bats were recorded. During surveys in all other months, a limited number of passes from common pipistrelle were recorded, with a single soprano pipistrelle pass recorded in each of the June and July transects. In May, June and September a low number of common pipistrelle were observed foraging above hedges or treelines to the north and east of Wigmore Park.

#### ***Transect 2***

5.3.22 Transect 2 covers the perimeter of the arable fields and woodland to the west of Winch Hill (including a broadleaved woodland block with ancient woodland indicator species present (but is not listed as ancient woodland) and areas adjacent to the dilapidated residential buildings). Common pipistrelle passes were recorded in low numbers across all months, with infrequent (one or two per survey) pipistrelle sp. and soprano pipistrelle passes. Some brief foraging behaviour was observed near the broadleaved woodland block in April, May and August (during both dusk and dawn transects).

### ***Transect 3***

- 5.3.23 Transect 3 covers the perimeter of the arable fields and pasture to the east of Winch Hill, to the north of (not including) Winch Hill House and associated coniferous plantation woodland. During the April survey of this area, no bats were recorded. During the subsequent surveys, a low level of commuting by common pipistrelle was recorded, with some more prolonged foraging behaviour observed during the May and June transects. Infrequent (one or two per survey) Pipistrelle sp. and soprano pipistrelle passes and a single Myotis sp. pass at 23:08 were noted during the June transect. Throughout all months, several of the 'listening stops', particularly in the north of the area, yielded no bat observations.

### ***Transect 4***

- 5.3.24 Transect 4 covers the perimeter of the arable fields to the south of Winch Hill, on both the east and west of the Winch Hill B-road, bordering the fragment of ancient woodland and sections of the airport. During the first two surveys in April and May, very low numbers of common pipistrelle passes were recorded (less than 10 per survey). In subsequent surveys, low levels of common pipistrelle commuting activity were recorded, and foraging was only recorded during the July and September transects. There were occasional passes by soprano pipistrelle and noctule during the July transect only. A single barbastelle pass was recorded during the September transect (at 19:51), near the treeline which runs immediately north of the runway, however the direction of flight was not observed.

### ***Transect 5***

- 5.3.25 Transect 5 is a linear transect which follows the southern perimeter fencing of the airport, from Luton Airport Parkway to the fragment of ancient woodland at the south of Winch Hill, passing by Someries Castle. Low levels of common pipistrelle and soprano pipistrelle foraging and commuting activity was recorded in all months, mostly concentrated near the woodlands and Someries castle to the south of the Proposed Development. Passes were not observed/bat calls were not recorded along the perimeter of the airport, likely due to high levels of noise and light disturbance.

### ***Static monitoring of bat activity***

- 5.3.26 The assemblage of bat species recorded during static detector surveys comprises at least nine different species. Species/genera recorded (in order of number of bat passes, from high to low) comprise:
- a. common pipistrelle;
  - b. pipistrelle sp.;
  - c. soprano pipistrelle;
  - d. Myotis sp.;
  - e. noctule;
  - f. barbastelle;

- g. Leisler's bat;
- h. brown long-eared bat;
- i. Nathusius' pipistrelle; and
- j. Serotine.

5.3.27 A summary of the Bat Activity Index (average bat passes per night) is provided in **Table 5.9**. The locations of static detectors from Location 1 (Loc1) to Location 10 (Loc10) are shown on the Bat Activity Survey Plan in **Appendix I**.

Table 5.9: Overall results of the static bat detector monitoring (all species)

Month	Average Bat Passes/Night										
	Loc1	Loc2	Loc3	Loc4	Loc5	Loc6	Loc7	Loc8	Loc9	Loc10	Total
April	1.4	12.8	0.4	0.6	54.4	0	0	7.4	5	0.2	82.2
May	15.2	24.2	708.6	68.6	221.4	3.4	18.8	93.4	231.4	94.8	1479.8
June	17.6	26.8	109.5	38	132	21.6	0	139.8	289.8	61.2	836.3
July	141.6	71.4	207	0.2	196.2	0	49.6	267	2.2	120	1055.2
Aug	32	49.2	6.4	0.2	196.2	6.2	11.2	543.4	0.2	8	853
Sept	526.8	111.4	-	50	-	67	7.6	-	-	1	763.8*
Total	734.6	295.8	1031.9*	157.6	800.2*	98.2	87.2	1051*	528.6*	285.2	

\* Indicates totals including September data, where data is missing due to theft or destruction of detectors

5.3.28 Overall, May was the month of highest recorded bat passes per night and April was the month of lowest recorded bat passes per night. The data from September is not readily comparable to other months however, due to the theft or destruction of bat detectors in three of the ten locations in this month. Locations 3 and 8 generally had the highest levels of bat activity and Locations 6 and 7 had the lowest.

5.3.29 A summary of the bat activity recorded from static detector surveys is described by species below.

### ***Common pipistrelle***

5.3.30 Common pipistrelle was recorded widely across the site, with the species present in all locations and all months from April to September. Activity was relatively low, with most recording periods registering around 200 or fewer common pipistrelle average passes per night (see **Table 5.10** below). Some of these passes may be attributed to foraging bats repeatedly passing the detector, based on the calls recorded and time between recordings. This assumption is also based on the foraging behaviour observed in several locations during transect surveys. The lowest common pipistrelle activity at any location was zero and the highest was 589.6 average passes per night, which was recorded in May at Location 3 (north of the runway, between Wigmore Park and Winch Hill). Other notable periods of activity included 526 average passes per night in August at Location 8 (immediately north of the runway, adjacent to



the ancient woodland block) and 519.6 average passes per night in September at Location 1 (in Wigmore Park, near the Pillbox).

Table 5.10: Average bat passes per night for common pipistrelle

Month	Average Passes/Night									
	Loc1	Loc2	Loc3	Loc4	Loc5	Loc6	Loc7	Loc8	Loc9	Loc10
April	1.4	12.8	0.4	0.6	53.8	0	0	7.2	5	0.2
May	12.6	22.8	589.6	53	172	3.4	1	83.4	208.8	84.8
June	11.8	24.6	85.8	33.2	92.6	19.4	0	119.4	230.6	40.6
July	124.8	62.4	181	0.2	172.4	0	46.2	253	1.2	72.8
Aug	22.8	29.4	4	0.2	185.4	3	8.4	526	0	5.8
Sept	519.6	96.6	-	47	-	61.2	0	-	-	0.8

### *Pipistrelle sp.*

5.3.31 Pipistrelle sp. (bats which cannot be distinguished as either common pipistrelle or soprano pipistrelle due to peak frequency overlap) were recorded across the site, in all months, with very low levels of activity (see **Table 5.11** below). These results should be considered in combination with the common pipistrelle and soprano pipistrelle results, however the average number of Pipistrelle sp. passes per night does not have a significant impact on the classification of activity level for either species since the values are mostly near zero and the maximum is low at 95.4 passes per night (May, Location 3 – situated in the north of the site, between Wigmore and Winch Hill).

Table 5.11: Average bat passes per night for Pipistrelle sp.

Month	Average Passes/Night									
	Loc1	Loc2	Loc3	Loc4	Loc5	Loc6	Loc7	Loc8	Loc9	Loc10
April	0	0	0	0	0.6	0	0	0	0	0
May	2.6	0.6	95.4	10	39.8	0	17.2	8.8	21	9.4
June	5.4	1	21.3	3.8	30.2	0.4	0	12	48.6	5.2
July	14	7	20.8	0	15.2	0	1	11.4	1	8.6
Aug	6.4	6.2	1.8	0	4.2	0.4	0	8.4	0	0.8
Sept	6	10.6	-	2.8	-	0	0.4	-	-	0.2

### *Soprano pipistrelle*

5.3.32 Soprano pipistrelle activity was recorded across the site from May to September with very low levels of activity (see **Table 5.12** below). Soprano pipistrelle were not recorded at any locations in April. Activity was very low, with average number of passes per night ranging from zero to 37.2, recorded in July at Location 10 (south west of the runway).

Table 5.12: Average bat passes per night for soprano pipistrelle

Month	Average Passes/Night									
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	Loc1	Loc2	Loc3	Loc4	Loc5	Loc6	Loc7	Loc8	Loc9	Loc10
April	0	0	0	0	0	0	0	0	0	0
May	0	0	23.4	4.8	8.6	0	0	1	1.4	0.6
June	0.4	0.4	2	1	8.8	0.8	0	3.6	10.6	15.4
July	2.6	1.6	5	0	6.2	0	1.6	2.2	0	37.2
Aug	1	0.8	0.4	0	4.2	0	0	4.6	0	1
Sept	0.4	0.2	-	0	-	0.8	2.2	-	-	0

### *Myotis sp.*

5.3.33 *Myotis sp.* bats were recorded across the site from May to September with very low levels of activity (see **Table 5.13** below). *Myotis sp.* were not recorded at any locations in April. Activity was limited, with the average number of passes per night ranging from zero to 2.4 (July and August, Location 5 – Winch Hill).

Table 5.13: Average bat passes per night for *Myotis sp.*

Month	Average Passes/Night									
	Loc1	Loc2	Loc3	Loc4	Loc5	Loc6	Loc7	Loc8	Loc9	Loc10
April	0	0	0	0	0	0	0	0	0	0
May	0	0	0.2	0	0.6	0	0.6	0.2	0.2	0
June	0	0	0.2	0	0.4	0	0	0.2	0	0
July	0	0	0.2	0	2.4	0	0.4	0	0	0.4
Aug	0.8	1.6	0.2	0	2.4	1.2	0.8	1.4	0.2	0.4
Sept	0.2	0.6	-	0.2	-	1.8	2	-	-	0

### *Nyctalus sp.*

*Nyctalus sp.* bats were recorded across the site, with the exception of Location 9 (in the south east of the site) (see **Table 5.14** below). *Nyctalus sp.* were recorded in all months from April to September with very low levels of activity. The highest levels of activity were concentrated to the east of the runway at Location 8, with the average number of passes per night reaching 4.6.

Table 5.14: Average bat passes per night for *Nyctalus sp.*

Month	Average Passes/Night									
	Loc1	Loc2	Loc3	Loc4	Loc5	Loc6	Loc7	Loc8	Loc9	Loc10
April	0	0	0	0	0	0	0	0.2	0	0
May	0	0	0	0.6	0.2	0	0	0	0	0
June	0	0.2	0.2	0	0	0.8	0	4.6	0	0
July	0.2	0.4	0	0	0	0	0.4	0.4	0	1
Aug	1	6	0	0	0	1.4	1.6	3	0	0
Sept	0.6	2.2	-	0	-	0.4	1.6	-	-	0

### ***Barbastelle***

5.3.34 Barbastelle activity was recorded sporadically in May, June, August and September at locations 2, 6 and 7 (see **Table 5.15** below). There was a very low level of activity, with average number of passes per night ranging from zero to 5.2 (August, Location 2 – situated south of Wigmore Park and north of the runway). During the August recording period at Location 2, the number of actual barbastelle passes varied between zero and ten each night, indicating a low number of bats passing briefly through the area. The timing of barbastelle passes did not correspond to expected barbastelle emergence times, therefore did not indicate that barbastelle are likely to be emerging from nearby roosts.

Table 5.15: Average bat passes per night for barbastelle

Month	Average Passes/Night									
	Loc1	Loc2	Loc3	Loc4	Loc5	Loc6	Loc7	Loc8	Loc9	Loc10
April	0	0	0	0	0	0	0	0	0	0
May	0	0.8	0	0	0	0	0	0	0	0
June	0	0.4	0	0	0	0.2	0	0	0	0
July	0	0	0	0	0	0	0	0	0	0
Aug	0	5.2	0	0	0	0.2	0.2	0	0	0
Sept	0	1.2	-	0	-	2.2	0.6	-	-	0

### ***Brown long-eared bat***

5.3.35 Brown long-eared bat was recorded sporadically in May, June and September at locations 2 (south of Wigmore Park and north of the runway), 4, 6 and 7 (all within the east of the site) (see **Table 5.16** below). There was a very low level of activity, with average number of passes per night ranging from zero to 0.6 in September (at Locations 6 and 7, east of the runway). The highest number of passes on any given night was two, indicating this species passes through the area in low numbers.

Table 5.16: Average bat passes per night for brown long-eared bat

Month	Average Passes/Night									
	Loc1	Loc2	Loc3	Loc4	Loc5	Loc6	Loc7	Loc8	Loc9	Loc10
April	0	0	0	0	0	0	0	0	0	0
May	0	0	0	0.2	0	0	0	0	0	0
June	0	0.2	0	0	0	0	0	0	0	0
July	0	0	0	0	0	0	0	0	0	0
Aug	0	0	0	0	0	0	0	0	0	0
Sept	0	0	-	0	-	0.6	0.6	-	-	0

***Nathusius' pipistrelle***

- 5.3.36 *Nathusius' pipistrelle* was recorded once in May and once in September, at locations 5 (Winch Hill) and 7 (east of the runway) respectively (see **Table 5.17** below).

Table 5.17: Average bat passes per night for *Nathusius' pipistrelle*

Month	Average Passes/Night									
	Loc1	Loc2	Loc3	Loc4	Loc5	Loc6	Loc7	Loc8	Loc9	Loc10
April	0	0	0	0	0	0	0	0	0	0
May	0	0	0	0	0.2	0	0	0	0	0
June	0	0	0	0	0	0	0	0	0	0
July	0	0	0	0	0	0	0	0	0	0
Aug	0	0	0	0	0	0	0	0	0	0
Sept	0	0	-	0	-	0	0.2	-	-	0

***Serotine***

- 5.3.37 *Serotine* was recorded once in August at location 7 (east of the runway) (see **Table 5.18** below).

Table 5.18: Average bat passes per night for *Serotine*

Month	Average Passes/Night									
	Loc1	Loc2	Loc3	Loc4	Loc5	Loc6	Loc7	Loc8	Loc9	Loc10
April	0	0	0	0	0	0	0	0	0	0
May	0	0	0	0	0	0	0	0	0	0
June	0	0	0	0	0	0	0	0	0	0
July	0	0	0	0	0	0	0	0	0	0
Aug	0	0	0	0	0	0	0.2	0	0	0
Sept	0	0	-	0	-	0	0	-	-	0

***Bat back-tracking surveys***

- 5.3.38 During the dawn back-tracking survey carried out at the conifer and broadleaf ridgeline woodland, one common pipistrelle was successfully tracked back to its roost in tree T126, on the western edge of the conifer woodland. Common pipistrelles were recorded by all surveyors positioned around the woodland, with observations of bats foraging along the woodland edges, and flying and foraging inside the woodland.
- 5.3.39 No bat roosts were found during the dawn back-tracking survey carried out in the ancient woodland (Winch Hill Wood). Common pipistrelles and noctule bats were recorded by three of the four surveyors during the survey, with few observational notes of foraging of common pipistrelles along the lane to the eastern side of the woodland.

**Bat trapping surveys**

5.3.40 Low numbers of bats were recorded during both trapping surveys, with a peak count of four bats on 29 August 2018. Species diversity was also low with only two common bat species encountered, common pipistrelle and brown long-eared, as detailed in **Tables 5.19** and **5.20** below.

Table 5.19: Bat trapping survey results for 04 July 2018

Time	Species	Sex	Age	Forearm (mm)	Weight (g)	Breeding Status	Notes
23:26	Common pipistrelle	Female	Juvenile	32.1	5	Non-breeding	Caught in harp trap within ridgeline woodland
00:47	Common pipistrelle	Male	Adult	32.3	5.5	Breeding	Caught in harp trap within ridgeline woodland

Table 5.20: Bat trapping survey results for 29 August 2018

Time	Species	Sex	Age	Forearm (mm)	Weight (g)	Breeding Status	Notes
21:13	Brown long-eared	Male	Adult	36.7	11.5	Non-breeding	Caught in harp trap within ancient woodland
21:25	Common pipistrelle	Female	Juvenile	31.7	5	Non-breeding	Caught in harp trap within ridgeline woodland
21:35	Common pipistrelle	Male	Juvenile	30	5.2	Non-breeding	Caught in harp trap within ancient woodland
00:29	Brown long-eared	Female	Adult	39	11	Breeding	Caught in harp trap within ancient woodland

## Summary of results

A summary of the bat species recorded within the study area is provided in **Table 5.21** below.

Table 5.21: Bat species recorded within study area during surveys

Species	Desk study records	Recorded during active (emergence and transect) surveys?	Recorded during passive (static detector) surveys?	Confirmed roosts within the study area?
Common pipistrelle	Bats in flight; no known roosts	Yes	Yes	Yes
Soprano pipistrelle	None	Yes	Yes	No
Myotis sp.	None	Yes	Yes	No
Noctule	None	Yes	Yes	No
Barbastelle	None	Yes	Yes	No
Leisler's bat	None	No	Yes	No
Brown long-eared bat	None	Yes	Yes	No
Nathusius' pipistrelle	None	No	Yes	No
Serotine	None	No	Yes	No

5.3.41 **Table 5.22** provides an indication of the roost potential on and near to the site for each species recorded, based on existing records of roosts obtained through the desk study, the presence of suitable roost features, and the amount of time before or after sunset that bats were first recorded (then considered against published average emergence times in BCT guidelines (Ref. 36).

Table 5.22: Site/nearby roost potential and contributing factors or evidence

Species	Suitable roost features present on site	Earliest record (time from sunset in hr.min)	Nearby roost potential (not necessarily on-site)
Common pipistrelle	Trees of varying roost potential on site. Four known summer day roosts (T104, T120, T124 and T126). Few buildings on site but greater number of potentially suitable buildings in the wider landscape. Two known summer day roosts (B001 and B005).	-0.20	Moderate number of roosts likely, including six known roosts – T104, T120, T124, T126, B001 and B005.



Species	Suitable roost features present on site	Earliest record (time from sunset in hr.min)	Nearby roost potential (not necessarily on-site)
Soprano pipistrelle	Trees of varying roost potential on site. Few buildings on site but greater number of potentially suitable buildings in the wider landscape.	+0.04	Potential for Small number of roosts.
Myotis sp.	Trees of varying roost potential on site. Few buildings on site but greater number of potentially suitable buildings in the wider landscape.	+0.58	Potential for Small number of roosts.
Noctule	Trees of varying roost potential on site.	+0.13	Potential for Small number of roosts.
Barbastelle	Trees of varying roost potential on site.	+0.24	Potential for Small number of roosts.
Leisler's bat	Trees of varying roost potential on site. Few buildings on site but greater number of potentially suitable buildings in the wider landscape.	+0.28	Potential for Small number of roosts.
Brown long-eared bat	Few buildings on site but greater number of potentially suitable buildings in the wider landscape.	+1.21	Potential for Small number of roosts.
Nathusius' pipistrelle	Trees of varying roost potential on site. Few buildings on site but greater number of potentially suitable buildings in the wider landscape.	+0.18	Potential for Small number of roosts.
Serotine	Few buildings on site but greater number of potentially suitable buildings in the wider landscape.	+7.25	None likely.

5.3.42 The Bat Activity Index from static surveys is used, together with data from activity transect surveys, to guide determination of activity scores modified from Wray et al. (2007) (Ref. 38) (see the Bat/Site Evaluation System in **Appendix J**) which are in turn used to assess the value of the site for each species recorded (see **Table 5.23**).



Table 5.23: Site/species valuations modified from Wray et al. (2007) (Ref. 38)

Species	National rarity	Activity	Site/Near by roost potential	Type/ complexity of linear features	Total score	Value
Common pipistrelle	2	10	4	3	19	District, Local or Parish
Soprano pipistrelle	2	10	3	3	18	District, Local or Parish
Myotis sp.*	5	5	3	3	16	District, Local or Parish
Noctule	5	5	3	3	16	District, Local or Parish
Barbastelle	5	5	3	3	16	District, Local or Parish
Leisler's bat	5	5	3	3	16	District, Local or Parish
Brown long-eared bat	2	5	3	3	13	District, Local or Parish
Nathusius' pipistrelle	5	5	3	3	16	District, Local or Parish
Serotine	5	5	1	3	14	District, Local or Parish

\*Score based on the rarer Myotis species – it is unlikely that any of the Myotis records are Bechstein's based on the habitats present on site which are largely sub-optimal for the species.

## 5.4 Conclusions and recommendations

5.4.1 Two building roosts and four tree roosts were found to be present within the study area.

5.4.2 Both of the building roosts (The Pillbox and Winch Hill Cottage (2)) are considered to be summer roosts for small numbers of common pipistrelle. Hibernation potential at Winch Hill Cottage (2) cannot be ruled out due to it not being possible to carry out an internal inspection. However, this building will not be directly impacted by the Proposed Development.

- 5.4.3 All tree roosts found are considered to be summer day roosts and should be retained where possible. If loss of a roost is unavoidable, a licence from Natural England will be needed to permit its loss. This would fall within the scope of the Natural England Bat Low Impact Class Licence (BLICL) because all roosts observed were used by low numbers of common pipistrelle bats and therefore of low conservation significance.
- 5.4.4 Update surveys would be required prior to the commencement of any works, including vegetation clearance, which should include an update assessment of potential roost features where trees and buildings are likely to be impacted.
- 5.4.5 At least nine species of bat utilise habitats found within the study area, including four UK Priority species (noctule, soprano pipistrelle, brown long-eared bat and barbastelle). It is possible that Bechstein's bat was detected, within records of *Myotis* species, however this is unlikely due to this species' specific habitat needs.
- 5.4.6 Most activity was from common pipistrelle, which was the only species confirmed as roosting onsite, recorded commuting and foraging widely across the site. Higher levels of activity were concentrated near existing features with mature vegetation, such as the woodland blocks adjacent to Winch Hill and Wigmore Park. There was very low bat activity in the areas bordering the airport runway, particularly to the south and east. Whilst common pipistrelle was the most commonly recorded species, overall the activity level for this species was relatively low across all months surveyed, when compared to the authors' knowledge of sites of a similar size and habitat type.
- 5.4.7 Taking the results of the activity transect surveys, static detector surveys and incidental observations during the bat emergence/re-entry surveys, the levels of activity from other species is considered to be very low. There is no indication that the site offers an important foraging resource for bats or supports well used commuting routes.
- 5.4.8 Barbastelle is the most significant species recorded in terms of conservation interest, as an Annex II species, but it was only recorded once and is therefore unlikely to be present in large numbers. The results confirm that barbastelle occur locally, however neither the surveys nor the assessment of habitats present suggest that the site provides a valuable or key habitat resource for this species.

## 6 HAZEL DORMOUSE

### 6.1 Introduction

6.1.1 This section sets out the methodology and results of the hazel dormouse survey work undertaken in relation to the Proposed Development during 2018.

#### Study area

6.1.2 The study area of the Hazel Dormouse Survey is limited to the Main Application Site as habitats within the highway intervention works and car park locations are not considered suitable for hazel dormice and were therefore scoped out of further survey.

6.1.3 The study area covered all areas of suitable habitat, primarily woodland blocks and associated scrub, set within the largely arable context to the east of the Main Application Site.

6.1.4 A Dormouse Survey Plan is included within **Appendix K** and this should be referenced in the reading of this section.

#### Survey scope

6.1.5 A series of hazel dormouse surveys were undertaken between May to November 2018.

6.1.6 The objectives of the survey were to:

- a. undertake a desk-based review of hazel dormouse records within 2km of the Main Application Site to identify those that may be relevant to the development proposals;
- b. undertake a desk-based review of all suitable woodlands with connectivity to the study area to determine whether habitats within the site could potentially support hazel dormice that would be relevant to the development proposals;
- c. determine the presence or absence of hazel dormouse in suitable habitats within the study area; and
- d. provide sufficient information to inform an assessment of the potential impacts to hazel dormice as a result of the Proposed Development.
- e. Provide sufficient information to inform an assessment of the potential impacts on hazel dormouse as a result of the Proposed Development and allow the design of appropriate mitigation measures (where appropriate).

#### Legislation and local biodiversity context

6.1.7 The hazel dormouse is fully protected under the Wildlife and Countryside Act 1981 (as amended) (Ref. 5) and The Conservation of Species and Habitats Regulations 2017 (as amended) (Ref. **Error! Bookmark not defined.**), making it an offence to:

- a. Deliberately capture, injure or kill a dormouse;

- b. Damage, destroy or obstruct access to any breeding site or resting place of a dormouse;
- c. Deliberately or recklessly disturb a hazel dormouse while it's in a structure or place of shelter or protection; and
- d. Possess, sell, control or transport live or dead hazel dormice, or parts of hazel dormice.

6.1.8 Hazel dormouse is also a species of principal importance for the purpose of conserving biodiversity in England, listed in accordance with the provisions of Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 (Ref. **Error! Bookmark not defined.**). Section 40 of the same Act requires that planning authorities have regard to the conservation of biodiversity in England, when carrying out their normal functions. The hazel dormouse is listed on the Bedfordshire and Luton and Hertfordshire Local Biodiversity Action Plans (LBAPs).

## 6.2 Methodology

### Desk study

- 6.2.1 A desk study exercise was undertaken in February 2018, which incorporated a 'scoping' exercise and a records search.
- 6.2.2 The scoping exercise involved a review of Ordnance Survey maps and online aerial mapping resources to identify woodlands within the study area and those within the surrounding landscape that are connected to the study area by a network of hedgerows. Broadleaved woodlands in excess of 20ha are generally considered optimal for supporting a viable population of hazel dormice, however hedgerows and smaller woodlands are able to support viable populations of dormice if they are well connected to other habitats that offer a food source and shelter throughout the year (Ref. 39).
- 6.2.3 A records search was conducted to obtain existing records of legally protected and notable species, including hazel dormouse. Species records within 2km of the Main Application Site were requested from the Bedfordshire and Luton Biological Recording and Monitoring Centre (BRMC). Where portions of the study area fell within the Hertfordshire county boundary, these records were returned from the Herts Environmental Records Centre (HERC). This exercise was repeated in November 2020 to capture any additional records.
- 6.2.4 No limit was placed on the age of the records.

### Field survey

#### *Habitat Assessment*

- 6.2.5 A site walkover was undertaken in April 2018 by an experienced ecologist to identify any habitats within the Proposed Development site that would be suitable to support hazel dormice.

### ***Feeding Remains/Nut search***

- 6.2.6 Hazel dormice have a varied diet but feed predominantly on nuts such as hazel nuts or acorns when they are available, dropping the shells onto the ground as they feed. Nuts, pits and fruit stones which have been eaten by hazel dormice are distinguishable from those eaten by other rodents due to the markings left on the discarded shell. By searching for feeding remains beneath fruiting trees and analysing the tooth marks on nut shells, the presence of hazel dormice can be confirmed, although the method cannot reliably confirm the absence of dormice (Ref. 40).
- 6.2.7 Nut search surveys were carried out within Winch Hill Wood and the linear 'ridgeline' woodland immediately to the west of Winch Hill, both within the Main Application Site. The locations of the woodlands where nut searches were undertaken is shown on the Dormouse Survey Plan within **Appendix K**.
- 6.2.8 The initial nut search survey in May 2018 was not undertaken at the optimal time of year. Nut search surveys can be undertaken at any time of year; however the optimal period to undertake a search for distinctively gnawed nuts is when hazelnuts are fresh from mid-August to end-December (Ref. 39). In this instance an additional nut search was undertaken alongside surveys in September 2018 (within the optimal period) to increase the chances of successfully finding gnawed nuts.

### ***Nest Tube/Box Survey***

- 6.2.9 Hazel dormice naturally nest within tree cavities or in hedgerows and scrub but will readily nest within artificial hollows provided by nest tubes or boxes deployed within their habitat.
- 6.2.10 Nest tubes and nest boxes were deployed within suitable hedgerow, woodland and scrub in two wooded habitat sections, one in the central woodland west of the cottages at Winch Hill, and the other was along the northern airport boundary connecting to Winch Hill wood, as shown on the Dormouse Survey Plan in **Appendix K**. Nest tubes were placed every 10m to 15m according to best practice methodology (Ref. 40) by experienced dormouse surveyors. Fifteen nest boxes were also deployed within areas of woodland to provide alternative nesting opportunities.
- 6.2.11 Best practice methodology (Ref. 39) describes an index of probability dictating sufficient survey effort which should be undertaken to confidently detect dormice/assume absence on a site where a minimum of 50 dormouse tubes have been installed, whereby set scores are awarded for each month of survey as shown in **Table 6.1**.
- 6.2.12 The indices awarded for a single survey in each month should be added up for a total index of probability of detecting dormice. Assumed absence should not be based on a search effort score of less than 20, so nest tube surveys should aim to equal or exceed this score.

Table 6.1: Index of probability from Dormouse Conservation Handbook (Ref. 39)

Month	Index of probability
April	1
May	4
June	2
July	2
August	5
September	7
October	2
November	2

6.2.13 In total, 95 nest tubes and 15 nest boxes were installed on 26 and 27 April and 3 and 4 May 2018 within the habitats of the Main Application Site which were assessed as likely to support dormice. Survey visits to check for evidence of dormice were undertaken once per month between May and November 2018 as detailed in **Table 6.2** below.

Table 6.2: Dates of dormouse survey visits (2018)

Visit number	Date	Survey type
1	22/05/2018	Nut search Nest tube/nest box survey
2	27/06/2018	Nest tube/nest box survey
3	25/07/2018	Nest tube/nest box survey
4	22/08/2018	Nest tube/nest box survey
5	25/09/2018	Nut search Nest tube/nest box survey
6	24/10/2018	Nest tube/nest box survey
7	20/11/2018	Nest tube/nest box survey

6.2.14 Excluding nest boxes and accounting for the loss and damage to a small number of nest tubes throughout the survey (as detailed under survey limitations below), it is considered that a search effort score of 24 was achieved.

### Survey limitations

6.2.15 Individual nest tubes were found to be missing inserts, damaged or were lost entirely to dense summer vegetation growth from injurious plants such as bramble and nettle scrub. The highest number of lost and/or damaged nest tubes was recorded in May 2018, with seven tubes subject to vandalism. These were all replaced during the survey and relocated in more discreet locations. These tubes or inserts were replaced during the next survey visit. The loss and/or damage of these tubes was factored into calculation of the search effort score, which exceeded the minimum score of 20 required to align with best practice guidance (Ref. 39).



## 6.3 Results

### Desk study

- 6.3.1 Analysis of aerial imagery confirmed that the study area comprises of small parcels of woodland, interconnected by linear woodland and hedgerows. The Main Application Site supports small semi-natural broadleaved and plantation woodlands, areas of scrub and hedgerows that have some connectivity to the network of hedgerows and woodlands within the wider landscape. These habitats have the potential to support hazel dormice, however it is noted that the wider landscape comprises intensively managed arable land and many of the hedgerows within the network are gappy and heavily flailed. This may limit the ability of any hazel dormice present to disperse across the landscape and colonise new habitats.
- 6.3.2 The offsite car park areas do not support habitats that have suitable connectivity to the larger woodlands, or hedgerow networks, within the wider landscape and are therefore not considered suitable for supporting populations of hazel dormouse. These areas were not subject to further survey for hazel dormouse.
- 6.3.3 There were two records of hazel dormouse in the Hertfordshire area. The first was recorded from 1995 to the 1km square, located adjacent to the study area to the east and the other from 1996 for over 1km to the south east.
- 6.3.4 There were no records of hazel dormouse in the Bedfordshire and Luton area and no nearby re-introduction sites.

### Field survey

#### *Habitat Assessment*

- 6.3.5 The main areas of potential hazel dormouse habitat within the study area were the central woodland blocks and the linear woodland boundary of the farmland and Luton Airport leading to Winch Hill Wood CWS.
- 6.3.6 These areas of semi-natural broadleaved woodland comprised of predominately pedunculate oak (*Quercus robur*), occasional sycamore (*Acer pseudoplatanus*) and self-seeded ash (*Fraxinus excelsior*). The scrub interspersed or at the edge of the woodland comprised of blackthorn (*Prunus spinosa*), hawthorn (*Crataegous monogyna*) and bramble (*Rubus agg*). These areas are illustrated by Photograph 5 within **Section 13**.
- 6.3.7 The scrub to the north west of Wigmore Park is comprised of mainly ornamental shrubs which were assessed as unsuitable for hazel dormouse.
- 6.3.8 Potentially suitable habitats within the farmland across the rest of the study area comprised of islands of scrub habitat and defunct hedgerows which offer limited suitability for dormice due to their poor connectivity. While dormice will cross gaps including active highways (Ref. 41) and open fields, this is likely to be where optimal dormouse habitat is limited and exists either side of the gap. Dormice have been shown to be unlikely to descend to ground level to cross gaps of a few metres, preferring instead to take substantial detours to avoid doing so (Ref. 42,43).

### ***Feeding Remains/Nut Search***

- 6.3.9 Hazel nuts were found throughout the woodland blocks. Feeding remains from wood mouse and grey squirrel were identified. No hazel dormouse feeding remains were found during the survey.

### ***Nest Tube Survey***

- 6.3.10 No evidence of hazel dormouse was found during the survey period.
- 6.3.11 A wood mouse (*Apodemus sylvaticus*) nest was found in a nest box during October 2018, located within Winch Hill Wood CWS.

## **6.4 Conclusions and recommendations**

- 6.4.1 No evidence of hazel dormouse presence was detected during the survey period and for the purpose of the environmental impact assessment this species is considered likely absent from the Main Application Site.
- 6.4.2 Wood mouse were recorded using Winch Hill Wood in October 2018, demonstrating the existing value of these wooded habitats on site to semi-arboreal mammals.
- 6.4.3 An update presence/absence survey would be required prior to the commencement of any works, including vegetation clearance, to reconfirm the likely absence of this species from the Main Application Site.

## 7 RIPARIAN MAMMALS

### 7.1 Introduction

7.1.1 This section sets out the methodology and results of specific riparian mammal survey work undertaken in relation to the Proposed Development during 2019.

#### Study area

7.1.2 The study area of the Riparian Mammal Survey covers waterbodies and watercourses within 250m of the Proposed Development boundary. Within the Main Application Site, there are no waterbodies or watercourses of suitable size or connectivity for supporting riparian mammals. However, highway interventions in the Luton and Hitchin areas are located within close proximity to watercourses. These watercourses have the potential to be impacted by the Proposed Development and therefore form the study area for the riparian mammal surveys.

7.1.3 A Riparian Mammal Survey Area Plan is included within **Appendix L**, a Riparian Mammal Habitat Assessment Plan is provided at **Appendix M** and an Otter Survey Plan is provided at **Appendix N**. These should be referenced in the reading of this section.

#### Survey scope

7.1.4 A series of otter and water vole surveys were undertaken in June and July 2019, with a repeat visit in September 2019.

7.1.5 The objectives of the surveys were to:

- a. Undertake a desk-based review of riparian mammal records within 2km of the Main Application Site to identify those that may be relevant to the development proposals;
- b. Assess the suitability of the watercourses within the study area to support populations of riparian mammals;
- c. Determine the presence or absence of riparian mammals on watercourses within the study area; and
- d. Provide sufficient information to inform an assessment of the potential impacts to riparian mammals as a result of the Proposed Development and allow the design of appropriate mitigation measures (where appropriate).

#### Legislation and local biodiversity context

7.1.6 Otter and sites that they use for breeding or shelter are afforded protection through the provisions of the Wildlife and Countryside Act 1981 (as amended) (Ref. 5), and The Conservation of Habitats and Species Regulations 2017 (as amended) (Ref. **Error! Bookmark not defined.**). It is an offence, without a licence from Natural England to:

- a. kill, injure or capture an otter; or

b. damage, destroy or obstruct access to any otter breeding or resting site.

7.1.7 Water vole is afforded legal protection through provisions in the Wildlife and Countryside Act 1981 (as amended) (Ref. 5) and the CRoW Act 2000 (Ref. 6). It is an offence to kill or injure water voles, and to damage, destroy or obstruct access to any place that water vole use for shelter or protection, or to disturb water voles while using these places.

7.1.8 Otter and water vole are also species of principal importance for the purpose of conserving biodiversity in England, listed in accordance with the provisions of Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 (Ref. **Error! Bookmark not defined.**). Section 40 of the same Act requires that planning authorities have regard to the conservation of biodiversity in England, when carrying out their normal functions.

7.1.9 In addition, both otter and water vole are listed as priority species within Hertfordshire (Ref. 44) and Bedfordshire and Luton (Ref. 45), and consequently have specific Species Action Plans, last updated March 2006 and September 2009 respectively.

## 7.2 Methodology

### Desk study

7.2.1 A desk study exercise was undertaken in June 2019, which incorporated a 'scoping' exercise to identify watercourses within proximity to the Proposed Development and a records search. This exercise was repeated in November 2020 to capture any additional records.

7.2.2 The records search was conducted to obtain existing records of legally protected and notable species, including otter and water vole. Species records within 2km of the Main Application Site were requested from the Bedfordshire and Luton Biological Recording and Monitoring Centre (BRMC), Herts Environmental Records Centre (HERC).

### Field survey

7.2.3 Survey work for riparian mammals was undertaken in accordance and with regard to current guidance and best practice outlined in:

- a. Ecology of the European Otter (2003) (Ref. 46);
- b. Fourth Otter Survey of England 2000-2002(Ref. 47);
- c. The Water Vole Mitigation Handbook (2016) (Ref. 48).

7.2.4 A ground truthing exercise was conducted on all watercourses identified by the desk-based study, on 17, 18 and 24 June 2019, with an additional section of the River Lea assessed on 04 July 2019. The purpose of this exercise was to identify and scope out waterbodies unsuitable for survey for riparian mammals due to being either dry or inaccessible. For the purposes of this report, the sections of River Lea upstream and downstream of the A1081 are treated separately as their channel characteristics and neighbouring land uses are highly divergent.

7.2.5 Ground truthed watercourses were subsequently assessed for suitability to support otter and water vole. Habitat suitability assessments were conducted by experienced surveyors immediately following successful ground truthing. Where access permitted, habitat suitability was assessed to 50 meters each side of the road transect point, aside from the River Lea, where surveyors were able to access several kilometres of bank adjacent to and downstream of the airport. Habitat suitability was assessed using the criteria summarised below.

***Habitat suitability assessment criteria - otter***

7.2.6 Otter can utilise a wide variety of habitat types, especially those in close proximity to watercourses and waterbodies. They are likely to use different habitats at different times, including terrestrial habitats for shelter and movement between various waterbodies for foraging. Key habitat features that are likely to contribute towards otter preferentially utilising an area include low disturbance, abundant prey (primarily fish and crayfish) and cover for resting opportunities in close proximity to the watercourse, including couches and holts. As holts and couches can be set back from the watercourse, surveys also took into account any areas of suitable vegetation or other habitat suitable for resting directly adjacent to the watercourse, up to 10m from the bank.

***Habitat suitability assessment criteria - water vole***

7.2.7 Optimal habitat conditions for water vole include slow flowing or still water, with a width over 3m and depth of over 1m, while steep banks in close proximity to the watercourse offer burrowing opportunities for shelter and breeding. Water vole also require emergent bankside vegetation for food and shelter, which is generally a consequence of minimal channel shading. Whilst water vole will utilise sub-optimal habitats outside of these parameters, total absence of any one of these habitat features will impair the ability of water vole to utilise an area.

***Presence/likely absence surveys***

7.2.8 Following habitat suitability assessment, presence/likely absence surveys were conducted on waterbodies with any suitability for either otter or water vole. The first of the two presence/likely absence surveys was conducted on the same date as the original ground truthing and habitat suitability assessment (i.e. 17, 18 and 24 June 2019 and 04 July 2019), with a further presence/likely absence survey undertaken in autumn on 25 September 2019. The second visit increases the robustness of the assessment, especially where watercourses are likely to change throughout the year, and consequently be utilised by water vole during different parts of the breeding season (Ref. 48).

7.2.9 Activity surveys involve a bankside systematic search for field signs of both otter and water vole, both on banks immediately adjacent to the watercourse, and within any suitable terrestrial habitat in close proximity. Otter field signs include feeding remains, spraints, footprints, holts, slides and anal jelly. Water vole field signs include latrines, burrows, footprints, and 'lawns' created by grazing.

## ***Evaluation of results***

- 7.2.10 When assessing the relative importance of watercourses for otter and water vole, consideration has been given to both the suitability of habitats present and the abundance of field signs as indicators of use and population density. Given their often transient nature and large home ranges, otter population density is extremely difficult to reliably determine (Ref. 46), therefore conclusions have been drawn using the number and type of field signs located at each site.

## **Survey limitations**

- 7.2.11 The desk-based study identified all watercourses with the potential to be impacted upon by works. Due to health and safety concerns a drainage ditch, that runs along the M1 motorway to the south of junction 10, was not accessed. Given that this ditch is directly adjacent to the M1 on one side and intensively managed agricultural land on the other it is considered unlikely to offer suitable habitat for water vole or otter, therefore its lack of survey is not considered a significant limitation.
- 7.2.12 Riparian mammals, especially otter, are highly mobile animals, frequently occupying large home ranges and travelling large distances to make use of various habitats. Consequently, they may occur only transiently in parts of their ranges. However, given that both species are usually associated with water as the core habitat type within their territory, it is reasonable to assume that identifying and surveying all potentially impacted watercourses will minimise this issue. Additionally, conducting a second survey in a later season is likely to increase the chance of identifying riparian mammals given the possibility of habitats features changing throughout the year. Therefore, this is not considered a significant limitation.
- 7.2.13 Small sections of the potentially impacted watercourses were inaccessible, on health and safety grounds, for detailed survey during the presence/absence survey, for example due to dense scrub or thick muddy banks. However, it was generally possible to conduct habitat suitability assessments on the full length of the study section at each watercourse, using binoculars to assess areas surveyors could not directly access. Additionally, the repeat survey in autumn allowed surveyors to assess several areas that were inaccessible earlier in the year as dense vegetation had died back.
- 7.2.14 Of the section of River Lea upstream of the A1081, a large portion of the watercourse was inaccessible for detailed survey, shown in the Riparian Mammal Habitat Assessment Plan within **Appendix L**. However, surveyors were able to use overbridges at several points in this inaccessible section to determine the suitability of this section to support otter and water vole. The habitat suitability was considered negligible for both species, given the heavy channelization and channel shading, high disturbance, extremely shallow depth and clear signs of pollution. As the section of River Lea directly upstream of this inaccessible area at Manor Road Park was considered to be of low suitability for water vole, the whole section of River Lea upstream of the A1081 is, on a precautionary basis, considered of low suitability for water vole.



- 7.2.15 Although undertaken within the ideal survey season, heavy rain prior to the autumn activity survey may have washed away field signs from more exposed locations. However, field signs are likely to persist in more sheltered locations, under bridges or amongst vegetation for example, as river levels did not rise above normal levels.
- 7.2.16 On the basis that the survey encompassed the majority of the sections of watercourse identified at desk study, it is considered that the results of the survey work undertaken are robust and that these are not significant limitations.

## 7.3 Results

### Desk study

- 7.3.1 The data search results from BRMC and HERC returned no records of otter or water vole from the 2km area surrounding the Main Application Site within the past 10 years.
- 7.3.2 The citation for the River Lea CWS references populations of water vole utilising the River, although no specific location is given. A section of the River Lea within Luton, upstream of survey area, is listed as a key area for water vole within the LBAP from 2009.

### Field survey

- 7.3.3 Habitat Suitability Assessment of all potentially impacted watercourses identified only the River Lea downstream of the A1081 as being of at least moderate suitability to support a population of otter and water vole. Reassessment of all watercourses during the autumn surveys determined that the habitat features present represent similar suitability to the initial summer survey.
- 7.3.4 Results of the Habitat Suitability Assessment are displayed in **Table 7.1** and are mapped on the Riparian Mammal Habitat Assessment Plan in **Appendix M**.

Table 7.1: Riparian mammal survey dates, results of ground truthing and Habitat Suitability Assessment.

Watercourse	Survey Date	Ground Truthed	Otter Suitability	Water Vole Suitability
A602 ditch	17/06/2019	True	Low	Low
Ippollitts Brook	17/06/2019	True	Negligible	Low
River Lea (downstream A1081)	18/06/2019	True	High	Moderate
London road ditch	24/06/2019	False	-	-
River Lea (upstream A1081)	04/07/2019	True	Negligible	Low

- 7.3.5 Field signs for riparian mammals were detected during the presence/absence surveys during the summer visit. Field signs were located only on the section of the River Lea downstream of the A1081, and were limited to otter, despite the watercourse also being of moderate suitability for water vole.
- 7.3.6 During the autumn presence/absence surveys, reductions in vegetation allowed surveyors to assess areas of the River Lea downstream of the A1081 that had been inaccessible on the previous visit. This area was highly suitable for otter sheltering opportunities with suitable holt and couching areas identified, though no definitive field signs were found. On the same section of River Lea, a single potential water vole burrow was located, though in the absence of other field signs, is considered too ambiguous to derive presence.
- 7.3.7 As the riparian and surrounding terrestrial habitat is of high quality, with multiple otter sprainting sites located in addition to extensive areas of suitable holting sites (although no confirmed holts were identified), it is considered that the section of River Lea directly downstream of the A1081 is an important site for otter. Despite the same location representing moderate habitat suitability for supporting water vole, no definitive field signs were located during the summer surveys, and therefore water vole are considered unlikely to be present.
- 7.3.8 On the A602 ditch, potential otter feeding remains were identified to contain a signal crayfish claw. Despite identifying potential otter feeding remains at the A602 ditch, the absence of other field signs, as well as low quality riparian and surrounding terrestrial habitat, mean that this area is not considered an important site for otter.
- 7.3.9 All field signs detected are recorded in **Table 7.2** and mapped on the Riparian Mammal Habitat Assessment Plan in **Appendix M**. Photographs (6-8) showing the otter spraints, potential water vole burrow and potential feeding remains are included within **Section 13** of this report.

Table 7.2: Results of the presence/absence surveys

Location	Season	Species	Field sign	Grid reference
River Lea	Summer	Otter	Spraint	TL 10971 19678
River Lea	Summer	Otter	Spraint	TL 10424 20184
River Lea	Autumn	Water vole	Potential Burrow	TL 10935 19740
A602 ditch	Autumn	Otter	Potential feeding remains	TL 18222 28634

## 7.4 Conclusions and recommendations

- 7.4.1 A section of the River Lea directly downstream of the A1081 has been identified as supporting habitat of high suitability for otter and moderate suitability for water vole.

- 7.4.2 Further surveys have determined that the section of the River Lea directly downstream of the A1081 represents a potentially important site for supporting otter. This was confirmed through the presence of otter spraint and highly suitable terrestrial habitat offering extensive sheltering opportunities. Otter may utilise any of the other watercourses within the study area but given the lack of prey and sheltering opportunities, it is considered likely that this is only transiently to commute between areas of more suitable habitat.
- 7.4.3 Despite the habitat present on the River Lea downstream of the A1081 also being of moderate potential to support water vole, no definitive field signs were detected during either visit; the single potential burrow identified is considered too ambiguous to derive presence in the absence of additional field signs.
- 7.4.4 Habitat features are likely to change temporally throughout the year, and consequently the suitability of watercourses for supporting either otter or water vole may also change. The second survey during autumn ensures the results of the initial assessment are robust, allowing surveyors to search for field signs over multiple seasons, thus accounting for changes in habitat, and riparian mammal activity, throughout the year.
- 7.4.5 As there are no watercourses capable of supporting riparian mammals within the Main Application Site, recommendations made in subsequent mitigation strategies will be limited only to works that may impact upon watercourses indirectly from the Proposed Development or direct effects as a result of the highways interventions proposed to existing carriageways within proximity to watercourses, most notably the River Lea.
- 7.4.6 An update presence/absence survey would be required prior to the commencement of any works, including vegetation clearance, to reconfirm the likely absence of this species from the Proposed Development and its immediate surroundings. If evidence of otter and/or water vole is recorded in close proximity to highway intervention works, a licence from Natural England may be required to disturb and/or displace these species.

## 8 BREEDING BIRDS

### 8.1 Introduction

8.1.1 This section sets out the methodology and results of the breeding bird survey work undertaken in relation to the Proposed Development during 2018, 2019 and 2021.

#### Study area

8.1.2 The Study Area used to gather existing records for the Site as part of the desk study last updated in November 2020 extended to 2km from the Main Application Site.

8.1.3 The 2018 study area for breeding bird surveys included two transects; one to the east and one to the south of the existing airport. The southern transect was incorporated due to an ongoing sift process at that time, which included an option to expand the airport to the south of the existing runway. Expansion to the south was not progressed after an option appraisal and selection process was undertaken. As a result, the study area for surveys undertaken in 2021 included one transect to the east of the existing airport, covering habitats suitable for breeding birds within the Main Application Site, as well as suitable connective habitat up to 500m beyond. However, with the exception of junction 10 of the M1, the majority of the highways intervention locations and car parking locations do not include suitable habitats for breeding birds and were therefore scoped out by the project team for further breeding bird surveys.

8.1.4 The study area for the 2019 additional Schedule 1 Breeding Bird Surveys was extended to incorporate the surrounding farmland within 1.5km of the Main Application Site.

8.1.5 The Phase 1 Habitat Survey of junction 10 of the M1 identified scrub and grassland habitats which a low number of common bird species may utilise. A full breeding bird survey of these habitats has not been carried out.

8.1.6 The study area site is set within a largely agricultural landscape context, with arable land bordering to the north, south and east; and residential areas of Luton to the north and west of the existing airport.

8.1.7 A Bird Survey Area Plan is included in **Appendix O** and a Breeding Bird Survey Plan is provided in **Appendix P**, and these should be referenced in the reading of this section.

#### Survey scope

8.1.8 The survey aim was to sample breeding bird territories for all species within the study area (within and up to 500m from the Main Application Site, other than those areas scoped out due to low suitability) along a defined transect route, particularly those species which are:

- a. subject to special protection through the provisions of legislation; and/or
- b. otherwise notable bird species including;

- i. Red<sup>1</sup> and Amber<sup>2</sup> List species of the Birds of Conservation Concern (Ref. 49); and/or
- ii. species of principal importance listed by Natural England in accordance with Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 (Ref. **Error! Bookmark not defined.**).

- 8.1.9 Due to the time lag since the initial survey work, the 2018 Breeding Bird Survey was repeated (scope remained unchanged) in 2021. However, the current development option being taken forward is an expansion to the east of the existing airport (and not the south), requiring re-surveying of the eastern transect only.
- 8.1.10 During 2019, an additional survey was undertaken for the presence of nesting red kite and barn owl (both Schedule 1 species). The survey area for this extended to 1.5km from the Main Application Site. This survey was not repeated in 2021 as results from 2019 were still considered valid at this time.
- 8.1.11 The overall objective of the survey was to provide sufficient information to inform an assessment of the potential impacts to the breeding bird assemblage as a result of the Proposed Development and allow the design of appropriate mitigation measures.

### Legislation and local biodiversity context

- 8.1.12 All wild birds, their nests and their eggs are afforded legal protection through provisions in the Wildlife and Countryside Act 1981 (as amended) (Ref. 5) and the Countryside and Rights of Way (CRoW) Act 2000 (Ref. 6).
- 8.1.13 It is an offence, with certain exceptions, to:
- a. kill, injure or take any wild bird;
  - b. take, damage or destroy the nest of any wild bird while it is in use or being built;
  - c. take or destroy the egg of any wild bird; and
  - d. have in one's possession or control any wild bird (dead or alive), part of a wild bird or egg of a wild bird which has been taken in contravention of the Act or, the Protection of Birds Act 1954 (Ref. 50).
- 8.1.14 In addition to the above listed offences, it is also illegal to intentionally or recklessly disturb any wild bird listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), while it is nest building or is in, on or near a nest with eggs or young; or to disturb the dependent young of such a species. Consent from Natural England would be required to cause disturbance while nesting or to disturb its dependent young.

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<sup>1</sup> Red List criteria for breeding birds are those species which have experienced a severe decline of more than 50% of population and/or range over the last 25 years.

<sup>2</sup> Amber List criteria for breeding birds are those species which have experienced a moderate decline of between 25% and 49% of population and/or range over the last 25 years.



- 8.1.15 Species of Principal Importance in England are listed by Natural England in accordance with Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 (Ref. **Error! Bookmark not defined.**). These include species in England that were identified as requiring action in the UK Biodiversity Action Plan (UK BAP) and continue to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework.
- 8.1.16 The Bedfordshire and Luton (Ref. 51) and Hertfordshire (Ref. 52) Local Biodiversity Action Plans (LBAPs) detail actions to help maintain and enhance the nature conservation status of certain bird species of local conservation concern. This includes:
- a. Tree sparrow (*Passer montanus*);
  - b. Bittern (*Botaurus stellaris*);
  - c. Stone-curlew (*Burhinus oedichnemus*); and
  - d. Song thrush (*Turdus philomelos*).

## 8.2 Methodology

### Desk study

- 8.2.1 The bird records obtained from Bedfordshire and Luton and Hertfordshire Biological Records Centres in November 2020 within 2km of the Main Application Site were reviewed.

### Field survey

#### *General breeding bird territories*

- 8.2.2 The methodology was adapted from the Common Bird Census (Ref. 53), aiming to estimate the number of breeding bird territories within and up to 500m from the Main Application Site, utilising two fixed transect routes.
- 8.2.3 Four survey visits were carried out between April and July 2018 and April and June 2021. This was considered to be a sufficient survey effort to make an estimation of the number of breeding territories present for each species, given the types of habitats present. Two transect routes were devised to include the main habitat types present that are likely to be important for breeding birds within the survey area. The transect routes are shown on the Bird Survey Area Plan in **Appendix O**. The north-eastern transect is mainly located along/adjacent to amenity grassland, scrub, semi-natural broadleaved woodland and arable land. The southern transect is mainly located along/adjacent to airfield, pastures, arable land, hedgerows and semi-natural broadleaved woodland.
- 8.2.4 As detailed within the study area section above, the 2018 breeding bird survey included a transect to the east and south of the existing airport as alternative options under consideration at that time included works to the south. The 2021 breeding bird surveys focussed solely on the transect to the east of the existing airport, covering habitats suitable for breeding birds within the Main Application Site.



8.2.5 In 2018, the first three survey visits took place within 4 hours from sunrise and the final visit 3 hours and 15 minutes before and 45 minutes after sunset. The sunset visit was included in order to increase the likelihood of identifying crepuscular species with greater activity peaks at dusk. During 2021, all survey visits took place within 4 hours from sunrise.

8.2.6 The survey visits were completed, in line with standard guidance<sup>53</sup>, during suitable weather conditions for recording birds by avoiding strong winds, fog and rain. Details of the prevailing weather conditions during the survey visits are summarised in **Table 8.1**.

Table 8.1: Weather conditions during all breeding bird survey visits

Survey date	Weather conditions
06/04/2018	F2 southerly, 13°C, 75% cloud and dry
09/05/2018	F1 westerly, 14°C, cloudless and dry
06/06/2018	F1 north-easterly, 9°C, overcast and dry
02/07/2018	F1 north-easterly, 15°C, 25% cloud and dry
22/04/2021	F1 easterly, 1°C, 0% cloud, sunny and dry
12/05/2021	F2 south-westerly, 9°C, 100% cloud and dry
28/05/2021	F2 southerly, 9°C, 100% cloud and dry
08/06/2021	F2 northerly, 9°C, 100% cloud and dry

8.2.7 On each visit, the fixed transect route(s) were slowly walked by a surveyor competent and experienced in breeding bird surveys using the above methodology. All birds within the survey area were identified and recorded on 1:6,000 scale site maps, or recorded digitally on a tablet, using standard British Trust for Ornithology (BTO) species codes (Ref. 54). A pair of 10x42 binoculars was used to assist with detecting signs of breeding activity. The methodology is based on the premise that many species are territorial during the breeding season. This is found particularly amongst passerines, where territories are often marked by conspicuous song, display, and periodic disputes with neighbouring individuals. The following signs of bird breeding activity were recorded:

- a. singing male in suitable nesting habitat;
- b. pair in suitable nesting habitat;
- c. courtship and display;
- d. visiting a probable nest site;
- e. agitated behaviour;

- f. adults building a nest;
- g. used nest or eggshells;
- h. recently fledged young;
- i. adults entering or leaving an occupied nest;
- j. adults carrying faecal sac of food for young;
- k. nest containing eggs; and
- l. nest with young.

8.2.8 Upon completion of the survey visits, all data was transferred to a master map, to highlight the location of an occupied nest site or presumed centre of a breeding territory. When the same species was recorded in the same vicinity on three or more visits, this was taken to constitute a breeding territory. Separate territory maps were produced for the 2019 and 2021 breeding bird surveys.

### ***Schedule 1 species breeding territories***

- 8.2.9 During 2019, specific surveys were undertaken to determine the presence of red kite and barn owl nest sites from an extended study area including land within 1.5km of the Main Application Site. This data was used to supplement records taken for these species during the 2018 Breeding Bird Survey.
- 8.2.10 Two daytime surveys to search for active red kite nests were undertaken on 12 and 29 April, outside of the key sensitivity nesting period (Ref. 55) to reduce the likelihood of nest desertion through surveyor disturbance. These surveys were carried out in suitable weather conditions, avoiding strong winds and precipitation. Binoculars were used to observe any areas considered likely nesting areas for red kite, including woodland blocks, and locations where indicative kite activity, such as active pairs of birds or birds mating, had previously been noted. Given a lack of canopy cover, in smaller woodland blocks it was possible for surveyors to use binoculars to observe nests directly. In larger woodlands, characteristic nesting behaviours, such as returning with nest material, aggression to other avian species, agitated behaviour while flying around the nest or both parents simultaneously entering the woodland, were noted and used to determine breeding territories.
- 8.2.11 Stage 2 (Ref. 56) daytime surveys to search for barn owl potential nest sites were carried out on 20 May and 24 June, constituting a ground level assessment of suitable trees and structures within the Main Application Site noted during prior Stage 1 surveys, as well as an initial assessment of trees and structures within the expanded study area. Stage 1 surveys aim to broadly establish and record those features, such as built structures, mature trees and habitats, which might offer potential nest sites, roost sites or foraging habitats for barn owls. Stage 3 nest site verification surveys were undertaken at potential nest sites within the optimal survey period (Ref. 57) during suitable weather conditions on 24 June, 4 and 8 July, in-line with best practice guidance (Ref. 58). The prevailing weather conditions during the dusk emergence survey visits are summarised in **Table 8.2**. Due to project health and safety restrictions, nest site verifications were restricted to dusk emergence surveys, observing site entrances from distance and noting signs of breeding behaviours, including

chick screeching, adult birds returning with prey items, or both parents observed concurrently at the nest site. All surveys were undertaken by a licensed surveyor.

Table 8.2: Weather conditions during the barn owl dusk emergence survey visits

Survey Date	Weather conditions
24/06/2019	F1 westerly, 18°C, 100% cloud, intermittent drizzle
04/07/2019	F2 north westerly, 20°C, cloudless and dry
08/07/2019	F3 south easterly, 16°C, 75% cloud and dry

### Survey limitations

- 8.2.12 Factors that influence bird presence and dispersal to and/or from the survey area include prevailing food availability, roost site suitability, disturbance and weather conditions. However, the fieldwork was undertaken by experienced bird surveyors during suitable weather and times of day to help ensure that regularly occurring species within the survey area were recorded with sufficient certainty to not significantly limit the validity of the findings presented in this report.
- 8.2.13 Surveys of Schedule 1 nesting birds were primarily conducted on private land away from the Main Application Site. As such, access was restricted to Public Rights of Way (PRoW), and private land encapsulating suitable nesting features where surveyors were able to agree access.
- 8.2.14 In several areas, particularly to the east of the Main Application site, this restricted red kite scoping surveys to being taken from vantage points on PRoW. This technique was unable to reliably determine red kite nest site locations. However, given frequent activity over areas of suitable habitat, as well as similar occupied territories to the south of the Main Application Site, it is considered likely that at least another pair of red kite may nest in woodland to the east of the Main Application Site within 1.5km. Given the distance from the Main Application Site, it is not considered necessary to pinpoint the exact nest location as potential disturbance is considered unlikely.
- 8.2.15 Surveyors were able to access the majority of areas identified for barn owl nest site scoping and subsequent emergence surveys. However, access was not available to several private properties to the north of the Main Application Site which, from a distance, may provide potential nest sites for barn owls. Given frequent anecdotal reports of barn owl sightings to the north of the Main Application Site, it is considered likely that there may be an additional breeding pair of barn owls to the north of the Main Application Site within 1.5km. Given the distance from the Main Application Site, it is not considered necessary to pinpoint the exact nest location as potential disturbance is considered unlikely.

## 8.3 Results

### Desk study

8.3.1 Information from the Bedfordshire and Luton and Hertfordshire Biological Records Centres confirmed that the following breeding species relevant to this report have been recorded within the desk study area (including and extending to 2km from the Main Application Site) since 2006.

#### **Thirteen Red List species:**

- a. grey partridge (*Perdix perdix*);
- b. lapwing (*Vanellus vanellus*);cuckoo (*Cuculus canorus*);
- c. turtle dove (*Streptopelia turtur*);
- d. marsh tit (*Poecile palustris*);
- e. skylark (*Alauda arvensis*);
- f. starling (*Sturnus vulgaris*);
- g. song thrush;
- h. spotted flycatcher (*Muscicapa striata*);
- i. house sparrow (*Passer domesticus*);
- j. yellow wagtail (*Motacilla flava*);
- k. linnet (*Linaria cannabina*);and
- l. yellowhammer (*Emberiza citrinella*).

#### **Eight Amber List species:**

- a. swift (*Apus apus*)
- b. stock dove (*Columba oenas*);
- c. tawny owl (*Strix aluco*)
- d. kestrel (*Falco tinnunculus*);
- e. house martin (*Delichon urbicum*)
- f. willow warbler (*Phylloscopus trochilus*);
- g. dunnock (*Prunella modularis*); and
- h. bullfinch (*Pyrrhula pyrrhula*).

#### **Schedule 1 species:**

- a. red kite (*Milvus milvus*); and
- b. barn owl (*Tyto alba*).

### Field survey

8.3.2 The distribution of territories is indicated on the Breeding bird Survey Plan in **Appendix P**.



8.3.3 A summary of breeding bird territories identified during the 2018, and 2021 surveys is provided in **Table 8.3**. The taxonomic sequence of species listed is in accordance with the British List (Ref. 59).

Table 8.3: Breeding bird territories recorded within the Main Application Site and within 500m from survey visits in 2018 and 2021

Common name	Scientific name	BTO symbol	Status	Estimated number of breeding territories 2018	Estimated number of breeding territories 2021
Woodpigeon	<i>Columba palumbus</i>	WP	Green List	15	8
Collared Dove	<i>Streptopelia decaocto</i>	CD	Green List	1	0
Great Spotted Woodpecker	<i>Dendrocopos major</i>	GS	Green List	1	1
Magpie	<i>Pica pica</i>	MG	Green List	1	1
Coal Tit	<i>Parus ater</i>	CT	Green List	2	1
Blue Tit	<i>Cyanistes caeruleus</i>	BT	Green List	1	5
Great Tit	<i>Parus major</i>	GT	Green List	1	2
Skylark	<i>Alauda arvensis</i>	S.	Red List, Species of Principal Importance, LBAP	12	11
Willow Warbler	<i>Phylloscopus trochilus</i>	WW	Amber List, Species of Principal Importance	1	0
Chiffchaff	<i>Phylloscopus collybita</i>	CC	Green List	3	4
Blackcap	<i>Sylvia atricapilla</i>	BC	Green List	4	7
Lesser Whitethroat	<i>Sylvia curruca</i>	LW	Green List	1	0
Whitethroat	<i>Sylvia communis</i>	WH	Green List	3	5
Goldcrest	<i>Regulus regulus</i>	GC	Green List	0	1
Wren	<i>Troglodytes troglodytes</i>	WR	Green List	9	12
Song Thrush	<i>Turdus philomelos</i>	ST	Red List, Species of	1	2

Common name	Scientific name	BTO symbol	Status	Estimated number of breeding territories 2018	Estimated number of breeding territories 2021
			Principal Importance, LBAP		
Blackbird	<i>Turdus merula</i>	B.	Green List	3	8
Robin	<i>Erithacus rubecula</i>	R.	Green List	8	5
Dunnock	<i>Prunella modularis</i>	D.	Amber List, Species of Principal Importance, LBAP	2	3
Meadow Pipit	<i>Anthus pratensis</i>	MP	Amber List	1	0
Chaffinch	<i>Fringilla coelebs</i>	CH	Green List	5	5
Linnet	<i>Linaria cannabina</i>	LI	Red List, Species of Principal Importance, LBAP	3	1
Goldfinch	<i>Carduelis carduelis</i>	GO	Green List	4	2
Yellowhammer	<i>Emberiza citrinella</i>	Y.	Red List, Species of Principal Importance, LBAP	4	2

\* 2018 and 2021 data only included in this table. For results of the focussed 2019 Schedule 1 Species Surveys (red kite and barn owl) within the Main Application Site and up to 1.5 km please refer to Section 8.3.9 below.

8.3.4 During 2018, a total of 23 breeding species and 86 breeding territories were recorded across both transects. During the 2021 surveys, a total of 20 breeding species and 86 breeding territories were recorded.

8.3.5 During 2018, four Red List species were recorded: skylark (12 territories), yellowhammer (4 territories), linnet (4 territories) and song thrush (1 territory). During 2021, four Red List species were recorded: skylark (11 territories), yellowhammer (2 territories), linnet (1 territory) and song thrush (2 territories). During 2018, three Amber List species were recorded within the survey area: dunnock (2 territories), willow warbler (1 territory) and meadow pipit (1 territory). During 2021, one Amber List species was recorded within the survey area: dunnock (3 territories). In addition to being Red or Amber List, skylark, willow



warbler, song thrush, dunnock, linnet and yellowhammer are species of principal importance.

- 8.3.6 During 2018, it is likely that the following 12 species, for which individuals were recorded in suitable habitat on either one or two survey visits, may also have bred successfully within the survey area: stock dove (Amber List), tawny owl (Amber List), green woodpecker (Green List), jackdaw (Green List), carrion crow (Green List), goldcrest (Green List), long-tailed tit (Green List), garden warbler (Green List), mistle thrush (Red List), greenfinch (Green List), goldfinch (Green List) and bullfinch (Amber List, species of principal importance).
- 8.3.7 During 2021, it is likely that the following 17 species, for which individuals were recorded in suitable habitat on either one or two survey visits, may also have bred successfully within the survey area: green woodpecker (Green List), jackdaw (Green List), carrion crow (Green List), long-tailed tit (Green List), buzzard (Green List), collared dove (Green List), grey partridge (Red List), house sparrow (Red List, species of principal importance), jay (Green List), lesser whitethroat (Green List), pheasant (non-listed), red kite (Schedule 1, Green List), red-legged partridge (non-listed), reed bunting (Amber List), starling (Red List, species of principal importance), swallow (Green List) and bullfinch (Amber List, species of principal importance).
- 8.3.8 Skylark, song thrush, dunnock, bullfinch, linnet and yellowhammer noted above are also LBAP species.
- 8.3.9 During the 2019 survey work, breeding territories of two Schedule 1 species were also recorded:
- a. Red kite - two occupied nests and another territory were recorded in woodland within the expanded study area; and
  - b. Barn owl - an occupied nest and another breeding territory were recorded within the expanded study area (also an LBAP species).

## 8.4 Conclusions and recommendations

- 8.4.1 During 2018, a total of 23 common bird species were recorded breeding within the study area. Of these, Red and Amber List species were represented by less than ten breeding territories with the exception of skylark with 12 territories.
- 8.4.2 During 2021, a total of 20 common bird species were recorded breeding within the study area. Of these, Red and Amber species were represented by less than ten breeding territories with the exception of skylark with 11 territories.
- 8.4.3 Breeding territories of the Red and Amber List species are associated with the following habitats within the survey area: arable land (skylark), species-poor semi-improved grassland (skylark and meadow pipit), scrub (willow warbler and linnet) hedgerows (dunnock, linnet and yellowhammer) and woodland (song thrush). Survey findings in 2018 and 2021 were largely similar in terms of numbers and diversity of species recorded. Habitats with a higher number of territories associated with them included woodland, scrub and hedgerows and semi-improved rough grassland. This was consistent in 2018 and 2021 surveys.

8.4.4 A total of five breeding territories were recorded during 2019 in the extended survey area for species listed under Schedule 1. These were three red kite and two barn owl breeding territories within the expanded study area. No breeding territories of Schedule 1 species were recorded during 2018 or 2021 (within the Main Application Site). However, targeted surveys were not carried out as they were for 2019.

## 9 WINTERING BIRDS

### 9.1 Introduction

9.1.1 This section sets out the methodology and results of the wintering bird survey work undertaken in relation to the Proposed Development between 2017 and 2019.

#### Study area

9.1.2 The study area of the Wintering Birds Survey covers suitable habitats within the Main Application Site and further suitable habitats up to 500m beyond, as shown on the Wintering Bird Survey Plan in **Appendix Q**. However, given the low suitability of the habitats present, and high levels of disturbance at the highways intervention locations and carparking locations these areas were scoped out for further wintering bird surveys. The study area also incorporates the surrounding farmland within 500m of the Main Application Site.

9.1.3 The study area is set within a largely agricultural landscape context, with arable land bordering to the north, south and east; and residential areas of Luton to the north and west of the existing airport.

#### Survey scope

9.1.4 The survey aim was to determine the wintering bird assemblage and peak monthly counts of individual species within and up to 500m from the Main Application Site, particularly of those species which are:

- a. Subject to special protection through the provisions of legislation, such as Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) (Ref. 5) and Annex 1 of the Birds Directive 2009/147/EC on the Conservation of Wild Birds (Ref. 60);
- b. Otherwise notable bird species:
  - i. Red (those species which have experienced a severe decline of more than 50% of population and/or range over the last 25 years) and Amber (those species which have experienced a moderate decline of between 25% and 49% of population and/or range over the last 25 years) List species of the Birds of Conservation Concern 4 (Ref. 61); and/or,
  - ii. Species of principal importance listed on Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006.
- c. Provide sufficient information to inform an assessment of the potential impacts to the wintering bird assemblage as a result of the Proposed Development and allow the design of appropriate mitigation measures.

#### Legislation and local biodiversity context

9.1.5 All wild birds, their nests and their eggs are afforded legal protection through provisions in the Wildlife and Countryside Act 1981 (as amended) (Ref. 5) and the Countryside and Rights of Way (CROW) Act 2000 (Ref. 6).

- 9.1.6 It is an offence, with certain exceptions, to:
- a. kill, injure or take any wild bird;
  - b. take, damage or destroy the nest of any wild bird while it is in use or being built;
  - c. take or destroy the egg of any wild bird; and
  - d. have in one's possession or control any wild bird (dead or alive), part of a wild bird or egg of a wild bird which has been taken in contravention of the Act, the Protection of Birds Act 1954 or the law of any EU Member State (which implements the Birds Directive 2009/147/EC).
- 9.1.7 In addition to the above listed offences, it is also illegal to intentionally or recklessly disturb any wild bird listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), while it is nest building or is in, on or near a nest with eggs or young; or to disturb the dependent young of such a species. Consent from Natural England would be required to cause disturbance while nesting or to disturb its dependent young.
- 9.1.8 Rare or vulnerable bird species of European importance are listed in Annex 1 of Birds Directive 2009/147/EC on the Conservation of Wild Birds. Sites that regularly support threshold populations of Annex 1 species qualify for designation and to become part of the national site network.
- 9.1.9 Various bird species are also species of principal importance for the purpose of conserving biodiversity in England, listed in accordance with the provisions of Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 (Ref. **Error! Bookmark not defined.**), which places a duty on public organisations to 'have regard' to the conservation of these bird species.
- 9.1.10 The Bedfordshire and Luton (Ref. 62) and Hertfordshire (Ref. 63) Local Biodiversity Action Plans (LBAPs) details actions to help maintain or enhance the nature conservation status of certain bird species of local conservation concern. This includes:
- a. Tree sparrow (*Passer montanus*);
  - b. Bittern (*Botaurus stellaris*);
  - c. Stone-curlew (*Burhinus oedicephalus*); and
  - d. Song thrush (*Turdus philomelos*).

## 9.2 Methodology

### Desk study

- 9.2.1 Species records within 2km of the Main Application Site were requested from the Bedfordshire and Luton Biological Recording and Monitoring Centre (BRMC). Where records within the 2km search fell within the Hertfordshire county boundary, these were returned from the Herts Environmental Records Centre (HERC). This exercise was most recently updated in November 2020 to capture any additional records.

## Field survey

- 9.2.2 The transect survey method used in undertaking assessments of wintering birds was derived from current best practice as described by (Bibby et al, 2000 (Ref. 64)) and (Gilbert et al 1998 (Ref. 65)) and conforms to the recommendations of the British Trust for Ornithology (BTO) and the Joint Nature Conservation Committee (JNCC).
- 9.2.3 Monthly transect survey visits were carried out over two winters between December 2017 and February 2018, with further more detailed surveys between October 2018 and March 2019. Two transect routes were selected to include habitats that are likely to be attractive to birds. Areas with no access within 500m of the Main Application Site could be seen from the transect routes.
- 9.2.4 The transect routes are shown on the Wintering Bird Survey Plan in **Appendix Q**. The north eastern transect is mainly located along/adjacent to amenity grassland, scrub, semi-natural broadleaved woodland and arable land. The southern transect is mainly located along/adjacent to airfield, pastures, arable land, hedgerows and semi-natural broadleaved woodland.
- 9.2.5 The survey visits were completed during the day in suitable weather conditions for recording birds by avoiding strong winds, fog, torrential rain and falling snow. Details of the prevailing weather conditions during the survey visits are summarised in **Table 9.1**.

Table 9.1: Weather conditions during all wintering bird survey visits

Survey date	Weather conditions
20/12/2017	F2 westerly, 9°C, overcast and dry
17/01/2018	F4 south-westerly, 6°C, 25% cloud cover and dry
22/02/2018	F1 easterly, 4°C, 50% cloud cover and dry
26/10/2018	F2 north-westerly, 8°C, 75% cloud cover and dry
6/12/2018	F2 south-westerly, 12°C, overcast and dry
19/12/2018	F1 southerly, 8°C, 25% cloud cover and dry
24/01/2019	F1 north-westerly, 1°C, overcast and dry
15/02/2019	F1 southerly, 12°C, cloudless and dry
22/02/2019	F1 south-westerly, 10°C, 90% cloud cover and dry

- 9.2.6 On each visit, the fixed transect route was slowly walked by a surveyor competent and experienced in wintering bird surveys using the above methods. All birds visible along the transect within the survey area were identified and

recorded on 1:6,000 scale site maps using standard British Trust for Ornithology (BTO) species codes. A pair of 10x42 binoculars was used to assist with species identification.

- 9.2.7 Update wintering bird surveys will be undertaken over winter 2021/2022, the results of which will be reported with the ES.

### **Survey limitations**

- 9.2.8 Factors that influence bird presence and dispersal to and/or from the study area include prevailing food availability, roost site suitability, disturbance and weather conditions. However, the fieldwork was undertaken by experienced bird surveyors during suitable weather and times of day to help ensure that regularly occurring species within the survey area were recorded with sufficient certainty to not significantly limit the validity of the findings presented in this report.

## **9.3 Results**

### **Desk study**

- 9.3.1 Information obtained from the Bedfordshire and Luton and Hertfordshire Biological Records Centres confirmed that the following wintering species relevant to this report have been recorded within the study area since 2006.

#### ***Ten Red List species:***

- a. grey partridge (*Perdix perdix*);
- b. herring gull (*Larus argentatus*)
- c. skylark (*Alauda arvensis*);
- d. starling (*Sturnus vulgaris*);
- e. fieldfare (*Turdus pilaris*);
- f. redwing (*Turdus iliacus*);
- g. song thrush;
- h. house sparrow (*Passer domesticus*);
- i. linnet (*Linaria cannabina*);and
- j. yellowhammer (*Emberiza citrinella*).

#### ***Nine Amber List species:***

- a. black-headed gull (*Chroicocephalus ridibundus*);
- b. common gull (*Larus canus*);
- c. yellow-legged gull (*Larus michahellis*);
- d. lesser black-backed gull (*Larus fuscus*);
- e. stock dove (*Columba oenas*);
- f. kestrel (*Falco tinnunculus*);
- g. dunnock (*Prunella modularis*);



- h. meadow pipit (*Anthus pratensis*); and
- i. bullfinch (*Pyrrhula pyrrhula*).

**Schedule 1 species:**

- a. red kite (*Milvus milvus*); and
- b. barn owl (*Tyto alba*).

**Annex 1 species:**

- a. golden plover (*Pluvialis apricaria*).

**Field survey**

- 9.3.2 Areas that were regularly frequented by wintering birds are shown on the Wintering Bird Survey in **Appendix Q**.
- 9.3.3 Monthly counts of all species recorded between October 2018 and March 2019 are provided in the Wintering Bird Survey Data 2018/2019 in **Appendix R** and between December 2017 and February 2018 are provided on the Wintering Bird Survey Data 2017/2018 in **Appendix S**.
- 9.3.4 Peak monthly counts recorded from all wintering bird survey visits are provided in **Table 9.2**. The taxonomic sequence of species listed in is in accordance with the British List (Ref. 66).

Table 9.2: Peak monthly counts from all wintering bird survey visits

Common name	Scientific name	BTO symbol	Status	Peak monthly count
Red-legged Partridge	<i>Alectoris rufa</i>	RL	Green List	106
Grey Partridge	<i>Perdix perdix</i>	P.	Red List, Species of Principal Importance, LBAP	2
Pheasant	<i>Phasianus colchicus</i>	PH	Green List	22
Sparrowhawk	<i>Accipiter nisus</i>	SH	Green List	2
Red Kite	<i>Milvus milvus</i>	KT	Schedule 1, Green List	13
Buzzard	<i>Buteo buteo</i>	BZ	Green List	6
Golden Plover	<i>Pluvialis apricaria</i>	GP	Annex 1 and Red List	2
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	BH	Amber List	c.330

Common name	Scientific name	BTO symbol	Status	Peak monthly count
Common Gull	<i>Larus canus</i>	CM	Amber List	5
Herring Gull	<i>Larus argentatus</i>	HG	Red List, Species of Principal Importance	2
Yellow-legged Gull	<i>Larus michahellis</i>	YG	Amber List	1
Lesser black-backed gull	<i>Larus fuscus</i>	LB	Amber List	1
Feral Pigeon	<i>Columba livia ssp. domestica</i>	FP	Green List	c.60
Stock Dove	<i>Columba oenas</i>	SD	Amber List	2
Woodpigeon	<i>Columba palumbus</i>	WP	Green List	c.400
Collared Dove	<i>Streptopelia decaocto</i>	CD	Green List	4
Barn Owl	<i>Tyto alba</i>	BO	Schedule 1, LBAP, Green List	1
Great Spotted Woodpecker	<i>Dendrocopus major</i>	GS	Green List	3
Green Woodpecker	<i>Picus viridis</i>	G.	Green List	1
Kestrel	<i>Falco tinnunculus</i>	K.	Amber list	1
Jay	<i>Garrulus glandarius</i>	J.	Green List	5
Magpie	<i>Pica pica</i>	MG	Green List	19
Jackdaw	<i>Corvus monedula</i>	JD	Green List	42
Rook	<i>Corvus frugilegus</i>	RK	Green List	11
Carrion Crow	<i>Corvus corone</i>	C.	Green List	21
Coal Tit	<i>Parus ater</i>	CT	Green List	3
Blue Tit	<i>Cyanistes caeruleus</i>	BT	Green List	16
Great Tit	<i>Parus major</i>	GT	Green List	11

Common name	Scientific name	BTO symbol	Status	Peak monthly count
Skylark	<i>Alauda arvensis</i>	S.	Red List, Species of Principal Importance, LBAP	31
Long-tailed Tit	<i>Aegithalos caudatus</i>	LT	Green List	32
Goldcrest	<i>Regulus regulus</i>	GC	Green List	6
Wren	<i>Troglodytes troglodytes</i>	WR	Green List	14
Nuthatch	<i>Sitta europaea</i>	NH	Green List	1
Starling	<i>Sturnus vulgaris</i>	SG	Red List, Species of Principal Importance, LBAP	68
Blackbird	<i>Turdus merula</i>	B.	Green List	20
Fieldfare	<i>Turdus pilaris</i>	FF	Red List, Schedule 1	108
Redwing	<i>Turdus iliacus</i>	RE	Red List, Schedule 1	69
Song Thrush	<i>Turdus philomelos</i>	ST	Red List, Species of Principal Importance, LBAP	4
Mistle Thrush	<i>Turdus viscivorus</i>	M.	Red List	1
Robin	<i>Erithacus rubecula</i>	R.	Green List	9
House Sparrow	<i>Passer domesticus</i>	HS	Red List, Species of Principal Importance, LBAP	5
Dunnock	<i>Prunella modularis</i>	D.	Amber List and Species of Principal Importance, LBAP	10
Pied Wagtail	<i>Motacilla alba</i>	PW	Green List	21

Common name	Scientific name	BTO symbol	Status	Peak monthly count
Meadow Pipit	<i>Anthus pratensis</i>	MP	Amber List	7
Chaffinch	<i>Fringilla coelebs</i>	CH	Green List	12
Bullfinch	<i>Pyrrhula pyrrhula</i>	BF	Amber List, Species of Principal Importance, LBAP	2
Greenfinch	<i>Chloris chloris</i>	GR	Green List	4
Linnet	<i>Linaria cannabina</i>	LI	Red List, Species of Principal Importance, LBAP	c.220
Goldfinch	<i>Carduelis carduelis</i>	GO	Green List	73
Siskin	<i>Spinus spinus</i>	SK	Green List	10
Yellowhammer	<i>Emberiza citrinella</i>	Y.	Red List, Species of Principal Importance, LBAP	32

9.3.5 A total of 51 species were recorded wintering within the survey area. The peak monthly counts of abundant species (represented by more than 20 individuals) are as follows:

- a. red-legged partridge (106) and pheasant (22) recorded on the farmland mainly east of the Proposed Development;
- b. black-headed gull (c.330) recorded on the amenity grassland playing fields and goldfinch (73) on tall ruderal vegetation at Wigmore Park;
- c. long-tailed tit (32) in the scrub and hedgerows south of Wigmore Park;
- d. feral pigeon (c.60) skylark (31), linnet (c.220) and yellowhammer (32) on the set-aside to the east of Wigmore Park;
- e. woodpigeon (c.400) recorded in the woods mainly east of the Proposed Development;
- f. jackdaw (42) and carrion crow (21) recorded on arable land mainly south of the Proposed Development;
- g. starling (68), blackbird (20), fieldfare (108), redwing (69) and pied wagtail (21) on the grazing pasture south of the Proposed Development.

- 9.3.6 In total, eleven Red List species (grey partridge, golden plover, herring gull, skylark, starling, fieldfare, redwing, song thrush, house sparrow, linnet and yellowhammer) and nine Amber List species (black-headed gull, common gull, yellow-legged gull, lesser black-backed gull, stock dove, kestrel, dunnoek, meadow pipit and bullfinch) were recorded within the survey area.
- 9.3.7 In addition to being Red or Amber List, grey partridge, herring gull, skylark, starling, song thrush, house sparrow, dunnoek, linnet, bullfinch and yellowhammer are also species of principal importance.
- 9.3.8 Red kite which is a Schedule 1 species was most frequently recorded over farmland within 500m of the south east, south and north east sides of the Main Application Site.
- 9.3.9 Barn owl is another Schedule 1 species for which signs of their presence was recorded. Barn owl pellets were found directly beneath a potential nest site in a building at Someries Farm approximately 150m south of the Proposed Development. Barn owl pellets were also found at the base of a tree roost site on the eastern most edge of the Main Application Site.
- 9.3.10 Two golden plovers, which is an Annex 1 and Red List species, were recorded flying south over the eastern side of the survey area on one occasion. It is likely that these birds are associated with the flock that frequented the bean fields at Tankards Farm, Tea Green approximately 500m north east of the Main Application Site.
- 9.3.11 Grey partridge, barn owl, skylark, starling, song thrush, house sparrow, dunnoek, bullfinch, linnet and yellowhammer are also LBAP species.

## **9.4 Conclusions and recommendations**

- 9.4.1 A total of 51 wintering bird species, including Red and Amber List species, were recorded within the study area.
- 9.4.2 The Red and Amber List species associated with the following habitats within the study area were:
- a. amenity grassland (herring gull, black-headed gull and common gull);
  - b. arable set-aside land (kestrel, skylark, linnet and yellowhammer);
  - c. species-poor semi-improved grassland (grey partridge, kestrel, skylark, starling, fieldfare, redwing and meadow pipit);
  - d. scrub and hedgerows (dunnoek, bullfinch, linnet, goldfinch and yellowhammer); and
  - e. woodland (stock dove and song thrush).
- 9.4.3 The flock of c.220 linnets that regularly frequented the arable set-aside to the east of Wigmore Park is noteworthy.
- 9.4.4 Red kite was most frequently recorded over farmland within 500m to the south east, south and north east of the Main Application Site.

- 9.4.5 A barn owl potential nest site was recorded in a building within 500m and south west of the Main Application Site. A barn owl roost site was also recorded in a tree on the eastern most edge of the Main Application Site.
- 9.4.6 A golden plover flock frequented the bean fields at Tankards Farm, Tea Green approximately 500m north east of the Main Application Site.



## 10 REPTILES

### 10.1 Introduction

10.1.1 This section sets out the methodology and results of the reptile survey work undertaken in relation to the Proposed Development during 2018 and 2019.

#### Study area

10.1.2 The study area of the Reptile Survey covers suitable habitats within the Main Application Site as shown on the Reptile Survey Area Plan in **Appendix T**. However, with the exception of junction 10 of the M1, the majority of the highway intervention locations and carparking locations do not include suitable habitats for reptiles and were therefore scoped out of further reptile surveys. The Phase 1 Habitat Survey of junction 10 of the M1 identified grassland and scrub habitats which could be utilised by a small number of common species though is generally unsuitable for reptiles. Consequently, this area did not form part of the study area for the Reptile Survey.

10.1.3 The study area is set within a largely agricultural landscape context, with arable land bordering to the north, south and east; and residential areas of Luton to the north and west of the existing airport.

#### Survey scope

10.1.4 A series of reptile surveys were undertaken between April 2018 and July 2019.

10.1.5 The objectives of the survey were to:

- a. undertake a desk-based review of reptile records within 2km of the Main Application Site to identify those that may be relevant to the development proposals;
- b. assess the suitability of the habitats within the study area to support populations of reptiles;
- c. determine the presence or absence of reptiles in suitable habitats within the study area;
- d. determine the size of any reptile populations present within the study area; and
- e. provide sufficient information to inform an assessment of the potential impacts to common reptile species as a result of the Proposed Development and design appropriate mitigation measures.

#### Legislation and local biodiversity context

10.1.6 All native British reptile species are protected against killing and injury under Section 9 of the Wildlife and Countryside Act 1981 (as amended) (Ref. 5) and the Countryside and Rights of Way (CROW) Act 2000 (Ref. 6).

10.1.7 The following reptile species are also species of principal importance for the purpose of conserving biodiversity in England, listed in accordance with the provisions of Section 41 of the Natural Environment and Rural Communities

(NERC) Act 2006 (Ref. **Error! Bookmark not defined.**), which places a duty on public organisations to 'have regard' to the conservation of these reptiles:

- a. Adder (*Vipera berus*);
- b. Common lizard (*Zootoca vivipara*);
- c. Grass snake (*Natrix helvetica*);
- d. Sand lizard (*Lacerta agilis*);
- e. Slow-worm (*Anguis fragilis*); and
- f. Smooth snake (*Coronella austriaca*).

10.1.8 Adder is listed as a priority species within Bedfordshire and Luton on the Local Biodiversity Action Plan (LBAP) and has a specific Species Action Plan (Ref. 67), last updated July 2010. The Hertfordshire LBAP does not include any reptile species.

## 10.2 Methodology

### Desk study

10.2.1 A records search was conducted in February 2018 to obtain existing records of legally protected and notable species, including reptiles. Species records within 2km of the Main Application Site were requested from the Bedfordshire and Luton Biological Recording and Monitoring Centre (BRMC). Where records within the 2km search fell within the Hertfordshire county boundary, these were returned from the Herts Environmental Records Centre (HERC). This exercise was repeated in November 2020 to capture any additional records.

### Field survey

10.2.2 Survey work for reptiles was undertaken in accordance with guidelines produced by Froglife (Ref. 68,69) and the Herpetofauna Groups of Britain and Ireland (HGBI) (Ref. 70).

10.2.3 A systematic walkover of the study area was undertaken on 25 April and 09 May 2018 by experienced ecologists, in order to assess habitats for their suitability to support reptiles. Good reptile habitats are generally open aspect, well-drained and south facing, mostly sunny, sheltered and relatively undisturbed. If present, any signs of reptiles (such as moulted skins, feeding remains, dead animals or live animals basking) were noted. This initial habitat assessment was undertaken to inform the areas to be targeted for further surveys. The offsite car park areas were scoped out for further survey as habitats present do not offer suitability for reptiles.

10.2.4 Artificial refugia comprising squares (minimum size 0.5m x 0.5m) of bitumen roofing felt, corrugated tin and onduline were distributed across key habitat areas within the study area immediately following identification of suitable reptile habitat during the systematic walkover. The artificial refugia heat up during the day at a faster rate than the surrounding environment, thus making them attractive to cold-blooded reptiles for basking and shelter. Refuges were left to 'bed in' for one week before surveys commenced. The bedding-in period for

these artificial refugia allows for species to become accustomed to their presence and begin making use of them. The position of each artificial refuge was recorded using a data-enabled iPad with ArcGIS software installed, giving location points accurate to 5 metres.

- 10.2.5 A total of 115 refugia were placed within all areas of suitable reptile habitat, with locations and distribution illustrated on the Reptile Survey Area Plan in **Appendix T**. The total refugia density of all areas of suitable reptile habitat within the study area is approximately 10 artificial refugia per hectare, which is at the higher end of the guideline 5-10 refugia per hectare.
- 10.2.6 **Table 10.1** summarises information relating to each of the areas of suitable reptile habitat identified during the systematic walkover for consequent artificial refugia survey.

Table 10.1: Areas identified as suitable reptile habitat

Suitable habitat area Grid reference	Number of artificial refugia distributed	Approximate area of compartment (ha)	Refugia density (refugia/ha)
TL 12756 22212	10	0.7	14.3/ha
TL 12614 21693	10	0.6	16.7/ha
TL 13073 22187	15	1.5	10/ha
TL 13143 21356	10	0.35	28.6/ha
TL 13493 21652	20	2.35	8.5/ha
TL 13402 22014	10	1.25	8/ha
TL 13670 21783	10	0.8	12.5/ha
TL 13777 21807	5	0.3	16.7/ha
TL 13804 21741	10	1.3	7.7/ha
TL 13979 21548	10	2	5/ha
TL 14021 21318	5	0.4	12.5/ha

- 10.2.7 Due to a prolonged period of sub-optimal survey conditions associated with a heatwave during summer 2018, further surveys were undertaken in 2019 in more suitable conditions. Artificial refugia were re-deployed, within the same locations as the 2018 surveys, between 28 March and 2 April 2019. Checks

were conducted as per the 2018 survey methodology between 26 April and 15 July.

- 10.2.8 Refugia were checked on 18 occasions in 2018 and a further 7 occasions in 2019, to account for surveys not completed in 2018 and those undertaken in sub-optimal conditions. A minimum of 48 hours was left between visits and ordinarily more than three days between visits, however exceptions were made when there was a window of suitable weather conditions due to extended periods of unsuitable weather.
- 10.2.9 During each visit, both the artificial refugia and existing debris/natural refugia were carefully approached to avoid disturbance of basking reptiles, then lifted and subsequently replaced. Visual searches of the general habitat and potential basking spots for reptiles were also conducted alongside refugia checks. The location, number and species of any reptiles observed was recorded, with sex and age group identified where possible.
- 10.2.10 All surveys were completed by two suitably experienced ecologists, typically during optimal weather conditions (dry and calm with an ambient temperature between 9 and 18°C) during the months when reptiles are active (March to October). Full details of the conditions are provided within **Table 10.2**.

Table 10.2: Reptile survey dates and weather conditions

Visit no.	Date	Weather (cloud cover, wind, precipitation)	Temperature (°C)
1	15/05/2018	60%, light, dry	14
2	23/05/2018	50%, light, dry	10
3	07/06/2018	30 %, light, dry	12
4	14/06/2018	50%, light, dry	13
5	21/06/2018	60%, light, dry	13
6	26/06/2018	20%, light, dry	18
7	05/07/2018	20%, light, dry	19
8	24/08/2018	50%, moderate, dry	16
9	28/08/2018	50%, light, dry	16
10	30/08/2018	50%, light, dry	15
11	04/09/2018	60%, moderate, dry	18

Visit no.	Date	Weather (cloud cover, wind, precipitation)	Temperature (°C)
12	06/09/2018	30%, light, dry	10
13	11/09/2018	20%, light, dry	15
14	13/09/2018	10%, light, dry	15
15	25/09/2018	20%, light, dry	15
16	28/09/2018	50%, moderate, dry	15
17	02/10/2018	90%, moderate, dry	17
18	04/10/2018	30%, light, dry	17
19	26/04/2019	25%, light, dry	10
20	30/04/2019	10%, none, dry	13
21	13/05/2019	10%, light, dry	13
22	24/05/2019	10%, none, dry	16
23	30/05/2019	25%, moderate, dry	15
24	03/06/2019	40%, light, dry	14
25	15/07/2019	70%, none, dry	19

10.2.11 Given the prevalence of dense scrub within certain parts of the study area (and therefore the potential for live animals hidden within the undergrowth), further checks and searches were undertaken as part of the Ecological Clerk of Works (ECoW) when vegetation was cleared from Wigmore Park to facilitate ground investigation surveys (June to July 2018). These works were supervised by a suitably qualified ecologist and no reptiles were encountered.

### ***Evaluation of results***

10.2.12 Guidance on population size estimates from Froglife (Ref. 71) shown in **Table 10.3** and provides an indication of reptile population size class i.e. low, good or exceptional. The peak adult count from a single visit is utilised for the assessment.

Table 10.3: Population size for survey assessment of key reptile sites

Species	Low	Good	Exceptional
Slow-worm	<5	5-20	>20
Common lizard	<5	5-20	>20
Grass snake	<5,	5-10,	>10
Adder	<5	5-10	>10

10.2.13 Population density can be estimated by dividing the adult peak count by the area of suitable reptile habitat present (ha) using the calculation from the HGBI guidance (Ref. 72) on population density estimates is shown in **Table 10.4**.

Table 10.4: Population density estimates

Species	Population size (adult density)
Slow-worm	High population >100/ha
	Medium population >50/ha
	Low population <50/ha
Common lizard	High population >80/ha
	Medium population >40/ha
	Low population <20/ha
Adder	High population >4/ha
	Medium population 2-4/ha
	Low population <2/ha
Grass snake	High population >4/ha
	Medium population 2-4/ha
	Low population <2/ha



## Survey limitations

- 10.2.14 Reptiles are mobile animals, with some, such as grass snake, occupying large home ranges and therefore may occur as transient individuals on sites connected to wider areas that support these species. However, the level of survey effort undertaken is anticipated to have detected the reptile species present within the survey area.
- 10.2.15 The most effective times to undertake a reptile survey are April, May and September. Due to extended periods of high temperature, primarily during June and July 2018, fewer checks were undertaken in 2018 than initially planned. During such conditions, reptiles can enter aestivation, a period of enforced dormancy, which would be likely to influence survey results in this period (Ref. 73).
- 10.2.16 Consequently, and as described within the methodology section above, a further seven checks were conducted in suitable weather conditions between April and July 2019, with refugia redeployed in the same locations as the 2018 survey. These additional checks are considered to minimise the impact of adverse surveying weather conditions upon survey results, and therefore increase the robustness of results obtained during the 2018 surveys.
- 10.2.17 Although the surveys extended into early October 2018, which can be considered sub-optimal, the weather conditions during this period were well within the temperature range where reptiles would be active. As such, the survey dates are not considered to pose a constraint to the survey and are unlikely to materially affect the results of this report and the assessment that it informs.
- 10.2.18 A low number of the visits were undertaken during sub-optimal weather (e.g. moderate wind or high cloud cover); the overall results are considered robust due to the number of surveys completed within optimal conditions, with a suitable temperature range and dry conditions for all surveys, this is not considered to have affected the results of the survey.
- 10.2.19 Some areas where reptile refugia were initially located became inaccessible during the survey period. For example, four refugia were moved due to the commencement of the ground investigation works in Wigmore Park during June 2018 and approximately 12 refugia became shaded and overgrown by tall ruderal vegetation, including extensive stinging nettle cover to around head-height at the southern end of Wigmore Park.
- 10.2.20 These areas were likely reduced in suitability for reptiles and were discounted from further checks after July 2018. Given this, the 2019 artificial refugia surveys avoided these areas and placed refugia in adjacent areas of suitable habitat.
- 10.2.21 Additionally, approximately 15 (10%) refugia were removed by third parties, particularly in areas with a higher level of human disturbance such as Wigmore Park, or in areas of agricultural activity/machinery. Surveyors endeavoured to replace these refugia on subsequent visits to reduce the impact of this disruption to survey effort. Given the density of refugia utilised and the

distribution of refugia throughout all habitat types, this is not considered to be a significant limitation that could have affected the robustness of the survey.

- 10.2.22 Some parts of the Main Application Site were not accessible for survey, for example due to dense scrub or steep slopes. However, on the basis that the survey encompassed the majority of suitable habitats within the study area, it is considered that the results of the survey work undertaken are robust and that this is also not a significant limitation.
- 10.2.23 The results of these reptile surveys are representative only of the period in which the surveys were undertaken. Variations in conditions may occur over time due to seasonal factors, population dispersal or changes in habitat management and therefore the status of reptiles may be subject to change over time.

## 10.3 Results

### Desk study

- 10.3.1 The Bedfordshire and Luton Species Action Plan for adder states: *“In 2009, an injured female adder was found among rubbish collected from the Luton area, so it appears there may also be a population remaining in the south of the county.”* No records of adder were returned from HERC.
- 10.3.2 The data search results from BRMC and HERC returned one record of slow-worm from the 2km area surrounding the Main Application site within the past 10 years. Some additional historic records (between 1973 and 2007) of common lizard, grass snake and slow-worm were also returned.

### Field survey

- 10.3.3 Slow-worm accounted for all reptiles identified during the survey, with the vast majority of individuals observed in the grassland area adjacent to Wigmore Park Allotments. Additionally, two slow-worm were found in the area of calcareous grassland to the south of Eaton green road. The first was found during the systematic walkover basking beneath a piece of an abandoned vehicle which has been in this location for some time and may have formed a permanent ‘artificial’ refuge, with the second found under an artificial refuge in 2019.
- 10.3.4 The location of the two areas supporting slow worm are shown on the Reptile Survey Results Plan within **Appendix U** and Photographs 9 and 10 within **Section 13**.
- 10.3.5 The results of all surveys and the incidental record are summarised in **Table 10.5** below.

Table 10.5: Results of the artificial refugia checks

Visit no.	Date	Result	Location
Incidental	06/05/2019	1 adult slow-worm	Grassland east of Wigmore Park

Visit no.	Date	Result	Location
1	15/05/2018	1 adult slow-worm	Adjacent to Wigmore Allotments
2	23/05/2018	1 adult slow-worm	Adjacent to Wigmore Allotments
3	07/06/2018	1 adult slow-worm	Adjacent to Wigmore Allotments
4	14/06/2018	Nil	-
5	21/06/2018	1 adult slow-worm	Adjacent to Wigmore Allotments
6	26/06/2018	Nil	-
7	05/07/2018	2 adult slow-worms	Adjacent to Wigmore Allotments
8	24/08/2018	4 adult slow-worms	Adjacent to Wigmore Allotments
9	28/08/2018	2 adult slow-worms, 6 juvenile slow-worms	Adjacent to Wigmore Allotments
10	30/08/2018	1 adult slow-worm, 1 juvenile slow-worm	Adjacent to Wigmore Allotments
11	04/09/2018	4 adult slow-worms	Adjacent to Wigmore Allotments
12	06/09/2018	1 juvenile slow-worm	Adjacent to Wigmore Allotments
13	11/09/2018	2 adult slow-worms, 2 juvenile slow-worms	Adjacent to Wigmore Allotments
14	13/09/2018	1 adult slow-worm	Adjacent to Wigmore Allotments
15	25/09/2018	1 adult slow-worm	Adjacent to Wigmore Allotments
16	28/09/2018	Nil	-
17	02/10/2018	1 adult slow-worm, 1 juvenile slow-worm	Adjacent to Wigmore Allotments
18	04/10/2018	3 adult slow-worms	Adjacent to Wigmore Allotments
19	26/04/2019	Nil	-
20	30/04/2019	5 juvenile slow-worm	Adjacent to Wigmore Allotments
21	13/05/2019	Nil	-
22	24/05/2019	1 juvenile slow-worm, 1 sub-adult slow worm	Adjacent to Wigmore Allotments

Visit no.	Date	Result	Location
23	30/05/2019	2 adult slow- worm, 2 juvenile slow-worm	3 Adjacent to Wigmore Allotments, 1 grassland east of Wigmore Park
24	03/06/2019	1 sub-adult slow-worm	Adjacent to Wigmore Allotments
25	15/07/2019	2 adult slow-worm, 5 juvenile slow-worm	Adjacent to Wigmore Allotments

### ***Population Size Class and Population Density Estimate***

- 10.3.6 The survey results indicate two small populations of slow-worm present within the Main Application Site, as highlighted on the Reptile Survey Results Plan in **Appendix U**. This is based upon peak adult counts of four and one for each of Wigmore Allotments and the area of unmanaged calcareous grassland east of Wigmore Park respectively. These two areas are separated by an area of arable land, mown semi-improved grassland and wooded belt; however, given the proximity of these two populations (approximately 200m) there is likely to be some movement of individuals between the two populations.
- 10.3.7 Based on an area of approximately 0.7 hectares of suitable habitat, the population density at Wigmore Park Allotments is 2.85/ha, while based on an area of approximately 1.5 hectares, the population density at the area of unmanaged grassland south of Eaton Green road is 0.67/ha. As such, based on guidance, both areas appear to support 'low' populations of slow-worm.

## **10.4 Conclusions and recommendations**

- 10.4.1 Suitable habitats for reptiles exist within the study area. Reptile surveys have identified two 'low' populations of slow-worm within limited areas of the Main Application Site.
- 10.4.2 An additional nine surveyed areas within the survey extent boundary contain habitats suitable for slow-worm and other common species of reptile; however, none were identified in these areas during the artificial refugia surveys undertaken in 2018 and 2019. Given the presence of suitable habitats within the Main Application Site and immediate surrounds, and the large ranges covered by grass snake, it is possible that this species is also present at low densities.



## 11 AMPHIBIANS

### 11.1 Introduction

11.1.1 This section sets out the methodology and results of the amphibian survey work undertaken in relation to the Proposed Development between 2018 and 2020.

#### Study area

11.1.2 The study area of the Amphibian Survey covers waterbodies within 500m of the Main Application Site boundary as detailed on the Pond Location Plan in **Appendix V**. The majority of the works associated with the highways interventions would occur in existing habitats within the highway boundary that largely comprise areas of hard standing, which do not include suitable habitats for amphibians and therefore were not included in the study area. The exception to this is the proposed highways intervention works at junction 10 of the M1, where vegetation clearance would be required. With reference to aerial imagery, there are three ponds and a drainage ditch system within 500m of Junction 10 and some terrestrial habitat also exists at this location.

11.1.3 The study area is set within a largely agricultural landscape context, with arable land bordering to the north, south and east; and residential areas of Luton to the north and west of the existing airport. Individual waterbodies took a variety of forms, ranging from natural and semi-natural field ponds, to man-made lined ponds.

#### Survey scope

11.1.4 Amphibian surveys were undertaken between April 2018 and May 2020.

11.1.5 The objectives of these surveys were to:

- a. undertake a desk-based review of all waterbodies within 500m of the Main Application Site to determine whether they could potentially support any amphibian species, with a particular focus given to great crested newt populations;
- b. undertake a review of amphibian species records within 2km of the Main Application Site;
- c. assess the suitability of the habitats within the Main Application Site to support amphibian populations;
- d. determine the presence or absence of any amphibian populations in any waterbodies within 500m of the Main Application Site;
- e. determine the population size class of any great crested newt populations found to be present within 500m of the Main Application Site; and
- f. provide sufficient information to inform an assessment of the potential impacts to amphibians as a result of the Proposed Development and design appropriate mitigation measures (where required).

## Legislation and local biodiversity context

- 11.1.6 Great crested newt (*Triturus cristatus*) is fully protected under the Wildlife and Countryside Act 1981 (as amended) (Ref. 5), Countryside and Rights of Way (CROW) Act 2000 (Ref. 6) and The Conservation of Habitats and Species Regulations 2017 (as amended) (Ref. **Error! Bookmark not defined.**). As such, without a licence from Natural England (NE), it is an offence to:
- Kill, injure or capture a great crested newt;
  - Damage, destroy or obstruct access to any breeding site or resting place of a great crested newt; and
  - Disturb a great crested newt while it is occupying a structure or place that it uses for protection.
- 11.1.7 The legislation applies to all stages of the life cycle including eggs, larvae and juveniles.
- 11.1.8 The following amphibian species are also species of principal importance for the purpose of conserving biodiversity in England, listed in accordance with the provisions of Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 (Ref. **Error! Bookmark not defined.**), which places a duty on public organisations to 'have regard' to the conservation of these amphibians:
- Common toad (*Bufo bufo*);
  - Natterjack toad (*Epidalea calamita*);
  - Pool frog (*Pelophylax lessonae*); and
  - Great crested newt.
- 11.1.9 Of the species listed on the NERC Act 2006, only two could feasibly be present within the Proposed Development boundary, great crested newt and common toad. These species were previously identified as requiring action in the UK Biodiversity Action Plan (UK BAP) and continue to be regarded as conservation priorities.
- 11.1.10 Natterjack toad is unlikely to be present as this species is almost exclusively confined to coastal sand dune systems, coastal grazing marsh and sandy heath habitats, which are not present within the Main Application Site. In addition, pool frog was presumed extinct in the wild in 1995 but has since been re-introduce at two sites in Norfolk; however they are still very restricted in distribution and considered absent from the Main Application Site.
- 11.1.11 Great crested newts are listed as priority species on both the Bedfordshire and Hertfordshire Local Biodiversity Action Plan (LBAP). Furthermore, the following species are referenced in the Hertfordshire LBAP;
- Smooth newt (*Lissotriton vulgaris*);
  - Palmate newt (*Lissotriton helveticus*);
  - Common frog (*Rana temporaria*); and
  - Common toad.



## 11.2 Methodology

### Desk study

- 11.2.1 A desk study exercise was undertaken in February 2018, which incorporated a 'pond scoping' exercise and a biological records search.
- 11.2.2 Ordnance Survey maps and aerial photographs were reviewed to identify ponds and other relevant waterbodies within 500m of the study area and to review habitat connectivity between these and the Main Application Site. This information was used to determine which required field survey, on the basis that they could potentially support great crested newt populations and other amphibians that could be affected by the Proposed Development.
- 11.2.3 A biological records search was conducted to obtain existing records of legally protected and notable species, including amphibians such as great crested newts. Species records within 2km of the Main Application Site were requested from the Bedfordshire and Luton Biological Recording and Monitoring Centre (BRMC). Where records within the 2km search fell within the Hertfordshire county boundary, these were returned from the Herts Environmental Records Centre (HERC). This exercise was repeated in November 2020 to capture any additional records.
- 11.2.4 Records of over 10 years were omitted as they may not accurately represent the current status of any amphibian populations in the area.

### Field survey

#### *Habitat suitability survey*

- 11.2.5 A ground truthing and Habitat Suitability Index (HSI) assessment for great crested newts was completed at all accessible ponds within the study area, using the simplified HSI methodology (Ref. 74). The HSI surveys were carried out on 16 April 2018 by suitably qualified ecologists. An additional set of ground truthing and HSI assessments were conducted on 11 November 2019 in order to capture ponds where access had previously been restricted. During 2020 update HSI assessments were conducted on all ponds, where access was granted, between 23 April 2020 to 27 May 2020. On all occasions, the lead surveyor or both surveyors held survey licences for great crested newt.
- 11.2.6 The assessments are based on provision of suitable habitat for great crested newt breeding, foraging, shelter, and hibernation within the vicinity of the pond, and give an overall indication of suitability between 0 and 1:
- a. 0 to 0.5 = poor suitability for great crested newts;
  - b. 0.51 to 0.59 = below average suitability for great crested newts;
  - c. 0.6 to 0.69 = average suitability for great crested newts;
  - d. 0.7 to 0.79 = good suitability for great crested newts; and
  - e. 0.8 to 1 = excellent suitability for great crested newts.
- 11.2.7 Habitats and features known to benefit amphibian populations include (Ref. 75):

- a. Unshaded water bodies with emergent and submerged vegetation, which rarely dries out;
- b. Unimproved and semi-improved grassland, swamps, hedgerow and scrub;
- c. Connecting semi-natural habitat between ponds such as rough grassland, stone walls, hedgerows, scrub and trees;
- d. Log piles and stone walls to provide refuge; and
- e. Absence of predators, such as fish or wildfowl.

### ***Presence/absence surveys***

- 11.2.8 To determine great crested newt presence or absence, survey visits were undertaken at the ponds which held water, and where access was granted by the landowner. The initial survey visits were completed between 26 April 2018 and 22 May 2018. Updated surveys visits were completed between 23 April 2020 and 19 May 2020. All surveys were undertaken within the core period of mid-April to mid-May in line with best practice guidance (Ref. 76).
- 11.2.9 Four surveys are required to confirm great crested newt presence or absence, the surveys should be undertaken on the same evenings across all scoped in ponds. Where this was not possible, an explanation is provided under Survey Limitations in this section.
- 11.2.10 Each survey was carried out in accordance with the Great Crested Newt Mitigation Guidelines (Ref. 76) where possible; however, due to health and safety considerations in the 2018 surveys it was not possible to undertake bottle trapping, egg search or netting surveys at any waterbody, see explanation in Section 11.2.14. Therefore, during each visit in 2018, two survey methods were deployed, as described below:
- a. **Torch survey:** The perimeter of the pond was surveyed for great crested newts after dark using a high-powered torch (1 million CP). Animals observed were identified to species, sex and life stage where possible; and
  - b. **Refugia search:** suitable natural and artificial refugia within proximity to ponds were searched by hand for the presence of great crested newts. Such refugia took the form of log piles, rubble, wooden planks and other such detritus within the terrestrial habitats. Any amphibians found were identified to species and gender.
- 11.2.11 During the updated surveys in 2020, where possible, three survey methods were deployed. Where this wasn't possible an explanation is provided in Section 11.2.14 below. The methods deployed for each pond were chosen based upon health and safety constraints, and therefore different combinations of the methods described below were used:
- a. **Bottle trapping:** Traps were set up around the perimeter of the pond. Where access did not allow the use of standard bottle traps, floating bottle traps were used. Ponds were visited in the evening to set up the

traps, and an early morning visit to check the traps. Animals observed were identified to species, sex and life stage where possible;

- b. **Egg search:** The perimeter of the pond was surveyed for Great Crested Newt (GCN) eggs by searching for folded leaves, and gently opening them to check for eggs. Only the minimum number of leaves were unwrapped to confirm GCN presence.
- c. **Netting:** A dip net with a 2-4mm mesh was used to sweep around the pond margins, particularly through vegetation. Catch was inspected then released. Animals observed were identified to species, sex and life stage where possible;
- d. **Torch survey:** The perimeter of the pond was surveyed for great crested newts after dark using a high-powered torch (1 million CP). Animals observed were identified to species, sex and life stage where possible; and
- e. **Refugia search:** suitable natural and artificial refugia within proximity to ponds were searched by hand for the presence of great crested newts. Such refugia took the form of log piles, rubble, wooden planks and other such detritus within the terrestrial habitats. Any amphibians found were identified to species and sex.

### ***Weather Conditions***

11.2.12 The dates, times and weather conditions of each survey are detailed below in **Tables 11.1** and **11.2** below.

Table 11.1: Weather conditions during amphibian surveys in 2018

<b>Visit</b>	<b>Date</b>	<b>Overnight Temperature (°C)</b>	<b>Weather Conditions</b>
1	26/04/2018	6	Clear, light wind, no rain
2	03/05/2018	6	Clear, light wind, no rain
3	08/05/2018	8	Clear, light wind, no rain
4	15/05/2018	10	Clear, light wind, no rain

Table 11.2: Weather conditions during amphibian surveys in 2020

<b>Visit</b>	<b>Date</b>	<b>Overnight Temperature (°C)</b>	<b>Weather Conditions</b>
1	23/04/2020	15	10% cloud cover, light wind, no rain
2	30/04/2020	10	15% cloud cover, no wind, no rain
3	06/05/2020	12	Clear, no wind, no rain
4	14/05/2020	12	Clear, light wind, no rain
5	19/05/2020	18	Clear, light wind, no rain

### **Environmental DNA survey**

- 11.2.13 Environmental DNA analysis, known as eDNA, is a technique developed to detect DNA of a target species in the environment, in this case great crested newts in water. In order to assess the presence of great crested newt eDNA, 20 water samples are taken, following the field protocol outlined in the Defra Technical Advice Note (Ref. 77), at regular intervals from around each pond. The samples are analysed in laboratories using DNA amplification techniques, to identify whether great crested newt DNA is present.
- 11.2.14 Water samples for great crested newt eDNA were collected from all ponds that were holding water on 17 April 2018 except for Ponds 1 and 2 where samples were collected on 26 April 2018 due to delayed access permission. An attempt was made to eDNA survey Pond 7 again on 20 May 2019, due to an inconclusive result in 2018, however the pond was found to be dry on the return visit.

### **Survey limitations**

- 11.2.15 Survey limitations were experienced at most ponds during the presence/absence surveys relating to access and/or health and safety issues and are identified in **Table 11.3** below. Ponds that were dry at the time of HSI and subsequent survey visits are not included but are reported in the results section below. Due to the delayed timing of the additional ground truthing and HSI surveys conducted in November 2019, no presence/absence or eDNA surveys were conducted at ponds 16, 17, 18 and 19 in 2018. Water levels at pond 17 were insufficient to conduct presence/absence surveys in 2020, therefore this pond was scoped out on that basis. In 2020 the HSI of pond 20 was delayed until 27 May 2020 due to issues gaining access. Pond 20 therefore did not undergo further presence/absence or eDNA surveys. However, as Pond 20 is on the boundary of 500m from the Main Application site it is considered unlikely that any great crested newts that may use Pond 20 would be affected by the Proposed Development.
- 11.2.16 Despite the limitations identified, it is considered that an appropriate level of survey effort was deployed at each pond to allow a conclusion of presence or likely absence to be reached.

Table 11.3: Limitations experienced during the 2018 and 2020 amphibian surveys

<b>Pond Number</b>	<b>Description</b>	<b>Limitations 2018</b>	<b>Methods Deployed 2018</b>	<b>Limitations 2020</b>	<b>Methods Deployed 2020</b>
1	Steep-sided, deep Thames Water surface water retention ponds, next to Wigmore Park	90% margin inaccessible No BT due to lining No N due to H&S	T R ES	90% margin inaccessible No BT due to H&S* No N due to H&S Limited accessible	FBT R ES



Pond Number	Description	Limitations 2018	Methods Deployed 2018	Limitations 2020	Methods Deployed 2020
		Limited accessible vegetation for ES		vegetation for ES	
2	Steep-sided, deep Thames Water surface water retention ponds, next to Wigmore Park	90% margin inaccessible No BT due to lining No N due to H&S Leaf litter only for ES	T R ES	90% margin inaccessible No initial BT due to H&S* No N due to H&S Leaf litter only for ES	FBT R ES
4	Garden pond	Access granted for eDNA only	N/A	N/A	N/A
5	Steep, lined fire-training ponds covered by netting, located within the airfield	Turbidity limiting T No BT or ES due to netting	T R	No BT, ES or N due to new fencing	T R
6	Steep, lined fire-training ponds covered by netting, located within the airfield	Turbidity limiting T No BT or ES due to netting	T R	No BT, ES or N due to new fencing	T R
7	Field pond south of the airfield	Macrophytes Turbidity	R	N/A	N/A
8	Deep concrete walled pond, located within the airfield	No BT due to lining No N due to macrophyte Macrophyte cover limiting T	T R ES	No initial BT due to H&S* No N due to macrophyte Macrophyte cover limiting T	FBT R T
12	Ephemeral depression, located in Wigmore Park	Dry on third visit No BT or N due to depth Limited vegetation for ES	T ES R	Dry on second visit No BT or N due to depth Limited vegetation for ES	T ES R

Pond Number	Description	Limitations 2018	Methods Deployed 2018	Limitations 2020	Methods Deployed 2020
13	Part of drainage infrastructure for airport	No access	N/A	No initial BT due to H&S* Fluctuating water levels	FBT R T
14	Part of drainage infrastructure for airport	No access	N/A	No initial BT due to H&S* Limited vegetation for ES Fluctuating water levels	FBT R T
15	Part of drainage infrastructure for airport	No access	N/A	No initial BT due to H&S* Fluctuating water levels	FBT R T
16	N/A	N/A	N/A	Too shallow to BT or N Dry by third visit Turbidity limited T Leaf litter only for ES	T R ES
19	N/A	N/A	N/A	Too shallow to BT or N Leaf litter only for ES	T R ES

T: Torch, R: Refuge Search, ES: Egg Search, BT: Bottle Trap, FBT: Floating Bottle Trap, N: Netting.

\* Bottle trapping was not initially possible due to Covid-19 restrictions on overnight stays however was instigated on subsequent surveys (using separate survey teams for the AM and PM), and using Floating bottle traps where necessary

Note: Where possible, three methods were deployed, however this was not always possible and not all methods identified below were deployed on each occasion due to changing limitations.

## 11.3 Results

### Desk study

- 11.3.1 The desk-based pond scoping exercise identified 19 ponds within 500m of the study area as shown on the Pond Location Plan in **Appendix V**.
- 11.3.2 BRMC provided 24 records of three amphibian species within the 2km distance from the Main Application Site:



- a. 23 records of common frog, the closest record returned was located approximately 1 km north of the Main Application Site.
- b. 1 record of smooth newt located approximately 1.9 km north of the Main Application Site.

11.3.3 HERC provided one record of an amphibian species within a 2km distance from the Main Application Site:

- a. 1 record of common toad approximately 900m north of the Main Application Site.

## Field survey

### *Habitat suitability Index Assessment*

11.3.4 The results of the HSI assessment of the ponds of relevance to the Proposed Development are provided in **Table 11.4**; where ponds were not able to be surveyed due to access restriction this is stated.

Table 11.4: Pond locations and HSI assessment scores

Pond Number	Approximate distance and direction from the Proposed Development site	Grid reference of pond	HSI score 2018	Pond suitability 2018	HSI score 2020	Pond suitability 2020
1	Within the Proposed Development site	TL120221	0.43	Poor	0.60	Average
2	Within the Proposed Development site	TL122221	0.43	Poor	0.61	Average
3	60m north	TL130222	Dry	N/A	0.25	Poor
4	140m north	TL136224	0.65	Average	No Access	
5	Within the Proposed Development site	TL127215	0.46	Poor	0.60	Average
6	Within the Proposed Development site	TL128215	0.43	Poor	0.44	Poor
7	60m south	TL129206	0.49	Poor	Dry	N/A
8	Within the Proposed Development site	TL132212	0.51	Below Average	0.59	Below Average
9	Within the Proposed Development site	TL136212	0.45	Poor	Dry	N/A
10	370m east	TL148220	Dry	N/A	Dry	N/A
11	450m east	TL149215	No access		Dry	N/A

Pond Number	Approximate distance and direction from the Proposed Development site	Grid reference of pond	HSI score 2018	Pond suitability 2018	HSI score 2020	Pond suitability 2020
12	Within the Proposed Development site	TL125216	0.55	Below Average	0.40	Poor
13	Within the Proposed Development site	TL128212	Dry	N/A	0.57	Below Average
14	Within the Proposed Development site	TL127212	Dry	N/A	0.54	Below Average
15	Within the Proposed Development site	TL126212	0.29	Poor	0.40	Poor
16	290m north west	TL146223	0.46	Poor	0.36	Poor
17	330m north west	TL147223	Dry	N/A	N/A	N/A
18	310m south	TL120202	0.57	Below Average	Dry	N/A
19	20m west	TL105203	0.51	Below Average	0.53	Below Average
20	500m north	TL117225	N/A	N/A	0.44	Poor

### ***Presence/Absence Survey***

11.3.5 A habitat description and summary of the survey results for each pond included in the presence/absence surveys is provided below. Photographs of all ponds are provided in **Section 13** at the end of this report and detailed survey results are provided on the Amphibian Survey Results Plan in **Appendix W**.

#### **Pond 1**

11.3.6 This pond is at the northern edge of the Main Application Site, just south of Eaton Green Road. It is a Thames Water surface water retention pond, steep sided, with near vertical banks. It is surrounded by mixed broadleaved woodland and scrub.

11.3.7 No great crested newts were recorded during the surveys in 2018 or 2020.

11.3.8 A peak count of 2 smooth newts were recorded during the 2018 surveys. A peak count of 31 smooth newts and 1 common frog was recorded during the 2020 surveys.

#### **Pond 2**

11.3.9 This pond is at the northern edge of the Main Application Site, just south of Eaton Green Road. It is a Thames Water small surface water retention pond,

steep sided, again with near vertical banks. It is also surrounded by mixed broadleaved woodland and some scrub.

11.3.10 No great crested newts were recorded during the surveys in 2018 or 2020.

11.3.11 No other amphibians were recorded during the surveys.

### **Pond 5**

11.3.12 This pond is within the Main Application Site to the east of Wigmore Park CWS. It is a fire training pool, with a strong odour of hydrocarbons. It is steep, plastic lined with negligible vegetation. It is surrounded by rabbit grazed semi-improved grassland with some rubble piles nearby.

11.3.13 No great crested newts were recorded during the surveys in 2018 or 2020.

11.3.14 No other amphibians were recorded during the 2018 surveys. A peak count of 8 smooth newts, 3 common toads, 6 common toad tadpoles and 1 common frog was recorded in 2020.

### **Pond 6**

11.3.15 This pond is within the Main Application Site to the east of Wigmore Park CWS. Like pond 5, it is a fire training pool, with a very strong odour of hydrocarbons. It is also steep, plastic lined with negligible vegetation. It is surrounded by rabbit grazed semi-improved grassland with some rubble piles nearby.

11.3.16 No great crested newts were recorded during the surveys in 2018 or 2020.

11.3.17 No other amphibians were recorded during the 2018 surveys. A peak count of 3 smooth newts and 3 common toads and 6 common toad tadpoles was recorded in 2020.

### **Pond 8**

11.3.18 This pond is within the Main Application Site to the west of Winch Hill wood. It is a concrete walled, airfield drainage pond with high levels of macrophytes. It is surrounded by grassland and tarmac access roads.

11.3.19 No great crested newts were recorded during the surveys in 2018 or 2020.

11.3.20 A peak count of 1 smooth newt was recorded at Pond 8 in 2018. A peak count of 8 smooth newts, 1 common toad and 4 common frog3 was recorded in 2020.

### **Pond 12**

11.3.21 This pond is 70m from the western boundary of Wigmore Park. It is a grassed depression with patches of bare ground surrounded by willow trees and scrub. It sporadically holds water following high rainfall events. It held water during only one visit on 15 May 2018 and again only one visit.

11.3.22 No great crested newts were recorded during the surveys in 2018 or 2020.

11.3.23 Common toad tadpoles were recorded during the 2018 surveys. A peak count of 2 smooth newts was recorded in 2020.

### **Pond 13**

- 11.3.24 This pond is within the Main Application Site. It forms part of the drainage infrastructure for the airport runway. It intermittently holds water and is subject to high levels of pollution through runoff from the airport infrastructure.
- 11.3.25 No great crested newts were recorded during the surveys in 2020.
- 11.3.26 A peak count of 1 smooth newt and 1 common toad was recorded during the 2020 surveys.

### **Pond 14**

- 11.3.27 This pond is within the Main Application Site. It forms part of the drainage infrastructure for the airport runway. It intermittently holds water and is subject to high levels of pollution through runoff from the airport infrastructure.
- 11.3.28 No great crested newts were recorded during the surveys in 2020.
- 11.3.29 A peak count of 4 smooth newts and 3 common toads was recorded during the 2020 surveys.

### **Pond 15**

- 11.3.30 This pond is within the Main Application Site. It forms part of the drainage infrastructure for the airport runway. It intermittently holds water and is subject to high levels of pollution through runoff from the airport infrastructure.
- 11.3.31 No great crested newts were recorded during the surveys in 2020.
- 11.3.32 No other amphibians were recorded during the surveys.

### **Pond 16**

- 11.3.33 This pond is 290m north west of the Main Application Site. It is a small pond of reasonable depth with surrounding terrestrial habitat suitable for supporting great crested newts.
- 11.3.34 No great crested newts were recorded during the surveys in 2020.
- 11.3.35 A peak count of 3 smooth newts was recorded during the surveys in 2020.

### **Pond 19**

- 11.3.36 This pond is 20m west of the Main Application site. It is a small pond that had dried considerably at the time of HSI.
- 11.3.37 No other amphibians were recorded during the surveys in 2020.
- 11.3.38 A peak count of 3 smooth newts was recorded during the surveys in 2020.

### ***Environmental DNA***

- 11.3.39 Of the twelve ponds subject to HSI assessment in April 2018, only six ponds were sampled for environmental DNA. The six remaining ponds were not sampled due to low water levels which made them unsuitable for sampling at

the time of survey or due to a lack of access. See **Table 11.5** for a summary of the eDNA results

Table 11.5: Environmental DNA (eDNA) results noting survey limitations

Pond Number	eDNA result	Limitations
1	Negative	None
2	Negative	None
4	Negative	None
5	Negative	None
6	Negative	None
7	Indeterminate (2018) Dry (2019)	Algae and particulate matter present in sample in 2018.

11.3.40 All ponds apart from pond 7 returned a negative result for great crested newt eDNA.

11.3.41 Pond 7 was subject to an eDNA test and returned an indeterminate result, likely due to very low water levels causing the concentration of chemical/organic materials within the water sample. An attempt was made to resurvey Pond 7 in 2019 during the great crested newt breeding season however the pond was found to be dry.

### ***Incidental sightings***

11.3.42 During reptile surveys of the Main Application Site in 2018 utilising artificial refugia, in the form of corrugated metal/onduline and roofing felts, common toad were occasionally encountered within and to the periphery of Wigmore Park, within proximity to ponds 2 and 3. A single common toad was also encountered during a reptile survey to the west of the runway, between ponds 9 and 11.

## **11.4 Conclusions and recommendations**

11.4.1 These conclusions and recommendations are based upon the most recent findings from the 2020 surveys with due regard for previous survey results.

11.4.2 No evidence of great crested newts was recorded during the survey period; it is considered this species is likely to be absent from the study area, and therefore no further consideration is required.

11.4.3 Ponds 1, 5, 6, 8, 13, 14, 16 and 19 were found to support low numbers of smooth newts. Therefore, it is assumed that these water bodies support a small-scale population of this species.

11.4.4 Additional amphibian species recorded during the surveys were common frog and common toad. Low numbers of common toad were incidentally found

during the reptile survey utilising terrestrial habitats, most notably the areas of long grassland to the periphery of Wigmore Park and allotments.

- 11.4.5 An update presence/absence survey would be required prior to the commencement of any works, including vegetation clearance, to reconfirm the likely absence of this species from the Main Application Site.



## 12 ROMAN SNAILS

### 12.1 Introduction

12.1.1 This section sets out the methodology and results of the Roman snail survey work undertaken in relation to the Proposed Development between 2018 and 2020.

#### Study area

12.1.2 The study area of the Roman Snail Survey incorporated land within the Main Application Site, as shown on the Roman Snail Survey Plan in **Appendix X**. However, highway intervention locations and car parking locations do not include suitable habitats for Roman snail and were therefore scoped out for further surveys.

12.1.3 Field surveys undertaken in connection to the Luton DART planning application in 2017 identified 20 live Roman snail along the south west boundary of the airport. For this reason, the habitat immediately adjacent to the Main Application Site of the Proposed Development boundary in this area was also included in the study area.

12.1.4 The study area is set within a largely agricultural landscape context, with arable land bordering to the north, south and east; and residential areas of Luton to the north and west of the existing airport.

#### Survey scope

12.1.5 A series of Roman snail surveys were undertaken between June 2018 and September 2020.

12.1.6 The objectives of the survey were to:

- a. undertake a desk-based review of all Roman snail records within 2km of the Main Application Site to identify those that may be relevant to the development proposals;
- b. assess the suitability of the habitats within the study area to support populations of Roman snail;
- c. determine the presence or absence of Roman snail in suitable habitats within the study area; and
- d. provide sufficient information to inform an assessment of the potential impacts to Roman snail as a result of the Proposed Development and allow the design of appropriate mitigation measures where required.

### 12.2 Legislation

12.2.1 The Roman snail is included within Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) (Ref. 5). It is protected in relation to Section 9(1), (2) and (5), making it an offence to:

- a. Intentionally kill, injure or take (including taking by hand) a Roman snail;

- b. Possess or control a live or dead Roman snail, or any part of one; or
- c. Sell, offer for sale or advertise for, live or dead Roman snails.

12.2.2 Any intentional movement or handling, however temporary, of a Roman snail is only permissible if covered by a relevant defence in the Act or carried out under a Natural England licence.

## 12.3 Methodology

### Desk study

12.3.1 A desk study exercise was undertaken in February 2018 which included a biological records search for relevant species. The records search was conducted to obtain existing records of legally protected and notable species, including Roman snail. Species records within 2km of the Main Application Site were requested from the Bedfordshire and Luton Biological Recording and Monitoring Centre (BRMC). Where portions of the study area fell within the Hertfordshire county boundary, these records were returned from the Herts Environmental Records Centre (HERC). This exercise was repeated in November 2020 to capture any additional records.

### Field survey

12.3.2 There is currently no standardised or published survey methodology for Roman snail. However, from discussions with species experts at Natural England, it is considered that a combination of a daytime hand search and nocturnal torchlight surveys in suitable weather conditions is sufficient to enable an assessment of presence or likely absence of Roman snail at a site. It is considered good practice that nocturnal surveys are undertaken in wet weather or within 24 hours following rainfall.

12.3.3 A walkover survey of all accessible potentially suitable habitat within the study area was carried out on 14 and 15 June 2018. No significant areas were inaccessible, however very dense areas could not always be fully accessed. These habitats typically included grassland margins along field boundaries and woodland areas. At the same time a daytime hand search was carried out where suitable habitat was identified. Areas of habitat with limited suitability for Roman snails within the Proposed Development were also identified at this time and discounted from further survey.

12.3.4 Where live snails and/or shells were not encountered during the daytime survey, but habitat was considered suitable, a subsequent torchlight survey was undertaken to determine presence or likely absence. The torchlight survey was carried out on 11 June 2019.

12.3.5 Field surveys undertaken in connection to the Luton DART planning application in 2017 identified 20 live Roman snail along the south west boundary of the airport. An additional daytime survey of the identified habitats immediately adjacent to the Main Application Site boundary, to the south west, was completed on 18 June 2019. A daytime survey of the habitats at Dairyborne Scarp DWS was also undertaken on 16 September 2020.

- 12.3.6 The daytime surveys consisted of systematically hand searching through ground vegetation and beneath logs and stones. The torchlight surveys focussed upon hand searching through ground vegetation, parting dense areas by hand. Any live snails and shells which were encountered were recorded. The tendency for Roman snail to aggregate (Ref. 78) makes hand searching a viable survey technique.
- 12.3.7 The surveys were undertaken by suitably qualified ecologists. Any survey techniques that involved temporarily taking snails (i.e. picking up for examination) were undertaken by an experienced surveyor who is a Natural England Roman snail licence holder.
- 12.3.8 The nocturnal survey was undertaken during optimal weather conditions, during rain and within 24 hours of a heavy downpour. The daytime survey of off-site habitats was undertaken during heavy rain. Full details of the conditions are provided within **Table 12.1**.

Table 12.1: Roman snail survey dates and weather conditions

Visit no.	Date	Survey Type	Weather	Temperature (°C)
1	14/06/2018 and 15/06/2018	Daytime hand search	Wind: 1/12 Dry	21
2	11/06/2019	Torchlight survey	Wind: 5/12 Light rainfall	10
3	18/06/2019	Daytime hand search	Wind: 4/12* Heavy rainfall	15
4	16/09/2020	Daytime hand search	Wind: 1/12 Dry	20

\*Wind is provided using the Beaufort scale

### Survey limitations

- 12.3.9 Whilst access was granted to the enclosed Dairyborn Scarp DWS, the majority of this site was inaccessible for survey given the extremely steep gradient of the escarpment, as well as impenetrable vegetation covering many other areas. Where possible, inaccessible habitats were viewed from multiple angles, using binoculars and through site fencing at suitable viewpoints. This is considered a significant limitation to the survey.
- 12.3.10 Some other areas of vegetation within the study area could not be fully searched due to inaccessibility. However (with the exception of Dairyborn Scarp DWS) it is considered that sufficient survey effort was employed to ascertain presence or likely absence of Roman snail across the study area.

## 12.4 Results

### Desk study

- 12.4.1 The data search results from BRMC and HERC returned two records of Roman snail inside the 2km search radius of the Main Application Site within the past 10 years. The location of both records was London Luton Airport itself. The results are summarised in **Table 12.2** below.
- 12.4.2 Some additional historic records (between 1948 and 1981) of Roman snail were also returned within Luton Airport and to the south of Luton Airport along the River Lea in addition to one originating from Dairyborn Scarp DWS (1981).

Table 12.2: Records of Roman snail within the last 10 years.

Species	Date	Comments	Grid Reference
Roman snail Helix pomatia	28/06/2017	>20 Roman snails	TL109202
Roman snail Helix pomatia	21/08/2017	1 Roman snail	TL112210

- 12.4.3 Field surveys undertaken in connection to the Luton DART planning application in 2017 identified 20 live Roman snail along the south west boundary of the airport.

### Field Survey

- 12.4.4 The surveys did not identify the presence of live Roman snail within the Main Application Site, however a shell fragment was found within Dairyborn Scarp DWS during the 2020 survey of this site. In addition, a high number of adult individuals were identified within the study area immediately adjacent to the Main Application Site, as shown on the Roman Snail Survey Plan included in **Appendix X**. A total of 113 individuals were recorded during this survey (see Photograph within **Section 13**).

## 12.5 Conclusions and recommendations

- 12.5.1 Suitable habitats for Roman snails exist within the boundary of the Main Application Site, however, no Roman snail have been identified. A high number of individuals have been identified just beyond the boundary, to the south west.
- 12.5.2 A shell fragment was found within Dairyborn Scarp DWS during the 2020 survey of this site. Given the historic record from this site and the fragment identified, low numbers of Roman snail are assumed to be present on a precautionary basis in the absence of a full survey.
- 12.5.3 While Roman snail have been identified in immediately adjacent habitat, it is considered that continuation of current habitat management practices, which comprises regular mowing to maintain a short grassland sward, will prevent dispersal into the Main Application Site. This existing management involves standard controls such as maintenance of minimal vegetation between the

interior and exterior fence-lines present in this location, avoiding overgrowth of vegetation within the Main Application Site in these locations.



## 13 PHOTOGRAPHS

**Photograph 1:** Pillbox supporting common pipistrelle roost

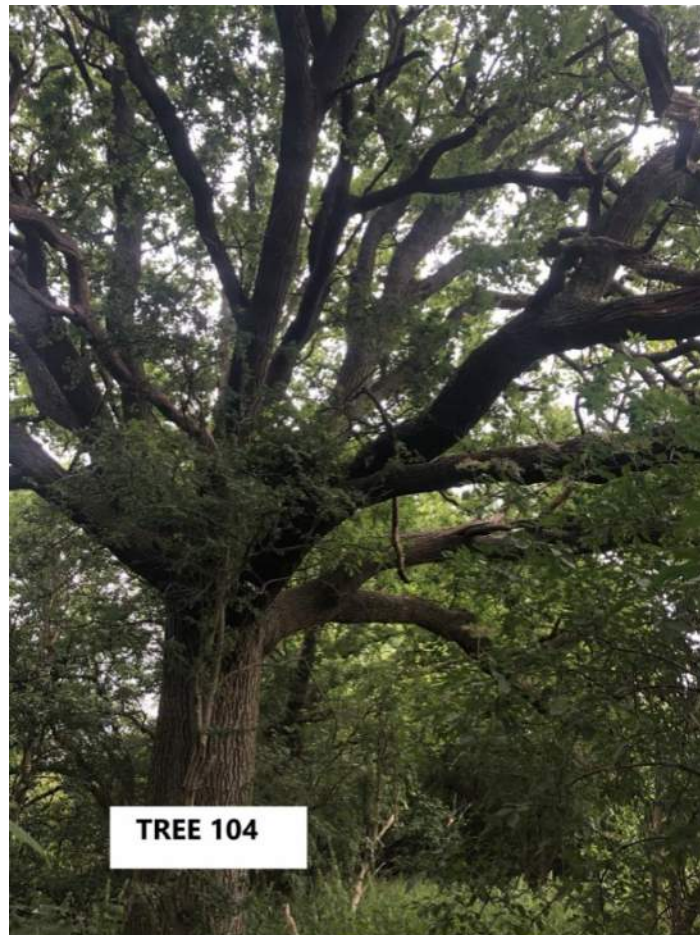


**Photograph 2:** Winch Hill Cottage (2) supporting common pipistrelle roost.

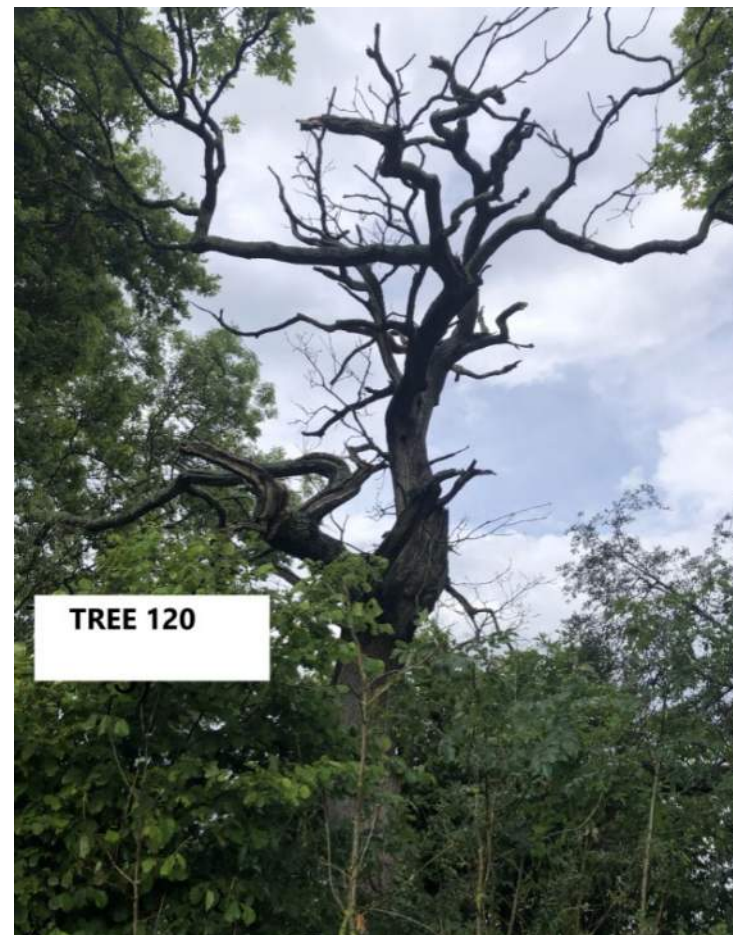




**Photograph 3:** Confirmed common pipistrelle roost

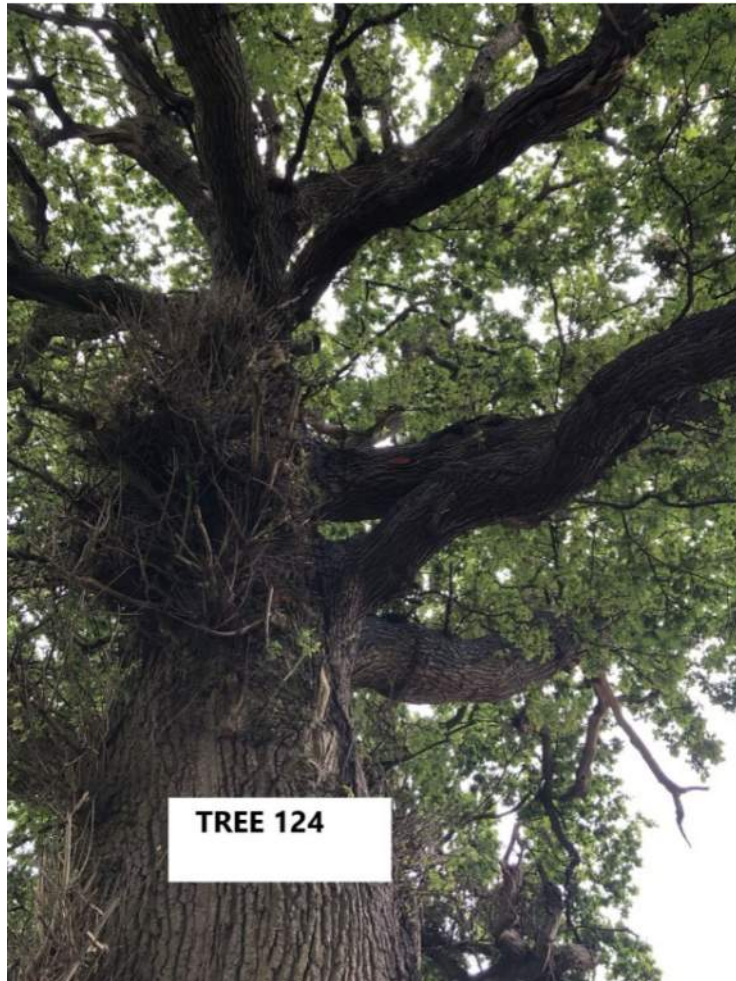


**Photograph 4:** Confirmed common pipistrelle roost





**Photograph 5:** Confirmed common pipistrelle roost



**Photograph 6:** Confirmed common pipistrelle roost





**Photograph 7: Otter spraint**



**Photograph 8: Potential water vole burrow**





**Photograph 9:** Potential otter feeding remains



**Photograph 10:** Reptile habitat supporting slow-worm adjacent to Wigmore Park Allotments





**Photograph 11:** Reptile habitat supporting slow-worm adjacent to the east of Wigmore Park



**Photograph 12:** Pond 1 - Thames Water attenuation pond, west of Darley Road (2018)





**Photograph 13:** Pond 2 - Thames Water attenuation pond (2018)



**Photograph 14:** Pond 3 - Thames Water attenuation pond north of Eaton Green Road (2020)





**Photograph 15:** Pond 4 – Pond north of Darley Road (2018)



**Photograph 16:** Pond 5 – fire training area pool, north of the airfield, the western pool (2020)





**Photograph 17:** Pond 6 – fire training area pool, north of the airfield (2020)



**Photograph 18:** Pond 7 (2018) – Farm pond to the south of the study area, temporarily wet





**Photograph 19:** Pond 7 (2019) – Farm pond to the south of the study area, dry when revisited



**Photograph 20:** Pond 8 – airfield drainage pond, north of airfield (2020)





**Photograph 21:** Pond 9 – dry drainage pond, north east of airfield (2020)



**Photograph 22:** Pond 12 – temporarily wet pond within Wigmore Park (2018)





**Photograph 23:** Pond 13 – Drainage basin part of SUDs associated with runway infrastructure (2018)



**Photograph 24:** Pond 14 – Drainage infrastructure forms part of SUDs associated with runway infrastructure (2018).





**Photograph 25:** Pond 15 – Drainage infrastructure forms part of SUDs associated with runway infrastructure (2018).



**Photograph 26:** Pond 16 – Small ephemeral depression on boundary between arable field and minor





**Photograph 27:** Pond 18 – Drainage pond at the edge of a farm track (2018)



**Photograph 28:** Pond 18 – Drainage pond at the edge of a farm access track (2020)





**Photograph 29:** Pond 19 – Balancing pond adjacent to the roadside between Gypsy Lane and Parkway road (2020)



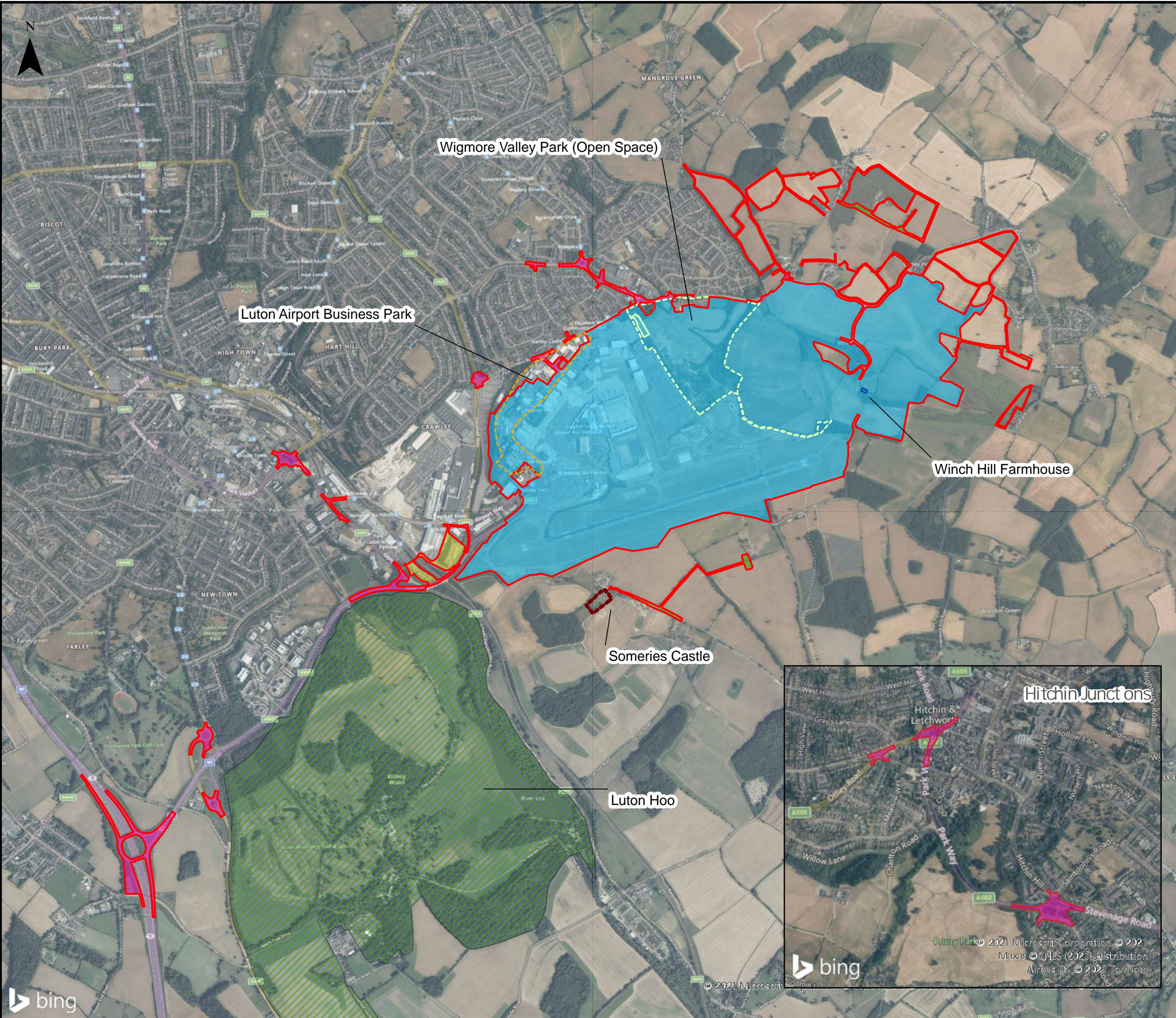
**Photograph 30:** Roman snail directly adjacent to Main Application Site boundary



# Appendix A

## A1 Development Areas Plan





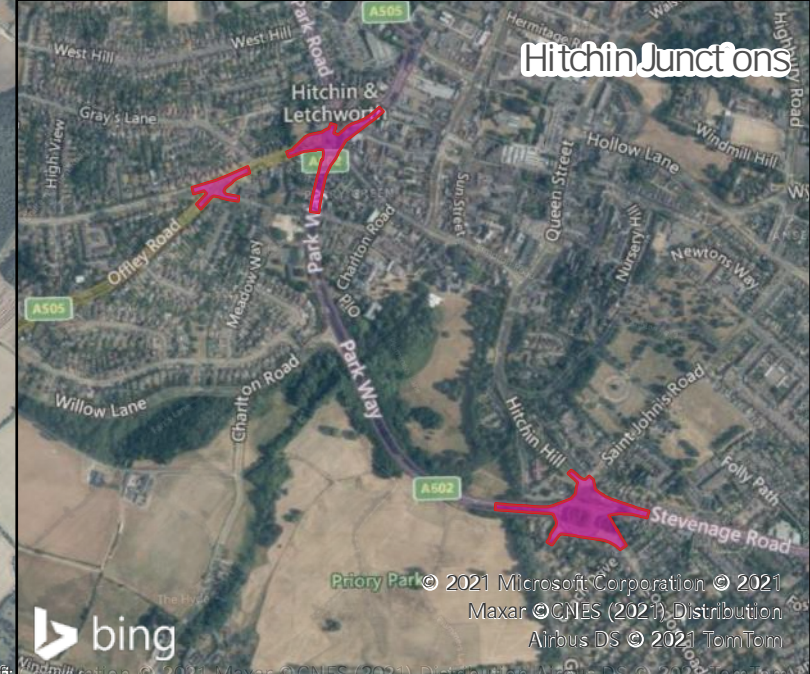
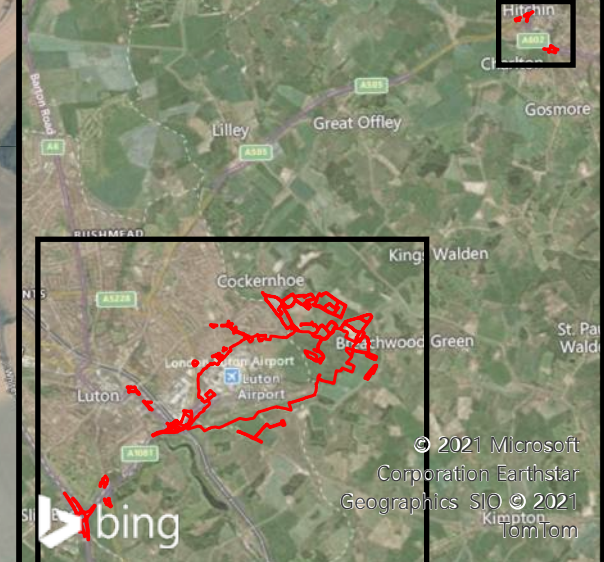
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All structure positions are indicative. The proposed works will be subject to detailed design development. The changes will be within limits of deviation specified in the Development Consent Order.

**Legend**

- Proposed Development Boundary
  - Local Authority Boundaries
  - Someries Castle
  - Luton Hoo Registered Park and Garden
  - Winch Hill Farmhouse
  - Luton Airport Business Park
  - Open Space
- Development Areas**
- Main Application Site
  - Off-Site Highway Interventions
  - Off-Site Planting
  - Off-site Car Parks

First Issue	AB	SM	CS	07/12/21	P01
Revision History	Drawn	Checked	Approved	Date	Rev.



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**Development Areas Plan**

Purpose of issue		Suitability	
<b>SUITABLE FOR INFORMATION</b>		S2	
Drawn	Checked	Approved	Date
AB	SM	CS	07/12/21
Scale	Size		
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DCO Application Ref.	APFP Regulation	DCO Document Ref.
TR020001		

Drawing Number	Revision
LLADCO-3C-ARP-00-00-DR-YE-0205	P01
Project - Phase - Originator - Asset/Zone - Sub-Asset - Type - Discp. - Number	



# Appendix B

## B1 Phase 1 Habitat Survey Plan



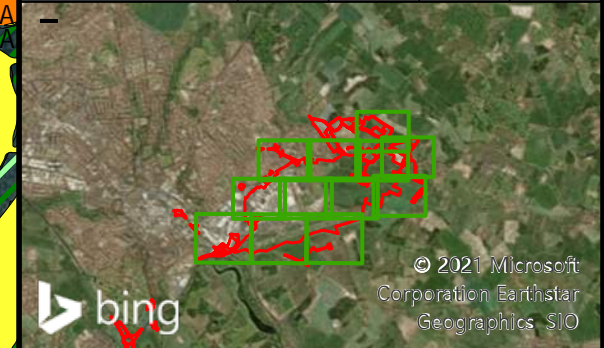


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Legend	
	Proposed Development Boundary
	Target Notes
Habitat Description	
	A1.1.1 - Broadleaved woodland - semi-natural
	A1.1.2 - Broadleaved woodland - plantation
	A1.3.2 - Mixed woodland - plantation
	A2.1 - Scrub - dense/continuous
	A2.2 - Scrub - scattered
	A3.1 - Broadleaved parkland/scattered trees
	A3.3 - Mixed parkland/scattered trees
	A4.1 - Broadleaved woodland - recently felled
	B2.2 - Neutral grassland - semi-improved
	B3.1 - Calcareous grassland - unimproved
	B3.2 - Calcareous grassland - semi-improved
	B5 - Marsh/marshy grassland
	B6 - Poor semi-improved grassland
	C3.1 - Other tall herb and fern - ruderal
	G1 - Standing water
	G1.1 - Standing water - eutrophic
	J1.2 - Cultivated/disturbed land - amenity grassland
	J1.3 - Cultivated/disturbed land - ephemeral/short perennial
	J1.4 - Introduced shrub
	J3.6 - Buildings
	J4 - Bare ground
	J5 - Other habitat
	A2.2 - Scrub - scattered
	A3.1 - Broadleaved parkland/scattered trees
	J2.4 - Fence
	J2.5 - Wall
	J2.6 - Dry ditch

First Issue	AB	SM	CS	18/11/21	P01
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**Phase 1 Habitats Plan**  
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Purpose of issue <b>SUITABLE FOR INFORMATION</b>				Suitability S2	
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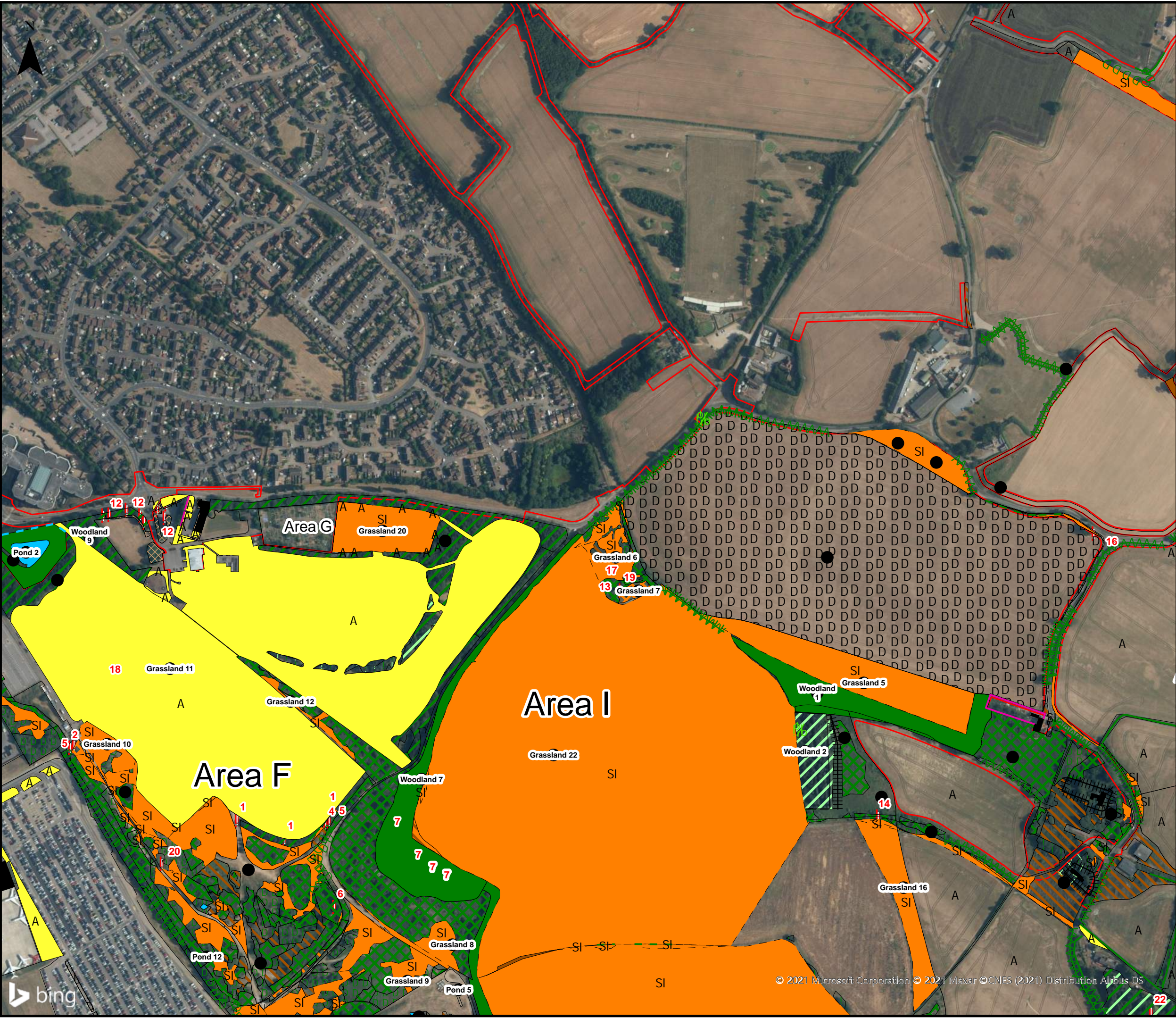
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Legend	
	Proposed Development Boundary
	Target Notes
Habitat Description	
	A1.1.1 - Broadleaved woodland - semi-natural
	A1.1.2 - Broadleaved woodland - plantation
	A1.2.2 - Coniferous woodland - plantation
	A1.3.2 - Mixed woodland - plantation
	A2.1 - Scrub - dense/continuous
	A2.2 - Scrub - scattered
	A3.1 - Broadleaved parkland/scattered trees
	A3.3 - Mixed parkland/scattered trees
	B2.2 - Neutral grassland - semi-improved
	B3.1 - Calcareous grassland - unimproved
	B3.2 - Calcareous grassland - semi-improved
	B5 - Marsh/marshy grassland
	B6 - Poor semi-improved grassland
	C1.1 - Bracken - continuous
	C1.2 - Bracken - scattered
	C3.1 - Other tall herb and fern - ruderal
	G1 - Standing water
	G1.1 - Standing water - eutrophic
	J2.4 - Refuse-tip
	J1.1 - Cultivated/disturbed land - arable
	J1.2 - Cultivated/disturbed land - amenity grassland
	J1.3 - Cultivated/disturbed land - ephemeral/short perennial
	J1.4 - Introduced shrub
	J3.6 - Buildings
	J4 - Bare ground
	J5 - Other habitat
	A2.2 - Scrub - scattered
	A3.1 - Broadleaved parkland/scattered trees
	A3.2 - Coniferous parkland/scattered trees
	J2.1.1 - Intact hedge - native species-rich
	J2.1.2 - Intact hedge - species-poor
	J2.2.1 - Defunct hedge - native species-rich
	J2.2.2 - Defunct hedge - species-poor
	J2.3.1 - Hedge with trees - native species-rich
	J2.3.2 - Hedge with trees - species-poor
	J2.4 - Fence
	J2.5 - Wall
	J2.6 - Dry ditch

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Purpose of issue		Suitability	
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Scale	Size		
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Project - Phase - Originator - Asset/Zone - Sub-Asset - Type - Disc - Number			



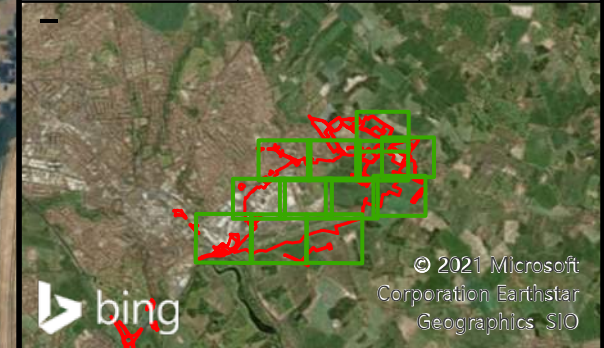


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Legend	
Proposed Development Boundary	J1.3 - Cultivated/disturbed land - ephemeral/short perennial
Target Notes	J1.4 - Introduced shrub
Habitat Description	
A1.1.1 - Broadleaved woodland - semi-natural	J3.6 - Buildings
A1.2.2 - Coniferous woodland - plantation	J5 - Other habitat
A1.3.2 - Mixed woodland - plantation	A2.2 - Scrub - scattered
A2.1 - Scrub - dense/continuous	A3.1 - Broadleaved parkland/scattered trees
A2.2 - Scrub - scattered	A3.2 - Coniferous parkland/scattered trees
A3.1 - Broadleaved parkland/scattered trees	J2.1.1 - Intact hedge - native species-rich
B2.2 - Neutral grassland - semi-improved	J2.1.2 - Intact hedge - species-poor
B6 - Poor semi-improved grassland	J2.2.1 - Defunct hedge - native species-rich
C1.1 - Bracken - continuous	J2.2.2 - Defunct hedge - species-poor
C3.1 - Other tall herb and fern - ruderal	J2.3.1 - Hedge with trees - native species-rich
I2.4 - Refuse-tip	J2.3.2 - Hedge with trees - species-poor
J1.1 - Cultivated/disturbed land - arable	J2.4 - Fence
J1.2 - Cultivated/disturbed land - amenity grassland	J2.5 - Wall
	J2.6 - Dry ditch

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Purpose of issue				Suitability		
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DCO Application Ref.	APFP Regulation	DCO Document Ref.
TR020001		

Drawing Number	Revision
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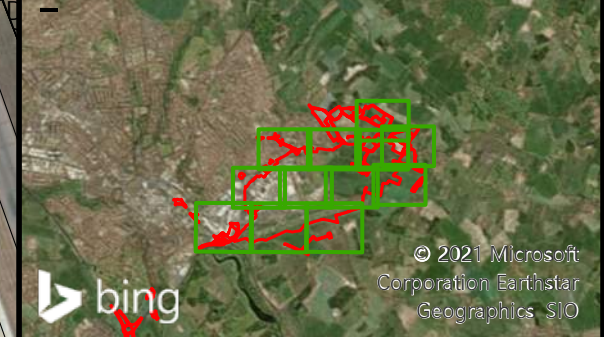
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- Proposed Development Boundary
- ! Target Notes

**Habitat Description**

- A1.1.1 - Broadleaved woodland - semi-natural
- A1.1.2 - Broadleaved woodland - plantation
- A1.3.2 - Mixed woodland - plantation
- A2.1 - Scrub - dense/continuous
- A2.2 - Scrub - scattered
- A3.1 - Broadleaved parkland/scattered trees
- A4.1 - Broadleaved woodland - recently felled
- B2.2 - Neutral grassland - semi-improved
- B3.1 - Calcareous grassland - unimproved
- B3.2 - Calcareous grassland - semi-improved
- B6 - Poor semi-improved grassland
- C3.1 - Other tall herb and fern - ruderal
- G1 - Standing water
- G1.1 - Standing water - eutrophic
- J1.2 - Cultivated/disturbed land - amenity grassland
- J1.3 - Cultivated/disturbed land - ephemeral/short perennial
- J1.4 - Introduced shrub
- J3.6 - Buildings
- J4 - Bare ground
- J5 - Other habitat
- A3.1 - Broadleaved parkland/scattered trees
- J2.4 - Fence
- J2.5 - Wall
- J2.6 - Dry ditch

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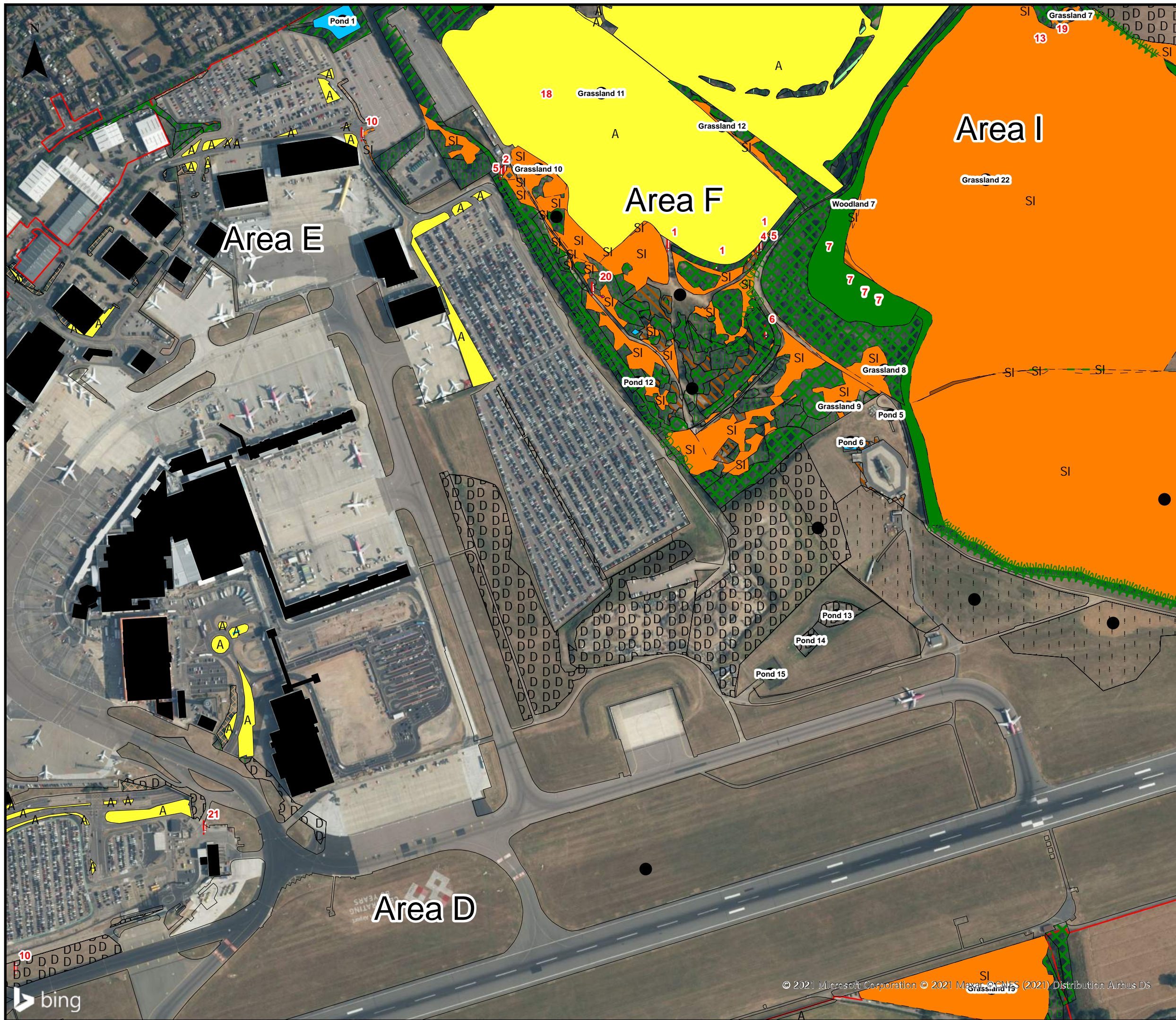
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 Phase 1 Habitats Plan  
 Page 4 of 12

Purpose of issue				Suitability		
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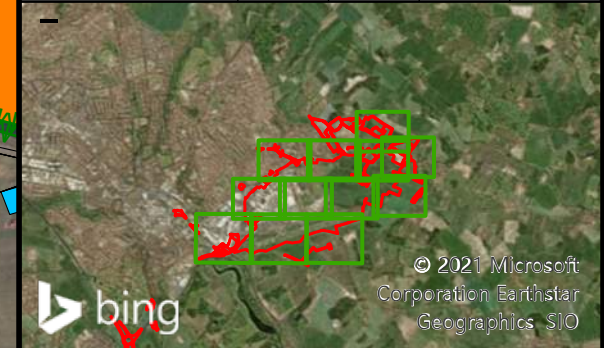
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Proposed Development Boundary  
 Target Notes

**Habitat Description**

- A1.1.1 - Broadleaved woodland - semi-natural
- A1.1.2 - Broadleaved woodland - plantation
- A1.3.2 - Mixed woodland - plantation
- A2.1 - Scrub - dense/continuous
- A2.2 - Scrub - scattered
- A3.3 - Mixed parkland/scattered trees
- A4.1 - Broadleaved woodland - recently felled
- B2.2 - Neutral grassland - semi-improved
- B3.1 - Calcareous grassland - unimproved
- B3.2 - Calcareous grassland - semi-improved
- B5 - Marsh/marshy grassland
- B6 - Poor semi-improved grassland
- C1.1 - Bracken - continuous
- C3.1 - Other tall herb and fern - ruderal
- G1 - Standing water
- J1.1 - Standing water - eutrophic
- J1.2 - Cultivated/disturbed land - arable
- J1.2 - Cultivated/disturbed land - amenity grassland
- J1.3 - Cultivated/disturbed land - ephemeral/short perennial
- J1.4 - Introduced shrub
- J3.6 - Buildings
- J4 - Bare ground
- A3.1 - Scrub - scattered
- A3.1 - Broadleaved parkland/scattered trees
- J2.2.2 - Defunct hedge - species-poor
- J2.3.1 - Hedge with trees - native species-rich
- J2.6 - Dry ditch

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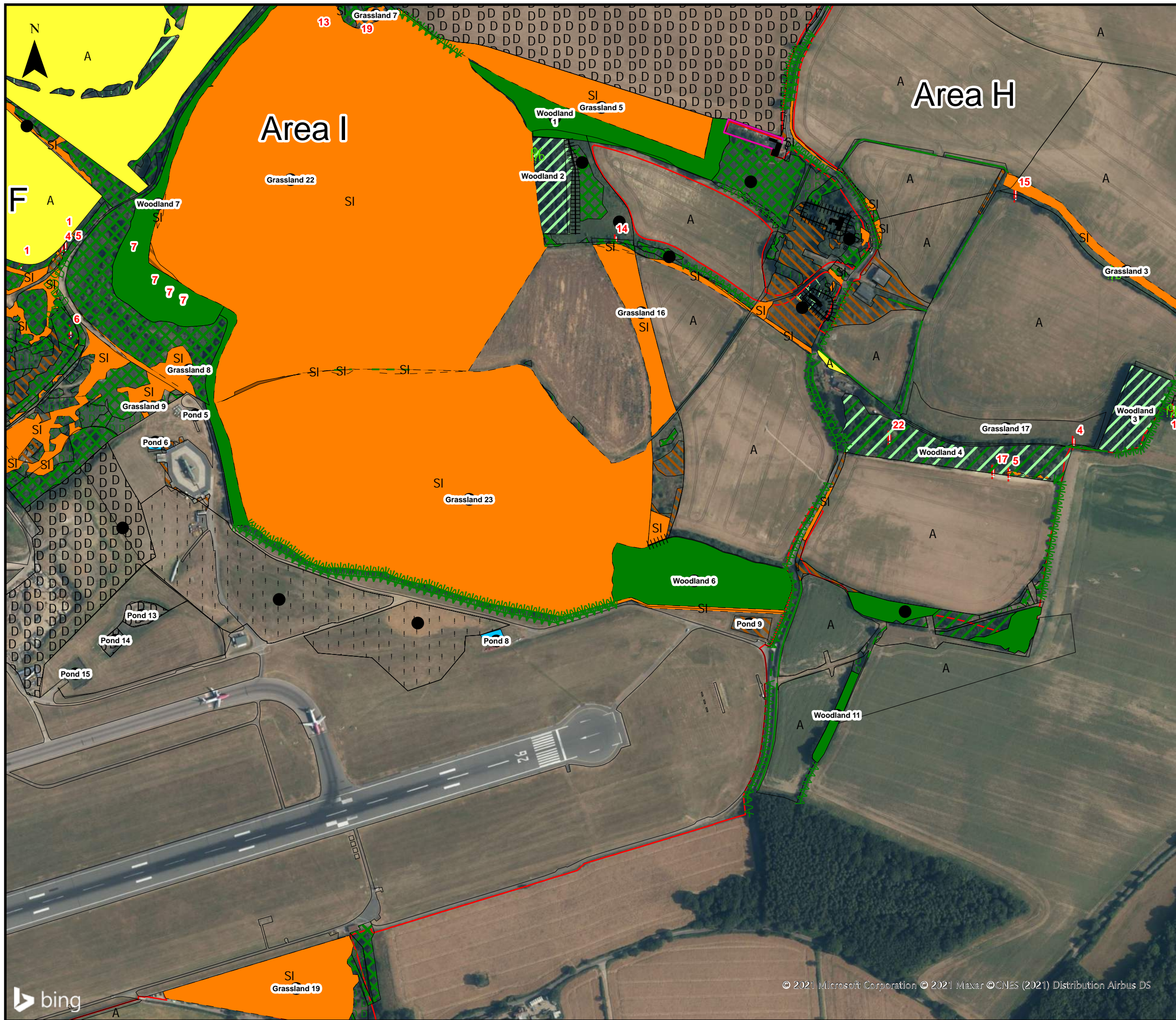
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 Page 5 of 12

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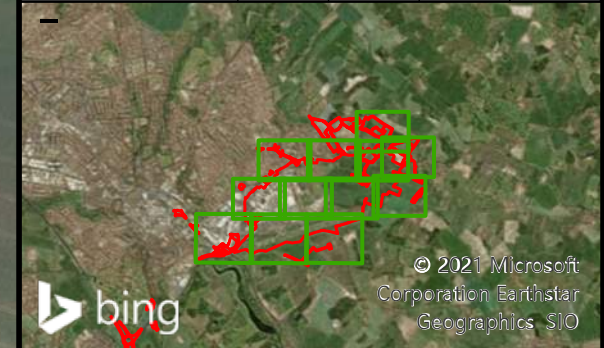


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Legend	
	Proposed Development Boundary
	Target Notes
Habitat Description	
	A1.1.1 - Broadleaved woodland - semi-natural
	A1.1.2 - Broadleaved woodland - plantation
	A1.2.2 - Coniferous woodland - plantation
	A1.3.2 - Mixed woodland - plantation
	A2.1 - Scrub - dense/continuous
	A2.2 - Scrub - scattered
	A3.1 - Broadleaved parkland/scattered trees
	A3.3 - Mixed parkland/scattered trees
	B2.2 - Neutral grassland - semi-improved
	B3.1 - Calcareous grassland - unimproved
	B3.2 - Calcareous grassland - semi-improved
	B6 - Poor semi-improved grassland
	C1.1 - Bracken - continuous
	C3.1 - Other tall herb and fern - ruderal
	G1.1 - Standing water - eutrophic
	J2.4 - Refuse-tip
	J1.1 - Cultivated/disturbed land - arable
	J1.2 - Cultivated/disturbed land - amenity grassland
	J1.3 - Cultivated/disturbed land - ephemeral/short perennial
	J1.4 - Introduced shrub
	J3.6 - Buildings
	J4 - Bare ground
	J5 - Other habitat
	A2.2 - Scrub - scattered
	A3.2 - Coniferous parkland/scattered trees
	J2.1.1 - Intact hedge - native species-rich
	J2.1.2 - Intact hedge - species-poor
	J2.2.1 - Defunct hedge - native species-rich
	J2.2.2 - Defunct hedge - species-poor
	J2.3.1 - Hedge with trees - native species-rich
	J2.3.2 - Hedge with trees - species-poor
	J2.4 - Fence
	J2.5 - Wall

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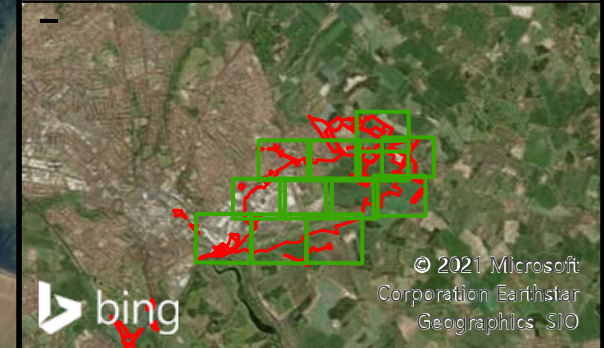


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	Target Notes
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	A2.1 - Scrub - dense/continuous
	A2.2 - Scrub - scattered
	A3.1 - Broadleaved parkland/scattered trees
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	B3.2 - Calcareous grassland - semi-improved
	B6 - Poor semi-improved grassland
	C1.1 - Bracken - continuous
	C3.1 - Other tall herb and fern - ruderal
	12.4 - Refuse-tip
	J1.1 - Cultivated/disturbed land - arable
	J1.2 - Cultivated/disturbed land - amenity grassland
	J1.3 - Cultivated/disturbed land - ephemeral/short perennial
	J1.4 - Introduced shrub
	J3.6 - Buildings
	J5 - Other habitat
	A3.1 - Broadleaved parkland/scattered trees
	A3.2 - Coniferous parkland/scattered trees
	J2.1.1 - Intact hedge - native species-rich
	J2.1.2 - Intact hedge - species-poor
	J2.2.1 - Defunct hedge - native species-rich
	J2.2.2 - Defunct hedge - species-poor
	J2.3.1 - Hedge with trees - native species-rich
	J2.3.2 - Hedge with trees - species-poor
	J2.4 - Fence
	J2.5 - Wall

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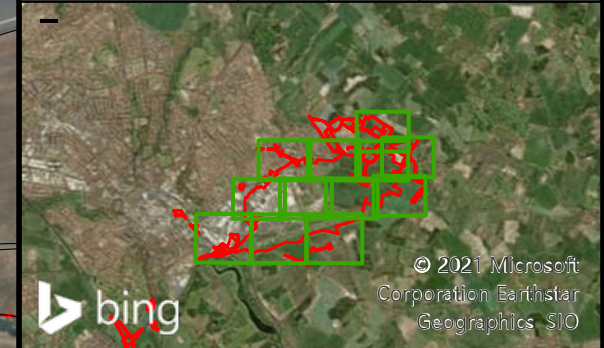
**Legend**

- Proposed Development Boundary
- ! Target Notes

**Habitat Description**

- A1.1.1 - Broadleaved woodland - semi-natural
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- B3.2 - Calcareous grassland - semi-improved
- B6 - Poor semi-improved grassland
- C3.1 - Other tall herb and fern - ruderal
- J1.2 - Cultivated/disturbed land - amenity grassland
- J1.3 - Cultivated/disturbed land - ephemeral/short perennial
- J1.4 - Introduced shrub
- J3.6 - Buildings
- J4 - Bare ground
- J5 - Other habitat
- A2.2 - Scrub - scattered
- J2.4 - Fence
- J2.5 - Wall

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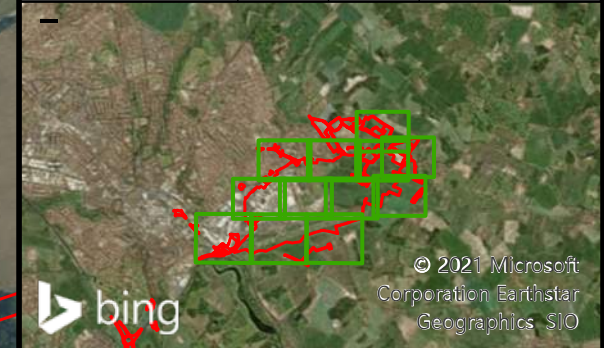
**Legend**

- Proposed Development Boundary
- ! Target Notes

**Habitat Description**

- A1.1.1 - Broadleaved woodland - semi-natural
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- B3.2 - Calcareous grassland - semi-improved
- B6 - Poor semi-improved grassland
- C3.1 - Other tall herb and fern - ruderal
- J1.1 - Cultivated/disturbed land - arable
- J1.2 - Cultivated/disturbed land - amenity grassland
- J1.3 - Cultivated/disturbed land - ephemeral/short perennial
- J1.4 - Introduced shrub
- J3.6 - Buildings
- J4 - Bare ground
- J5 - Other habitat
- J2.4 - Fence
- J2.5 - Wall
- J2.6 - Dry ditch

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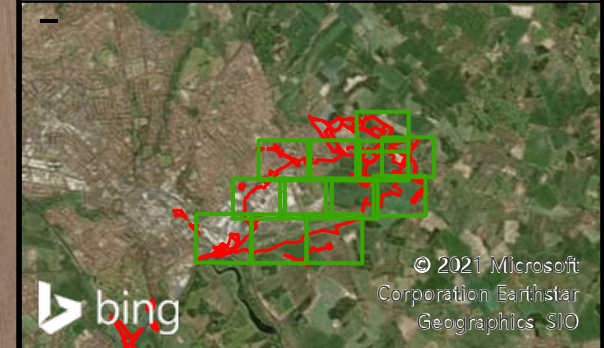
**Legend**

- Proposed Development Boundary
- ! Target Notes

**Habitat Description**

- A1.1.1 - Broadleaved woodland - semi-natural
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- G1.1 - Standing water - eutrophic
- J1.1 - Cultivated/disturbed land - arable
- J1.3 - Cultivated/disturbed land - ephemeral/short perennial
- J3.6 - Buildings
- J4 - Bare ground
- VAV J2.1.1 - Intact hedge - native species-rich
- J2.1.2 - Intact hedge - species-poor
- VAV J2.2.1 - Defunct hedge - native species-rich
- - J2.2.2 - Defunct hedge - species-poor
- VAV J2.3.1 - Hedge with trees - native species-rich

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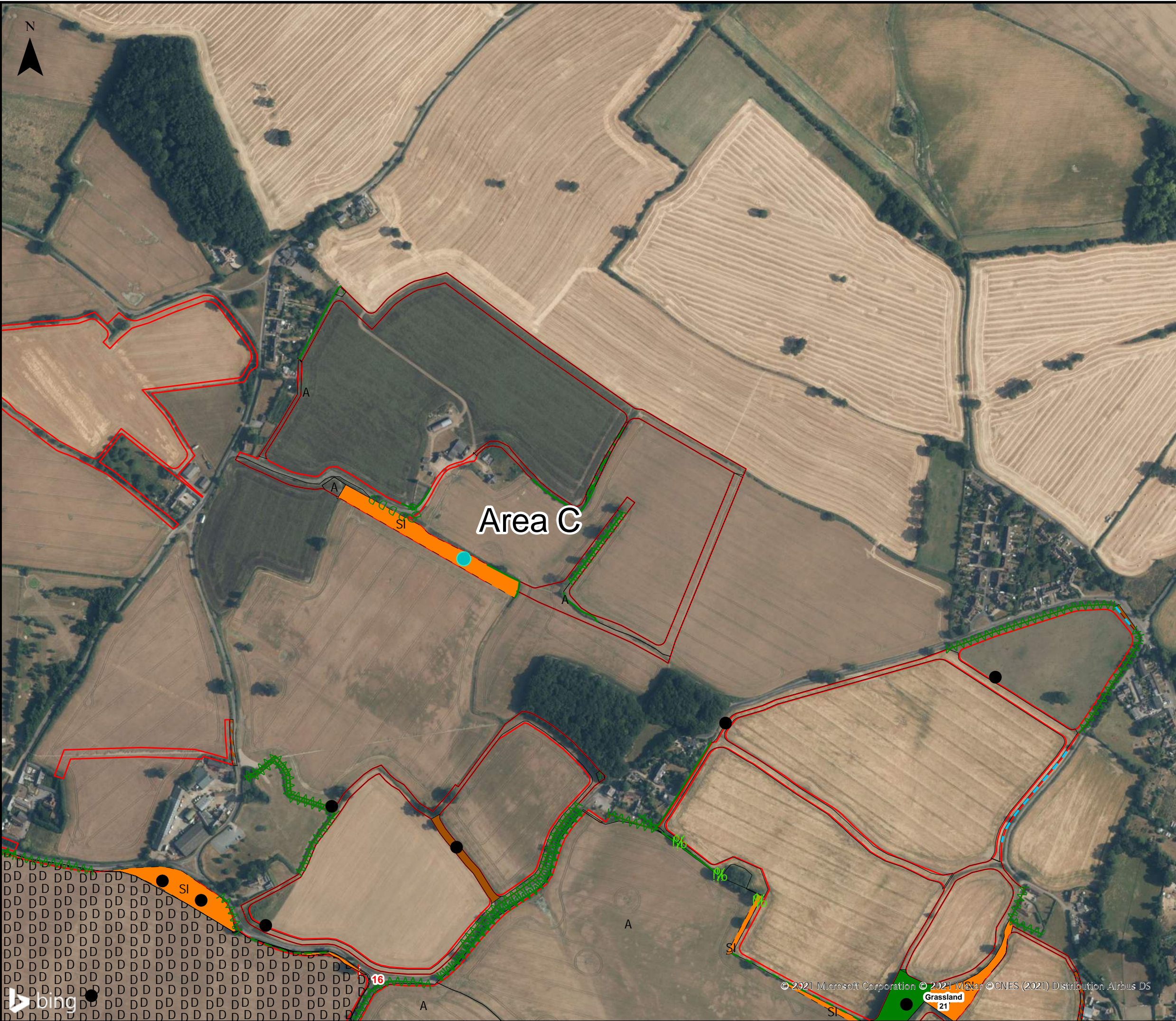
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Purpose of issue				Suitability		
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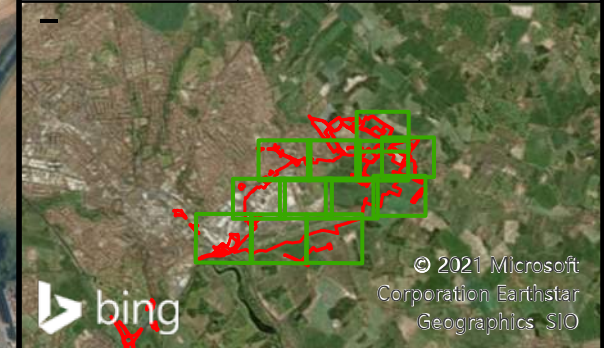
**Legend**

- Proposed Development Boundary
- ! Target Notes

**Habitat Description**

- A1.1.1 - Broadleaved woodland - semi-natural
- A2.1 - Scrub - dense/continuous
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- B6 - Poor semi-improved grassland
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- C3.1 - Other tall herb and fern - ruderal
- J1.1 - Cultivated/disturbed land - arable
- J1.3 - Cultivated/disturbed land - ephemeral/short perennial
- J1.3 - Cultivated/disturbed land - ephemeral/short perennial
- A2.2 - Scrub - scattered
- D D A2.2 - Scrub - scattered
- V V V J2.1.1 - Intact hedge - native species-rich
- V V V J2.1.2 - Intact hedge - species-poor
- V V V J2.2.1 - Defunct hedge - native species-rich
- - - J2.2.2 - Defunct hedge - species-poor
- V V V J2.3.1 - Hedge with trees - native species-rich
- - - J2.6 - Dry ditch

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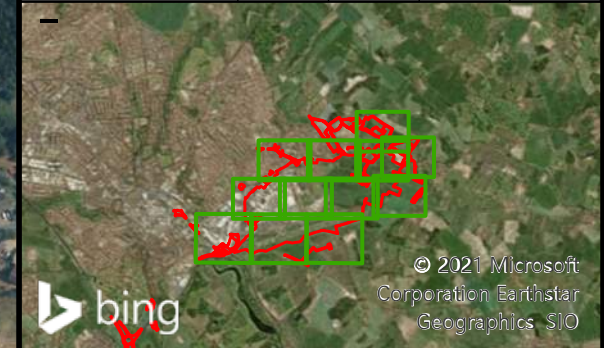
**Legend**

- Proposed Development Boundary
- ! Target Notes

**Habitat Description**

- A1.1.1 - Broadleaved woodland - semi-natural
- A1.2.2 - Coniferous woodland - plantation
- A2.1 - Scrub - dense/continuous
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- B2.2 - Neutral grassland - semi-improved
- B6 - Poor semi-improved grassland
- C1.1 - Bracken - continuous
- C3.1 - Other tall herb and fern - ruderal
- J1.1 - Cultivated/disturbed land - arable
- J1.4 - Introduced shrub
- A2.2 - Scrub - scattered
- ! A3.1 - Broadleaved parkland/scattered trees
- V J2.1.1 - Intact hedge - native species-rich
- V J2.1.2 - Intact hedge - species-poor
- V J2.2.1 - Defunct hedge - native species-rich
- V J2.2.2 - Defunct hedge - species-poor
- V J2.3.1 - Hedge with trees - native species-rich
- V J2.3.2 - Hedge with trees - species-poor
- V J2.4 - Fence
- J2.6 - Dry ditch

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## Appendix C

### C1 Phase 1 Habitat Survey Target Notes

Target Note	Species	Easting	Northing	Summary
1	Japanese rose	512549.5	221808.2	Schedule 9 invasive plant
1	Jaanesese rose	512675.5	221822.8	Schedule 9 invasive plant
1	Japanese rose	511239.4	221279.2	Schedule 9 invasive plant species
1	Japanese rose	512616.5	221782.1	Schedule 9 invasive plant
2	Grass vetchling	512315.7	221909.8	Plant species of interest
4	Wild basil	512673.9	221802.3	Plant species of interest
4	Wild basil	514090	221531.2	Plant species of interest
5	Basil thyme	512678.9	221806.9	Notable plant species
5	Basil thyme	512321	221912.7	Notable plant species
5	Basil thyme	514000	221487.8	Notable plant species
6	Common twayblade	512686.1	221686.5	Plant species (17 no.) of interest
7	Japanese knotweed	512216.5	222190.3	Schedule 9 invasive plant
7	Japanese knotweed	512212.9	222188.2	Schedule 9 invasive plant
7	Japanese knotweed	512785.1	221841.6	Schedule 9 invasive plant
7	Japanese knotweed	512777.2	221824.9	Schedule 9 invasive plant
7	Japanese knotweed	512770.9	221806.6	Schedule 9 invasive plant
7	Japanese knotweed	512766.1	221787.6	Schedule 9 invasive plant
7	Japanese knotweed	512777.2	221751.9	Schedule 9 invasive plant
7	Japanese knotweed	512795.5	221741.5	Schedule 9 invasive plant
7	Japanese knotweed	512810.5	221731.2	Schedule 9 invasive plant

Target Note	Species	Easting	Northing	Summary
7	Japanese knotweed	512829.6	221719.3	Schedule 9 invasive plant
10	Small toadflax	511636.3	220796.1	plant species of interest and arable weed
10	Small toadflax	512121.9	221962.9	plant species of interest and arable weed
11	Round-leaved fluellen	511145.7	220448.3	plant species of interest and arable weed
12	Cotoneaster (C.simonsii/integrifolius)	512362.3	222235.1	Likely Schedule 9 invasive plant
12	Cotoneaster	512370.9	222236.7	Likely Schedule 9 invasive plant
12	Cotoneaster	512414.1	222235.4	Likely Schedule 9 invasive plan
12	Cotoneaster	512419.5	222225.4	Likely Schedule 9 invasive plant
12	Cotoneaster	512395	222243	Likely Schedule 9 invasive plant
12	Cotoneaster	512438	222243	Likely Schedule 9 invasive plant
12	Cotoneaster	512448.3	222232.1	Likely Schedule 9 invasive plant
12	Cotoneaster	512450.8	222251.3	Likely Schedule 9 invasive plant
13	Cornflower	513057.3	222116.9	Notable plant species and arable weed
14	Hairy violet	513449.1	221813	Notable plant species
14	Hairy violet	510823.1	220405.4	Plant species of interest
15	Field madder	514271	222035.1	Notable plant species and arable weed
15	Field madder	514267.3	221679	Notable plant species and arable weed
15	Field madder	514229.7	221576.7	Notable plant species and arable weed
15	Field madder	514390.3	221816	Notable plant species and arable weed
15	Field madder	514008.3	221878	Plant species of interest
16	Wild strawberry	513751.4	222209.9	Notable plant species



Target Note	Species	Easting	Northing	Summary
17	Field scabious	514273.5	222022.3	Notable plant species
17	Field scabious	514323.8	221904.2	Notable plant species
17	Field scabious	513977.2	221490.8	Notable plant species
17	Field scabious	513078.5	222178	Notable plant species
18	Bee orchids (12 no)	512366.2	222001.2	Plant species of interest
19	Hoary plantain	513088	222130.3	Notable plant species
20	Galingale	512444.2	221747.1	Notable plant species
21	Rat's-tail fescue	511900.8	220993.9	Plant species of interest
22	Large-leaved Lime	513832	221538.5	Notable plant species
16	Wild strawberry	513751.4	222209.9	Notable plant species
17	Field scabious	514273.5	222022.3	Notable plant species
17	Field scabious	514323.8	221904.2	Notable plant species
17	Field scabious	513977.2	221490.8	Notable plant species
17	Field scabious	513078.5	222178	Notable plant species
18	Bee orchids (12 no)	512366.2	222001.2	Plant species of interest
19	Hoary plantain	513088	222130.3	Notable plant species
20	Galingale	512444.2	221747.1	Notable plant species
21	Rat's-tail fescue	511900.8	220993.9	Plant species of interest
22	Large-leaved lime	513832	221538.5	Notable plant species
23	Large oak possible veteran	513813	221587	Tree of interest

## Appendix D

### D1 Botanical Species List

Scientific Name	English Name
<i>Acer campestre</i>	Field Maple
<i>Acer platanoides</i>	Norway maple
<i>Achillea millefolium</i>	Yarrow
<i>Aesculus hippocastanum</i>	Horse chestnut
<i>Agrimonia eupatoria</i>	Agrimon
<i>Agrimonia procera</i>	Fragrant agrimony
<i>Agrostis capillaris</i>	Common bent
<i>Agrostis stolonifera</i>	Creeping bent
<i>Allaria petiolata</i>	Hedge garlic
<i>Allium paradoxum</i>	Few-flowered garlic
<i>Alnus glutinosa</i>	Italian alder
<i>Alnus sp</i>	Alder sp.
<i>Alopecurus pratensis</i>	Meadow foxtail
<i>Anisantha sterilis</i>	Barren brome
<i>Anthoxanthum odoratum</i>	Sweet vernal grass
<i>Anthriscus sylvestris</i>	Cow parsley
<i>Aphanes arvensis</i>	Parsley piert
<i>Aquilegia vulgaris</i>	Columbine
<i>Arrhenatherum elatius</i>	False oat grass
<i>Artemesia vulgaris</i>	Mugwort
<i>Arum maculatum</i>	Wild arum
<i>Atriplex patula</i>	Common orache
<i>Avena fatua</i>	Wild oat
<i>Ballota nigra</i>	Black horehound
<i>Barbarea sp.</i>	Winter cress sp.
<i>Bellis perennis</i>	Daisy
<i>Berberis sp.</i>	Barberry sp.
<i>Betula pendula</i>	Silver birch
<i>Blackstonia perfoliata</i>	Yellow-wort
<i>Brachypodium sylvaticum</i>	False wood brome
<i>Brachypodium sylvaticum</i>	False brome
<i>Bromus erecta</i>	Upright brome

Scientific Name	English Name
<i>Bromus hordaceus</i>	Soft brome
<i>Bryonia alba</i>	White bryony
<i>Buddleia davidii</i>	Buddleia
<i>Buddleia globosa</i>	Orange ball-tree
<i>Buxus sempervirens</i>	Box
<i>Capsella bursa-pastoris</i>	Shepherd's purse
<i>Carduus crispus</i>	Wetted thistle
<i>Carex disticha</i>	Brown sedge
<i>Carex remota</i>	Remote sedge
<i>Carex spicata</i>	Spiked sedge
<i>Carpinus betulus</i>	Hornbeam
<i>Cedrus sp.</i>	Cedar sp.
<i>Centaurea cyanus</i>	Cornflower
<i>Centaurea nigra</i>	Common knapweed
<i>Centaureum erythraea</i>	Common centaury
<i>Cerastium fontanum</i>	Common mouse-ear
<i>Chamaenerion angustifolium</i>	Rosebay willowherb
<i>Chenopodium album</i>	Fat hen
<i>Chenorhinum minus</i>	Small toadflax
<i>Cirsium arvense</i>	Creeping thistle
<i>Cirsium vulgare</i>	Spear thistle
<i>Clematis vitalba</i>	Traveller's joy
<i>Clinopodium acinos</i>	Basil thyme
<i>Clinopodium vulgare</i>	Wild basil
<i>Conium maculatum</i>	Hemlock
<i>Conopodium majus</i>	Pignut
<i>Convolvulus arvensis</i>	Field bindweed
<i>Cornus sanguinea</i>	Dogwood
<i>Coronopus squamatus</i>	Swine-cress
<i>Corylus avellana</i>	Hazel
<i>Cota austriaca</i>	Austrian chamomile
<i>Cotoneaster horizontalis</i>	Wall cotoneaster
<i>Cotoneaster microphyllus</i>	Small leaved cotoneaster
<i>Cotoneaster simonsii</i>	Himalayan cotoneaster
<i>Cotoneaster sp.</i>	Cotoneaster sp.



Scientific Name	English Name
<i>Cotoneaster waterii</i>	Waterer's cotoneaster
<i>Crataegus monogyna</i>	Hawthorn
<i>Crepis capillaris</i>	Hawk's-beard
<i>Cupressocyparis sp.</i>	Cypress sp.
<i>Cyanus cyaneus</i>	Rare cornflower
<i>Cynosurus cristatus</i>	Crested dog's tail
<i>Cyperus longus</i>	Galingale
<i>Dactylis glomerata</i>	Cock's-foot
<i>Dactylorhiza fuschsii</i>	Common spotted orchid
<i>Daucus carota</i>	Wild carrot
<i>Dipsacus fullonum</i>	Common teasel
<i>Dryopteris filix-mas</i>	Male fern
<i>Elymus repens</i>	Couch grass
<i>Epilobium ciliatum</i>	American willowherb
<i>Epilobium hirsutum</i>	Hoary willowherb
<i>Epilobium hirsutum</i>	Great willowherb
<i>Epilobium montanum</i>	Broad-leaved willowherb
<i>Epilobium sp</i>	Willowherb sp.
<i>Ervum tetraspermum</i>	Smooth tare
<i>Euonymus europaeus</i>	Spindle
<i>Euonymus japonicus</i>	Evergreen spindle
<i>Euphorbia helioscopia</i>	Sun spurge
<i>Festuca gigantea</i>	Giant fescue
<i>Festuca rubra</i>	Red fescue
<i>Fragaria vesca</i>	Wild strawberry
<i>Fraxinus excelsior</i>	Ash
<i>Fumaria officinalis</i>	Common fumitory
<i>Galega officinalis</i>	Goat's rue
<i>Galeopsis tetrahit</i>	Common hemp nettle
<i>Galium verum</i>	Ladies' bedstraw
<i>Gallium aparine</i>	Cleavers
<i>Geranium dissectum</i>	Cut leaved crane's bill
<i>Geranium robertianum</i>	Herb robert
<i>Glechoma hederacea</i>	Ground ivy
<i>Hedera helix</i>	Ivy

Scientific Name	English Name
<i>Helminthotheca echioides</i>	Bristly ox-tongue
<i>Heracleum mantegazzianum</i>	Giant hogweed
<i>Heracleum sphondylium</i>	Hogweed
<i>Holcus lanatus</i>	Yorkshire fog
<i>Hyacinthoides non-scripta</i>	Bluebell
<i>Hypericum perforatum</i>	St John's-wort
<i>Ilex aquifolium</i>	Holly
<i>Impatiens glandulifera</i>	Indian balsam
<i>Iris pseudacorus</i>	Flag iris
<i>Jacobaea erucifolia</i>	Hoary ragwort
<i>Juglans regia</i>	Walnut
<i>Juncus inflexus</i>	Hard rush
<i>Kickxia spuria</i>	Round-leaved fluellen
<i>Knautia arvensis</i>	Field scabious
<i>Lamium galeobdolon subsp. montanum</i>	Yellow archangel
<i>Lamium album</i>	White dead nettle
<i>Lamium galeobdolon subsp. argentatum</i>	Variegated yellow archangel
<i>Lamium purpureum</i>	Red dead nettle
<i>Larix decidua</i>	Larch
<i>Lathyrus nissolia</i>	Grass vetchling
<i>Lathyrus pratensis</i>	Meadow vetchling
<i>Lavandula angustifolia</i>	Garden lavender
<i>Leontodon hispidus</i>	Rough hawkbit
<i>Leucanthemum vulgare</i>	Ox-eye daisy
<i>Linaria vulgaris</i>	Yellow toadflax
<i>Linum catharticum</i>	Fairy flax
<i>Lolium multiflorum</i>	Italian rye-grass
<i>Lolium perenne</i>	Perennial rye grass
<i>Lonicera nitida</i>	Wilson's honeysuckle
<i>Lonicera periclymenum</i>	Honey suckle
<i>Lotus corniculatus</i>	Bird's foot trefoil
<i>Lycium barbarum</i>	Duke of Argyll's teaplant
<i>Lysimachia arvensis</i>	Scarlet pimpernel
<i>Mahonia aquifolium</i>	Oregon-grape

Scientific Name	English Name
<i>Malus domestica</i>	Domestic apple
<i>Malus sylvestris</i>	Crab apple
<i>Malva moschata</i>	Muskmallow
<i>Malva sylvestris</i>	Common mallow
<i>Matricaria discoidea</i>	Pineapple weed
<i>Medicago lupulina</i>	Black medick
<i>Medicago sativa ssp. sativa</i>	Lucerne
<i>Melica uniflora</i>	Wood medlick
<i>Mentha aquatica</i>	Water mint
<i>Mentha sp.</i>	Mint sp.
<i>Mercurialis perennis</i>	Dog's mercury
<i>Moehringia trinerva</i>	Three-nerved sandwort
<i>Myosotis arvensis</i>	Forget-me-not
<i>Myrrhis odorata</i>	Sweet cicely
<i>Neottia ovata</i>	Common twayblade
<i>Nothofagus obliqua</i>	Role beech
<i>Nothofagus oblqua</i>	Roble beech
<i>Odontites vernus</i>	Red bartsia
<i>Oenothera glazioviana</i>	Evening primrose
<i>Ophrys apifera</i>	Bee orchid
<i>Orchis pyramidalis</i>	Pyramidal orchid
<i>Papaver rhoeas</i>	Common poppy
<i>Pastinaca sativa</i>	Wild parsnip
<i>Persicaria lapathifolia</i>	Pale persicaria
<i>Persicaria maculosa</i>	Redshank
<i>Phleum bertolonii</i>	Cat's-tail
<i>Phleum pratense</i>	Timothy
<i>Picea abies</i>	Norway spruce
<i>Picea sp.</i>	Spruce sp.
<i>Pinus sylvestris</i>	Scots pine
<i>Plantago lanceolata</i>	Ribwort plantain
<i>Plantago major</i>	Greater plantain
<i>Plantago media</i>	Hoary plantain
<i>Platanus x hispanica</i>	London plane
<i>Poa annua</i>	Annual meadow grass



Scientific Name	English Name
<i>Poa pratensis</i>	Smooth meadow grass
<i>Poa trivialis</i>	Rough meadow grass
<i>Populus canescen</i>	Grey poplar
<i>Populus nigra</i>	Black poplar
<i>Populus sp</i>	Poplar sp.
<i>Potentilla reptans</i>	Creeping cinquefoil
<i>Prunus avium</i>	Wild cherry
<i>Prunus laurocerasus</i>	Cherry Laurel
<i>Prunus spinosa</i>	Blackthorn
<i>Pteridium aquilinum</i>	Bracken
<i>Pyracantha sp.</i>	Firethorn sp.
<i>Quercus robur</i>	Pedunculate oak
<i>Quercus rubra</i>	Red oak
<i>Ranunculus acris</i>	Meadow buttercup
<i>Ranunculus repens</i>	Creeping buttercup
<i>Raphanus raphanistrum</i>	Wild radish
<i>Reynoutria japonica</i>	Japanese Knotweed
<i>Rhinanthus minor</i>	Yellow-rattle
<i>Rosa arvensis</i>	Field rose
<i>Rosa canina</i>	Dog rose
<i>Rosa rugosa</i>	Japanese rose
<i>Rosa sp.</i>	Rose
<i>Rubus cockburnianus</i>	White stemmed bramble
<i>Rubus fruticosus agg</i>	Bramble aggregate
<i>Rubus ideus</i>	Raspberry
<i>Rumex acetosa</i>	Common sorrel
<i>Rumex conglomeratus</i>	Clustered dock
<i>Rumex crispus</i>	Curled dock
<i>Rumex obtusifolius</i>	Broad-leaved dock
<i>Rumex sanguineus</i>	Wood dock
<i>Salix caprea</i>	Goat willow
<i>Salix fragilis</i>	Crack willow
<i>Salix sp.</i>	Willow sp.
<i>Salix viminalis</i>	Osier
<i>Sambucus nigra</i>	Elder

<b>Scientific Name</b>	<b>English Name</b>
<i>Scrophularia nodosa</i>	Common figwort
<i>Sedum acre</i>	Biting stonecrop
<i>Sherardia arvensis</i>	Field madder
<i>Silene dioica</i>	Red campion
<i>Silene vulgaris</i>	Bladder campion
<i>Sinapis arvensis</i>	Charlock
<i>Solanum dulcamara</i>	Woody nightshade
<i>Sonchus asper</i>	Prickly sow thistle
<i>Sorbus aria</i> agg	Whitebeam aggregate
<i>Sorbus aucuparia</i>	Rowan
<i>Sorbus torminals</i>	Wild service tree
<i>Stachys sylvatica</i>	Hedge woundwort
<i>Stellaria holostea</i>	Greater stitchwort
<i>Stellaria media</i>	Chickweed
<i>Symphoricarpos</i>	Snowberry
<i>Symphytum officinale</i>	Common comfrey
<i>Taraxacum officinale</i> agg.	Dandelion aggregate
<i>Teucrium</i>	Germander
<i>Tilia cordata</i>	Small leaved lime
<i>Tilia platyphyllos</i>	Large leaved lime
<i>Torilis japonica</i>	Upright hedge parsley
<i>Tragopogon pratensis</i>	Goat's beard
<i>Trifolium campestre</i>	Hop trefoil
<i>Trifolium dubium</i>	Lesser hop trefoil
<i>Trifolium pratense</i>	Red clover
<i>Trifolium repens</i>	White clover
<i>Tripleurospermum inodorum</i>	Scentless mayweed
<i>Trisetum flavescens</i>	Yellow oat-grass
<i>Tsuga heterophylla</i>	Western hemlock
<i>Tussilago farfara</i>	Colt's foot
<i>Typha latifolia</i>	Bulrush
<i>Ulex</i> sp.	Gorse sp.
<i>Ulmus procera</i>	English elm
<i>Ulmus x hollandica</i>	Dutch elm
<i>Urtica dioica</i>	Common nettle

<b>Scientific Name</b>	<b>English Name</b>
<i>Verbascum nigrum</i>	Dark mullein
<i>Verbascum thapsus</i>	Great mullein
<i>Veronica chamaedrys</i>	Speedwell
<i>Veronica persica</i>	Common field speedwell
<i>Veronica polita</i>	Grey field speedwell
<i>Veronica serpyllifolia</i>	Thyme-leaved speedwell
<i>Veronica sp.</i>	Hebe sp.
<i>Viburnum lantana</i>	Wayfaring tree
<i>Viburnum opulus</i>	Guelder rose
<i>Vicia cracca</i>	Tufted vetch
<i>Viola arvensis</i>	Wild pansy
<i>Viola hirta</i>	Hairy violet
<i>Viola riviniana</i>	Common dog violet
<i>Vulpia myuros</i>	Rat's tail fescue
<i>Wiegela florida</i>	Wiegela



# Appendix E

## E1 Hedgerow Survey Plan





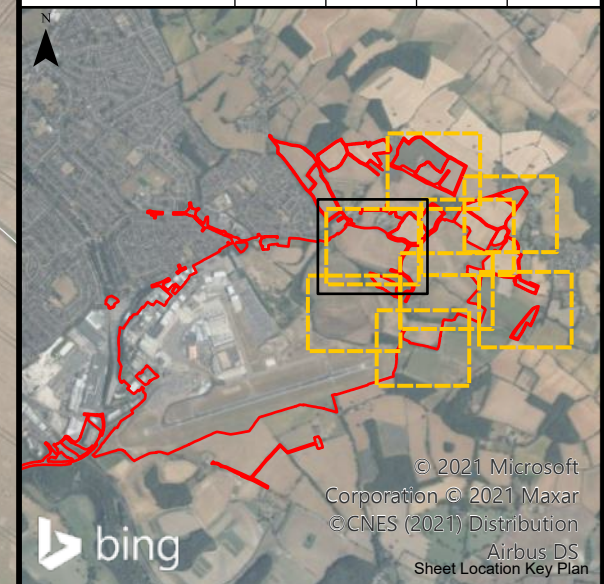
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**Legend**

- Proposed Development Boundary
- Important
- Not Important
- Not Assessed

Revision History	Drawn	Checked	Approved	Date	Rev.
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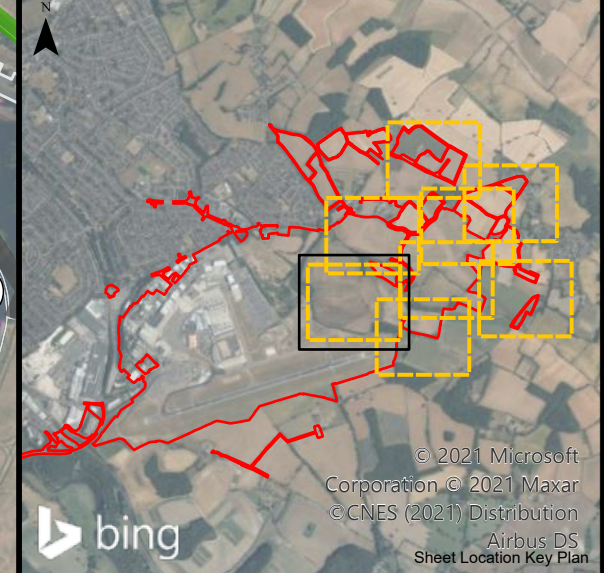


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**Legend**

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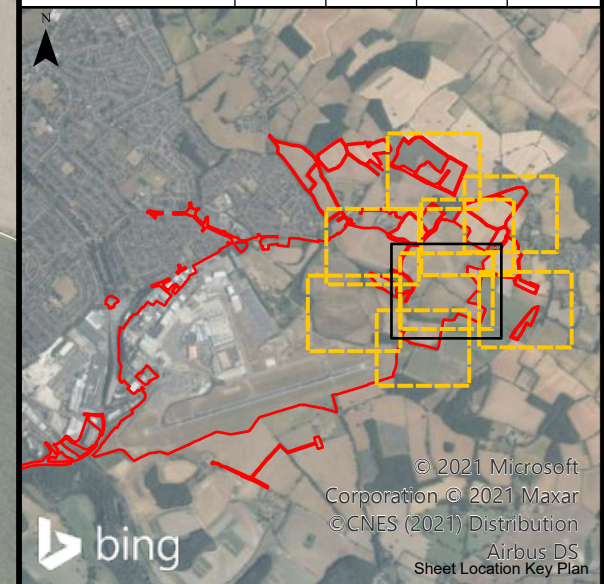


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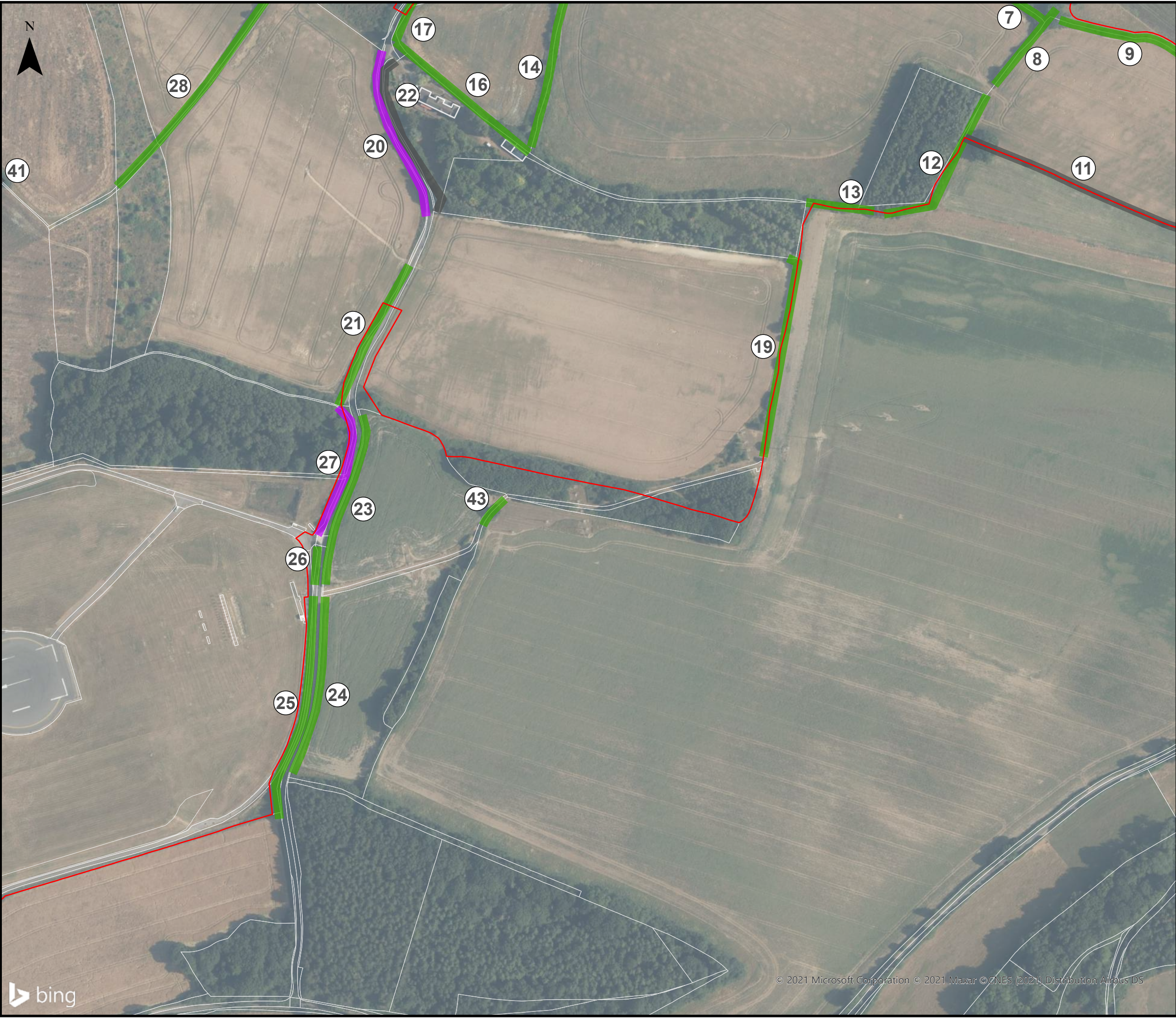
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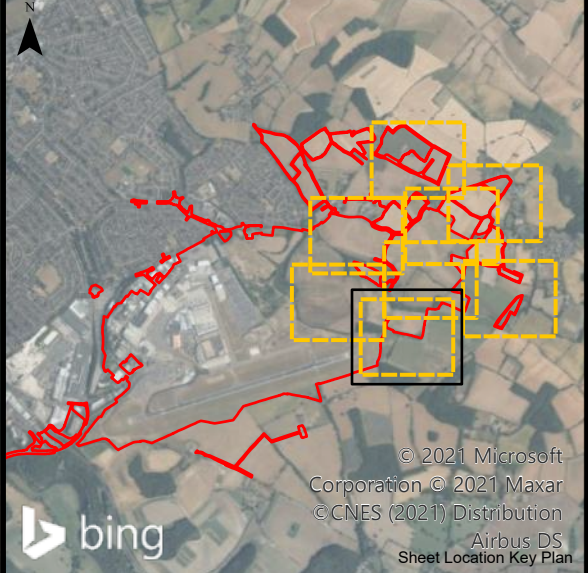


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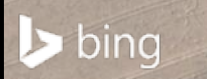
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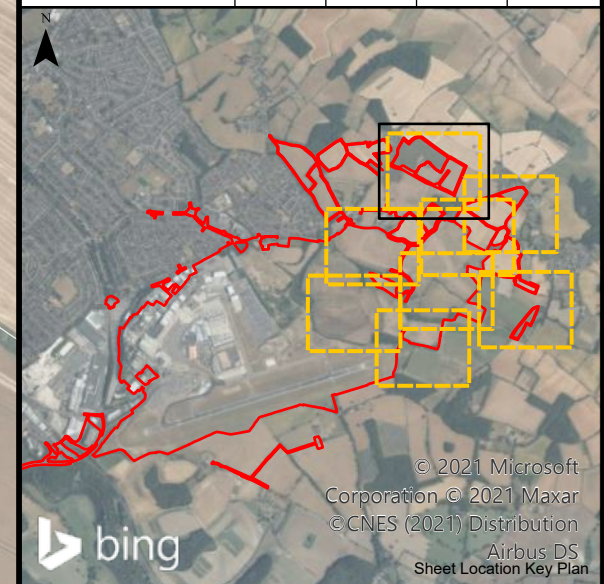


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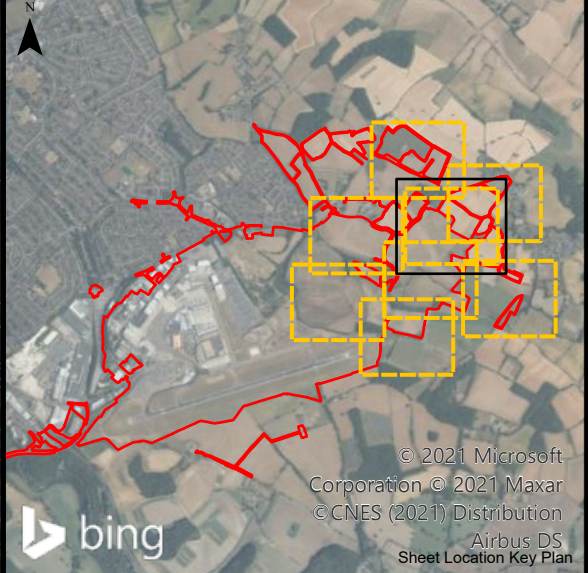


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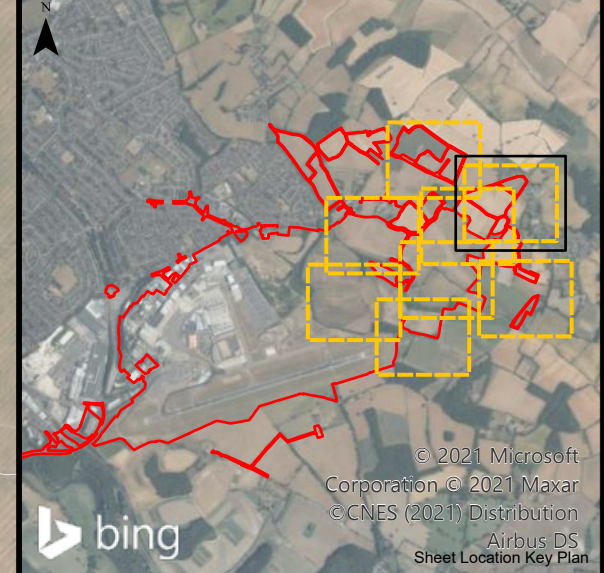


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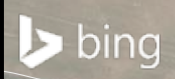
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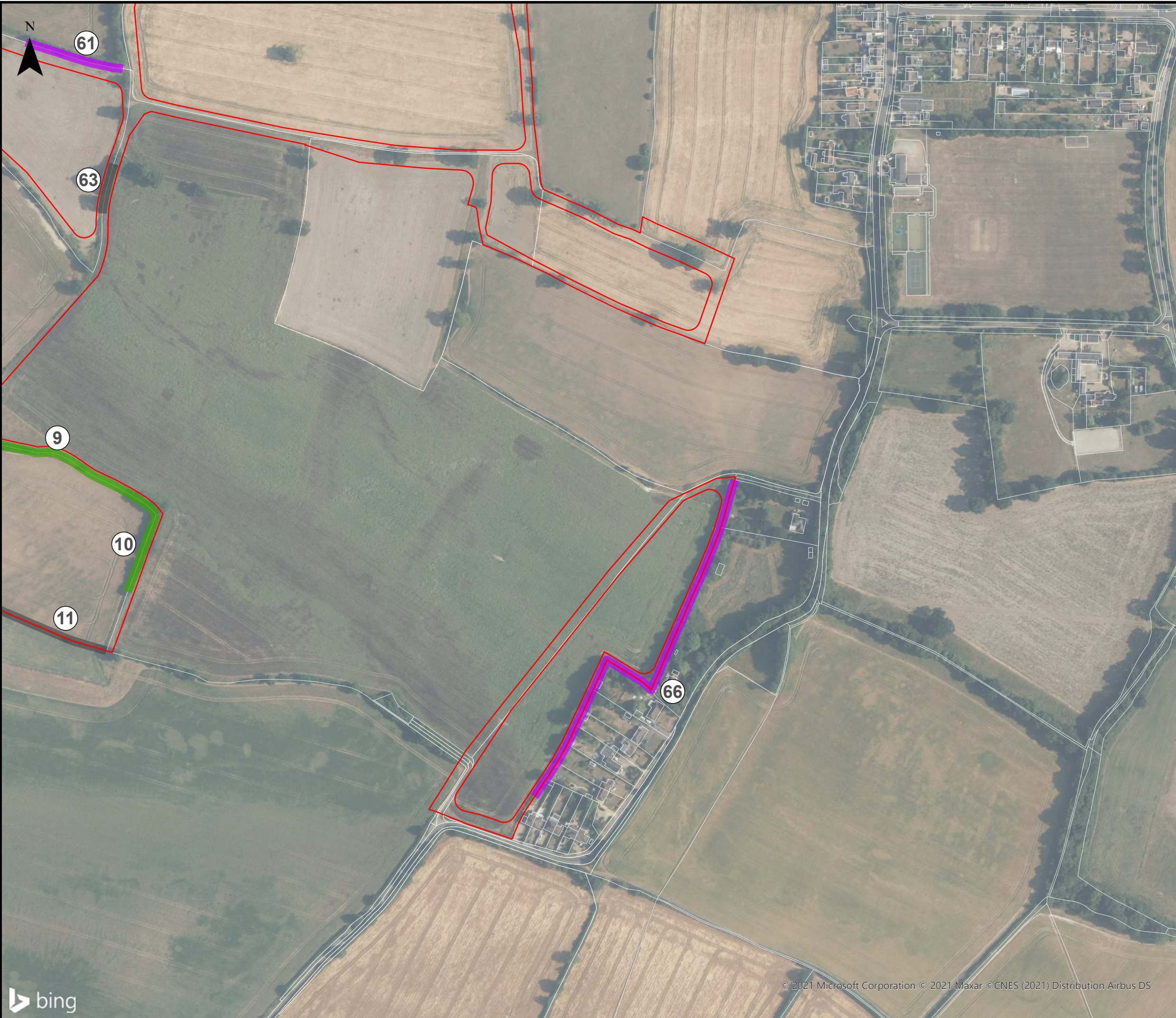
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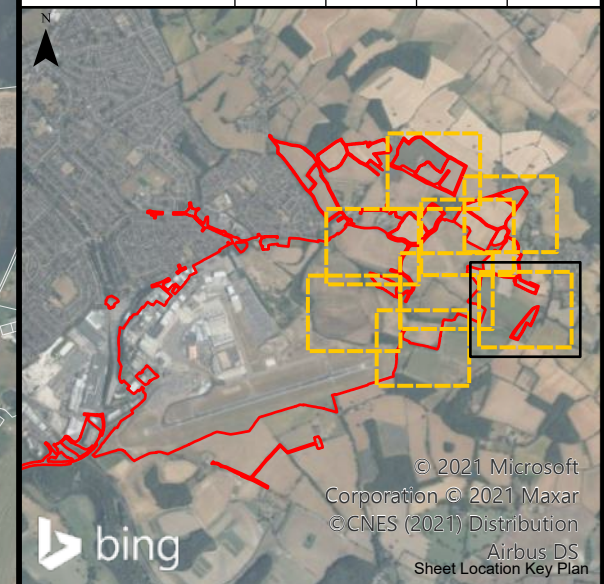


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# Appendix F

## **F1      Badger Survey Plan**

Confidential: not included with this public issues of the report

## Appendix G

### G1 **Badger Territory Mapping Plan**

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# Appendix H

## H1 Bat Tree and Building Roost Potential Survey Plan





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- Legend**
- Proposed Development Boundary
  - Confirmed
  - Moderate
  - Demolished in 2019 after earlier bat surveys
- Tree Roost Assessment 2020**
- ( Confirmed roost
  - ( High
  - ( Moderate
  - ( Low

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**Bat Trees and Buildings Plan**

Purpose of issue <b>SUITABLE FOR INFORMATION</b>				Suitability S2	
Drawn AB	Checked SM	Approved CS	Date 17/12/21	Scale 1:6,000	Size A3

DCO Application Ref. TR020001	APFP Regulation	DCO Document Ref.
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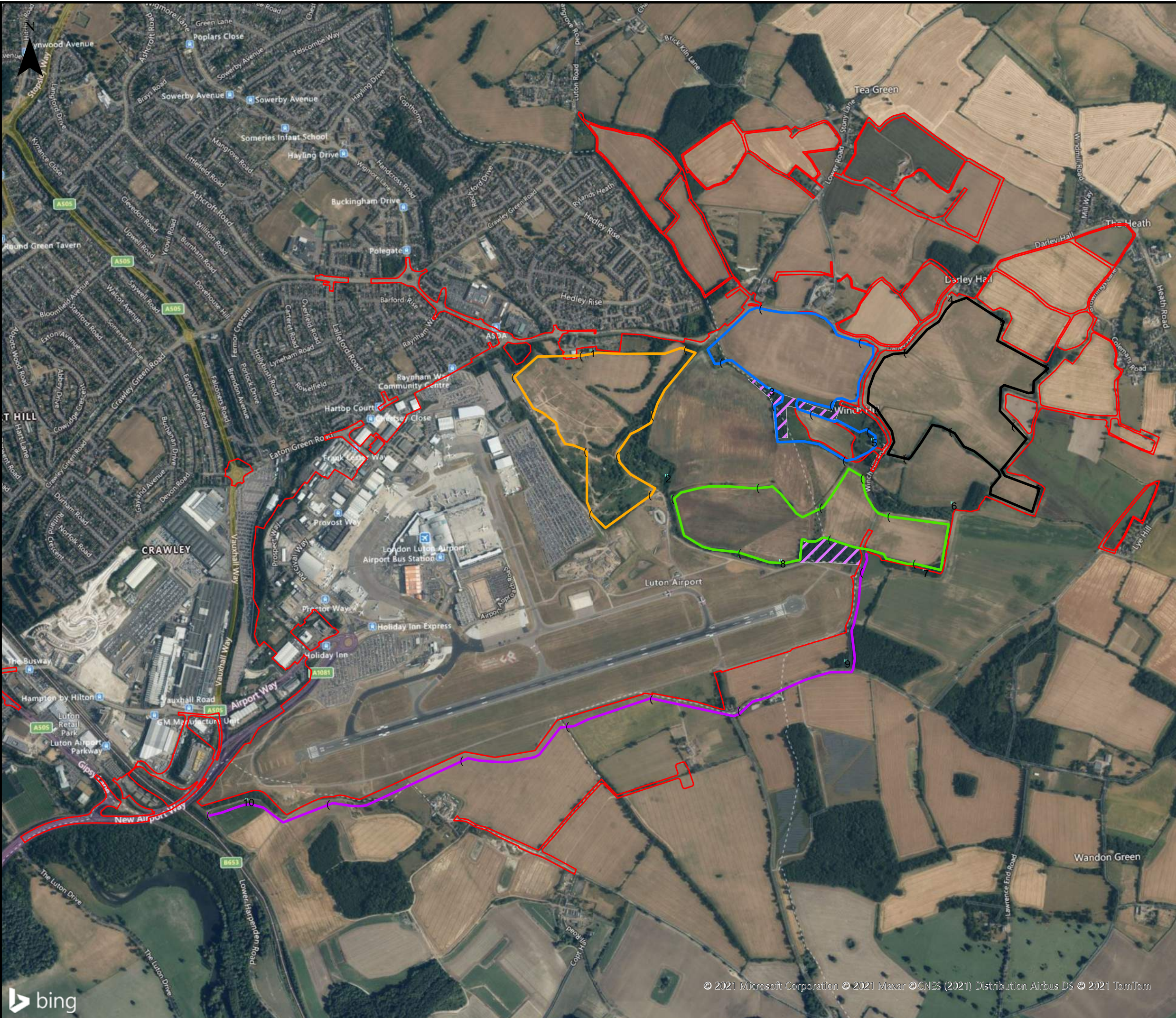
Drawing Number LLADCO-3C-ARP-0000-DR-YE-0210	Revision P01
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# Appendix I

## I1 Bat Activity Survey Plan





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**Legend**

- Proposed Development Boundary

**Transect Routes**

- 1
- 2
- 3
- 4
- 5

**Transect Stopping Points**

- { 1
- { 2
- { 3
- { 4
- { 5

- Static Detectors
- Back tracking survey area

First Issue	AB	SM	CS	30/11/21	P01
Revision History	Drawn	Checked	Approved	Date	Rev.

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**Bat Activity Survey Plan**

Purpose of issue				Suitability	
<b>SUITABLE FOR INFORMATION</b>				S2	
Drawn	Checked	Approved	Date	Scale	Size
AB	SM	CS	30/11/21	1:15,000	A3

DCO Application Ref.	APFP Regulation	DCO Document Ref.
TR020001		

Drawing Number	Revision
LLADCO-3C-ARP-0000-DR-YE-0211	P01
Project - Phase - Originator - Asset/Zone - Sub Asset - Type - Disc - Number	



## Appendix J

### J1 Bat/Site Evaluation System

J1.1.1 The valuation system used in this report is modified from Wray et al., (2007). Values are assigned using a geographic frame of reference as shown in Table J-1. The scores used to assign these values are calculated using Table J-2. 'National Rarity' values used in Table J-2 are based on the categorisation system shown in Table J-3.

**Table J-1: Site/species Valuation System**

Geographic Frame of Reference	Score
Not Important	1 - 10
District, Local or Parish	11 - 20
County	21 - 30
Regional	31 - 40
National/UK	41 - 50
International	> 50

**Table J-2: Calculation of Foraging/Commuting Habitat Scores (shown in brackets)**

National Rarity	Activity	Site/Nearby Potential	Roost	Habitat Characteristics
Common (2)	Low (5)	None (1)		Industrial or other site without established vegetation. Absence of linear features (1)
-	-	Small number (3)		Suburban areas or intensive arable land. Un-vegetated fences and large field sizes (2)
Rarer (5)	Moderate (10)	Moderate number/note known (4)		Isolated woodland patches, less intensive arable (moderate field sizes) and/or small towns and villages (3)
-	-	Large number of roosts, or close to a SSSI for the species (5)		Large or connected woodland blocks, mixed agriculture (small field sizes with well-grown, well-connected hedgerows) and small villages/hamlets (4)
Rarest (20)	High (20)	Close to or within a SAC for the species (20)		Mosaic of pasture (small fields), woodlands and wetland areas with complex network of

			mature well-established hedgerows (5).
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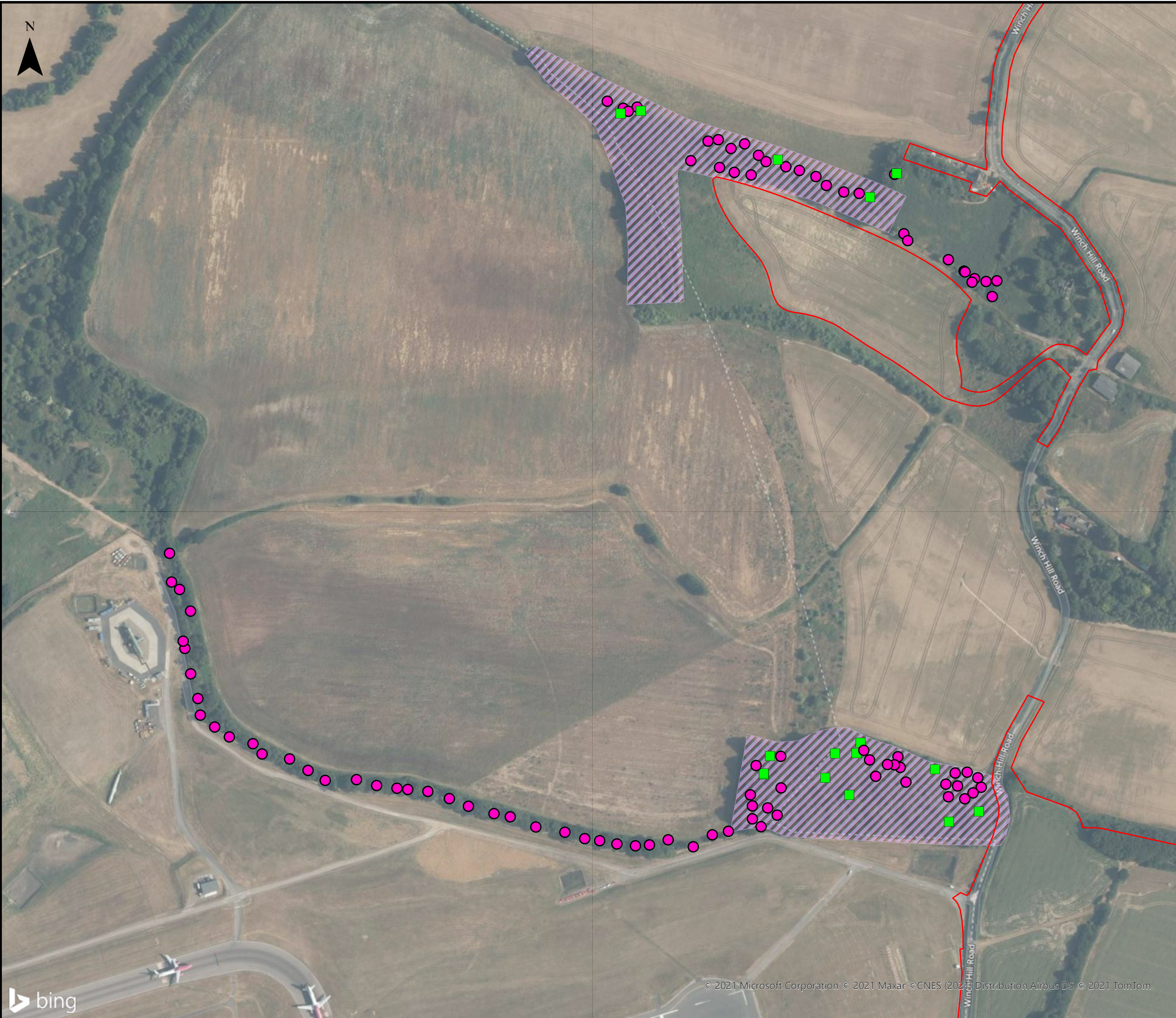
**Table J-3: Categorisation of Bats by National Rarity**

<b>Rarity within Range</b>	<b>England</b>	<b>Wales</b>	<b>Scotland</b>	<b>Northern Ireland</b>
Common (population. over 100,000)	Common Pipistrelle Soprano Pipistrelle Brown Long-eared	Common Pipistrelle Soprano Pipistrelle	Common Pipistrelle Soprano Pipistrelle	Common Pipistrelle Soprano Pipistrelle
Rarer (population. 10,000 – 100,000)	Lesser Horseshoe Whiskered Brandt's Daubenton's Natterer's Leisler's Noctule Nathusius' Pipistrelle Serotine	Lesser Horseshoe Daubenton's Natterer's Brown Long-eared	Daubenton's Natterer's Brown Long-eared	Daubenton's Natterer's Leisler's Nathusius' Pipistrelle Brown Long-eared
Rarest (population. under 10,000)	Greater Horseshoe Bechstein's Alcathoe Greater Mouse-eared Barbastelle Grey Long-eared	Greater Horseshoe Whiskered Brandt's Bechstein's Alcathoe Noctule Nathusius' Pipistrelle Serotine Barbastelle	Whiskered Brandt's Alcathoe Noctule Nathusius' Pipistrelle Leisler's	Whiskered

# Appendix K

## K1 Dormouse Survey Plan



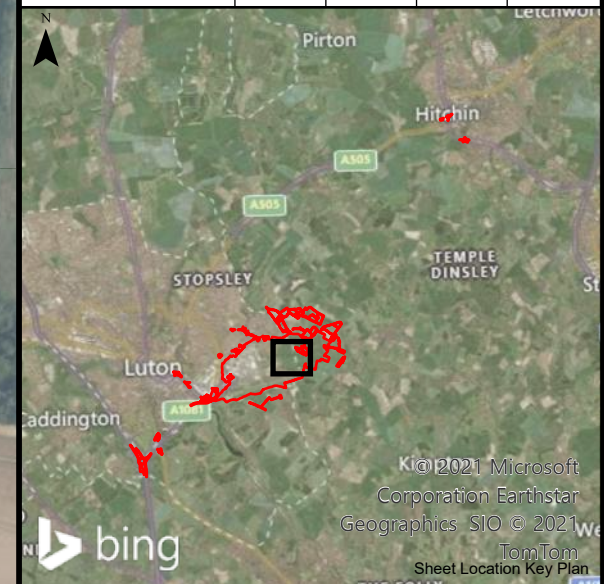


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**Legend**

- Proposed Development Boundary
- Dormouse Nest Tube
- Dormouse Nest Box
- Nut Search Area

First Issue	AB	SM	CS	17/12/21	P01
Revision History	Drawn	Checked	Approved	Date	Rev.



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 Dormouse Survey Plan

Purpose of issue <b>SUITABLE FOR INFORMATION</b>				Suitability S2	
Drawn AB	Checked SM	Approved JS	Date 17/12/21	Scale 1:3,500	Size A3

DCO Application Ref. TR020001	APFP Regulation	DCO Document Ref.
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Drawing Number LLADCO-3C-ARP-00-00-DR-YE-0212	Revision P01
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# Appendix L

## L1 Riparian Mammal Survey Area Plan



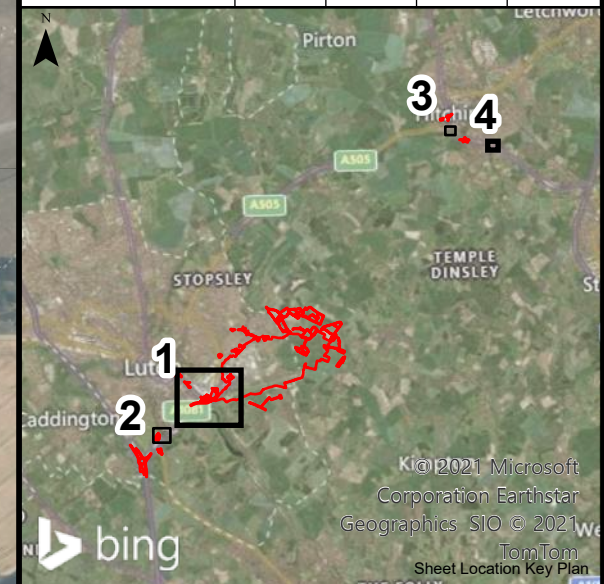


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**Legend**  
 [Red Outline] Proposed Development Boundary  
 [Blue Hatched] Watercourse survey extents

First Issue	AB	SM	CS	17/12/21	P01
Revision History	Drawn	Checked	Approved	Date	Rev.



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 Riparian Mammal Survey Plan

Purpose of issue <b>SUITABLE FOR INFORMATION</b>				Suitability S2	
Drawn AB	Checked SM	Approved CS	Date 17/12/21	Scale 1:6,000	Size A3

DCO Application Ref. TR020001	APFP Regulation	DCO Document Ref.
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Drawing Number LLADCO-3C-ARP-00-00-DR-YE-0213	Revision P01
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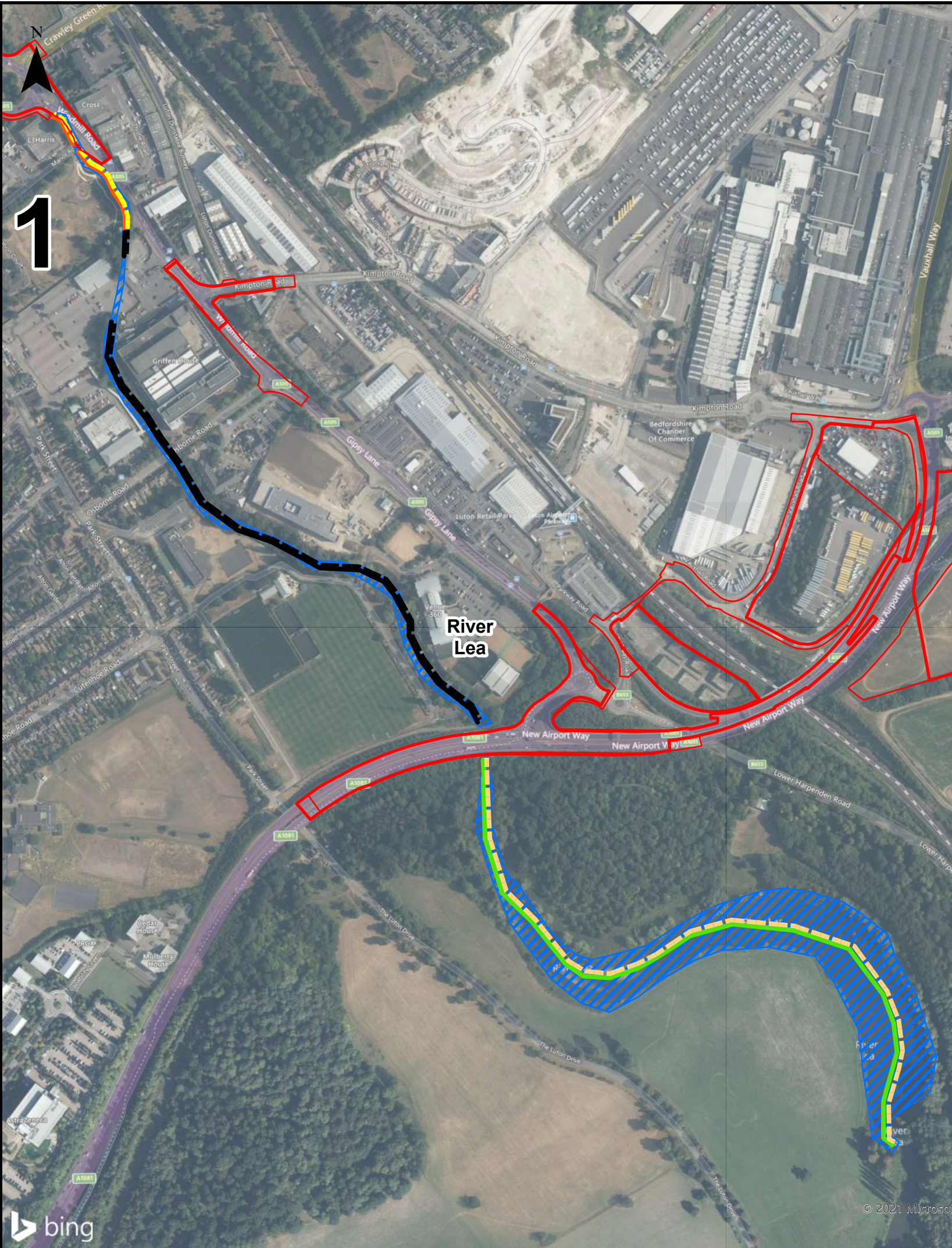
Project - Phase - Originator - Asset/Zone - Sub Asset - Type - Discp. - Number



# Appendix M

## M1 Riparian Mammal Habitat Assessment Plan



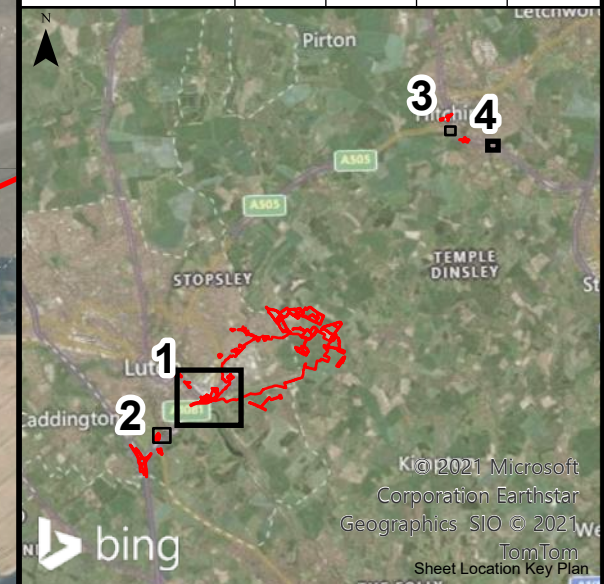


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- Legend**
- Proposed Development Boundary
  - Watercourse survey extents
- Otter Habitat Suitability**
- High
  - Moderate
  - Low
  - Negligible
  - Scoped out at ground truthing
- Water Vole Habitat Suitability**
- High
  - Moderate
  - Low
  - Negligible
  - Scoped out at ground truthing

First Issue	AB	SM	CS	17/12/21	P01
Revision History	Drawn	Checked	Approved	Date	Rev.



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**Riparian Mammal Habitat Assessment Plan**

Purpose of issue <b>SUITABLE FOR INFORMATION</b>				Suitability S2	
Drawn AB	Checked SM	Approved CS	Date 17/12/21	Scale 1:6,000	Size A3

DCO Application Ref. TR020001	APFP Regulation	DCO Document Ref.
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Drawing Number LLADCO-3C-ARP-00-00-DR-YE-0214	Revision P01
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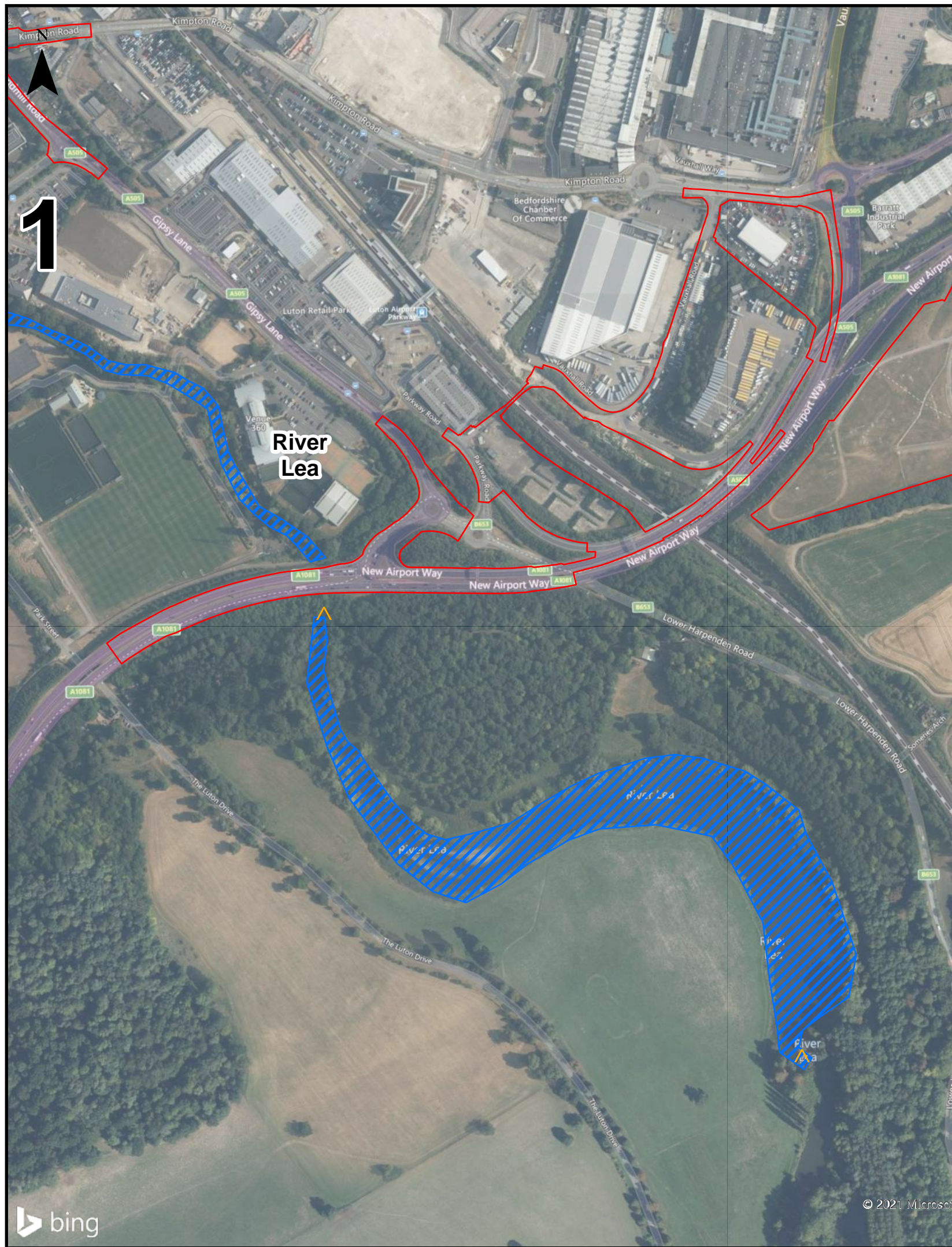
Project - Phase - Originator - Asset/Zone - Sub Asset - Type- Discp. - Number



# Appendix N

## N1 Otter Survey Plan





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**Legend**

- Proposed Development Boundary
- Watercourse Survey Extents
- ^ Otter Sprint

First Issue	AB	SM	CS	15/12/21	P01
Revision History	Drawn	Checked	Approved	Date	Rev.



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**Otter Survey Plan**

Purpose of issue <b>SUITABLE FOR INFORMATION</b>				Suitability S2	
Drawn AB	Checked SM	Approved CS	Date 15/12/21	Scale 1:5,000	Size A3

DCO Application Ref. TR020001	APFP Regulation	DCO Document Ref.
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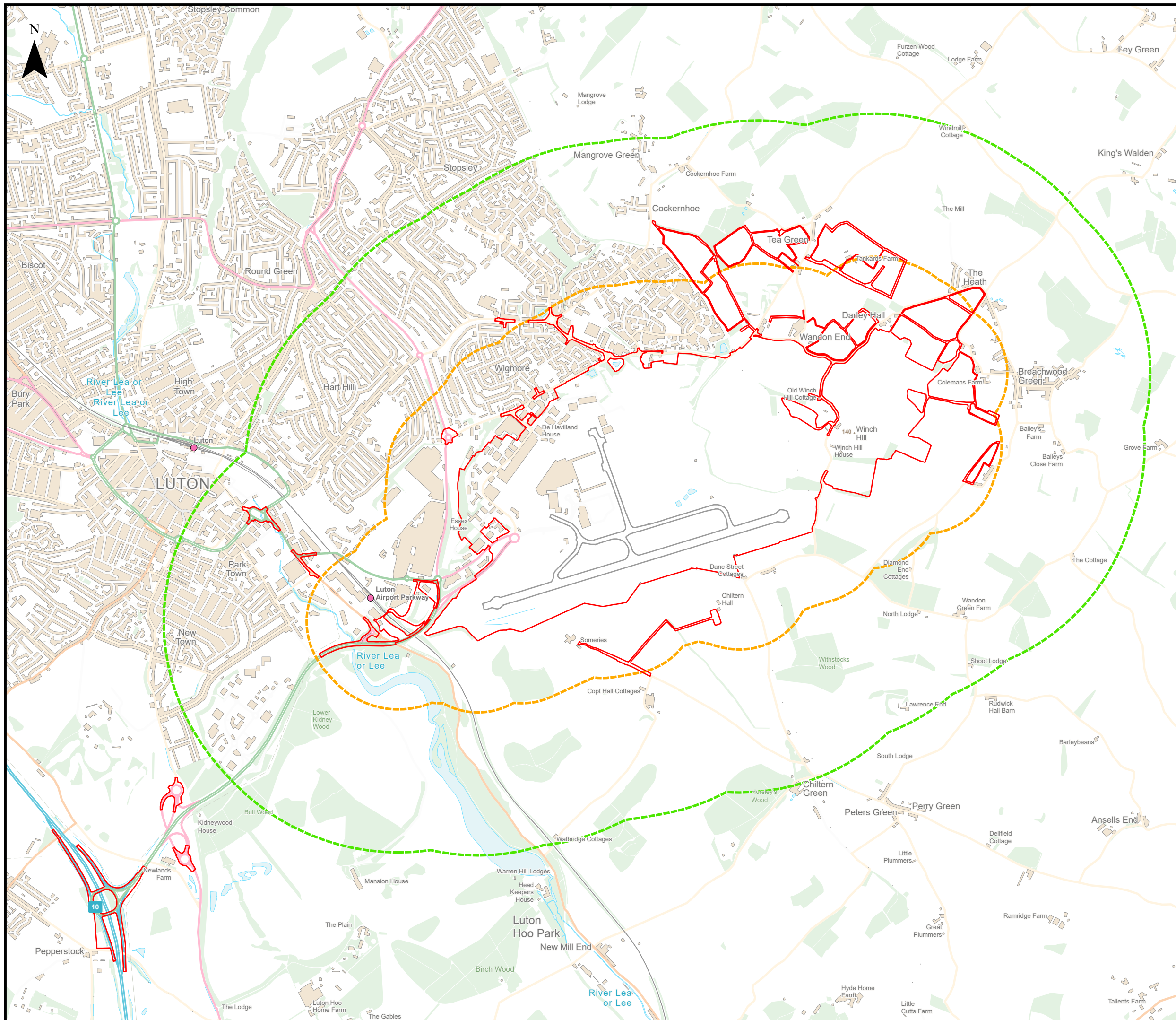
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Project - Phase - Originator - Asset/Zone - Sub Asset - Type - Discp. - Number



# Appendix O

## O1 Bird Survey Area Plan



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**Legend**

- Proposed Development Boundary
- 500m Bird Survey Buffer
- 1.5km Schedule 1 Bird Survey Buffer

First Issue	AB	SM	CS	17/12/21	P01
Revision History	Drawn	Checked	Approved	Date	Rev.

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**Bird Survey Area**

Purpose of issue <b>SUITABLE FOR COORDINATION</b>				Suitability S2	
Drawn AB	Checked SM	Approved CS	Date 17/12/21	Scale 1:25,000	Size A3

DCO Application Ref. TR020001	APFP Regulation	DCO Document Ref.
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Drawing Number LLADCO-3C-ARP-00-00-DR-YE-0216	Revision P01
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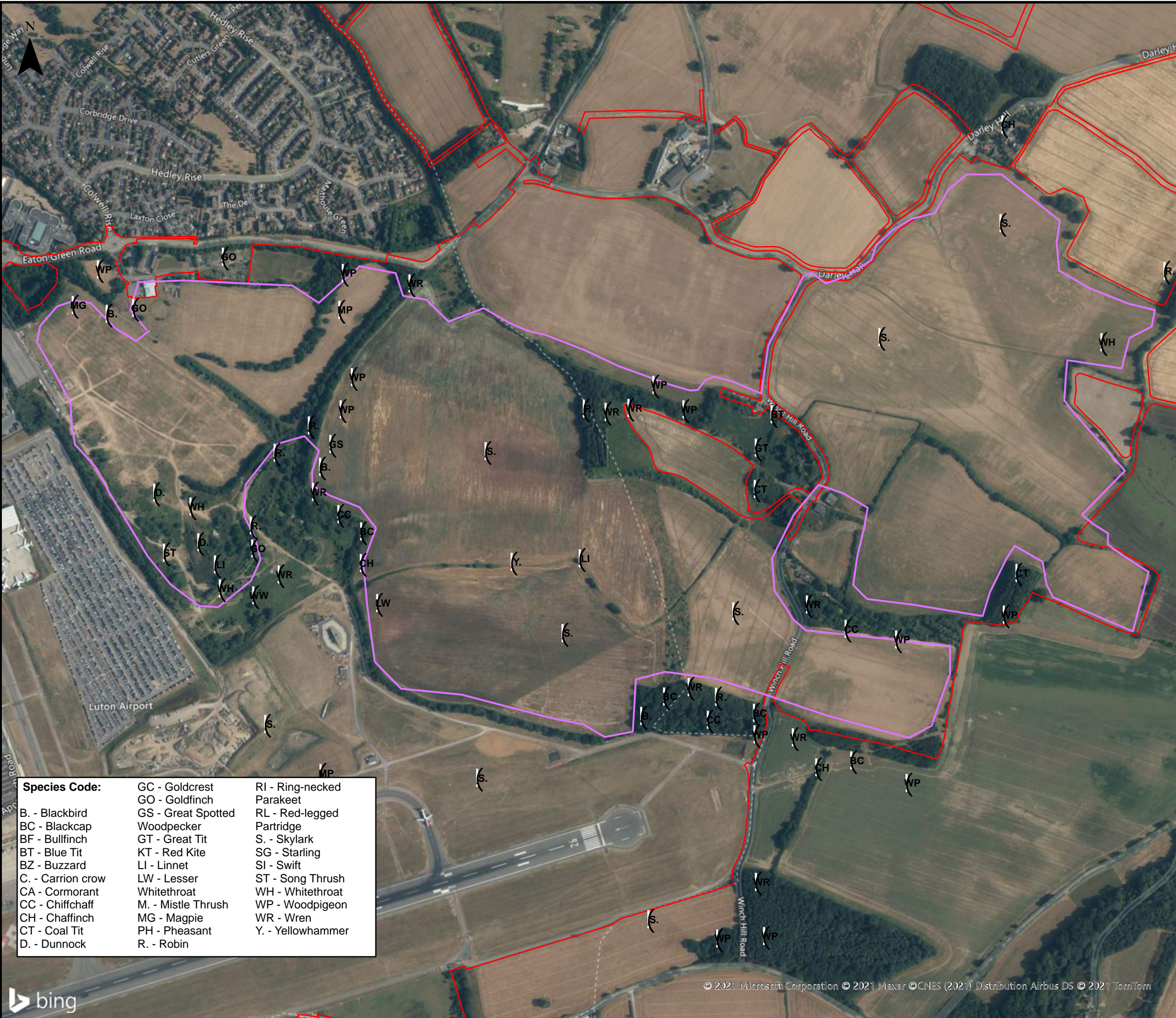
Project - Phase - Originator - Asset/Zone - Sub Asset - Type- Discp. - Number



# Appendix P

## P1 Breeding Bird Survey Plan





**Species Code:**

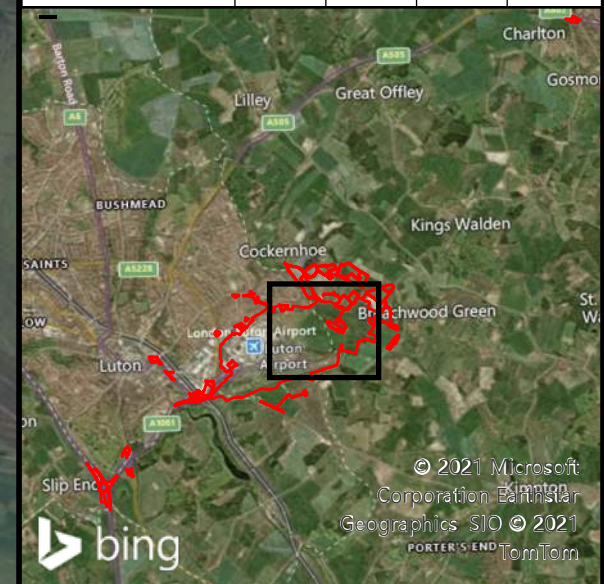
B. - Blackbird	GC - Goldcrest	RI - Ring-necked Parakeet
BC - Blackcap	GO - Goldfinch	RL - Red-legged Partridge
BF - Bullfinch	GS - Great Spotted Woodpecker	S. - Skylark
BT - Blue Tit	GT - Great Tit	SG - Starling
BZ - Buzzard	KT - Red Kite	SI - Swift
C. - Carrion crow	LI - Linnet	ST - Song Thrush
CA - Cormorant	LW - Lesser Whitethroat	WH - Whitethroat
CC - Chiffchaff	M. - Mistle Thrush	WP - Woodpigeon
CH - Chaffinch	MG - Magpie	WR - Wren
CT - Coal Tit	PH - Pheasant	Y. - Yellowhammer
D. - Dunnock	R. - Robin	

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**Legend**

- Proposed Development Boundary
- Transect Route

First Issue	AB	SM	CS	17/12/21	P01
Revision History	Drawn	Checked	Approved	Date	Rev.



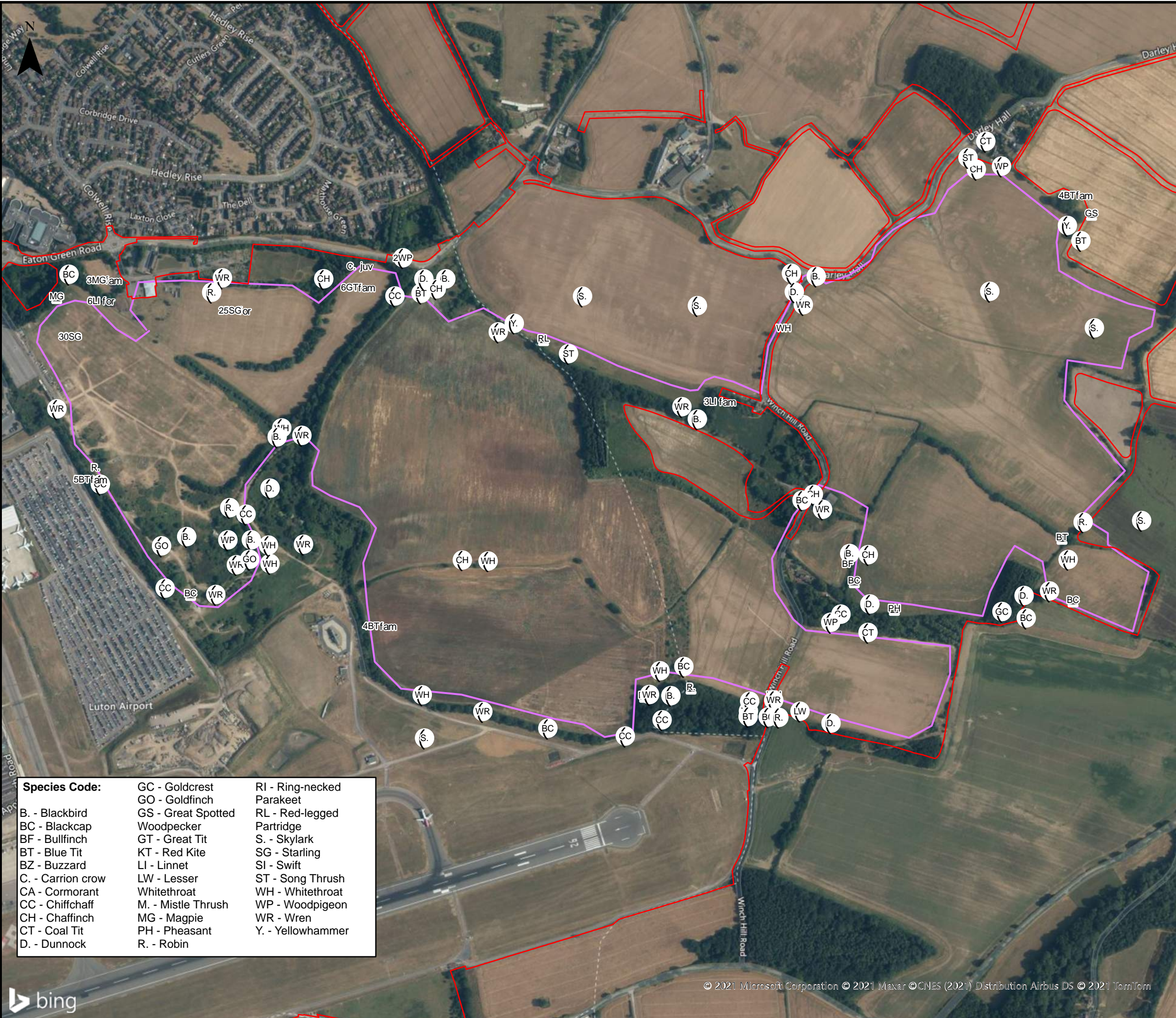
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**Breeding Bird Survey 2018 and 2019**  
 Page 1 of 2

Purpose of issue				Suitability	
<b>SUITABLE FOR INFORMATION</b>				S2	
Drawn	Checked	Approved	Date	Scale	Size
AB	SM	CS	17/12/21	1:7,000	A3
DCO Application Ref. TR020001		APFP Regulation	DCO Document Ref.		
Drawing Number LLADCO-3C-ARP-0000-DR-YE-0217					Revision P01
Project - Phase - Originator - Asset/Zone - Sub-Asset - Type - Discp. - Number					



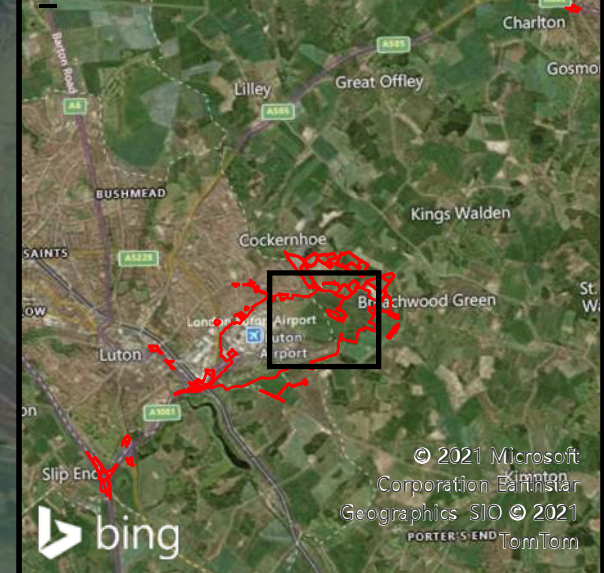


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**Legend**

□ Proposed Development Boundary  
— Transect Route

First Issue	AB	SM	CS	17/12/21	P01
Revision History	Drawn	Checked	Approved	Date	Rev.



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**Species Code:**

B. - Blackbird	GC - Goldcrest	RI - Ring-necked Parakeet
BC - Blackcap	GO - Goldfinch	RL - Red-legged Partridge
BF - Bullfinch	GS - Great Spotted Woodpecker	S. - Skylark
BT - Blue Tit	GT - Great Tit	SG - Starling
BZ - Buzzard	KT - Red Kite	SI - Swift
C. - Carrion crow	LI - Linnet	ST - Song Thrush
CA - Cormorant	LW - Lesser Whitethroat	WH - Whitethroat
CC - Chiffchaff	M. - Mistle Thrush	WP - Woodpigeon
CH - Chaffinch	MG - Magpie	WR - Wren
CT - Coal Tit	PH - Pheasant	Y. - Yellowhammer
D. - Dunnock	R. - Robin	

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Drawing Title  
**Breeding Bird Survey 2021**  
 Page 2 of 2

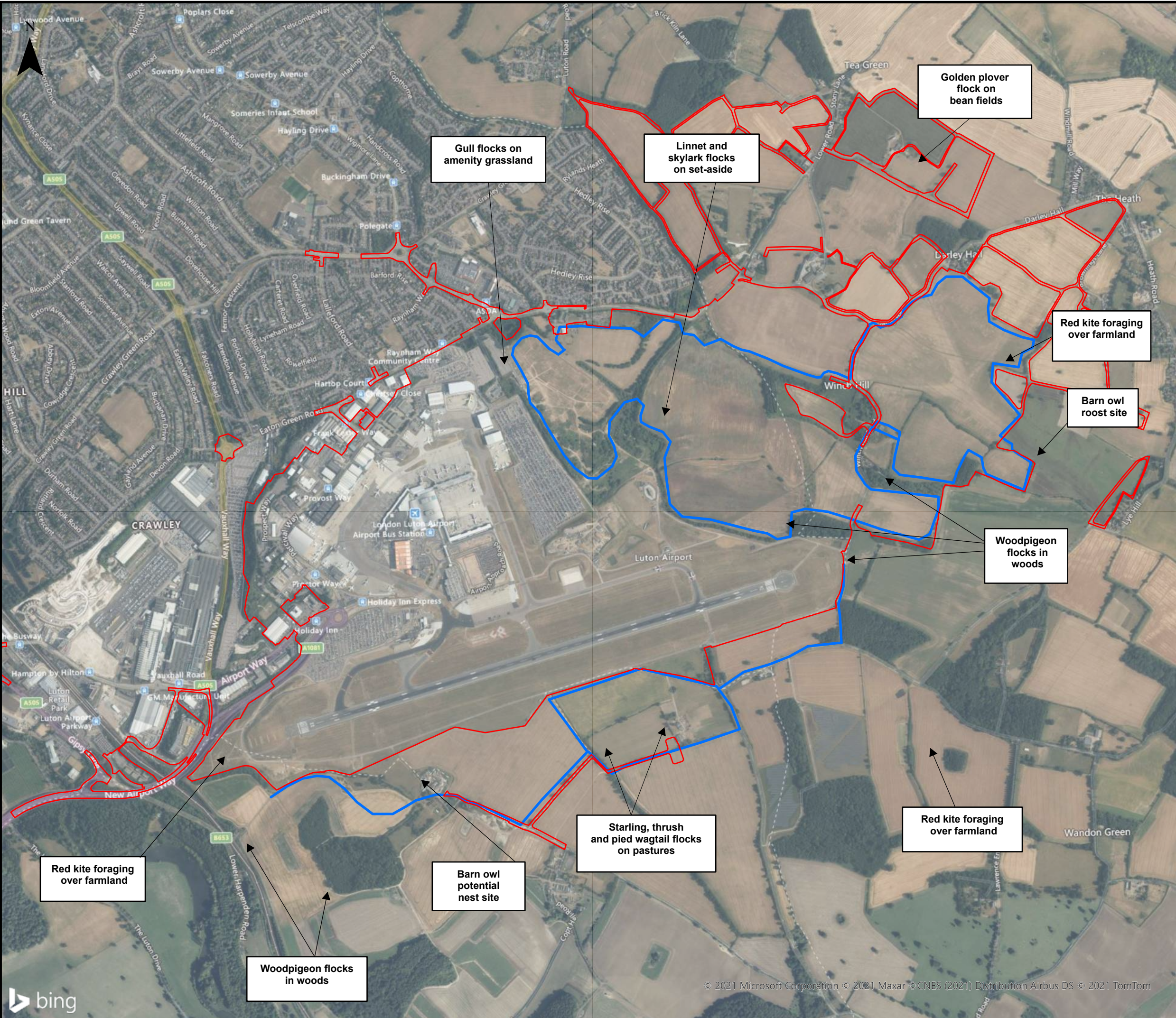
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Drawn	Checked	Approved	Date	Scale	Size
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DCO Application Ref.		APFP Regulation	DCO Document Ref.		
TR020001					
Drawing Number					Revision
LLADCO-3C-ARP-0000-DR-YE-0217					P01
Project - Phase - Originator - Asset/Zone - Sub Asset - Type - Discp - Number					



# Appendix Q

## Q1 Wintering Bird Survey Plan



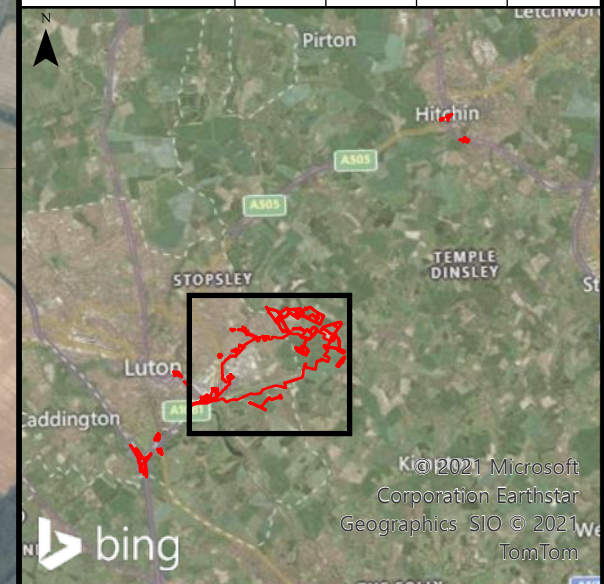


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**Legend**

- Proposed Development Boundary
- Transect Routes

First Issue	AB	SM	CS	17/12/21	P01
Revision History	Drawn	Checked	Approved	Date	Rev.



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Drawing Title  
**Wintering Bird Survey Plan**

Purpose of issue				Suitability	
SUITABLE FOR INFORMATION				S2	
Drawn	Checked	Approved	Date	Scale	Size
AB	SM	CS	17/12/21	1:15,000	A3

DCO Application Ref.	APFP Regulation	DCO Document Ref.
TR020001		

Drawing Number	Revision
LLADCO-3C-ARP-00-00-DR-YE-0218	P01



# Appendix R

## R1 Wintering Bird Survey Data 2018/2019

Common name	Scientific name	Monthly counts					
		26/10/2018	06/12/2018	19/12/2018	21/01/2019	15/02/2019	22/03/2019
Red-legged Partridge	<i>Alectoris rufa</i>	106	52	39	33	17	27
Grey Partridge	<i>Perdix</i>	0	2	0	0	0	0
Pheasant	<i>Phasianus colchicus</i>	22	19	3	7	5	12
Sparrowhawk	<i>Accipter nisus</i>	0	0	0	0	1	1
Red Kite	<i>Milvus</i>	8	4	4	3	4	9
Buzzard	<i>Buteo</i>	2	6	3	2	6	6
Golden Plover	<i>Pluvialis apricaria</i>	0	2	0	0	0	0
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	c.330	3	20	28	40	0
Common Gull	<i>Larus canus</i>	0	0	0	2	2	0
Herring Gull	<i>Larus argentatus</i>	1	0	0	0	0	0
Feral pigeon	<i>Columba livia</i> ssp. <i>domestica</i>	c.60	c.60	c.60	c.60	c.60	c.60
Stock Dove	<i>Columba oenas</i>	0	0	0	0	2	6
Woodpigeon	<i>Columba palumbus</i>	38	c.400	130	209	62	c.400
Collared Dove	<i>Streptopelia decaocto</i>	2	4	1	0	0	2
Great Spotted Woodpecker	<i>Dendrocopus major</i>	1	3	1	1	0	2



Common name	Scientific name	Monthly counts					
		26/10/2018	06/12/2018	19/12/2018	21/01/2019	15/02/2019	22/03/2019
Green Woodpecker	<i>Picus viridis</i>	0	0	0	1	0	0
Kestrel	<i>Falco tinnunculus</i>	1	1	0	0	0	0
Jay	<i>Garrulus glandarius</i>	1	5	1	2	3	1
Magpie	<i>Pica</i>	7	7	6	8	11	6
Jackdaw	<i>Corvus monedula</i>	42	0	0	20	4	2
Rook	<i>Corvus frugilegus</i>	11	0	0	0	0	0
Carrion Crow	<i>Corvus corone</i>	21	11	3	8	11	14
Coal Tit	<i>Parus ater</i>	0	2	0	1	0	2
Blue Tit	<i>Cyanistes caeruleus</i>	10	9	10	12	12	16
Great Tit	<i>Parus major</i>	1	1	5	5	5	5
Skylark	<i>Alauda arvensis</i>	17	3	13	21	23	24
Long-tailed Tit	<i>Aegithalos caudatus</i>	12	16	1	14	4	4
Goldcrest	<i>Regulus</i>	1	4	1	4	1	
Wren	<i>Troglodytes</i>	2	8	2	3	3	14
Starling	<i>Sturnus vulgaris</i>	59	0	20	7	3	
Blackbird	<i>Turdus merula</i>	2	16	14	7	10	20
Fieldfare	<i>Turdus pilaris</i>	65	37	6	7	12	3
Redwing	<i>Turdus iliacus</i>	4	28	9	69	0	0
Song Thrush	<i>Turdus philomelos</i>	0	1	1	0	3	1
Mistle Thrush	<i>Turdus viscivorus</i>	0	0	0	1	0	0
Robin	<i>Erithacus rubecula</i>	6	5	8	4	18	11
Dunnock	<i>Prunella modularis</i>	10	2	5	8	5	10

Common name	Scientific name	Monthly counts					
		26/10/2018	06/12/2018	19/12/2018	21/01/2019	15/02/2019	22/03/2019
Pied Wagtail	<i>Motacilla alba</i>	6	21	5	0	13	1
Meadow Pipit	<i>Anthus pratensis</i>	3	1	1	0	0	2
Chaffinch	<i>Fringilla coelebs</i>	5	3	6	3	5	12
Bullfinch	<i>Pyrrhula</i>	1	1	1	0	1	1
Greenfinch	<i>Chloris</i>	0	0	0	0	0	1
Linnet	<i>Linaria cannabina</i>	3	0	0	163	c.220	c.200



# Appendix S

## S1 Wintering Bird Survey data 2017/2018

Common name	Scientific name	Monthly counts		
		20/12/2017	17/01/2017	22/02/2018
Red-legged Partridge	<i>Alectoris rufa</i>	44	20	21
Grey Partridge	<i>Perdix</i>	0	0	1
Pheasant	<i>Phasianus colchicus</i>	1	6	6
Sparrowhawk	<i>Accipter nisus</i>	0	2	0
Red Kite	<i>Milvus</i>	1	9	13
Buzzard	<i>Buteo</i>	4	4	1
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	22	20	12
Common Gull	<i>Larus canus</i>	1	5	0
Herring Gull	<i>Larus argentatus</i>	0	2	0
Yellow-legged Gull	<i>Larus michahellis</i>	0	1	0
Lesser Black-backed Gull	<i>Larus fuscus</i>	1	1	0
Stock Dove	<i>Columba oenas</i>	1	0	0
Woodpigeon	<i>Columba palumbus</i>	20	27	127
Green Woodpecker	<i>Picus viridis</i>	0	0	1
Kestrel	<i>Falco tinnunculus</i>	1	0	0
Jay	<i>Garrulus glandarius</i>	1	0	0
Magpie	<i>Pica</i>	5	1	19
Jackdaw	<i>Corvus monedula</i>	0	0	29
Carrion Crow	<i>Corvus corone</i>	18	9	22

Common name	Scientific name	Monthly counts		
		20/12/2017	17/01/2017	22/02/2018
Coal Tit	<i>Periparus ater</i>	1	2	3
Blue Tit	<i>Cyanistes caeruleus</i>	11	12	13
Great Tit	<i>Parus major</i>	3	3	11
Skylark	<i>Alauda arvensis</i>	1	0	31
Long-tailed Tit	<i>Aegithalos caudatus</i>	3	32	9
Goldcrest	<i>Regulus</i>	3	0	0
Wren	<i>Troglodytes</i>	4	6	6
Starling	<i>Sturnus vulgaris</i>	14	10	68
Blackbird	<i>Turdus merula</i>	14	16	15
Fieldfare	<i>Turdus pilaris</i>	0	0	108
Redwing	<i>Turdus iliacus</i>	7	4	5
Song Thrush	<i>Turdus philomelos</i>	1	4	0
Robin	<i>Erithacus rubecula</i>	8	10	12
House Sparrow	<i>Passer domesticus</i>	5	0	0
Dunnock	<i>Prunella modularis</i>	3	5	5
Pied Wagtail	<i>Motacilla alba</i>	3	0	12
Meadow Pipit	<i>Anthus pratensis</i>	4	7	0
Chaffinch	<i>Fringilla coelebs</i>	4	8	7
Bullfinch	<i>Pyrrhula</i>	2	1	0
Greenfinch	<i>Chloris</i>	1	0	4
Linnet	<i>Linaria cannabina</i>	1	0	0
Goldfinch	<i>Carduelis</i>	73	13	8



Common name	Scientific name	Monthly counts		
		20/12/2017	17/01/2017	22/02/2018
Yellowhammer	<i>Emberiza citrinella</i>	1	9	15

# Appendix T

## T1 Reptile Survey Area Plan





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 All structure positions are indicative. The proposed works will be subject to detailed design development. The changes will be within limits of deviation specified in the Development Consent Order.

- Legend**
- Proposed Development Boundary
  - Reptile Refugia Survey Locations

First Issue	AB	SM	CS	17/12/21	P01
Revision History	Drawn	Checked	Approved	Date	Rev.

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Drawing Title  
**Reptile Survey Area Plan**

Purpose of issue <b>SUITABLE FOR INFORMATION</b>				Suitability S2	
Drawn AB	Checked SM	Approved CS	Date 17/12/21	Scale 1:7,000	Size A3
DCO Application Ref. TR020001		APFP Regulation	DCO Document Ref.		
Drawing Number LLADCO-3C-ARP-00-00-DR-YE-0219					Revision P01
<small>Project - Phase - Originator - Asset/Zone - Sub Asset - Type- Discp. - Number</small>					



# Appendix U

## U1 Reptile Survey Results Plan





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 All structure positions are indicative. The proposed works will be subject to detailed design development. The changes will be within limits of deviation specified in the Development Consent Order.

**Legend**

- Proposed Development Boundary
- Low Density Slow-worm Population
- No Reptiles Identified

First Issue	AB	SM	CS	17/12/21	P01
Revision History	Drawn	Checked	Approved	Date	Rev.

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Drawing Title  
 Reptile Survey Results Plan

Purpose of issue <b>SUITABLE FOR INFORMATION</b>				Suitability S2	
Drawn AB	Checked SM	Approved CS	Date 17/12/21	Scale 1:7,000	Size A3

DCO Application Ref. TR020001	APFP Regulation	DCO Document Ref.
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Drawing Number LLADCO-3C-ARP-00-00-DR-YE-0220	Revision P01
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Project - Phase - Originator - Asset/Zone - Sub Asset - Type- Discp. - Number



# Appendix V

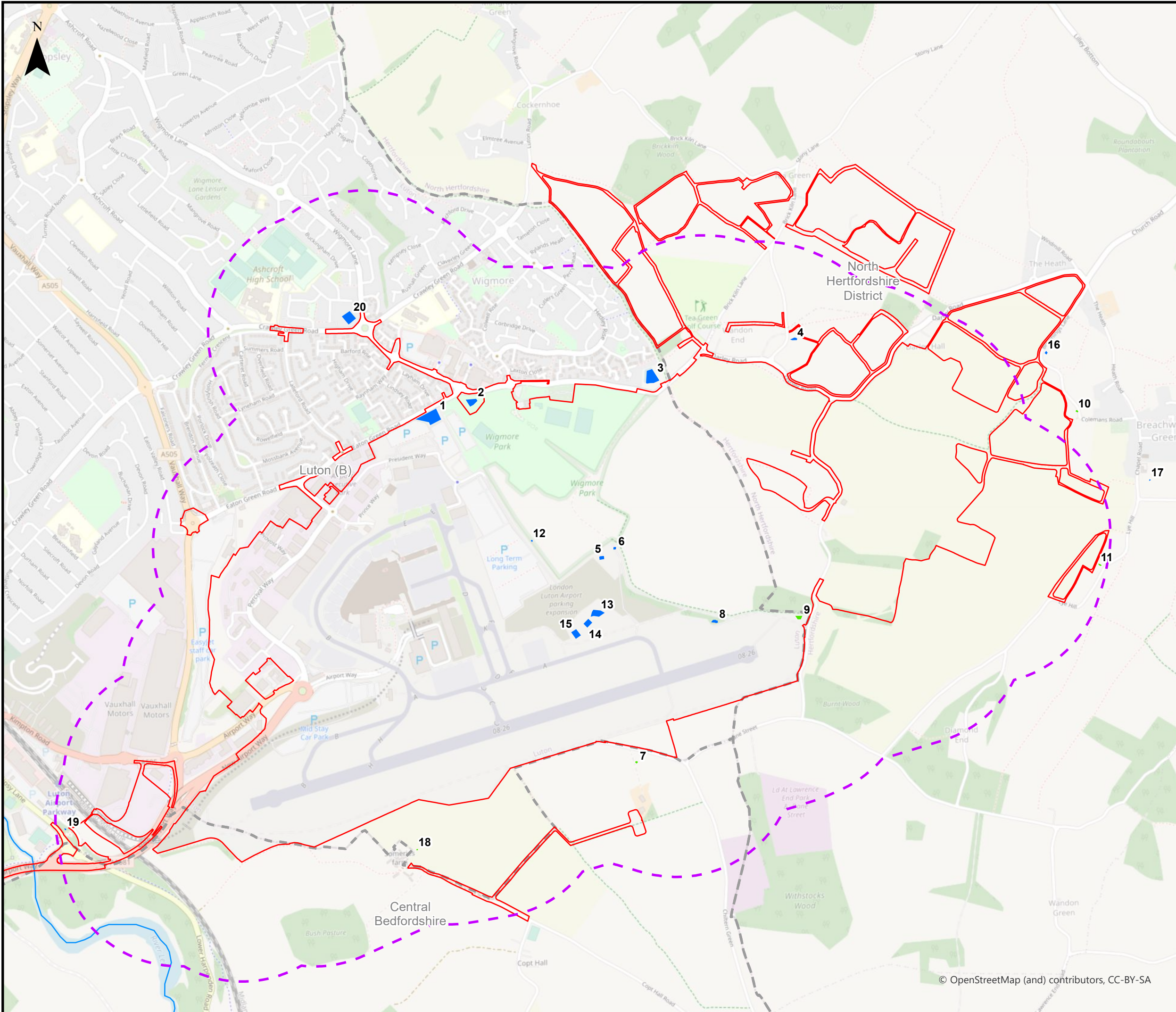
## V1 Pond Location Plan



All structure positions are indicative. The proposed works will be subject to detailed design development. The changes will be within limits of deviation specified in the Development Consent Order.

**Legend**

- Proposed Development Boundary
- District Borough Unitary Region
- 500m Buffer Ponds
- Dry
- Wet



First Issue	AB	SM	CS	17/12/21	P01
Revision History	Drawn	Checked	Approved	Date	Rev.

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Drawing Title  
**Pond Location Plan**

Purpose of issue <b>SUITABLE FOR INFORMATION</b>				Suitability S2	
Drawn AB	Checked SM	Approved CS	Date 17/12/21	Scale 1:15,000	Size A3

DCO Application Ref. TR020001	APFP Regulation	DCO Document Ref.
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Drawing Number LLADCO-3C-ARP-00-00-DR-YE-0221	Revision P01
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# Appendix W

## W1 Amphibian Survey Results

Pond 1: TL120221		Torching				Refuge search			
Date of survey	Surveyors	GCN	SN	CF	CT	GCN	SN	CF	CT
26/04/2018		0	0	0	0	0	0	0	0
03/05/2018		0	0	0	0	0	0	0	0
08/05/2018		0	0	0	0	0	0	0	0
15/05/2018		0	0	0	0	0	0	0	0
22/05/2018		0	0	0	0	0	0	0	0

Note: GCN = Great Crested Newt, SN = Smooth Newt, CF = Common Frog, CT = Common Toad

Pond 2: TL122221		Torching				Refuge search			
Date of survey	Surveyors	GCN	SN	CF	CT	GCN	SN	CF	CT
26/04/2018		0	0	0	0	0	0	0	0
03/05/2018		0	0	0	0	0	0	0	0
08/05/2018		0	0	0	0	0	0	0	0
15/05/2018		0	0	0	0	0	0	0	0



22/05/2018	Alys Black + Zak Newman	0	0	0	0	0	0	0	0
------------	-------------------------	---	---	---	---	---	---	---	---

Note: GCN = Great Crested Newt, SN = Smooth Newt, CF = Common Frog, CT = Common Toad

<b>Pond 5: TL127215</b>		<b>Torching</b>				<b>Refuge search</b>			
<b>Date of survey</b>	<b>Surveyors</b>	<b>GCN</b>	<b>SN</b>	<b>CF</b>	<b>CT</b>	<b>GCN</b>	<b>SN</b>	<b>CF</b>	<b>CT</b>
26/04/2018	[REDACTED]	0	0	0	0	0	0	0	0
03/05/2018	[REDACTED]	0	0	0	0	0	0	0	0
08/05/2018	[REDACTED]	0	0	0	0	0	0	0	0
15/05/2018	[REDACTED]	0	0	0	0	0	0	0	0
22/05/2018	[REDACTED]	0	0	0	0	0	0	0	0

Note: GCN = Great Crested Newt, SN = Smooth Newt, CF = Common Frog, CT = Common Toad

<b>Pond 6: TL128215</b>		<b>Torching</b>				<b>Refuge search</b>			
<b>Date of survey</b>	<b>Surveyors</b>	<b>GCN</b>	<b>SN</b>	<b>CF</b>	<b>CT</b>	<b>GCN</b>	<b>SN</b>	<b>CF</b>	<b>CT</b>
26/04/2018	[REDACTED]	0	0	0	0	0	0	0	0
03/05/2018	[REDACTED]	0	0	0	0	0	0	0	0
08/05/2018	[REDACTED]	0	0	0	0	0	0	0	0
15/05/2018	[REDACTED]	0	0	0	0	0	0	0	0

22/05/2018		0	0	0	0	0	0	0	0
------------	--	---	---	---	---	---	---	---	---

Note: GCN = Great Crested Newt, SN = Smooth Newt, CF = Common Frog, CT = Common Toad

<b>Pond 8: TL132212</b>		<b>Torching</b>				<b>Refuge search</b>			
<b>Date of survey</b>	<b>Surveyors</b>	<b>GCN</b>	<b>SN</b>	<b>CF</b>	<b>CT</b>	<b>GCN</b>	<b>SN</b>	<b>CF</b>	<b>CT</b>
26/04/2018		0	1	0	0	0	0	0	0
03/05/2018		0	0	0	0	0	0	0	0
08/05/2018		0	0	0	0	0	0	0	0
15/05/2018		0	0	0	0	0	0	0	0
22/05/2018		0	0	0	0	0	0	0	0

Note: GCN = Great Crested Newt, SN = Smooth Newt, CF = Common Frog, CT = Common Toad

<b>Pond 12: TL125218</b>		<b>Torching</b>				<b>Refuge search</b>			
<b>Date of survey</b>	<b>Surveyors</b>	<b>GCN</b>	<b>SN</b>	<b>CF</b>	<b>CT</b>	<b>GCN</b>	<b>SN</b>	<b>CF</b>	<b>CT</b>
15/05/2018		0	0	0	0	0	0	0	0
22/05/2018		0	0	0	0	0	0	0	0

Note: GCN = Great Crested Newt, SN = Smooth Newt, CF = Common Frog, CT = Common Toad



Pond 1 TL120221		Torching				Refuge search				Bottle trapping				Sweep netting				Egg search			
Date of survey	Surveyors	GCN	SN	CF	CT	GCN	SN	CF	CT	GCN	SN	CF	CT	GCN	SN	CF	CT	GCN	SN	CF	CT
23/04/2020	[REDACTED]	0	0	0	0													0	0	0	0
30/04/2020	[REDACTED]	0	31	1	0					0	0	0	0					0	0	0	0
06/05/2020	[REDACTED]	0	0	0	0					0	0	0	0	0	0	0	0				
14/05/2020	[REDACTED]	0	0	0	0	0	0	0	0	0	0	0	0					0	0	0	0
19/05/2020	[REDACTED]	0	1	0	0					0	0	0	0	0	0	0	0				

Note: GCN = Great Crested Newt, SN = Smooth Newt, CF = Common Frog, CT = Common Toad

Pond 2 TL12221		Torching				Refuge search				Bottle trapping				Sweep netting				Egg search				
Date of survey	Surveyors	GC N	S N	C F	C T	GC N	S N	C F	C T	GC N	S N	C F	C T	GC N	S N	C F	C T	GC N	S N	C F	C T	
23/04/2020	[REDACTED]	0	0	0	0																	
30/04/2020	[REDACTED]	0	0	0	0	0	0	0	0	0	0	0	0					0	0	0	0	
14/05/2020	[REDACTED]	0	0	0	0	0	0	0	0	0	0	0	0									
19/05/2020	[REDACTED]	0	0	0	0	0	0	0	0					0	0	0	0					

Note: GCN = Great Crested Newt, SN = Smooth Newt, CF = Common Frog, CT = Common Toad



<b>Pond 5: TL127215</b>		<b>Torching</b>				<b>Refuge search</b>			
<b>Date of survey</b>	<b>Surveyors</b>	<b>GCN</b>	<b>SN</b>	<b>CF</b>	<b>CT</b>	<b>GCN</b>	<b>SN</b>	<b>CF</b>	<b>CT</b>
30/04/2020	[REDACTED]	0	8	3	0	0	7	0	6
06/05/2020	[REDACTED]	0	1	0	0	0	0	0	0
14/05/2020	[REDACTED]	0	2	0	3	0	0	0	0
19/05/2020	[REDACTED]	0	6	1	0	0	0	0	0

<b>Pond 6: TL128215</b>		<b>Torching</b>				<b>Refuge search</b>			
<b>Date of survey</b>	<b>Surveyors</b>	<b>GCN</b>	<b>SN</b>	<b>CF</b>	<b>CT</b>	<b>GCN</b>	<b>SN</b>	<b>CF</b>	<b>CT</b>
30/04/2020	[REDACTED]	0	0	0	0	0	0	0	0
06/05/2020	[REDACTED]	0	0	3	0	0	0	0	0
14/05/2020	[REDACTED]	0	0	0	1	0	0	0	0
19/05/2020	[REDACTED]	0	3	0	6	0	0	0	0

Note: GCN = Great Crested Newt, SN = Smooth Newt, CF = Common Frog, CT = Common Toad

Note: GCN = Great Crested Newt, SN = Smooth Newt, CF = Common Frog, CT = Common Toad

Pond 8: TL132212		Torching				Refuge search				Bottle trapping				Sweep netting				Egg search			
Date of survey	Surveyors	GC N	S N	C F	C T	GC N	S N	C F	C T	GC N	S N	C F	C T	GC N	S N	C F	C T	GC N	S N	C F	C T
30/04/2020	[REDACTED]	0	1	4	0					0	0	0	0	0	0	0	1				
06/05/2020	[REDACTED]	0	8	1	1					0	0	0	0					0	0	0	0
14/05/2020	[REDACTED]	0	2	0	1	0	0	0	0	0	0	0	0								
19/05/2020	[REDACTED]	0	1	4	1	0	0	0	0	0	0	0	0								

Note: GCN = Great Crested Newt, SN = Smooth Newt, CF = Common Frog, CT = Common Toad

Note: GCN = Great Crested Newt, SN = Smooth Newt, CF = Common Frog, CT = Common Toad



<b>Pond 12: TL125216</b>		<b>Torching</b>				<b>Refuge search</b>				<b>Sweep netting</b>				<b>Egg search</b>			
<b>Date of survey</b>	<b>Surveyors</b>	<b>GCN</b>	<b>SN</b>	<b>CF</b>	<b>CT</b>	<b>GCN</b>	<b>SN</b>	<b>CF</b>	<b>CT</b>	<b>GCN</b>	<b>SN</b>	<b>CF</b>	<b>CT</b>	<b>GCN</b>	<b>SN</b>	<b>CF</b>	<b>CT</b>
30/04/2020	[REDACTED]					0	0	0	0	0	2	0	0	0	0	0	0
06/05/2020	[REDACTED]	0	0	0	0	0	0	0	0					0	0	0	0
14/05/2020	[REDACTED]	Pond dry															

Pond 13: TL128212		Torching				Refuge search				Bottle trapping				Sweep netting				Egg search			
Date of survey	Surveyors	GC N	S N	C F	C T	GC N	S N	C F	C T	GC N	S N	C F	C T	GC N	S N	C F	C T	GC N	S N	C F	C T
23/04/2020	[REDACTED]	0	0	0	0													0	0	0	0
30/04/2020	[REDACTED]	0	0	0	0	0	0	0	0									0	0	0	0
06/05/2020	[REDACTED]					0	0	0	0					0	0	0	0	0	0	0	0
14/05/2020	[REDACTED]	0	1	0	1	0	0	0	0									0	0	0	0
19/05/2020	[REDACTED]	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0				

Note: GCN = Great Crested Newt, SN = Smooth Newt, CF = Common Frog, CT = Common Toad



Pond 14: TL127212		Torching				Refuge search				Bottle trapping				Sweep netting				Egg search			
Date of survey	Surveyors	GCN	SN	CF	CT	GCN	SN	CF	CT	GCN	SN	CF	CT	GCN	SN	CF	CT	GCN	SN	CF	CT
23/04/2020	[REDACTED]	0	0	0	1													0	0	0	0
30/04/2020	[REDACTED]	0	0	0	0	0	0	0	0									0	0	0	0
06/05/2020	[REDACTED]					0	0	0	0					0	0	0	0				
14/05/2020	[REDACTED]	0	0	0	0	0	0	0	0	0	0	0	0					0	0	0	0
19/05/2020	[REDACTED]	0	1	0	3					0	4	0	0	0	0	0	0				

Note: GCN = Great Crested Newt, SN = Smooth Newt, CF = Common Frog, CT = Common Toad

<b>Pond 15: TL126212</b>		<b>Torching</b>				<b>Refuge search</b>				<b>Bottle trapping</b>				<b>Sweep netting</b>			
<b>Date of survey</b>	<b>Surveyors</b>	<b>GCN</b>	<b>SN</b>	<b>CF</b>	<b>CT</b>	<b>GCN</b>	<b>SN</b>	<b>CF</b>	<b>CT</b>	<b>GCN</b>	<b>SN</b>	<b>CF</b>	<b>CT</b>	<b>GCN</b>	<b>SN</b>	<b>CF</b>	<b>CT</b>
30/04/2020	[REDACTED]	0	0	0	0	0	0	0	0	0	0	0	0				
06/05/2020	[REDACTED]					0	0	0	0					0	0	0	0
14/05/2020	[REDACTED]	0	0	0	0	0	0	0	0					0	0	0	0
19/05/2020	[REDACTED]	0	0	0	0	0	0	0	0								

Note: GCN = Great Crested Newt, SN = Smooth Newt, CF = Common Frog, CT = Common Toad



<b>Pond 16: TL146223</b>		<b>Torching</b>				<b>Refuge search</b>				<b>Egg search</b>			
<b>Date of survey</b>	<b>Surveyors</b>	<b>GCN</b>	<b>SN</b>	<b>CF</b>	<b>CT</b>	<b>GCN</b>	<b>SN</b>	<b>CF</b>	<b>CT</b>	<b>GCN</b>	<b>SN</b>	<b>CF</b>	<b>CT</b>
23/04/2020	[REDACTED]	0	0	0	0	0	0	0	0	0	0	0	0
30/04/2020	[REDACTED]	0	0	0	0	0	0	0	0	0	0	0	0
06/05/2020	[REDACTED]	0	0	0	0	0	0	0	0	0	0	0	0
14/05/2020	[REDACTED]	Pond dry											

Note: GCN = Great Crested Newt, SN = Smooth Newt, CF = Common Frog, CT = Common Toad

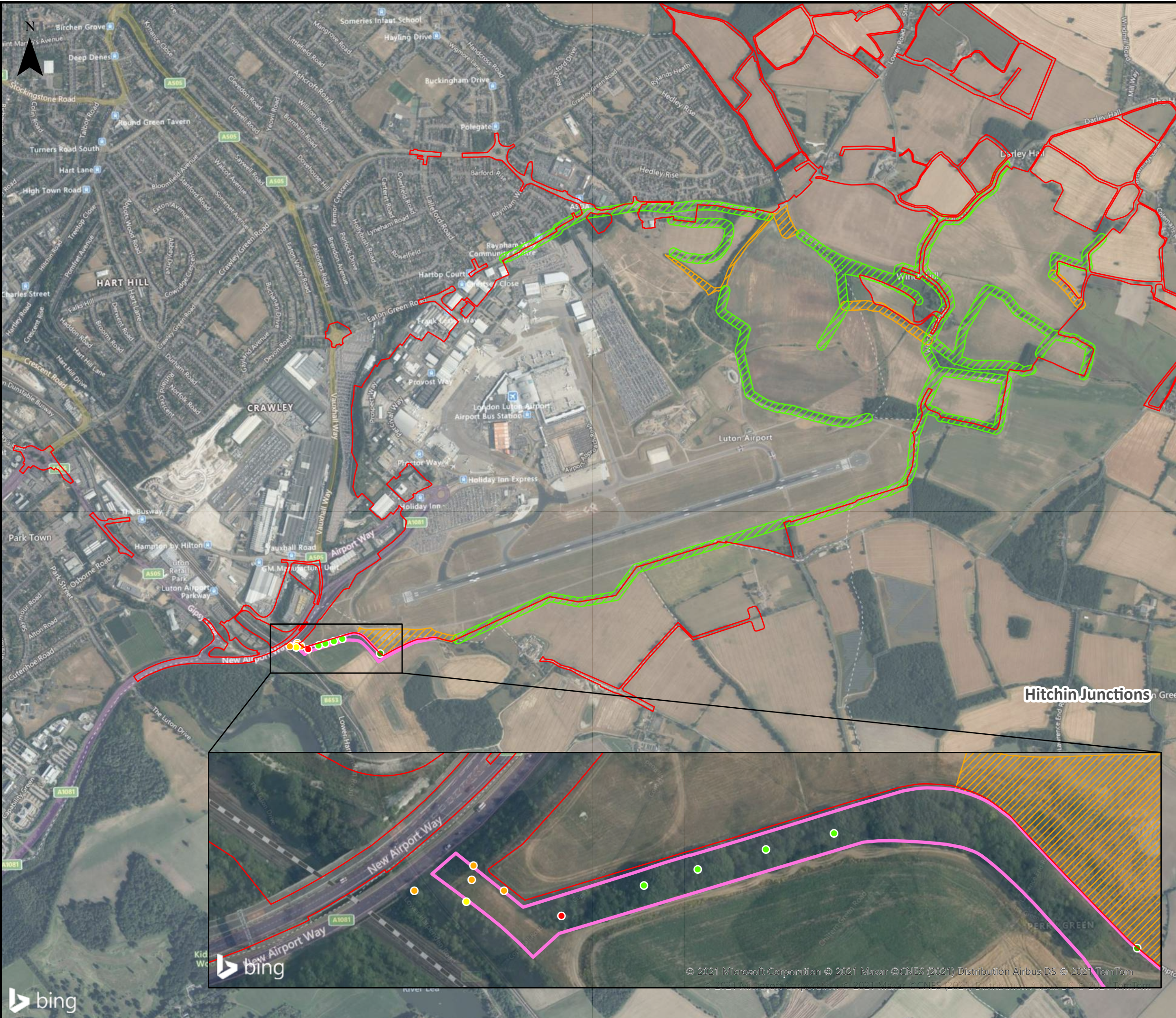
<b>Pond 19: TL105203</b>		<b>Torching</b>				<b>Refuge search</b>				<b>Egg search</b>			
<b>Date of survey</b>	<b>Surveyors</b>	<b>GCN</b>	<b>SN</b>	<b>CF</b>	<b>CT</b>	<b>GCN</b>	<b>SN</b>	<b>CF</b>	<b>CT</b>	<b>GCN</b>	<b>SN</b>	<b>CF</b>	<b>CT</b>
23/04/2020	[REDACTED]	0	0	0	0	0	0	0	0	0	0	0	0
30/04/2020	[REDACTED]	0	0	0	0	0	0	0	0	0	0	0	0
06/05/2020	[REDACTED]	0	0	0	0	0	0	0	0	0	0	0	0
14/05/2020	[REDACTED]	0	3	0	0	0	0	0	0	0	0	0	0
19/05/2020	[REDACTED]	Pond dry											

Note: GCN = Great Crested Newt, SN = Smooth Newt, CF = Common Frog, CT = Common Toad

# Appendix X

## X1 Roman Snail Survey Plan





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All structure positions are indicative. The proposed works will be subject to detailed design development. The changes will be within limits of deviation specified in the Development Consent Order.

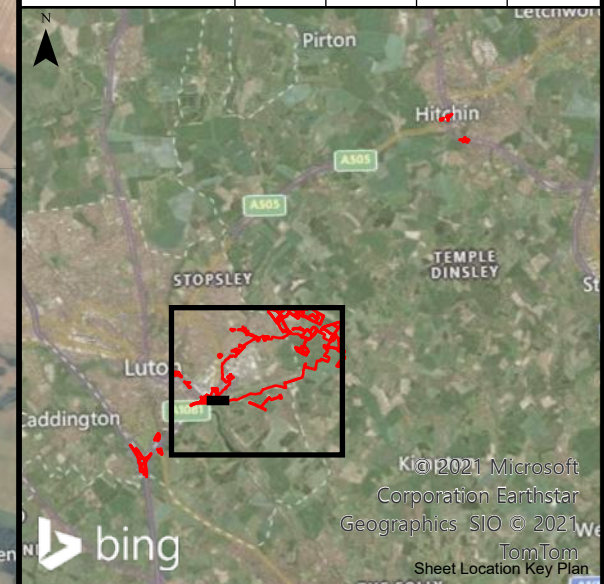
**Legend**

- Proposed Development Boundary
- Habitat with suitability for Roman snail – subject to hand-search and torchlight survey
- Habitat with limited or negligible suitability for Roman snail – negligible areas excluded from further survey, limited suitability areas hand-searched
- Offsite Survey Area

**Snail Locations - Number of Snails**

- 1
- 2 - 5
- 6 - 9
- 10 - 17
- 18 - 21

First Issue	AB	SM	CS	17/12/21	P01
Revision History	Drawn	Checked	Approved	Date	Rev.



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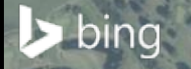
**London Luton Airport Development Consent Order**

Drawing Title  
**Roman Snail Survey Plan**

Purpose of issue <b>SUITABLE FOR INFORMATION</b>				Suitability S2	
Drawn AB	Checked SM	Approved CS	Date 17/12/21	Scale 1:16,000	Size A3

DCO Application Ref. TR020001	APFP Regulation	DCO Document Ref.
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Drawing Number LLADCO-3C-ARP-00-00-DR-YE-0222	Revision P01
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# Appendix Y

## Y1 National Vegetation Classification (NVC) Report





# VEGETATION SURVEY & ASSESSMENT

**LUTON AIRPORT EXPANSION**

**BOTANICAL ASSESSMENTS**

First issued October 2018  
Revised and re-issued June 2019



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- I NVC Field Data – 2018 Surveys
- II NVC Field Data – Wigmore Park CWS
- III All Species Recorded during NVC Surveys
- IV All Species Recorded during Arable Plant Surveys

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Sharon Pilkington BSc (Hons) MSc CEnv MCIEEM  
*Botanist – Bryologist – Vegetation Ecologist*

Vegetation Survey & Assessment Ltd  
66 Newtown  
Westbury  
Wiltshire  
BA13 3EF

Tel: 01373 827074  
Mob: 07801 627449

[www.vegetationsurvey.co.uk](http://www.vegetationsurvey.co.uk)



## **I. INTRODUCTION**

This report brings together the results of a number of botanical surveys undertaken in 2018 and 2019 to provide a baseline of information about vegetation communities and plant species within land with potential to be directly or indirectly affected by the proposed expansion of Luton Airport.

The work included the following elements:

- National Vegetation Classification surveys of semi-natural woodlands and neutral grassland on farmland adjacent to the airport;
- A National Vegetation Classification survey of Wigmore Park County Wildlife Site; and
- Surveys of arable plant communities in farmland adjacent to the airport.

## **2. METHODS**

### **2.1 Personnel**

All fieldwork, analysis and interpretation of vegetation data was undertaken by Sharon Pilkington CEnv MCIEEM, a botanist, bryologist and vegetation ecologist with 19 years' experience of professional assessment.

### **2.2 Grassland and Woodland**

Identification of habitat parcels where National Vegetation Classification (NVC) survey would be undertaken was partly driven by the results of a Phase I Habitat survey undertaken in 2015 (May, 2015). In addition, an initial walkover of the whole survey area was undertaken on 11 June 2018 to confirm appropriate areas for woodland and grassland sampling.

Some of the grasslands that were surveyed were wide strips of arable headland that appeared to have been sown and managed under an environmental stewardship scheme. Whilst such grassland would not normally be included in an NVC survey, some of these areas appeared to be well-established and relatively diverse, so a precautionary approach was taken.

8 stands of grassland and 4 stands of semi-natural woodland were sampled with a total of 56 quadrats from 12 – 15 June 2018 during good weather conditions. At this time of year both lowland grassland and woodland vegetation is in optimal floristic and structural condition for NVC sampling.

Standard NVC sampling methodology (Rodwell 2006) was employed for the grasslands. None of the woodland stands was sufficiently large to be sampled by standard means and so the minimalistic NVC woodland sampling approach set out by Hall, Kirby & Whitbread (2004) was employed instead. Five quadrats were sampled in all but the smallest stands of vegetation, where a single quadrat was sampled.

MATCH<sup>1</sup> software was employed to analyse the quadrat data and to highlight potential affinities with published NVC communities/sub-communities. Surveyor experience and detailed descriptions of vegetation communities provided by Rodwell (1991, 1992 and 2000) were subsequently used to confirm the classification of each stand in NVC terms where appropriate.

### **2.3 Wigmore Park CWS**

Vegetation communities within Wigmore Park CWS were mapped and assessed between 20 and 24 May 2019. Wherever possible, the same NVC sampling approach used for grassland and woodland communities in 2018 was employed to collect floristic data and map vegetation and 29 quadrats were

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<sup>1</sup> Vegetation analysis software developed by scientists from the University of Lancaster for NVC classification.

sampled and analysed. However, the secondary origins of much of the vegetation there combined with the effects of high levels of trampling and other public disturbance meant that a more pragmatic approach had to be employed when interpreting sample data. Vegetation was therefore only classified as an NVC community or sub-community where its floristic character (through field evaluation and/or analysis of quadrat samples) was convincing.

## 2.4 Evaluation of Vegetation Communities

Following analysis and interpretation of the NVC data, each vegetation community was accorded a relative intrinsic botanical value by considering the following criteria, among others:

- Whether it would be classified as a NERC Act Section 41 priority habitat;
- Whether it would be considered a scarce or rare example of that vegetation type in the area;
- Its 'naturalness' i.e. its resemblance to type NVC community/sub-community, age and condition;
- Its species diversity; and
- Whether it supports populations of any plants of recognised conservation importance.

Table 2.1 lists the criteria used to define plants of national or regional conservation importance.

**Table 2.1.**

Conservation Category	Status	Definition	Reference
Extent	Nationally Rare (NR)	A taxon present in 1-15 10km Ordnance Survey grid squares in Britain post-1950	<i>New Atlas of the British and Irish Flora</i> (2002) by C.D Preston, D.A. Pearman and T.D. Dines.
	Nationally Scarce (NS)	A taxon present in 16-100 10km Ordnance Survey grid squares in Britain post-1950	
	Locally Rare or Scarce	A species listed as Rare or Scarce in Bedfordshire or Hertfordshire.	<i>Hertfordshire Plant Red Data List</i> . In the <i>Flora of Hertfordshire</i> (2009) by T.J. James. <i>Bedfordshire Rare Plant Register</i> (extract provided by the Bedfordshire and Luton Biodiversity Recording and Monitoring Centre)
Threat (IUCN Red List)	Critically Endangered (CR)	A taxon facing an extremely high risk of regional extinction in the wild in the near future.	<i>The Vascular Plant Red Data List for Great Britain</i> (2005) by JNCC (Eds. C.M Cheffings and L. Farrell).
	Endangered (EN)	A taxon that is not CR but facing a very high risk of regional extinction in the wild in the immediate future.	
	Vulnerable (VU)	A taxon that is not CR or EN, but facing a high risk of regional extinction in the medium-term future.	Also: <i>A Vascular Plant Red List for England</i> (2014) by BSBI (Eds. P.A. Stroh et al)
Conservation	NERC Act Section 41	A taxon identified by the Secretary of State as being of principle importance for the purpose of conserving biodiversity in England.	Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006



## 2.5 Arable Plants

Surveys for arable plants were mainly undertaken during the period 16 – 20 July 2018, the timing of which is optimal for identification of the majority of species in this group. A number of earlier-flowering species were also recorded in some of the fields during the grassland and woodland surveys in June.

14 arable fields were surveyed; several of these (Fields 1, 5 and 6) were fallow at the time of survey and were surveyed by searching for species along margins as well as the interior. All other fields had maturing crops of wheat and were surveyed by searching the margins of each field.

A repeat survey of two fields (5 and 6) was undertaken between 20 and 25 May 2019. These fields had been sown with a grassland seed mixture in 2017 or 2018, but not subsequently cultivated.

Plantlife has developed a methodology for determining sites of importance for arable plant conservation (Byfield & Wilson, 2005). Although it is aimed principally at identifying nationally important sites, known as Important Arable Plant Areas, the approach works equally well on a smaller scale.

It works on the premise that certain rare and declining plants indicative of arable habitats are assigned a numerical score of between 1 and 9 (Table 2.2). When assessing the arable plant assemblage of a site (at farm, field or field margin level), the individual species scores are summated to give an overall score which allows an evaluation of conservation importance (Table 2.3).

**Table 2.2. Scoring categories for arable plant species**

Score	Species Status
9	Threatened: Critically Endangered (CR)
8	Threatened: Endangered (EN)
7	Threatened: Vulnerable
6	Near Threatened (NT)
5	Additional Nationally Scarce, in 16-100 10km squares; change index < -1.0
4	Additional Nationally Scarce: in 51-100 10km squares, change index > -1.0
3	Species of local concern: in 101 to 500 10km squares
2	Species of local concern: in 501 to 1000 10km squares
1	Species of local concern: in 1001 to 1500 10km squares, change index < 0.0 i.e. negative

**Table 2.3. Provisional threshold scores for assessing the conservation importance of arable plant sites**

	Chalk and limestone-derived soils (excluding clays)	Clays	Sands and freely draining acidic soils
European importance	90+	70+	70+
National importance	45-89	30-69	35-69
County importance	30-44	20-29	20-34

The fields within the survey area lie over chalk bedrock (Lewes Nodular Chalk, Seaford Chalk, Holywell Nodular Chalk and New Pit Chalk Formations). This outcrops at the surface in many fields, but locally there are also superficial deposits of clay-with flints producing soils derived from clay, silt, sand and gravel.

## **2.6 Limitations**

All surveys were undertaken at an optimal time of year and in reasonable weather conditions and no significant constraints were encountered in the grassland or woodland of the farmland.

Recent scrub clearance across extensive areas of Wigmore Park presented challenges classifying the resultant regenerating vegetation. Elsewhere, heavy trampling pressure by recreational users, disturbance and, more locally, high levels of rabbit grazing had produced a spectrum of short grassland communities that defied attempts to place in NVC communities.



### 3. RESULTS

Figure 1 shows the distribution of grassland and woodland communities classified in the 2018 surveys and tabulated NVC data collected from these sites is given in Appendix I. Figure 2 is an equivalent vegetation map of Wigmore Park CVS and Appendix II gives the tabulated field data. A list of all species recorded in all NVC surveys is provided as Appendix III.

Botanical nomenclature used in this report follows Stace (2010) for vascular plants and Blockeel *et al* (2014) for bryophytes.

#### 3.1 Woodland

Semi-natural woodland was quite scarce in the area and the stands that were present were small and showed evidence of having been managed in traditional ways in the past, followed by a long period of neglect. Two different kinds of broad woodland community were classified from the stands on site but the floristic differences between them were relatively subtle and blurred by the effects of a lack of recent silvicultural management.

Mature woodland was characterised by a closed canopy of deciduous trees, most notably Pedunculate Oak *Quercus robur*, Ash *Fraxinus excelsior*, locally dominant Hornbeam *Carpinus betulus* and Wild Cherry *Prunus avium*. Where an understory was present, Holly *Ilex aquifolium*, Hawthorn *Crataegus monogyna* and Elder *Sambucus nigra* were frequent.

In stands classified as **W8 Fraxinus excelsior – Acer campestre – Mercurialis perennis woodland**, Pedunculate Oak was subordinate to Ash in the canopy and Field Maple *Acer campestre* was a common understory/sub-canopy tree. Bluebell *Hyacinthoides non-scripta* was vernaly dominant, where frequent field layer associates included several other ancient woodland indicators (AWI) e.g. Wood Millet *Milium effusum*, Yellow Archangel *Lamium galeobdolon* subsp. *montanum* and Three-nerved Sandwort *Moehringia trinervia*. High cover of Bramble *Rubus fruticosus* agg. in the field layer suggested nutrient enrichment of the woodland floor whilst Common Ivy *Hedera helix* was also very common on deeply shaded ground below the trees.

*Fraxinus – Acer – Mercurialis* woodland is ubiquitous in lowland districts on well-drained, base-rich soils and it includes ancient, secondary and some replanted broad-leaved stands. The floristic composition of the sampled stands was insufficient to place them in any of the seven sub-communities of W8.

Secondary clay-with-flints woodland in the southern half of Winch Hill County Wildlife Site was acidic in character and was classified as an undifferentiated form of **W10 Quercus robur – Pteridium aquilinum – Rubus fruticosus woodland**. This kind of woodland is characteristic of base-poor brown earths mainly in the lowlands of southern Britain.

In this community, sub-mature Pedunculate Oak and birch (Silver Birch *Betula pendula*, Downy Birch *B. pubescens* and probable *B. x aurata*) dominated the 15m high canopy. Most of the trees were maidens but some had been coppiced in the distant past. A poorly-developed understory included Elder, Hawthorn, Hazel *Corylus avellana* and Honeysuckle *Lonicera periclymenum*. Bracken *Pteridium aquilinum*, Bramble, Honeysuckle, Bluebell and Yorkshire-fog *Holcus lanatus* were all prominent in the field layer. The floristics of this woodland could not place it with any confidence into any of the sub-communities of *Quercus – Pteridium – Rubus* woodland.

This woodland adjoined a visually striking and apparently older copse of near-pure mature Hornbeam, where the trees had been coppiced historically, although not in recent times. Apart from sparse Ash, Field Maple and birch, there were no other canopy species and only sparse Hawthorn and Elder below. Bluebell was abundant but had few field layer associates. Fallen dead wood was very common but it was very dry and consequently supported only sparse populations of very common mosses and liverworts. This woodland did not fit well into the NVC framework scope and was regarded as W8-W10 intermediate.

**Table 3.1. Evaluation of woodland communities**

Vegetation Community/sub-community	Botanical Value	Rationale
W8	Low to moderate	<ul style="list-style-type: none"> <li>• Not an S41 priority habitat;</li> <li>• W8 is a very common and widespread kind of lowland woodland on base-rich soils;</li> <li>• Both stands of W8 are small and the larger one has been modified by localised in-planting of exotic conifers and other non-native trees and shrubs. Canopy closure due to lack of recent management and eutrophication of the woodland floor have also degraded it and it cannot be assigned to a sub-community. The smaller stand is little more than an outgrown hedgerow;</li> <li>• It supports no populations of plants of recognised conservation importance; the larger stand does support several ancient woodland indicator species so may be relatively old;</li> <li>• Ancient/old semi-natural woodland is scarce in the area;</li> <li>• Both stands have relatively low diversity.</li> </ul>
W10	Low	<ul style="list-style-type: none"> <li>• Not an S41 priority habitat;</li> <li>• W10 is a very common and widespread kind of lowland woodland on acid soils;</li> <li>• The majority of this stand (part of Winch Hill Wood CWS) is still developing/maturing. It is not currently a good example of W10 and cannot be referred to a sub-community;</li> <li>• It supports no populations of plants of recognised conservation importance; it does support several ancient woodland indicator species which may have colonised from the older part of the CWS.</li> </ul>
W8-W10 intermediate	Low to moderate	<ul style="list-style-type: none"> <li>• Not an S41 priority habitat;</li> <li>• Ancient woodland – but it has been greatly modified by traditional intensive management as Hornbeam coppice and has poorly developed understory and field layers.</li> <li>• It supports no populations of plants of recognised conservation importance but there is a large population of Bluebell and other AWI are present in low numbers;</li> <li>• Ancient semi-natural woodland is scarce in the area;</li> <li>• It lacks diversity in all structural layers.</li> </ul>



## 3.2 Grassland

Grasslands within the survey area were typically of two kinds; long-established and unmanaged stands on banks and in fenced-off enclosures between arable fields and wide uncultivated headlands in intensively cultivated fields managed (presumably) under an agri-environment agreement as grassland.

All stands were found to be examples of mesotrophic grassland and the majority were classified as **MGI Arrhenatherum elatius grassland** or **MG6 Lolium perenne – Cynosurus cristatus grassland**.

Stands of *Arrhenatherum* grassland were variable but in every one False Oat-grass *Arrhenatherum elatius* was frequent to abundant and usually constant, alongside a range of associates which differentiated the stands into sub-communities. MGI is a very widespread kind of grassland which is characteristically associated with unmanaged (or very lightly managed) habitats on fertile, well-drained but moist soils in the lowlands.

The ***Festuca rubra* sub-community (MGIa)** formed part of a wide arable field headland. This stand was grass-dominated with few forbs, although it did support a small population of Common Spotted-orchid *Dactylorhiza fuchsii*. Red Fescue *Festuca rubra*, Rough Meadow-grass *Poa trivialis* and Yorkshire-fog were all constant and abundant along with False Oat-grass. Hogweed *Heracleum sphondylium* was the most abundant forb, although Meadow Buttercup *Ranunculus acris* and Smooth Tare *Vicia tetrasperma* were also frequent. Numerous other species were present but only in small quantity. MGIa is one of the least diverse and most widespread of the five *Arrhenatherum* grassland sub-communities and is commonly associated with fertile, circumneutral soils.

Examples of the ***Urtica dioica* sub-community (MGIb)** were found on ungrazed banks and in rough scrubby grassland between cultivated fields. In this sub-community Common Nettle *Urtica dioica* was usually prominent, alongside several other nutrient-demanding forbs e.g. Hogweed, Creeping Thistle *Cirsium arvense* and Cleavers *Galium aparine*. Patches of tall perennial forbs such as Rosebay Willowherb *Chamerion angustifolium* and Great Willowherb *Epilobium hirsutum* were developing in certain stands. Analysis of the quadrat data collected in these stands suggested that the grassland was moving toward **OV24 *Urtica dioica* – *Galium aparine* community**, a very common kind of weedy vegetation in which robust herbaceous species replace grasses.

MGIb is a very common and usually poor sub-community and is most common in areas of intensive arable agriculture, where it benefits from enrichment caused by fertiliser run-off and spray drift. The *Urtica* – *Galium* community is typical of eutrophic, moist but well-aerated soils in the lowlands and is especially frequent in open situation where there has been some kind of disturbance.

Two stands of unmanaged scrubby *Arrhenatherum* grassland (**MGI undifferentiated**) could not be placed with confidence in any sub-community. In these False Oat-grass was very dominant and there was a thick layer of thatch at tiller level. Certain of the associated species were calcicoles, including Traveller's-joy *Clematis vitalba*, Wild Basil *Clinopodium vulgare* and Carrot *Daucus carota* and the stands seemed to be associated with thinner soils where chalk was close to the surface.

Two small stands of **MG6 *Lolium perenne* – *Cynosurus cristatus* grassland** were also present. Most, but not all examples of *Lolium* – *Cynosurus* grassland originate as sown agricultural swards and the community is characteristic of a range of grazed pastures.

In the **Typical sub-community (MG6a)**, the stand was part of a wide grass headland in an arable field. Despite being dominated by such grasses as Crested Dog's-tail *Cynosurus cristatus*, Red Fescue, Rough Meadow-grass and Yorkshire-fog, the community was relatively diverse and supported many different common forbs. Meadow Buttercup, Red Clover *Trifolium pratense*, Carrot and Hoary Ragwort *Senecio erucifolius* were all prominent and there was also a large population of Common Spotted-orchid. The Typical sub-community is very common but rather variable and includes a range of older re-seeded grasslands on freely draining brown earths.

In the **Trisetum flavescens sub-community (MG6c)**, the vegetation had a distinctly calcareous flavour. This grassland, though unmanaged, was hard-grazed by rabbits on a small chalk bank and small/rosette-forming species were very common. It was also moderately rich in forbs, including a number of calcicoles: Fairy Flax *Linum catharticum*, Hoary Plantain *Plantago media* and Mouse-ear Hawkweed *Pilosella officinarum*. Populations of Spreading Meadow-grass *Poa humilis* and Narrow-leaved Meadow-grass *P. angustifolia*, both of which are relatively uncommon, were also supported by this community.

Constant and frequent species included Yellow Oat-grass *Trisetum flavescens*, Red Fescue, Smaller Cat's-tail *Phleum bertolonii*, Common Knapweed *Centaurea nigra*, Ribwort Plantain *Plantago lanceolata*, Yarrow *Achillea millefolium* and Black Medick *Medicago lupulina*.

The *Trisetum flavescens* sub-community of *Lolium-Cynosurus* grassland is less widespread than the other two sub-communities of MG6 and is characteristically associated with more calcareous and nutrient-deficient brown earths.

Other grass headlands in arable fields could not be classified as any particular NVC community and were instead mapped as **Neutral grassland – unclassified** (referred to as MG in Appendix I). These typically included quite diverse mixtures of species that had almost certainly been sown (Italian Ryegrass *Lolium multiflorum*, Cock's-foot *Dactylis glomerata*, Rough Meadow-grass) along with many that had probably already been present in the seedbank e.g. Soft-brome *Bromus hordeaceus*, Bristly Oxtongue *Helminthotheca echioides* and Cut-leaved Crane's-bill *Geranium dissectum*. Locally abundant False Oat-grass suggests that given more time such swards are likely to develop into forms of *Arrhenatherum* grassland.

**Table 3.2. Evaluation of grassland communities**

Vegetation Community/sub-community	Botanical Value	Rationale
MG1a, MG1b, MG1  Neutral grassland - unclassified	Low	<ul style="list-style-type: none"> <li>• Not S4I priority habitat;</li> <li>• Very common and widespread unmanaged neutral grassland types;</li> <li>• Examples in arable headlands have sown origins;</li> <li>• Only common species are present;</li> <li>• All stands have low species diversity.</li> </ul>
MG6a	Low	<ul style="list-style-type: none"> <li>• Not S4I priority habitat;</li> <li>• Very common and widespread kind of neutral grassland;</li> <li>• Sown origin as an arable headland;</li> <li>• Moderately diverse and supports a large population of Common Spotted-orchid, which is rare in the survey area.</li> </ul>
MG6c	Moderate	<ul style="list-style-type: none"> <li>• Not S4I priority habitat;</li> <li>• Relatively uncommon sub-community, restricted to more calcareous soils;</li> <li>• Maintained only by rabbits but threatened by scrub encroachment;</li> <li>• Only grassland in survey area to support populations of a number of grassland calcicoles;</li> <li>• Moderately diverse.</li> </ul>



### 3.3 Wigmore Park CWS

#### 3.3.1 Grassland

Across the CWS the majority of grassland was considered to be neutral (or mesotrophic) grassland and included a complete spectrum of diversity (from species-rich to species-poor) and structure (tall, rank vegetation to heavily trampled grassland). The edges of much of the grassland often did not form clear transitions to other vegetation types and Bramble was a frequent successional colonist, leading to a number of indeterminate communities.

Where trampling and grazing pressure was light, most neutral grassland could be classified as **MGI Arrhenatherum elatius grassland**, normally characterised by prominent False Oat-grass and other common mesotrophic grasses as described in Section 3.2. Four sub-communities were found to be present, along with a variable kind of *Arrhenatherum* grassland that could not be allocated to any sub-community. In this undifferentiated MGI, other species typically replaced some of the False Oat-grass, including, locally, Narrow-leaved Meadow-grass *Poa angustifolia*, Cut-leaved Crane's-bill *Geranium dissectum* and various legumes.

Of the four sub-communities, the floristic characteristics of two – the **Festuca rubra sub-community (MGIa)** and the **Urtica dioica sub-community (MGIb)** were broadly similar to those seen on land nearby (Section 3.2). Small areas of species-poor rank *Arrhenatherum* grassland with abundant Wild Parsnip *Pastinaca sativa* subsp. *sylvestris* replacing Hogweed were loosely referable to the **Pastinaca sativa sub-community (MGIc)** which is typical of brown earth soils of higher pH caused by underlying base-rich bedrock, rubble or other superficial material. High cover of Common Knapweed and/or Common Bird's-foot-trefoil *Lotus corniculatus* within a matrix of False Oat-grass and other coarse grasses was indicative of a sward with affinity to the **Centaurea nigra sub-community (MGIe)**. In the south of the CWS, extensive stands of a closely related **herb-rich neutral grassland** were present and were differentiated from MGIe by very low frequency and cover of grasses and particularly high cover of Common Bird's-foot-trefoil and/or Common Knapweed, a result of high levels of rabbit grazing. This community could not be placed in any NVC community but was relatively diverse locally, supporting populations of Common Spotted-orchid, Black Medick, Cock's-foot and Red Fescue. Much of it was degraded by the invasion of Bramble and large, well-established dense patches of a Michaelmas-daisy *Aster* sp. and Wood Small-reed *Calamagrostis epigejos*. A grassier version of the same community (**herb-rich grassland – trampled**) was frequent in and by some of the paths across the site, with trample-resistant species as Creeping Bent *Agrostis stolonifera* and plantains *Plantago* spp. becoming prominent.

Two small stands of rabbit-grazed **herb-rich calcareous grassland** were found but lacked the majority of indicators of any recognised NVC CG community. Floristically this community was quite diverse and shared the majority of species with its neutral counterpart including high cover of Common Bird's-foot-trefoil, Red Fescue and Ribwort Plantain. It differed primarily in the presence of two mainly calcicolous species – Glaucous Sedge *Carex flacca* and Fairy Flax. Small Scabious *Scabiosa columbaria* was locally abundant but typical lowland calcareous grassland grasses were almost entirely absent.

Well-used walker's paths across the site supported closed, trampled turf referable to the **OV23 Lolium perenne – Dactylis glomerata community** which is a species-poor kind of vegetation characteristic of recreational areas where there may be continuous disturbance. It supported a range of species able to withstand frequent trampling, including Perennial Rye-grass, Cock's-foot, Ribwort Plantain, White Clover, Daisy *Bellis perennis* and Annual Meadow-grass *Poa annua*.

Small depressions on the upper part of the CWS held no water at the time of survey but clearly had impeded drainage and supported several forms of damp grassland. Two of these were characterised by a densely stoloniferous carpet of Creeping Bent with various associates but only one had weak affinities to an NVC community. Examples of the **OV28 Agrostis stolonifera – Ranunculus repens community** were uniformly dominated by Creeping Bent alongside Creeping Buttercup *Ranunculus*

*repens*, Ribwort Plantain, Hairy Sedge *Carex hirta* and a scattering of small grassland forbs. The presence of the semi-aquatic moss *Drepanocladus aduncus* was an indicator of seasonally fluctuating water levels. Similar but more diverse vegetation (**Agrostis stolonifera – Potentilla reptans grassland**) with abundant Creeping Cinquefoil *Potentilla reptans* could not be classified in the NVC. Finally, **Sedge-rich neutral grassland** in another seasonally damp depression proved to be equally unclassifiable. Here, numerous tussocks of Grey Sedge *Carex divulsa* grew within a matrix of Common Bird's-foot-trefoil, Cut-leaved Crane's-bill *Geranium dissectum* and Creeping Cinquefoil.

### 3.3.2 Woodland and scrub

Large stands of dense Bramble scrub were present on the site, especially over mounds of rich and fertile soil and on the lower flanks of the site. Where well-grown, this scrub had weak affinities to **Rubus fruticosus – Holcus lanatus underscrub (W24)**, the frequency of thistles placing it most closely to the **Cirsium arvense – Cirsium vulgare sub-community (W24a)**. This is a very species-poor type which is characteristic of disturbed places where brambles have invaded open ground. The community represents succession toward tall scrub and woodland and many of the stands were punctuated by immature trees and large bushes of Hawthorn and other scrub species.

Although Hawthorn was frequent as scattered bushes, only in a few places was it dense enough to be classified as **W21 Crataegus monogyna – Hedera helix scrub**. Such stands were typically dominated by tall Hawthorn, often with some Elder or Blackthorn *Prunus spinosa* below. Its field layer species included Common Nettle, Ground-ivy *Glechoma hederacea* and Rough Meadow-grass.

An old and long-outgrown field hedgerow marking the eastern boundary of the CWS had widened and matured sufficiently to be classified as **W8 Fraxinus excelsior – Acer campestre – Mercurialis perennis woodland**. Some in-planting of species such as Scots Pine *Pinus sylvestris* had taken place but essentially the woodland had a similar floristic composition and physiognomy to other stands of W8 nearby (Section 3.1). The oldest trees were mature Pedunculate Oak, with some Ash and formerly coppiced Hazel below. The frequency of calcicolous understory and field layer species, especially Field Maple and Dog's Mercury confirmed this as a woodland of base-rich soils closest to the **Hedera helix sub-community (W8d)**, typical of situations where lack of management has caused long-term canopy closure. Locally, large numbers of Bluebell were also present.

Several stands of **planted trees and shrubs** were also present, especially along the western (airport) and northern boundary banks. Here, dense plantings of native and introduced species were not yet mature and included Italian Alder *Alnus cordata*, Field Maple, Wild Cherry and Swedish Whitebeam *Sorbus intermedia*. Locally, numerous suckers were advancing out into adjacent ground where Aspen *Populus tremula* had been planted on the bank.

Various willows had also been planted in places, with mature examples of Goat Willow *Salix caprea* especially prominent and usually part of a mosaic with nettle or bramble-dominated vegetation. In a site not noted for its bryophyte interest, these trees supported significant populations of epiphytic moss and liverwort, including a few locally uncommon mosses (*Orthotrichum stramineum*, *O. striatum*).

Other **dense native mixed scrub** could not be assigned to any NVC community. Typically stands of this included much Elder, together with a little Hawthorn, Blackthorn, some Bramble and Pedunculate Oak, Ash and Sycamore *Acer pseudoplatanus* saplings.

### 3.3.3 Tall herb and ruderal

Nettle beds were frequent and were particularly characteristic of spoil heaps and less disturbed areas and in mosaics of bramble and longer grassland. The majority had the floristic characteristics of the **OV24 Urtica dioica – Galium aparine community** and particularly the **Typical sub-community (OV24a)**. This kind of vegetation tended to be dominated by tall patches of Common Nettle, growing over variable amounts of Cleavers. Most of the stands were very species poor but some had a few scattered associates e.g. Rough Meadow-grass and Hemlock *Conium maculatum*.



Small areas of recently disturbed or heavily trampled semi-open vegetation characterised by a number of low-growing pioneering species could not be classified as an NVC type and were instead mapped as **ephemeral and disturbed** vegetation. These areas, whilst small, were highly variable but were characterised by such species as Sticky Mouse-ear *Cerastium glomeratum*, Wall Speedwell *Veronica arvensis*, Parsley-piert *Aphanes arvensis*, Annual Meadow-grass, Slender Sandwort *Arenaria leptoclados* and Slender Pearlwort *Sagina filicaulis*.

### 3.3.4 Mosaics

The vegetation of the CWS was very complex and much of it was represented by mosaics of two or more of the vegetation types described in Section 3. An estimate of the respective percentage cover of different types of vegetation in mosaics is given in the key to Figure 2.

**Table 3.3. Evaluation of Wigmore Park Vegetation Communities**

Vegetation Community/sub-community	Botanical Value	Rationale
MG1a, MG1b, MG1d, MG1, OV23, OV28, <i>Agrostis stolonifera</i> – <i>Potentilla reptans</i> grassland  OV24, W21, W24, Dense <i>Clematis vitalba</i> , Dense mixed native scrub, Planted trees and shrubs  All mosaics	Low	<ul style="list-style-type: none"> <li>• Common and widespread unmanaged / lightly managed communities;</li> <li>• Only common species are present;</li> <li>• All stands have low species diversity.</li> <li>• Includes some deliberately planted stands of trees and scrub;</li> <li>• Mosaics predominantly include significant elements of species-poor tall herb and bramble-dominated vegetation.</li> <li>• Open vegetation is locally degraded and threatened by scrub encroachment and trampling.</li> </ul>
MG1e, Herb-rich neutral grassland (trampled), Sedge-rich neutral grassland, W8d,  Ephemeral and disturbed	Low-moderate	<ul style="list-style-type: none"> <li>• Range of grassland communities with some semi-natural character or diversity but lacking formal conservation status e.g. S4I priority habitat;</li> <li>• Grasslands have no populations of notable species and locally show some degradation by scrub invasion;</li> <li>• W8 is a very common and widespread kind of lowland woodland on base-rich soils. This example is not ancient but has some botanical interest being derived from an old hedge boundary;</li> <li>• Ephemeral and disturbed vegetation supports a diverse community of pioneering plants, some of which are likely to be uncommon in the wider area.</li> </ul>
Herb-rich calcareous grassland  Herb-rich neutral grassland	Moderate	<ul style="list-style-type: none"> <li>• Locally uncommon grassland communities though not referable to NVC or S4I priority habitat;</li> <li>• Moderately diverse;</li> <li>• Only grasslands in survey area to support populations of a number of grassland calcicoles (Herb-rich calcareous grassland only);</li> <li>• Sward integrity is locally degraded and threatened by scrub encroachment and trampling.</li> </ul>

### 3.4 Arable Plants

Figure 2 ranks each field according to its arable plant score in 2018, with results provided on a field-by-field basis in Table 3.4 and Figure 3 ranks each field accordingly. Following the resurvey of Fields 1 and 6 in 2019, Table 3.5 provides updated results for those fields and Figure 4 ranks each field accordingly. Appendix IV provides a record of all plants recorded in these fields in the course of both years of the fieldwork.

**Table 3.4. Field scores (2018)**

Species	Score	Field Number													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Black-grass <i>Alopecurus myosuroides</i>	2	X	X		X	X	X	X		X	X	X	X	X	X
Stinking Chamomile <i>Anthemis cotula</i>	7														X
Rye Brome <i>Bromus secalinus</i>	7		X	X	X	X		X	X	X		X	X	X	X
Cornflower <i>Centaurea cyanus</i>	8	X					X								
Dwarf Spurge <i>Euphorbia exigua</i>	6	X				X	X		X					X	X
Common Cudweed <i>Filago vulgaris</i>	6						X								
Few-flowered Fumitory <i>Fumaria vaillantii</i>	7						X								
Corn Marigold <i>Glebionis segetum</i>	7	X					X								
Round-leaved Fluellen <i>Kickxia spuria</i>	3							X	X					X	
Dwarf Mallow <i>Malva neglecta</i>	2			X											
Wild Radish <i>Raphanus raphanistrum</i> subsp. <i>raphanistrum</i>	1	X	X												
Field Madder <i>Sherardia arvensis</i>	1		X						X					X	
Smooth Tare <i>Vicia tetrasperma</i>	2						X	X							
<b>Field assemblage score</b>		<b>24</b>	<b>11</b>	<b>9</b>	<b>9</b>	<b>15</b>	<b>38</b>	<b>14</b>	<b>17</b>	<b>9</b>	<b>2</b>	<b>9</b>	<b>9</b>	<b>19</b>	<b>23</b>

**Table 3.5. Field scores (2019)**

Species	Score	Field Number	
		1	6
Black-grass <i>Alopecurus myosuroides</i>	2	X	X
Lesser Quaking-grass <i>Briza minor</i>	5	X	
Cornflower <i>Centaurea cyanus</i>	8	X	X
Wild Radish <i>Raphanus raphanistrum</i> subsp. <i>raphanistrum</i>	1	X	
<b>Field assemblage score</b>		<b>16</b>	<b>10</b>



In 2018 Field 6 scored most highly (38) and supported 7 species of interest. These included a single small population of Few-flowered Fumitory *Fumaria vaillantii* (a Nationally Scarce species) on the eastern margin at TL 1334 2174 (Plate 1), scattered plants of Cornflower *Centaurea cyanus* which if of native (archaeophyte) origin is a Nationally Rare species, Corn Marigold *Glebionis segetum* and a large population of Dwarf Spurge *Euphorbia exigua*. The latter two species are listed on the Bedfordshire Rare Plant Register.

Although this score suggested Field 6 (which lies both on clay and chalk) could be of county importance (chalk and limestone-derived soils) or even national importance (clay soils) other species present in the field indicated that it had been sown with wildflower seed in the recent past. For example, Austrian Chamomile *Anthemis austriaca* was occasional in the field. This non-native species is frequently introduced as a contaminant of grass or wildflower seed. Other species more characteristic of grassland than cultivated ground were also frequent in Field 6, again suggesting that some recent seeding has taken place. At the southern end of Field 6 a field corner where very thin, stony soils predominated supported a small population of Common Cudweed *Filago vulgaris* (a Bedfordshire Rare Plant Register species); it was not seen in any of the other fields.

In 2019 the floristic character of Field 6 was found to have changed significantly, reflecting (i) the establishment of many of the perennial grassland species sown previously and (ii) lack of cultivation, allowing perennial or biennial species to colonise and replace annual arable-associated plants. Though certain arable weeds such as Black-grass remained frequent, there was high frequency and cover of e.g. Common Knapweed, Oxeye Daisy *Leucanthemum vulgare*, Spear Thistle *Cirsium vulgare*, Hedge Mustard *Sisymbrium officinale* and Red Fescue. Only 2 arable indicator species were found – including Lesser Quaking-grass *Briza minor*, a plant not found in any of the 2018 surveys - giving Field 6 a field assemblage score of 10 (38 in 2018).

In 2018 Fields 1 and 14 scored highly enough to be considered to be of county importance (for clay soils – both fields straddle the chalk and clay). Field 1 also supported a strong population of Dwarf Spurge and was the only field other than Field 6 to support small populations of Cornflower and Corn Marigold. By 2019 however, Field 1 supported a vegetation community similar to that in Field 6 and its field assemblage score dropped to 16 (24 in 2018).



Plate 1. Few-flowered Fumitory in Field 6 in 2018

The margins of a wheat crop in Field 14 also supported a small population of Dwarf Spurge as well as numerous plants of the Nationally Scarce<sup>2</sup> Rye Brome *Bromus secalinus* (Plate 2). Field 14 was also the only one to support a small population of Stinking Chamomile *Anthemis cotula*.



Plate 2. Rye Brome growing in wheat in Field 7 in 2018

All of the other fields (surveyed only in 2018) had limited arable plant interest, other than populations of Rye Brome and Black-grass *Alopecurus myosuroides*. Rye Brome was recorded in 11 of the 14 fields surveyed i.e. all those cultivating wheat, whilst Black-grass was seen in 12 and appears to be regarded as a troublesome weed in the area. In the majority of fields intensive cultivation techniques had confined arable plant interest to one or two chalky field corners that had escaped the herbicides, whilst the majority of margins were devoid of all but the most common arable plants.

Table 3.6 summarises the value of each of the 14 fields, based on the most recent survey results available. Numbers given in brackets refer to older / superseded values. Using the most recent survey results, only Field 14 would currently be considered to be of (county) importance for arable plants.

**Table 3.6. Evaluation of arable plant communities**

Field Score	Value	Field Number	No. of fields
31-40	High	(6)	0 (1)
21-30	Moderate	(1), 14	1 (2)
11-20	Low	1, 2, 5, 7, 8, 13	6 (5)
1-10	Negligible	3, 4, 6, 9-12	6 (5)

<sup>2</sup> Currently regarded as a Nationally Scarce species and one whose past decline merited inclusion on the Red List as Vulnerable. However, in the past two decades it has returned as a common seed contaminant of wheat crops in Britain and in the author's opinion it no longer merits any conservation status.

#### 4. CONCLUSIONS

The LLAL landholding to the east of the existing airport comprises mainly intensively cultivated fields with small associated areas of unmanaged grassland and semi-natural woodland.

Grasslands in this area are of two main types. Those of apparently semi-natural origin on banks and between fields are predominantly coarsely structured and of low or negligible botanical interest. Other younger swards sown as wide grassy headlands within intensively cultivated fields were less rank and a little more diverse but were considered to represent a very common and widespread kind of neutral grassland. Only one semi-natural grassland stand, on a chalky bank, was considered to have moderate value. However, without scrub control it is likely that this small stand will be lost within a few years.

Woodlands represented typical stands of base-rich and base-poor communities in southern England and although small, at least two appeared to be of considerable age. Lack of recent silvicultural management and enrichment of the field layer has left them in relatively poor condition.

Wigmore Park CWS has diverse vegetation communities, the majority of which it is not possible to place within the framework of the NVC. This is a commonplace occurrence when vegetation is (i) relatively young, (ii) overlies very variable substrate and (iii) is overgrazed or subject to high levels of disturbance. All of the above are relevant to Wigmore Park, which is heavily used by dog walkers and other recreational users and which appears to have a large population of rabbits.

As such, the most diverse/interesting vegetation communities cannot be classified in a standard way (for example as Section 41 priority habitat). However, their local value should still be recognised. Unfortunately the lack of regular livestock grazing at Wigmore Park means that Bramble and expanding rhizomatous patches of introduced Michaelmas-daisy are, and will continue to be, a threat to the extent and quality of herb-rich neutral and calcareous vegetation.

Arable land in the area is mostly managed in a very intensive way and in many fields the regular application of fertiliser and herbicide means that arable plant communities are poorly developed and favour certain species tolerant of such treatment.

The withdrawal of such management allowed certain fields (1 and 6 especially) to develop diverse arable plant communities of county importance or greater in 2018. However, a year later the lack of cultivation (creating the bare ground needed for the germination of many annual 'weeds') and the growth of many grassland species sown in 2017 or 2018 had greatly reduced the visible arable plant interest of these two fields to low levels. On this basis, only Field 14 would be considered to be of county importance for arable plant species in 2019.



## REFERENCES

- Blockeel T.L., Bosanquet S.D.S., Hill M.O. & Preston C.D. 2014. **Atlas of British & Irish Bryophytes**. Pisces Publications on behalf of the British Bryological Society.
- Byfield A. and Wilson P. 2005. **Important Arable Plant Areas: Identifying priority sites for arable plant conservation in the United Kingdom**. Plantlife, Salisbury.
- Hall J.E., Kirby K.J., and Whitbread A.M. 2004 (revised). **National Vegetation Classification: Field Guide to Woodland**. Joint Nature Conservation Committee.
- May K. (2015). **Land adjacent to London Luton Airport: Preliminary Ecological Appraisal**. Unpublished report by Capita for London Luton Airport Ltd.
- Rodwell J.S. (Ed.) 1991. **British Plant Communities Volume 1: Woodlands and scrub**. Cambridge University Press.
- Rodwell J.S. (Ed.) 1992. **British Plant Communities Volume 3: Grasslands and montane communities**. Cambridge University Press.
- Rodwell J.S. (Ed.) 2000. **British Plant Communities Volume 5: Maritime communities and vegetation of open habitats**. Cambridge University Press.
- Rodwell J.S. 2006. **National Vegetation Classification Users' handbook**. Joint Nature Conservation Committee, Peterborough.
- Stace C.A. 2010. **New Flora of the British Isles** (3<sup>rd</sup> edition). Cambridge University Press.

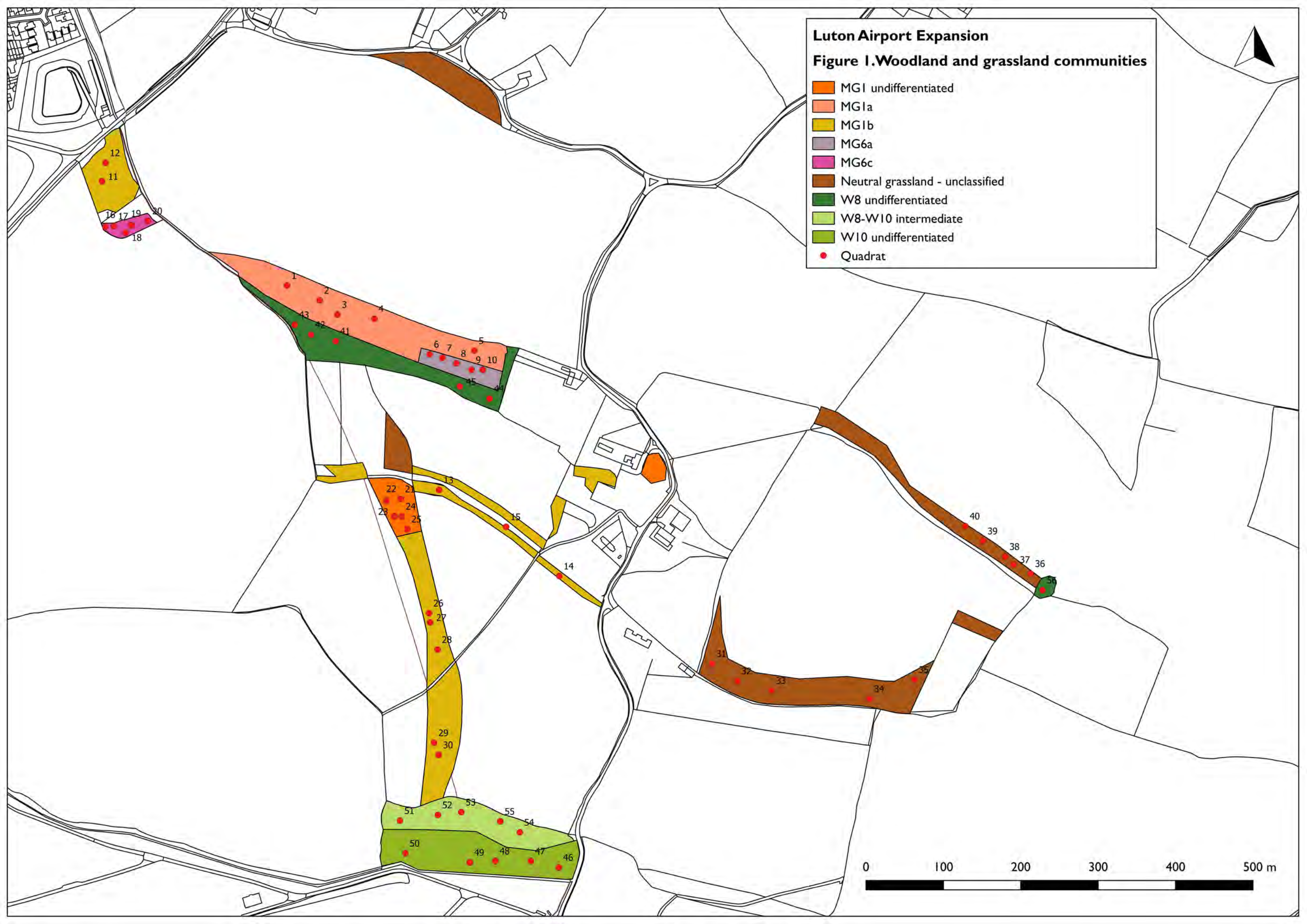
## **FIGURES**

- 1 Woodland and Grassland Communities
- 2 Wigmore Park CWS Vegetation Communities
- 3 Arable Plant Field Scores (2018)
- 4 Arable Plant Field Scores (2019)

# Luton Airport Expansion

## Figure I. Woodland and grassland communities

- MG1 undifferentiated
- MG1a
- MG1b
- MG6a
- MG6c
- Neutral grassland - unclassified
- W8 undifferentiated
- W8-W10 intermediate
- W10 undifferentiated
- Quadrat



0 100 200 300 400 500 m



# Luton Airport Expansion

## Figure 2. Wigmore Park CWS Vegetation Communities

### Grassland

- MGI
- MGIa
- MGIb
- MGIc
- MGIe
- Herb rich calcareous grassland
- Herb rich neutral grassland
- Herb rich neutral grassland - trampled
- Sedge rich neutral grassland
- Agrostis stolonifera - Potentilla reptans grassland
- OV23
- OV28

### Woodland and scrub

- W8d
- W21
- W24a
- Dense Clematis vitalba
- Dense mixed native scrub
- Planted trees and shrubs

### Tall herb and ruderal

- OV24
- OV24a below planted trees
- Ephemeral and disturbed

### Mosaics

- Herb-rich MG/scattered scrub 40:60
- Herb-rich MG/OV24 20:80
- Herb-rich MG/Salix caprea/OV24/W24 5:70:10:15
- Herb-rich MG/OV24/W21/W24 15:15:30:40
- Herb-rich MG/W21/W24 40:25:35
- MGI/W24/scattered scrub 20:40:40
- MGI/MGIb/W24 30:40:30
- MGI/MGIb/W24 30:10:60
- MGI/MGIc/W24 30:30:40
- MGI/MGIe/W24 50:20:30
- MGI/OV24/W24 10:50:40
- MGIb/OV24/W24 60:10:30
- MGIe/W24 80:20
- OV24/W24 10:90
- OV24/W24 50:50
- OV24/W21/W24 30:40:30
- OV24/W21/W24 15:20:65

Quadrat

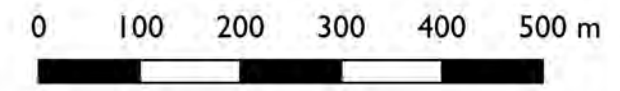




**Luton Airport Expansion**

**Figure 3. Arable Plant Field Scores (2018)**

- 1-20
- 21-30
- 31-40



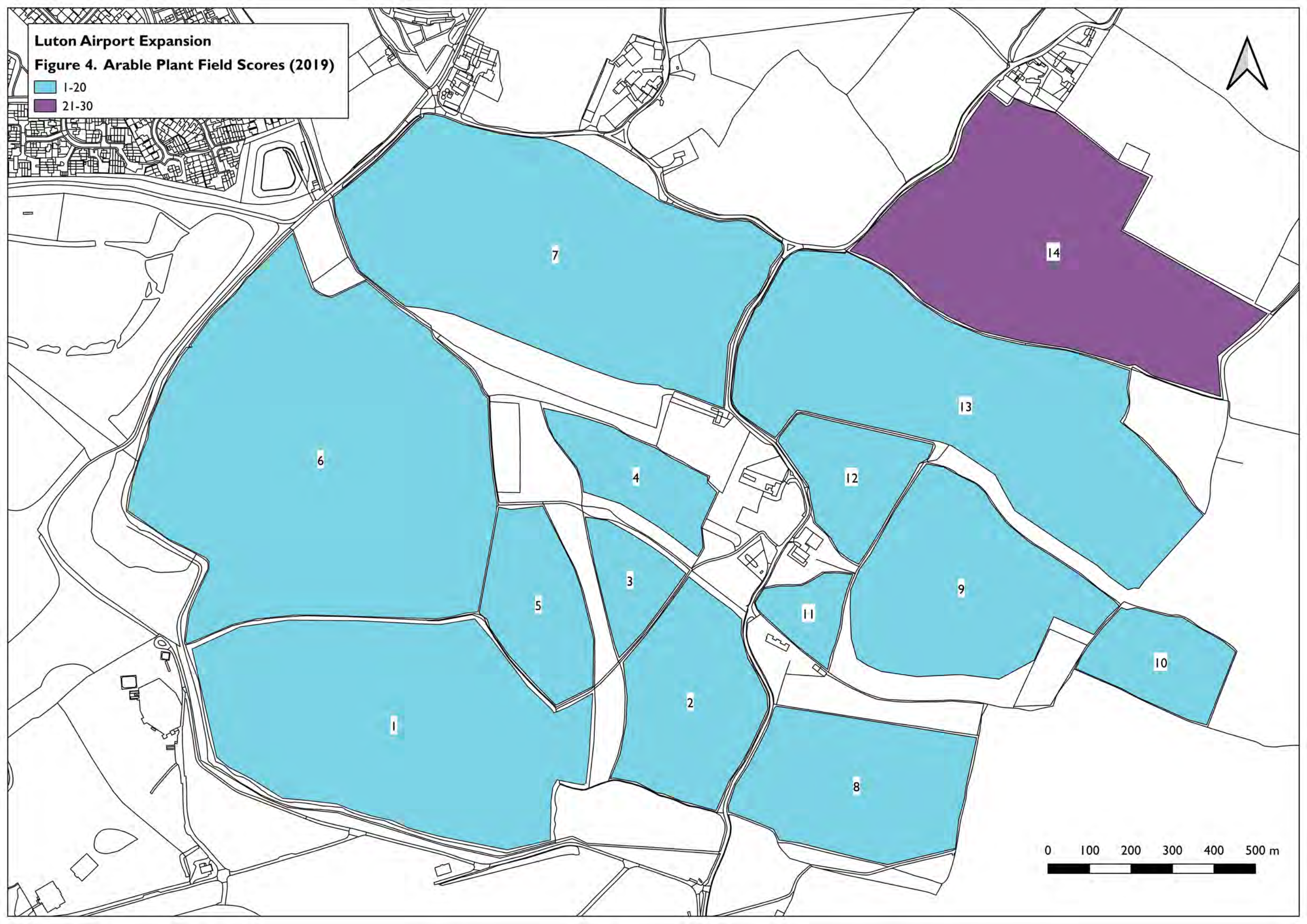


**Luton Airport Expansion**

**Figure 4. Arable Plant Field Scores (2019)**

1-20

21-30



0 100 200 300 400 500 m





## APPENDIX I. NVC FIELD DATA – 2018 SURVEYS

Quadrat number	1	2	3	4	5	6	7	8	9	10
Grid reference	TL133012 2055	TL133442 2037	TL133672 2019	TL134152 2014	TL135452 1976	TL134872 1970	TL135042 1966	TL135232 1959	TL135422 1951	TL135572 1952
NVC community	MG1a	MG1a	MG1a	MG1a	MG1a	MG6a	MG6a	MG6a	MG6a	MG6a
<i>Acer campestre</i>								1		
<i>Agrostis capillaris</i>					2	3				
<i>Agrostis stolonifera</i>						4	3		2	
<i>Alopecurus pratensis</i>							2	2	2	
<i>Arrhenatherum elatius</i>	7	8	8	5	5			1		
<i>Bellis perennis</i>								1		
<i>Brachythecium rutabulum</i>			2			3				
<i>Carex flacca</i>										5
<i>Carex sylvatica</i>						1	1	1	1	
<i>Carpinus betulus</i>					1			1		
<i>Centaurea nigra</i>		4								
<i>Cerastium fontanum</i>	3		1			2	3	1		
<i>Cirsium arvense</i>			4	2	4	1	1		1	
<i>Crataegus monogyna</i>	1		1	1					1	
<i>Crepis capillaris</i>		1								
<i>Cynosurus cristatus</i>						5	3	5	3	2
<i>Dactylis glomerata</i>									1	
<i>Dactylorhiza fuchsii</i>					2	1	2	2	1	
<i>Daucus carota</i>	2	1		1	4	3	1	1	4	3
<i>Festuca rubra</i>	6	3	6	6	5	4	4	3	5	5
<i>Fraxinus excelsior</i>					1		4		1	
<i>Galium aparine</i>	2									
<i>Heracleum sphondylium</i>	5	5	6	7	2	4	4	2	1	
<i>Holcus lanatus</i>	5	3	4	5	4	4	6	5	6	4
<i>Hypochaeris radicata</i>						1				
<i>Juncus effusus</i>			1							
<i>Lolium perenne</i>						2			2	
<i>Medicago lupulina</i>										1
<i>Odontites vernus</i>	1							1	1	2
<i>Phleum bertolonii</i>						4				
<i>Plantago lanceolata</i>	4		1	2		4	2		1	
<i>Poa trivialis</i>	3	3	3	2	6	3	4	5	5	4
<i>Prunus spinosa</i>			2						1	
<i>Quercus robur</i>		1	1					1		
<i>Ranunculus acris</i>	4	2	4	4	5	4	4	6	5	4
<i>Ranunculus repens</i>			1		2		4			
<i>Rosa</i> sp. (seedling)					1			1		
<i>Rumex sanguineus</i>					2					
<i>Schedonorus arundinaceus</i>										2
<i>Senecio erucifolius</i>					4	1	4	4	4	1
<i>Senecio jacobaea</i>	1			1						
<i>Taraxacum</i> agg.						6	6	5	5	6
<i>Tragopogon pratensis</i>		1								
<i>Trifolium dubium</i>	1									
<i>Trifolium pratense</i>						4	4	5	4	7
<i>Trifolium repens</i>	2			4				2	3	2
<i>Vicia sativa</i>			2	4	2					
<i>Vicia tetrasperma</i>	3	3	4	2	3	1			1	





Quadrat number	21	22	23	24	25	26	27	28	29	30
Grid reference	TL134542 1783	TL134362 1780	TL134462 1760	TL134562 1761	TL134632 1744	TL134942 1637	TL134962 1625	TL135062 1590	TL135052 1470	TL135102 1454
NVC community	MG1	MG1	MG1	MG1	MG1	MG1b	MG1b	MG1b	MG1b	MG1b
Anisantha sterilis				1	2				1	
Arrhenatherum elatius	8	9	9	8	9	9	9	5	4	6
Artemisia vulgaris								1		
Brachythecium rutabulum					2					
Bromus hordeaceus			2	3					3	
Cerastium fontanum					1					
Chaerophyllum temulum				5					1	
Chamerion angustifolium						5			8	7
Cirsium arvense	1		2		3	1	1		2	4
Clematis vitalba	4	4	4	1	5					
Clinopodium vulgare	3			4						
Conium maculatum										4
Crataegus monogyna					1					
Daucus carota	4		4	2	3					
Epilobium hirsutum								8		
Epilobium parviflorum	2			2	1					
Epilobium tetragonum	2		1		2		2		2	
Galium aparine		2		1	1		2	2	2	4
Geranium dissectum	4	4	3	1	1		1			
Geranium molle			1	1						
Helminthotheca echioides	4			2	2					
Heracleum sphondylium									2	
Holcus lanatus	2	1							5	1
Medicago lupulina	1				2					
Myosotis arvensis	1			1	1			2	3	
Oxyrrhynchium hians	4	3	3	2	3					
Plantago lanceolata					1					
Poa trivialis	4	3	3	4	3		2	4	4	2
Prunus spinosa									4	
Rubus fruticosus agg.				2				4		
Rumex crispus									4	
Rumex obtusifolius					1					
Sambucus nigra			1							
Senecio erucifolius					2		2	4	4	
Senecio jacobaea	2	1	3	3						
Taraxacum agg.	1									
Torilis japonica					1					
Urtica dioica			1		1	1	4	4	3	5
Veronica arvensis	1									
Veronica persica	1									
Vicia sativa	1		1	1						
Vicia tetrasperma		2	2							
LITTER	5	5	5	6	4	4	4	4		

Quadrat number	31	32	33	34	35	36	37	38	39	40
<b>Grid reference</b>	TL138622	TL138932	TL139392	TL140662	TL141232	TL142702	TL142482	TL142362	TL142082	TL141842
	1580	1558	1547	1539	1565	1705	1717	1726	1746	1764
<b>NVC community</b>	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
<i>Agrostis stolonifera</i>	2	2							2	
<i>Anisantha sterilis</i>					2	2	1			1
<i>Arrhenatherum elatius</i>		2	4	7	2	5	4	4		5
<i>Brachythecium rutabulum</i>							5	4	4	4
<i>Bromus hordeaceus</i>				2	3	4	4	5	5	4
<i>Carpinus betulus</i>	4		4						1	
<i>Cerastium fontanum</i>							1	1		
<i>Cirsium arvense</i>	5	4	6	4	4	4	4	5	6	5
<i>Cirsium vulgare</i>	1		4		2	4				1
<i>Clematis vitalba</i>				1	4					
<i>Clinopodium vulgare</i>			1	2						
<i>Conium maculatum</i>				1						
<i>Convolvulus arvensis</i>										4
<i>Corylus avellana</i>							4			1
<i>Crataegus monogyna</i>	1			1						
<i>Dactylis glomerata</i>	8	7			8	4		4	4	
<i>Epilobium parviflorum</i>								1	1	2
<i>Epilobium sp. (seedling)</i>	1				1					
<i>Epilobium tetragonum</i>			1			1	1	2		2
<i>Erigeron acris</i>						2				
<i>Galium aparine</i>	1		1	2	1				1	1
<i>Geranium dissectum</i>	1	3	3	3	4	3	4	3	4	3
<i>Geranium molle</i>										
<i>Helminthotheca echioides</i>		1	1	2		4		5	1	5
<i>Heracleum sphondylium</i>						1			1	1
<i>Holcus lanatus</i>	6	4	7	5	5		5			
<i>Hypochaeris radicata</i>						1				
<i>Inula conyzae</i>						4				
<i>Lolium multiflorum</i>								5	6	
<i>Lolium perenne</i>										3
<i>Myosotis arvensis</i>			1	1	1	3	2	3	2	
<i>Odontites vernus</i>				3			1			
<i>Plantago major</i>								1		
<i>Poa trivialis</i>	4	6	4	4	4	6	5	6	5	6
<i>Prunella vulgaris</i>				1						
<i>Prunus spinosa</i>			1	4			1		4	1
<i>Quercus robur</i>						4			1	
<i>Ranunculus repens</i>						4		4		
<i>Rosa sp. (seedling)</i>				1						
<i>Rubus fruticosus agg.</i>	1	5		1	1					
<i>Rumex crispus</i>						1			1	1
<i>Rumex obtusifolius</i>	1	4	1	1	1					
<i>Rumex sanguineus</i>							3			
<i>Scorzoneroides autumnalis</i>					1	1				
<i>Senecio erucifolius</i>				1	4	5	4	4		
<i>Senecio jacobaea</i>					1	1		1	2	1
<i>Sherardia arvensis</i>								4		2
<i>Taraxacum agg.</i>				1		1	1	1	1	1
<i>Tragopogon pratensis</i>				1						
<i>Trifolium pratense</i>					1				1	
<i>Urtica dioica</i>	1	3	4	1	2					
<i>Vicia tetrasperma</i>	3	4	5	5	4		1	4	3	
LITTER								4		2
BARE GROUND		4		4	4	4	4			



Quadrat number		41	42	43	44	45	46	47	48	49	50
Grid reference		TL133662	TL133332	TL133122	TL135662	TL135272	TL136692	TL136332	TL135872	TL135542	TL134712
NVC community	Structural unit	1985	1992	2004	1915	1930	1312	1320	1319	1316	1326
		W8	W8	W8	W8	W8	W10	W10	W10	W10	W10
Acer campestre	Understory	4		8	5	4					
Arrhenatherum elatius											1
Betula pubescens	Canopy						7	7	8	8	8
Betula sp.	Canopy	4									
Betula sp.	Field layer						2	1	2	2	
Brachythecium rutabulum			2					3	4		3
Carpinus betulus	Canopy	5	7		8	7					
Carpinus betulus	Field layer									1	1
Carpinus betulus	Understory						4			4	
Chaerophyllum temulum					1	4					
Conopodium majus						4					
Corylus avellana	Understory	5		5		1	4	4	4	5	4
Crataegus monogyna	Field layer						2	2	2	3	
Crataegus monogyna	Understory	2		4		4		1	4		
Dactylis glomerata					1						
Deschampsia cespitosa											4
Dicranella heteromalla				3							
Fraxinus excelsior	Canopy		4	4	4	5					
Fraxinus excelsior	Field layer				2		2	2	2	2	
Fraxinus excelsior	Understory								4	1	
Galium aparine		4	2	4		5	3	3		2	4
Geranium robertianum		4	5								
Glechoma hederacea									3		6
Hedera helix	Canopy		4	4	5	4					
Hedera helix	Field layer	3	2	4	4	4					
Holcus lanatus							2	4	3		2
Hyacinthoides non-scripta		4	3	7	4	4	6	6	4	4	5
Hypnum cupressiforme agg.								3	3		
Ilex aquifolium	Canopy		5	4							
Ilex aquifolium	Understory	4	5		5	5	1		1	1	1
Juncus effusus							1			1	
Kindbergia praelonga		4	4	4		2	3	3	5	2	3
Lamium galeobdolon		8	8	4			2		6	2	4
LITTER		4	5		8	5	6	4	6	6	5
Lonicera periclymenum	Field layer						7	4		4	6
Lonicera periclymenum	Understory						1	4		2	1
Lophocolea bidentata								2			
Milium effusum		4	5	6	2	4					
Mnium hornum			2				2				
Moehringia trinervia		2	4			4	1	4	4	4	
Poa trivialis					4	2	3	4	2	1	4
Prunus avium	Canopy	7	7		4	5					
Prunus avium	Field layer					1					
Prunus avium	Understory			4		1					
Prunus laurocerasus	Understory					4					
Prunus spinosa	Field layer							2		2	
Prunus spinosa	Understory					2	4	5	6	4	1
Pteridium aquilinum								7	4	5	2
Quercus robur	Canopy	6	4	7		4	8	6	4	5	6
Rosa canina	Understory							1			
Rubus fruticosus agg.		5	4	5		1	2	6	5	4	6
Rumex sanguineus					1						
Salix caprea	Canopy							5		4	
Sambucus nigra	Field layer		1								
Sambucus nigra	Understory	4	5	4	2		2	4		2	1
Schedonorus giganteus											1
Stachys sylvatica										1	
Stellaria holostea											4
Stellaria media						5					
Taraxacum agg.					1						
Ulex europaeus	Understory								1		
Urtica dioica			1		4						

Quadrat number		51	52	53	54	55	56
Grid reference		TL134622 1369	TL135122 1377	TL135412 1381	TL136182 1357	TL135922 1371	TL142782 1684
NVC community	Structural unit	W8-W10	W8-W10	W8-W10	W8-W10	W8-W10	W8
Acer campestre	Canopy		5			1	
Acer campestre	Field layer	1	1		1		
Acer campestre	Understory						5
Anthriscus sylvestris							1
BARE GROUND		8	7				7
Betula pendula	Canopy			5	5	1	
Betula pendula	Field layer				1		
Brachythecium rutabulum					2	2	2
Bryonia dioica							1
Carpinus betulus	Canopy	10	9	9	7	8	
Carpinus betulus	Field layer	1	4		3	4	
Corylus avellana	Understory		4		4		5
Crataegus monogyna	Field layer		1		1	1	
Crataegus monogyna	Understory	4		5	4	4	
Dactylis glomerata							1
Dicranum montanum						3	
Elymus caninus							2
Fraxinus excelsior	Canopy		4		5	6	7
Fraxinus excelsior	Field layer					2	
Galium aparine			1		1		
Geranium robertianum					1		
Holcus lanatus		2					
Hyacinthoides non-scripta		6	8	9	9	9	3
Hypnum cupressiforme agg.							3
Hypnum cupressiforme var. cupressiforme		2	2	2	3	3	
Ilex aquifolium	Field layer				1		
Isothecium myosuroides						3	
Kindbergia praelonga		4		3	2	2	3
Lamium album							1
LITTER				5	6	5	
Mercurialis perennis							5
Metzgeria furcata						2	
Mnium hornum						2	
Moehringia trinervia		1	2				
Orthotrichum affine						2	2
Orthotrichum diaphanum							3
Oxyrrhynchium hians							3
Poa trivialis		2	2				2
Prunus avium	Canopy			4			
Prunus spinosa	Understory						5
Quercus robur	Canopy				4		7
Rubus fruticosus agg.			1	4			
Rumex sanguineus							2
Sambucus nigra	Understory	4	4		4	2	1
Urtica dioica							2





Quadrat number	11	12	13	14	15	16	17	18	19	20
Grid reference	TL 12557 21730	TL 12415 21813	TL 12449 21802	TL 12825 21690	TL 12512 21814	TL 12449 21742	TL 12350 21919	TL 12446 21777	TL 12401 21829	TL 12518 21632
NVC community/ vegetation name	MG1d	MG1b	Herb-rich NG	Herb-rich NG	MG1a	Agr stol - Pot rept gsl d	MG1a	MG1	W24a	MG1e
Acer campestre		1								
Achillea millefolium	3			5			2	1		
Agrostis capillaris					2					
Agrostis stolonifera	4					8				5
Anthriscus sylvestris								2		
Arrhenatherum elatius	7	7	2	2	8		8	8		4
Bellis perennis			1							
Brachythecium rutabulum				2	3					
Bromus hordeaceus			4							
Calliergonella cuspidata						4		3		
Cardamine hirsuta		3							3	
Centaurea nigra						4				7
Cerastium fontanum				1						
Chaerophyllum temulum									4	
Cirsium arvense	4	1			5		4		4	4
Convolvulus arvensis							4			
Cornus sanguinea							1			
Crataegus monogyna				1						
Dactylis glomerata	4	4		6	4			4		4
Daucus carota			4	5		1		2		1
Festuca rubra			2				5	2		4
Ficaria verna								3		
Galium aparine		4						2	4	4
Geranium dissectum	3		4			3	4	2		
Helminthotheca echioides							2	2		
Heracleum sphondylium		1	2		5			4		
Holcus lanatus	3			4		5	3			4
Lamium album		1								
Lathyrus nissolia			1			3		3		
Lathyrus pratensis							3			5
Leucanthemum vulgare			7					5		
Medicago lupulina			3	5						4
Odontites vernus				1		3				1
Pastinaca sativa ssp. sylvestris	7			1			4			2
Plantago lanceolata			4		4	2	1	4		4
Poa angustifolia			5		4					
Poa humilis						4				
Poa trivialis	3						4	3	4	
Potentilla reptans						6	2			
Pseudoscleropodium purum				2						
Ranunculus repens						2	1			
Rosa sp. (seedling)			1				1			
Rubus fruticosus agg.				4	1				9	
Schedonorus arundinaceus				6						
Senecio erucifolius					1	3		1		4
Senecio jacobaea			1							
Sonchus arvensis										2
Stellaria holostea								2		
Taraxacum agg.							1			
Trifolium dubium			4							
Trifolium repens						4				
Urtica dioica		8								
Veronica hederifolia									2	
Vicia cracca							4	2		
Vicia hirsuta			2			3				
Vicia sativa			5	4	1	3	4	5		

Quadrat number		21	22	23	24	25	26	27	28	29
Grid reference		TL 12544 21628	TL 12778 21848	TL 12796 21855	TL 12772 21629	TL 12781 21577	TL 12710 21679	TL 12517 21657	TL 12619 21479	TL 12485 21674
NVC community/ vegetation name	Structural unit	OV28	W21	W8d	W24	MG1b	OV23	OV24	OV24	MG1e
Acer campestre	Understory			4						
Achillea millefolium					1		6			
Agrostis stolonifera		10					5			
Alliaria petiolata						1				
Amblystegium serpens			2							
Anthriscus sylvestris						5				
Arrhenatherum elatius						7		3		4
Artemisia vulgaris					6					
Arum maculatum			1	4						
Bellis perennis							4			
Brachythecium rutabulum		4	4	4				3		4
Calystegia sepium					4					
Cardamine hirsuta								3		
Centaurea nigra							1			
Cerastium fontanum		1								
Cirsium arvense					4	4		4		
Clinopodium vulgare					2					
Cololejeunea minutissima			3							
Conium maculatum								5		
Corylus avellana	Understory			7						
Crataegus monogyna	Canopy		9							
Crataegus monogyna	Understory			6						
Cryphaea heteromalla			2							
Dactylis glomerata							4			2
Daucus carota										2
Drepanocladus aduncus		2								
Epilobium hirsutum								4		
Epilobium sp. (seedling)		1								
Festuca rubra							5			5
Ficaria verna				2						
Fraxinus excelsior	Canopy			5						
Fraxinus excelsior	Understory			4						
Frullania dilatata			1							
Galium aparine			3	4		3		2	5	
Geranium dissectum		4								
Glechoma hederacea									2	
Helminthotheca echioides					2					
Heracleum sphondylium						6		1		4
Holcus lanatus							2			
Hyacinthoides non-scripta			1	6						
Hypericum perforatum										4
Hypnum cupressiforme agg.			3							
Kindbergia praelonga			5	5				4	5	
Lamium album						5				
Lepidium draba					7					
Lolium perenne							4			
Lotus corniculatus										8
Medicago lupulina							4			
Mercurialis perennis			5	2						
Metzgeria furcata			2							
Myosotis arvensis			2	1					2	1
Odontites vernus		1								
Orthotrichum affine			3							
Pastinaca sativa ssp. sylvestris					4					
Phleum bertolonii							4			
Plantago lanceolata		4			2		4			4
Plantago major							1			
Poa angustifolia										2
Poa humilis										
Poa trivialis					4		3	2	2	
Potentilla reptans							4			
Prunus spinosa	Understory		5	4						



Quadrat number		21	22	23	24	25	26	27	28	29
<b>Grid reference</b>		TL 12544 21628	TL 12778 21848	TL 12796 21855	TL 12772 21629	TL 12781 21577	TL 12710 21679	TL 12517 21657	TL 12619 21479	TL 12485 21674
NVC community/ vegetation name	Structural unit	OV28	W21	W8d	W24	MG1b	OV23	OV24	OV24	MG1e
<i>Quercus robur</i>	Canopy			7						
<i>Ranunculus repens</i>		4								
<i>Rhynchosstegium confertum</i>			2							
<i>Rubus fruticosus</i> agg.					6				4	
<i>Salix caprea</i>	Canopy		5							
<i>Sambucus nigra</i>	Understory			1						
<i>Scorzoneroides autumnalis</i>							4			
<i>Senecio jacobaea</i>							1			
<i>Senecio vulgaris</i>				1						
<i>Sinapis arvensis</i>				2						
<i>Sonchus asper</i>				4	1					
<i>Stachys sylvatica</i>						4				
<i>Taraxacum</i> agg.							2			1
<i>Tragopogon pratensis</i>										3
<i>Tussilago farfara</i>										4
<i>Ulotia bruchii</i>			2							
<i>Urtica dioica</i>			8		4	1		10	9	
<i>Veronica arvensis</i>							3			
<i>Veronica chamaedrys</i>					1					
<i>Vicia sativa</i>		1								1
<i>Vicia tetrasperma</i>					2	3				

### APPENDIX III. ALL SPECIES RECORDED DURING NVC SURVEYS

Scientific name	English name
<b>Higher plants</b>	
<i>Acer campestre</i>	Field Maple
<i>Achillea millefolium</i>	Yarrow
<i>Agrimonia eupatoria</i>	Agrimony
<i>Agrostis capillaris</i>	Common Bent
<i>Agrostis stolonifera</i>	Creeping Bent
<i>Alliaria petiolata</i>	Garlic Mustard
<i>Alopecurus pratensis</i>	Meadow Foxtail
<i>Anisantha sterilis</i>	Barren Brome
<i>Anthriscus sylvestris</i>	Cow Parsley
<i>Aphanes arvensis</i>	Parsley-piert
<i>Arrhenatherum elatius</i>	False Oat-Grass
<i>Artemisia vulgaris</i>	Mugwort
<i>Arum maculatum</i>	Lords-and-Ladies
<i>Bellis perennis</i>	Daisy
<i>Betula pendula</i>	Silver Birch
<i>Betula pendula</i> x <i>B. pubescens</i>	a hybrid birch
<i>Betula pubescens</i>	Downy Birch
<i>Brachypodium sylvaticum</i>	False-brome
<i>Bromopsis erecta</i>	Upright Brome
<i>Bromus hordeaceus</i>	Soft-brome
<i>Bryonia dioica</i>	White Bryony
<i>Calystegia sepium</i>	Hedge Bindweed
<i>Capsella bursa-pastoris</i>	Shepherd's-purse
<i>Cardamine hirsuta</i>	Hairy Bitter-cress
<i>Carex flacca</i>	Glaucous Sedge
<i>Carex sylvatica</i>	Wood-sedge
<i>Carpinus betulus</i>	Hornbeam
<i>Centaurea nigra</i>	Common Knapweed
<i>Centaurea scabiosa</i>	Greater Knapweed
<i>Cerastium fontanum</i>	Common Mouse-ear
<i>Chaerophyllum temulum</i>	Rough Chervil
<i>Chamerion angustifolium</i>	Rosebay Willowherb
<i>Cirsium arvense</i>	Creeping Thistle
<i>Cirsium vulgare</i>	Spear Thistle
<i>Clematis vitalba</i>	Traveller's-joy
<i>Clinopodium vulgare</i>	Wild Basil
<i>Conium maculatum</i>	Hemlock
<i>Conopodium majus</i>	Pignut
<i>Convolvulus arvensis</i>	Field Bindweed
<i>Cornus sanguinea</i>	Dogwood
<i>Corylus avellana</i>	Hazel
<i>Crataegus monogyna</i>	Hawthorn
<i>Crepis capillaris</i>	Smooth Hawk's-beard
<i>Cynosurus cristatus</i>	Crested Dog's-tail
<i>Dactylis glomerata</i>	Cock's-foot
<i>Dactylorhiza fuchsii</i>	Common Spotted-orchid
<i>Daucus carota</i>	Carrot
<i>Deschampsia cespitosa</i>	Tufted Hair-grass
<i>Elymus caninus</i>	Bearded Couch
<i>Epilobium hirsutum</i>	Great Willowherb

<b>Scientific name</b>	<b>English name</b>
<i>Epilobium parviflorum</i>	Hoary Willowherb
<i>Epilobium tetragonum</i>	Square-stalked Willowherb
<i>Erigeron acris</i>	Blue Fleabane
<i>Festuca rubra</i>	Red Fescue
<i>Ficaria verna</i>	Lesser Celandine
<i>Fraxinus excelsior</i>	Ash
<i>Galium aparine</i>	Cleavers
<i>Geranium dissectum</i>	Cut-leaved Crane's-bill
<i>Geranium molle</i>	Dove's-foot Crane's-bill
<i>Geranium robertianum</i>	Herb-Robert
<i>Glechoma hederacea</i>	Ground-ivy
<i>Hedera helix</i>	Common Ivy
<i>Helminthotheca echioides</i>	Bristly Oxtongue
<i>Heracleum sphondylium</i>	Hogweed
<i>Holcus lanatus</i>	Yorkshire-fog
<i>Hyacinthoides non-scripta</i>	Bluebell
<i>Hypericum perforatum</i>	Perforate St John's-wort
<i>Hypochaeris radicata</i>	Cat's-ear
<i>Ilex aquifolium</i>	Holly
<i>Inula conyzae</i>	Ploughman's-spikenard
<i>Juncus conglomeratus</i>	Compact Rush
<i>Juncus effusus</i>	Soft-rush
<i>Lamiastrum galeobdolon</i> subsp. <i>montanum</i>	Yellow Archangel
<i>Lamium album</i>	White Dead-nettle
<i>Lathyrus nissolia</i>	Grass Vetchling
<i>Lathyrus pratensis</i>	Meadow Vetchling
<i>Lepidium draba</i>	Hoary Cress
<i>Leucanthemum vulgare</i>	Oxeye Daisy
<i>Linum catharticum</i>	Fairy Flax
<i>Lolium multiflorum</i>	Italian Rye-grass
<i>Lolium perenne</i>	Perennial Rye-grass
<i>Lonicera periclymenum</i>	Honeysuckle
<i>Lotus corniculatus</i>	Common Bird's-foot-trefoil
<i>Medicago lupulina</i>	Black Medick
<i>Mercurialis perennis</i>	Dog's Mercury
<i>Milium effusum</i>	Wood Millet
<i>Moehringia trinervia</i>	Three-nerved Sandwort
<i>Myosotis arvensis</i>	Field Forget-me-not
<i>Odontites vernus</i>	Red Bartsia
<i>Ophrys apifera</i>	Bee Orchid
<i>Pastinaca sativa</i> subsp. <i>sylvestris</i>	Wild Parsnip
<i>Phleum bertolonii</i>	Smaller Cat's-tail
<i>Pilosella officinarum</i>	Mouse-ear-hawkweed
<i>Plantago lanceolata</i>	Ribwort Plantain
<i>Plantago major</i>	Greater Plantain
<i>Plantago media</i>	Hoary Plantain
<i>Poa angustifolia</i>	Narrow-leaved Meadow-grass
<i>Poa humilis</i>	Spreading Meadow-grass
<i>Poa trivialis</i>	Rough Meadow-grass
<i>Potentilla reptans</i>	Creeping Cinquefoil
<i>Prunella vulgaris</i>	Selfheal
<i>Prunus avium</i>	Wild Cherry
<i>Prunus laurocerasus</i>	Cherry Laurel



<b>Scientific name</b>	<b>English name</b>
<i>Prunus spinosa</i>	Blackthorn
<i>Pteridium aquilinum</i>	Bracken
<i>Quercus robur</i>	Pedunculate Oak
<i>Ranunculus acris</i>	Meadow Buttercup
<i>Ranunculus bulbosus</i>	Bulbous Buttercup
<i>Ranunculus repens</i>	Creeping Buttercup
<i>Rosa canina</i>	Dog-rose
<i>Rubus fruticosus</i> agg.	Bramble
<i>Rumex crispus</i>	Curled Dock
<i>Rumex obtusifolius</i>	Broad-leaved Dock
<i>Rumex sanguineus</i>	Wood Dock
<i>Salix caprea</i>	Goat Willow
<i>Sambucus nigra</i>	Elder
<i>Scabiosa columbaria</i>	Small Scabious
<i>Schedonorus arundinaceus</i>	Tall Fescue
<i>Schedonorus giganteus</i>	Giant Fescue
<i>Scorzoneroides autumnalis</i>	Autumn Hawkbit
<i>Senecio erucifolius</i>	Hoary Ragwort
<i>Senecio jacobaea</i>	Common Ragwort
<i>Senecio vulgaris</i>	Groundsel
<i>Sherardia arvensis</i>	Field Madder
<i>Silene latifolia</i>	White Campion
<i>Sinapis arvensis</i>	Charlock
<i>Solanum dulcamara</i>	Bittersweet
<i>Sonchus arvensis</i>	Perennial Sowthistle
<i>Sonchus asper</i>	Prickly Sowthistle
<i>Stachys sylvatica</i>	Hedge Woundwort
<i>Stellaria holostea</i>	Greater Stitchwort
<i>Stellaria media</i>	Common Chickweed
<i>Symphytum x uplandicum</i>	Russian Comfrey ( <i>S. asperum</i> x officinale)
<i>Taraxacum</i> agg.	Dandelion
<i>Torilis japonica</i>	Upright Hedge-parsley
<i>Tragopogon pratensis</i>	Goat's-beard
<i>Trifolium dubium</i>	Lesser Trefoil
<i>Trifolium pratense</i>	Red Clover
<i>Trifolium repens</i>	White Clover
<i>Trisetum flavescens</i>	Yellow Oat-grass
<i>Tussilago farfara</i>	Colt's-foot
<i>Ulex europaeus</i>	Gorse
<i>Urtica dioica</i>	Common Nettle
<i>Veronica arvensis</i>	Wall Speedwell
<i>Veronica chamaedrys</i>	Germander Speedwell
<i>Veronica hederifolia</i>	Ivy-leaved Speedwell
<i>Veronica persica</i>	Common Field-speedwell
<i>Veronica serpyllifolia</i>	Thyme-leaved Speedwell
<i>Viburnum opulus</i>	Guelder-rose
<i>Vicia cracca</i>	Tufted Vetch
<i>Vicia hirsuta</i>	Hairy Tare
<i>Vicia sativa</i>	Common Vetch
<i>Vicia tetrasperma</i>	Smooth Tare
<i>Viola hirta</i>	Hairy Violet

**Mosses and liverworts**

**Scientific name****English name**

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Amblystegium serpens	Creeping Feather-moss
Brachythecium rutabulum	Rough-stalked Feather-moss
Calliergonella cuspidata	Pointed Spear-moss
Cololejeunea minutissima	Minute Pouncewort
Cryphaea heteromalla	Lateral Cryphaea
Dicranella heteromalla	Silky Forklet-moss
Dicranum montanum	Mountain Fork-moss
Drepanocladus aduncus	Knieff's Hook-moss
Frullania dilatata	Dilated Scalewort
Hypnum cupressiforme	Cypress-leaved Plait-moss
Hypnum cupressiforme agg.	
Isothecium myosuroides	Slender Mouse-tail Moss
Kindbergia praelonga	Common Feather-moss
Lophocolea bidentata	Bifid Crestwort
Metzgeria furcata	Forked Veilwort
Mnium hornum	Swan's-neck Thyme-moss
Orthotrichum affine	Wood Bristle-moss
Orthotrichum diaphanum	White-tipped Bristle-moss
Oxyrrhynchium hians	Swartz's Feather-moss
Pseudoscleropodium purum	Neat Feather-moss
Rhynchostegium confertum	Clustered Feather-moss
Ulota bruchii	Bruch's Pincushion

#### APPENDIX IV. ALL SPECIES RECORDED IN ARABLE PLANT SURVEYS

<b>Scientific name</b>	<b>English name</b>
<i>Achillea millefolium</i>	Yarrow
<i>Aethusa cynapium</i>	Fool's Parsley
<i>Agrostis capillaris</i>	Common Bent
<i>Agrostis gigantea</i>	Black Bent
<i>Agrostis stolonifera</i>	Creeping Bent
<i>Alliaria petiolata</i>	Garlic Mustard
<i>Alopecurus myosuroides</i>	Black-grass
<i>Anagallis arvensis</i>	Scarlet Pimpernel
<i>Anisantha diandra</i>	Great Brome
<i>Anisantha sterilis</i>	Barren Brome
<i>Anthemis austriaca</i>	Austrian Chamomile
<i>Anthemis cotula</i>	Stinking Chamomile
<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass
<i>Anthriscus sylvestris</i>	Cow Parsley
<i>Anthyllis vulneraria</i>	Kidney Vetch
<i>Aphanes arvensis</i>	Parsley-piert
<i>Arabidopsis thaliana</i>	Thale Cress
<i>Arctium minus</i>	Lesser Burdock
<i>Arrhenatherum elatius</i>	False Oat-Grass
<i>Artemisia vulgaris</i>	Mugwort
<i>Atriplex patula</i>	Common Orache
<i>Atriplex prostrata</i>	Spear-leaved Orache
<i>Avena fatua</i>	Wild-oat
<i>Ballota nigra</i>	Black Horehound
<i>Barbarea intermedia</i>	Medium-flowered Winter-cress
<i>Bellis perennis</i>	Daisy
<i>Brachypodium sylvaticum</i>	False-brome
<i>Brassica napus</i> subsp. <i>oleifolia</i>	Oil-seed Rape
<i>Briza minor</i>	Lesser Quaking-grass
<i>Bromus hordeaceus</i>	Soft-brome
<i>Bromus hordeaceus</i> subsp. <i>hordeaceus</i>	Soft-brome
<i>Bromus hordeaceus</i> subsp. <i>longipedicellatus</i>	Soft-brome
<i>Bromus secalinus</i>	Rye Brome
<i>Bryonia dioica</i>	White Bryony
<i>Capsella bursa-pastoris</i>	Shepherd's-purse
<i>Cardamine hirsuta</i>	Hairy Bitter-cress
<i>Carduus crispus</i>	Wetted Thistle
<i>Centaurea cyanus</i>	Cornflower
<i>Centaurea nigra</i>	Common Knapweed
<i>Centaurea scabiosa</i>	Greater Knapweed
<i>Cerastium fontanum</i>	Common Mouse-ear
<i>Chaerophyllum temulum</i>	Rough Chervil
<i>Chamerion angustifolium</i>	Rosebay Willowherb
<i>Chenopodium album</i>	Fat-hen
<i>Chenopodium polyspermum</i>	Many-seeded Goosefoot
<i>Cirsium arvense</i>	Creeping Thistle
<i>Cirsium vulgare</i>	Spear Thistle
<i>Clematis vitalba</i>	Traveller's-joy
<i>Clinopodium vulgare</i>	Wild Basil
<i>Conium maculatum</i>	Hemlock
<i>Convolvulus arvensis</i>	Field Bindweed



<b>Scientific name</b>	<b>English name</b>
<i>Cornus sanguinea</i>	Dogwood
<i>Crepis capillaris</i>	Smooth Hawk's-beard
<i>Crepis vesicaria</i>	Beaked Hawk's-beard
<i>Cynosurus cristatus</i>	Crested Dog's-tail
<i>Dactylis glomerata</i>	Cock's-foot
<i>Daucus carota</i>	Carrot
<i>Dipsacus fullonum</i>	Wild Teasel
<i>Elytrigia repens</i>	Common Couch
<i>Epilobium ciliatum</i>	American Willowherb
<i>Epilobium hirsutum</i>	Great Willowherb
<i>Epilobium montanum</i>	Broad-leaved Willowherb
<i>Epilobium parviflorum</i>	Hoary Willowherb
<i>Epilobium tetragonum</i>	Square-stalked Willowherb
<i>Epilobium x brevipilum</i>	<i>E. hirsutum x tetragonum</i>
<i>Euphorbia exigua</i>	Dwarf Spurge
<i>Fallopia convolvulus</i>	Black-bindweed
<i>Festuca ovina</i>	Sheep's-fescue
<i>Festuca rubra</i>	Red Fescue
<i>Filago vulgaris</i>	Common Cudweed
<i>Fraxinus excelsior</i>	Ash
<i>Fumaria officinalis</i>	Common Fumitory
<i>Fumaria vaillantii</i>	Few-flowered Fumitory
<i>Galium album</i>	Hedge Bedstraw
<i>Galium aparine</i>	Cleavers
<i>Galium verum</i>	Lady's Bedstraw
<i>Geranium dissectum</i>	Cut-leaved Crane's-bill
<i>Geranium molle</i>	Dove's-foot Crane's-bill
<i>Geranium pyrenaicum</i>	Hedgerow Crane's-bill
<i>Geranium rotundifolium</i>	Round-leaved Crane's-bill
<i>Geum urbanum</i>	Wood Avens
<i>Glebionis segetum</i>	Corn Marigold
<i>Hedera helix</i>	Common Ivy
<i>Helminthotheca echioides</i>	Bristly Oxtongue
<i>Heracleum sphondylium</i>	Hogweed
<i>Holcus lanatus</i>	Yorkshire-fog
<i>Hordeum secalinum</i>	Meadow Barley
<i>Hypochaeris radicata</i>	Cat's-ear
<i>Kickxia spuria</i>	Round-leaved Fluellen
<i>Knautia arvensis</i>	Field Scabious
<i>Lactuca serriola</i>	Prickly Lettuce
<i>Lactuca virosa</i>	Great Lettuce
<i>Lamium album</i>	White Dead-nettle
<i>Lamium purpureum</i>	Red Dead-nettle
<i>Lapsana communis</i>	Nipplewort
<i>Lathyrus pratensis</i>	Meadow Vetchling
<i>Leontodon hispidus</i>	Rough Hawkbit
<i>Lepidium coronopus</i>	Swine-cress
<i>Leucanthemum vulgare</i>	Oxeye Daisy
<i>Lolium multiflorum</i>	Italian Rye-grass
<i>Lolium perenne</i>	Perennial Rye-grass
<i>Lotus corniculatus</i>	Common Bird's-foot-trefoil
<i>Malva moschata</i>	Musk-mallow
<i>Malva neglecta</i>	Dwarf Mallow

<b>Scientific name</b>	<b>English name</b>
Malva setigera	Rough Marsh-mallow
Malva sylvestris	Common Mallow
Matricaria discoidea	Pineappleweed
Medicago lupulina	Black Medick
Myosotis arvensis	Field Forget-me-not
Odontites vernus	Red Bartsia
Papaver rhoeas	Common Poppy
Persicaria lapathifolia	Pale Persicaria
Persicaria maculosa	Redshank
Phleum bertolonii	Smaller Cat's-tail
Phleum pratense	Timothy
Plantago lanceolata	Ribwort Plantain
Plantago major	Greater Plantain
Plantago media	Hoary Plantain
Poa annua	Annual Meadow-grass
Poa trivialis	Rough Meadow-grass
Polygonum aviculare	Knotgrass
Primula veris	Cowslip
Prunella vulgaris	Selfheal
Prunus spinosa	Blackthorn
Pteridium aquilinum	Bracken
Quercus robur	Pedunculate Oak
Ranunculus acris	Meadow Buttercup
Ranunculus bulbosus	Bulbous Buttercup
Ranunculus repens	Creeping Buttercup
Raphanus raphanistrum subsp. raphanistrum	Wild Radish
Reseda lutea	Wild Mignonette
Reseda luteola	Weld
Rhinanthus minor	Yellow-rattle
Rubus fruticosus agg.	Bramble
Rumex acetosa	Common Sorrel
Rumex crispus	Curled Dock
Rumex obtusifolius	Broad-leaved Dock
Rumex sanguineus	Wood Dock
Scorzoneroideis autumnalis	Autumn Hawkbit
Senecio erucifolius	Hoary Ragwort
Senecio jacobaea	Common Ragwort
Senecio squalidus	Oxford Ragwort
Senecio vulgaris	Groundsel
Sherardia arvensis	Field Madder
Silene dioica	Red Campion
Silene flos-cuculi	Ragged-Robin
Silene latifolia	White Campion
Sinapis arvensis	Charlock
Sisymbrium officinale	Hedge Mustard
Solanum dulcamara	Bittersweet
Sonchus arvensis	Perennial Sow-thistle
Sonchus asper	Prickly Sow-thistle
Sonchus oleraceus	Smooth Sow-thistle
Sonchus oleraceus	Smooth Sow-thistle
Stellaria media	Common Chickweed
Symphytum officinale	Common Comfrey
Taraxacum agg.	Dandelion

<b>Scientific name</b>	<b>English name</b>
Torilis japonica	Upright Hedge-parsley
Tragopogon pratensis	Goat's-beard
Trifolium campestre	Hop Trefoil
Trifolium dubium	Lesser Trefoil
Trifolium pratense	Red Clover
Tripleurospermum inodorum	Scentless Mayweed
Trisetum flavescens	Yellow Oat-grass
Ulmus procera	English Elm
Urtica dioica	Common Nettle
Veronica arvensis	Wall Speedwell
Veronica chamaedrys	Germander Speedwell
Veronica persica	Common Field-speedwell
Veronica serpyllifolia	Thyme-leaved Speedwell
Vicia faba	Broad Bean
Vicia tetrasperma	Smooth Tare
Viola arvensis	Field Pansy
Viola hirta	Hairy Violet
Vulpia bromoides	Squirreltail Fescue
Vulpia myuros	Rat's-tail Fescue



# Appendix Z

## Z1 Terrestrial Invertebrate Survey Report

# **INVERTEBRATE SURVEY AT LONDON LUTON AIRPORT IN 2018 AND 2019**



**MARK G. TELFER**

**31ST JULY 2019**

**THIS REPORT WAS COMMISSIONED BY OVE ARUP & PARTNERS LIMITED**

Dr. Mark G. Telfer MA (CANTAB), MCIEEM  
10, Northall Road  
Eaton Bray  
DUNSTABLE  
LU6 2DQ  
mark.g.telfer@btinternet.com  
<http://markgtelfer.co.uk/>

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## 1 Summary

- This report describes an invertebrate survey at London Luton Airport, aiming to supplement and update invertebrate survey work carried out between October 2015 and October 2016 by Colin Plant Associates.
- Following a scoping visit on 10th April 2018, survey fieldwork was carried out on 13 further visits from 26th April to 6th September 2018, and followed with six visits from 23rd April to 21st June 2019.
- The 2015-16 survey recorded 855 species. The 2018-19 survey recorded 988 species. The combined species list is 1,550, covering a very wide range of taxonomic groups.
- White-letter Hairstreak butterfly (a Section 41 species 'of principal importance for the purpose of conserving biodiversity') was not recorded and is probably absent.
- Small Blue butterfly (another Section 41 species) was also not recorded and is probably absent.
- Three Section 41 species were recorded (which are not 'research-only' species): the Set-aside Downy-back beetle *Ophonus laticollis*, the picture-winged fly *Dorycera graminum*, and the Dingy Skipper butterfly *Erynnis tages*.
- 91 species from the combined species list of 1,550 are here regarded as 'Key Species' (i.e., with rare, scarce, threatened or near threatened conservation status).
- 81 Key Species were recorded amongst the 988 species recorded by the 2018-19 survey, comprising 8.2% of the total.
- Pantheon identified that the survey area supports a large number of invertebrates of 'open habitats' and a high quality assemblage associated with 'short sward & bare ground'.
- Pantheon also identified a large number of 'tree-associated' species with a high quality assemblage associated with 'decaying wood'.
- Of the 570 species of beetle recorded by the combined surveys, 49 have no previous Bedfordshire record and 11 have no previous Hertfordshire record.
- The overall assessment of the Luton Airport survey area is of a site of high importance for invertebrate conservation at the county level.
- Key Habitats for open habitat invertebrates are (i) arable margins, field edges and field corners, (ii) disturbed areas with much bare ground, and sparsely developed ruderal vegetation, and (iii) short, flower-rich grasslands.
- Key Habitats for tree-associated species are the broad-leaved woods of the Eastern Area and Wigmore Valley Park as well as the hedges and field boundary trees, especially where there are veteran trees.
- Brief recommendations are made to mitigate the impacts of proposed development on the invertebrates of open habitats and trees.



## 2 Introduction

This report describes an invertebrate survey of an area at London Luton Airport (Figure 1). The survey area is largely within Luton Borough but a small area at the south-western edge lies within Central Bedfordshire and the eastern third of the survey area lies within North Hertfordshire District. The survey area lies entirely within grid reference TL12, with a centroid at approximately TL128215.

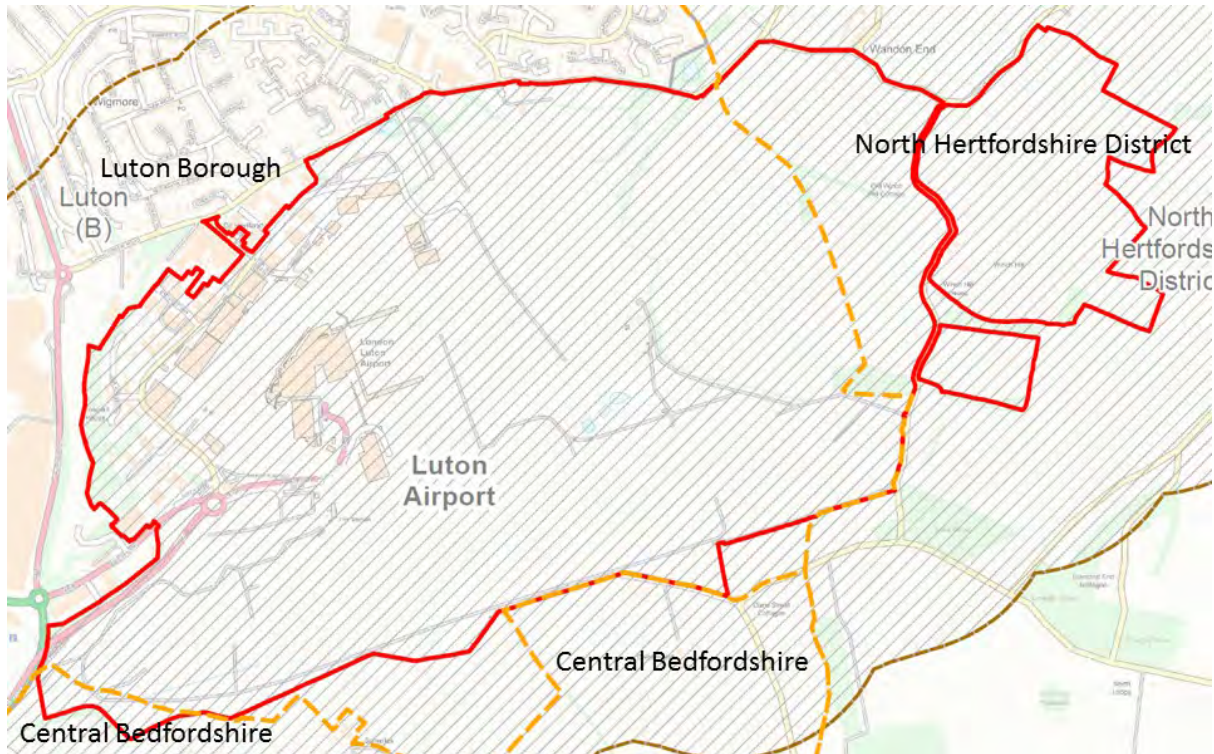


Figure 1: The London Luton Airport survey area, defined by the red outline. Administrative area boundaries are shown as dashed orange lines. Contains Ordnance Survey data © Crown copyright and database right 2017.

The survey fieldwork was carried out between April and September 2018 and April and June 2019 by the author, and was intended to supplement and update invertebrate survey work carried out between October 2015 and October 2016 by Colin Plant Associates (see Section 2.1 below).

An invertebrate survey report was prepared after the 2018 fieldwork season (Telfer, 2018). The current report covers the survey work in 2018 and 2019 and completely supersedes the 2018 report.

### 2.1 PREVIOUS INVERTEBRATE SURVEY WORK

The author has previously carried out an invertebrate survey at London Luton Airport, in 2012, commissioned by Arup. The 2012 survey covered an area entirely within the 2018 survey area (Figure 1), with most of the survey effort targeted at selected areas within the airside part of the survey area, as well as some small areas outside the perimeter fence (Telfer, 2012).

Colin Plant Associates carried out invertebrate survey at London Luton Airport over the course of 12 visits between 8th October 2015 and 8th October 2016 (Plant, 2017). The Colin

Plant Associates survey was probably given a similar redline to the current survey (Figure 1) but focused on three selected areas within the wider survey area (Areas A, B and C in Figure 2) and did not cover the airside parts of the airport.

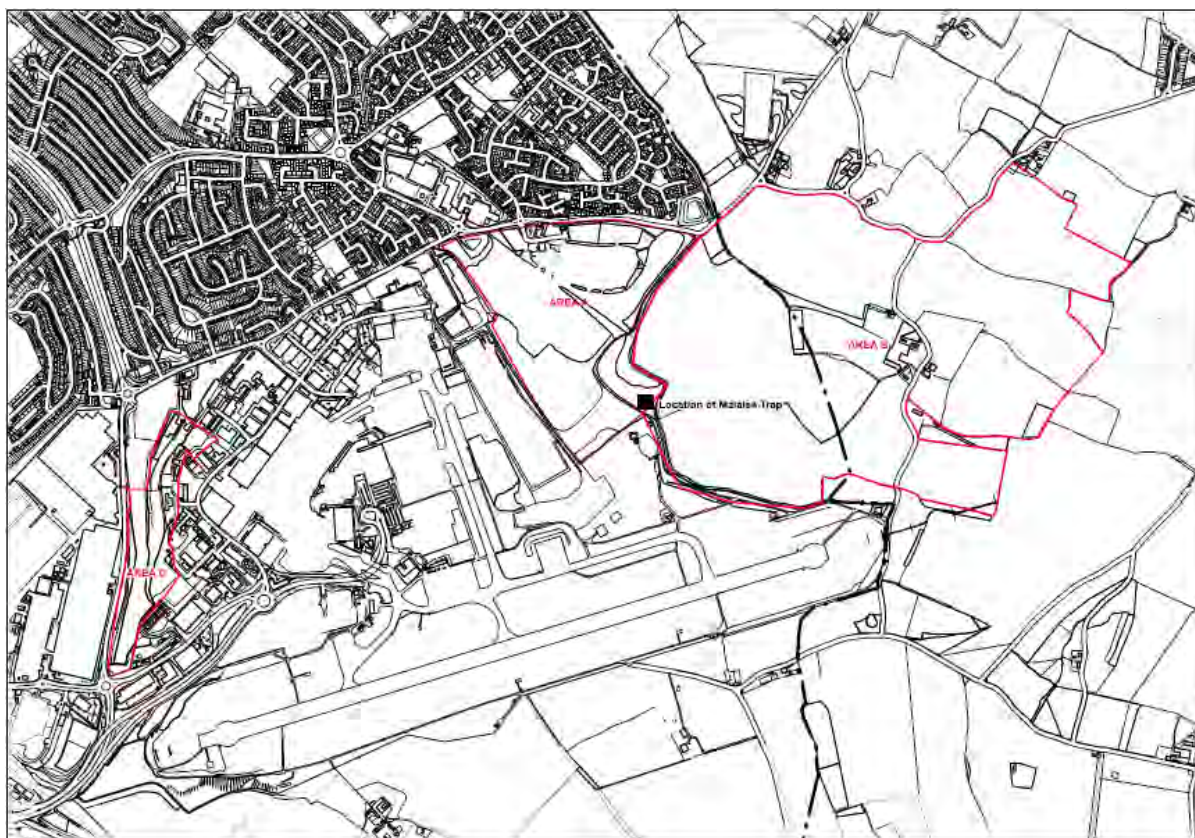


Figure 2: The three survey areas (A, B and C) selected by the 2015-16 Colin Plant survey.

Both Telfer (2012) and Plant (2017) found the survey area to contain habitats which support invertebrate assemblages of county importance.

Data searches from local records centres (the Herts Environmental Records Centre (HERC) covering North Hertfordshire District, and the Bedfordshire & Luton Biodiversity Recording and Monitoring Centre (BRMC) covering Luton Borough and Central Bedfordshire) were received from Arup on 5th May 2018.

## 2.2 THE SURVEY AREA

The survey area lies on the south-eastern edge of Luton town, with the neighbouring area of Luton Borough dominated by housing and industrial land uses, while the neighbouring parts of Central Beds and North Herts are rural, predominantly arable farmland with a scatter of small woodlands.

For the purposes of this report, the survey area has been subdivided (Figure 3) and the given names will be used within this report to refer to the different subdivisions.



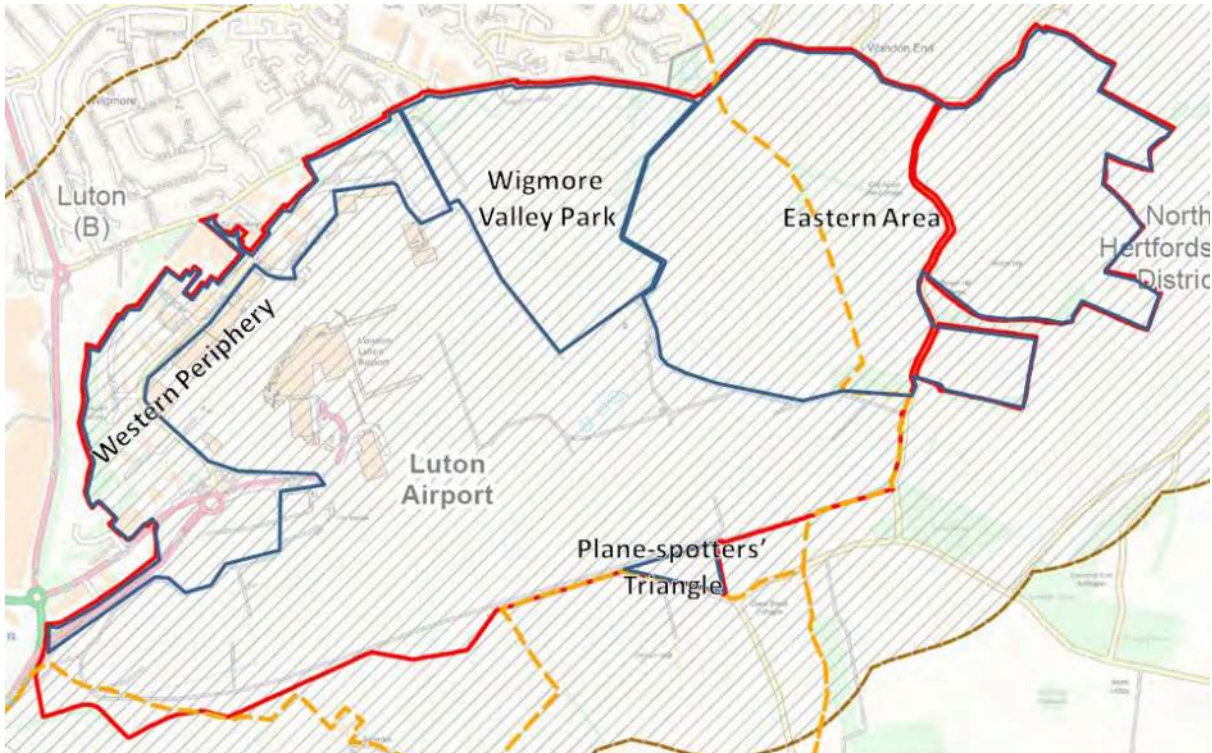


Figure 3: Subdivisions of the survey area, for the purposes of this report. Contains Ordnance Survey data © Crown copyright and database right 2017.

The natural soils of the area are chalky, and this is most apparent within the survey area on the higher and steeper parts of arable fields in the Eastern Area. Parts of Wigmore Valley Park, and adjacent airside areas of the airport overlie old (apparently Victorian era) landfill.

For ease of reference within this report, the Eastern Area has been subdivided (Figure 4) into 13 fields (coded F1 to F13), five woods (coded W1, W2, W4, W5 and W6) and three other areas of other habitats or mixed habitats (the 'old car compartment', the 'pipeline strip' and the Winch Hill Farm area). The 'pipeline strip' is an arbitrary name; the origin of this linear feature is not known to the author.

### 2.2.1 Invertebrate habitats and habitat features

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



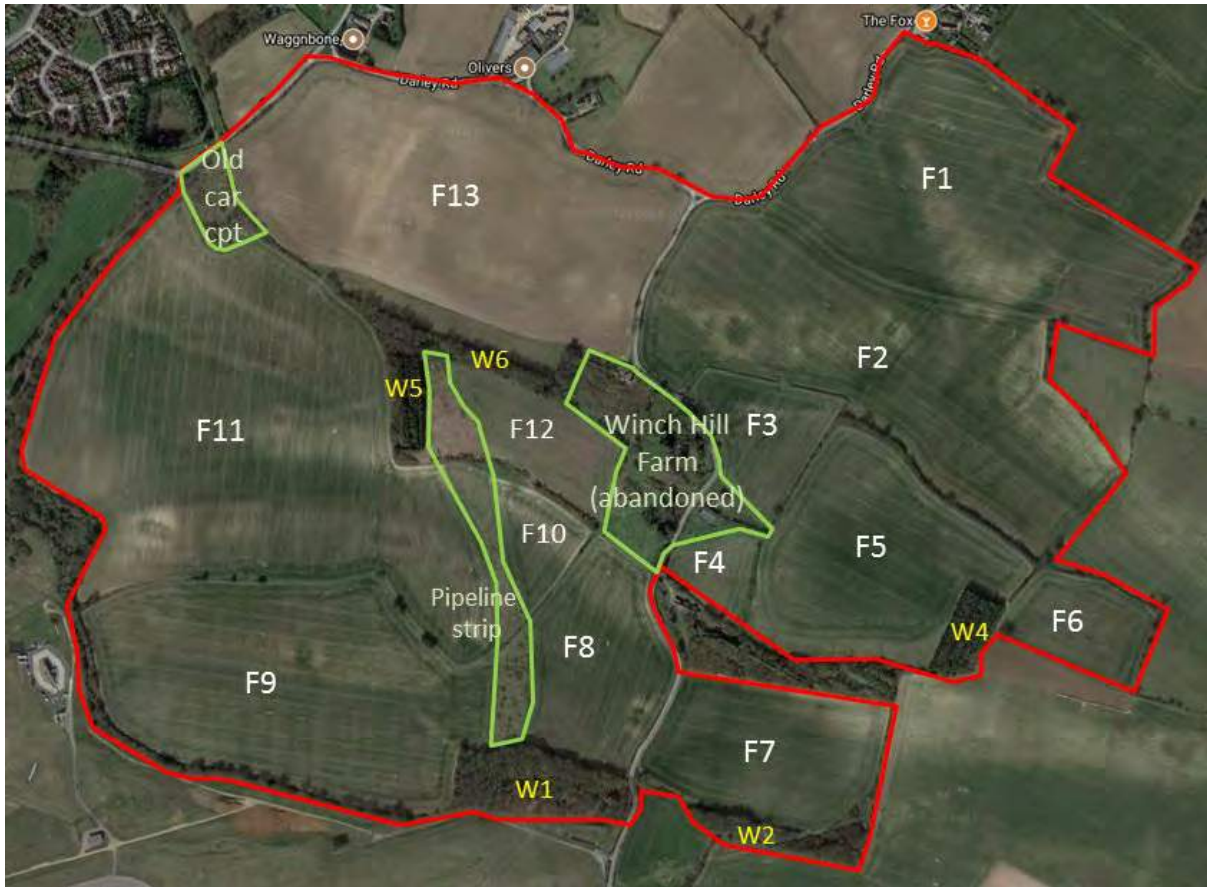


Figure 4: Fields, woods and other parts of the Eastern Area. Map data ©2018 Google Imagery ©2018 , DigitalGlobe, Getmapping plc, Infoterra Ltd & Bluesky, The GeoInformation Group.

### Arable fields

Arable fields form the majority of the Eastern Area and are a large part of the survey area as a whole. Arable fields on chalky soils are particularly interesting from a botanical perspective, and may support a wide range of 'arable weeds' which are dependent upon calcareous soils. Arable weeds are best looked for in arable margins, field edges and field corners, especially in higher, steeper and drier spots - showing as paler areas on the aerial image (Figure 4). The same places may also support important invertebrate species and assemblages, including some phytophagous and seed-feeding species which depend on the arable weeds.

During fieldwork in 2018-19, there were some large uncropped arable margins within the Eastern Area, notably at the edges of Fields F13 and F5. The whole of Fields F9 and F11 were uncropped in 2018 and 2019.

### Grassland

The airside part of the airport supports a large area of mown grassland of very low potential importance for invertebrates. The northern part of Wigmore Valley Park also supports a large area of mown amenity grassland which is also of low potential importance for invertebrates.

Grassland habitat of greater potential for invertebrates occurs in smaller patches throughout the survey area, varying from the rank, unmanaged, scrub-encroached grassland of most of the 'old car compartment' to the short, rabbit-grazed swards of some verges and interstitial greenspaces in the Western Periphery and in the southern part of Wigmore Valley Park.

### **Ruderal habitat**

Patches of ruderal vegetation on more-or-less disturbed ground occur in all parts of the survey area, e.g. Figure 5. These are varied habitats and intergrade both with the annually cultivated arable habitats and with the less disturbed grassland habitats.



Figure 5: Ruderal habitats on a disturbed bank in the western periphery.

Ruderal habitats of particular note were present in the Eastern Area, notably around Winch Hill Farm, though there has been little active disturbance here in recent years.

Within the airside part of the airport, the removal of several areas of scrub between 2012 and 2018 had created predominantly bare, disturbed ground and promoted the development of ruderal habitats of rather high potential importance for invertebrates. The ruderal habitats that had been present along the north-eastern airside perimeter in 2018 had been covered by fresh earthworks in 2019.

The allotments at Wigmore Valley Park (Figure 6) provide a distinct set of habitats for invertebrates but the most interesting invertebrate habitats are in those allotments which have been abandoned or neglected and support a range of ruderal weeds and plants of disturbed ground.





Figure 6: A view of the allotments at Wigmore Valley Park.

### **Woodland, trees and hedges**

Woodland is confined to Wigmore Valley Park and the Eastern Area. The woodlands are all small and rather varied in character, with W1 being an ancient woodland of diverse species composition and varied structure, whereas W4 and W5 are plantations of mostly coniferous trees, with older, broad-leaved trees at their boundaries. Hornbeam is the main component of W2 including a large number of veteran 'coppards' (Figure 7), here presumably managed to mitigate interference with the runway approach lights.





Figure 7: Hornbeam 'coppards' at Luton Airport: 'coppard' being a portmanteau term for a tree which is cut higher than a coppice and lower than a pollard.

Old Hornbeams are also present in many of the hedges in the Eastern Area though rarely of a large size. More visually striking are the mature and over-mature oaks *Quercus* (e.g., Figure 8) and Ash *Fraxinus excelsior* (e.g., Figure 9).





Figure 8: Veteran oak on the northern boundary of Field F6.



Figure 9: Veteran coppiced Ash at the corner of Fields F2, F5 and F6.



The microhabitats created by the processes of death and decay of trees support a large fauna of invertebrates collectively referred to as the 'saproxylic invertebrates' (or more simply known as 'deadwood invertebrates'). The saproxylic invertebrate fauna includes many species of conservation importance. Over-mature and veteran trees are particularly important trees for saproxylic invertebrates. The woodland, trees and hedges within the survey area are of high potential importance for saproxylic invertebrates.

Specifically within the woodlands, there is also moderate or high potential for the litter layer, herb layer and understorey habitats to support important species or assemblages of invertebrates.

Elms were present in unmanaged hedges around the western boundaries of Field F13 (Figure 10) and in much of the southern boundary of Field F9. There was the usual mix of saplings and dead or moribund larger trees. Elm is probably not present in sufficient size and quantity, and over a sufficiently large area, to support White-letter Hairstreak butterfly *Satyrrium w-album* (a Section 41 species discussed in more detail below).



Figure 10: Elms, including a moribund tree, at the south-western edge of Field F13.

A small and extremely derelict orchard of Apple trees (Figure 11) lies near to the Winch Hill farmhouse. The largest individual tree, and the only one which is still growing fully in the open, is inaccessible within the security fencing which now surrounds the dilapidated and dangerous building. Five or more apples of smaller size and lesser girth are outside the fencing, largely swamped amongst Elder and Blackthorn scrub with tall Stinging Nettles. Apple orchards can provide important habitats for saproxylic invertebrates. The importance of larger, traditionally-managed orchards with veteran trees is recognised by their



designation as a Section 41 Habitat of Principal Importance. Such orchards may support Noble Chafer beetle *Gnorimus nobilis* (a Section 41 species), though the Luton survey area would be slightly outside the known geographic range of this species.



Figure 11: An Apple tree at Winch Hill.

### **Waterbodies**

There are seven highly artificial waterbodies within the airside part of the airport, of low or moderate potential for invertebrates. There are two further artificial waterbodies within dense woodland or scrub at the north-western corner of Wigmore Valley Park, and in the adjacent northern corner of the Western Periphery. Elsewhere within Wigmore Valley Park there are some shallow, ephemeral waterbodies and areas of marshy ground. The Eastern Area is essentially dry. A small pond lies within the southern corner of the Plane-spotters' Triangle.

### **2.3 SECTION 41 SPECIES - SPECIES OF PRINCIPAL IMPORTANCE**

'Section 41 species' are species listed in Section 41 of the Natural Environment and Rural Communities Act 2006 as being 'of principal importance for the purpose of conserving biodiversity'.

For most Section 41 species, their occurrence within the survey area would be an important consideration for developers and planners. However, the Section 41 list includes a number of moths and butterflies which are still widespread and common though declining, and were formerly regarded as 'research-only' Biodiversity Action Plan (BAP) species. Though they

have been added to Section 41, conservation action for these 'research only' species is focused on further research rather than protection of individual sites.

Further details are given here of two Section 41 species which have occurred in or near the survey area in recent years, are not 'research only' species, and which merit targeted survey.

### **2.3.1 *Satyrium w-album* (Lepidoptera: Lycaenidae) White-letter Hairstreak**

White-letter Hairstreak caterpillars favour Wych Elm *Ulmus glabra* and its hybrid taxa but probably occur on all species of elm in Britain. Before the arrival of Dutch Elm Disease in Britain, White-letter Hairstreaks were patchily distributed in southern Britain northwards to Yorkshire. The loss of elms, particularly of the mature trees favoured by the butterfly, has caused a substantial decline. As well as being listed in Section 41, White-letter Hairstreak is listed as Endangered in Britain by Fox *et al.* (2010), indicating that on the best available evidence it is facing a very high risk of extinction in the wild.

The scoping survey and initial survey visits highlighted the presence of a small amount of elm in some hedges within the survey area, providing potential habitat for White-letter Hairstreak. A data search from the Herts Environmental Records Centre shows that White-letter Hairstreak was recorded at TL1323, less than 1 km north of the survey area, on 14th July 1997.

The adult butterflies are unobtrusive, feeding on honeydew in the canopy of elms and neighbouring trees, and very occasionally descending to nectar from flowers such as thistles. They are best surveyed during the last two weeks of June into early July, in accordance with advice on the White-letter Hairstreak Recording Project website<sup>1</sup>.

### **2.3.2 *Cupido minimus* (Lepidoptera: Lycaenidae) Small Blue**

A small and easily overlooked butterfly which breeds only on Kidney Vetch *Anthyllis vulneraria* on calcareous grasslands, coastal dunes, cliffs, quarries and embankments over a wide area of Britain. It is seldom common, even in its strongholds in Dorset, Gloucestershire and on Salisbury Plain. Fox *et al.* (2010) found this species to be declining in both population size and area of occupancy and considered it to be Near Threatened. It is for this reason that it is also listed in Section 41. This species is protected from sale by the Wildlife and Countryside Act, schedule 5.

A data search prepared by the Bedfordshire & Luton Biodiversity Recording and Monitoring Centre (BRMC) on 13th February 2018 for Jenny Singh of Arup shows that Small Blue has been recorded from the survey area in the southern part of Wigmore Valley Park (TL127217) on 9th June 2009.

Adult butterflies should be looked for in suitable weather conditions during their flight season from mid-May to late June.

## **2.4 *HELIX POMATIA* ROMAN SNAIL**

Roman Snail is a protected species in the UK. This species has been found within, or in the vicinity of, the survey area in recent years (BRMC data search). A separate, specialist Roman Snail survey was commissioned (Jenny Singh, pers. comm.) and so Roman Snail was not

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<sup>1</sup> <http://www.hertsmiddx-butterflies.org.uk/w-album/index.php>

specifically targeted within the current survey project, although had it been encountered it would certainly have been recorded.

## 2.5 DEVELOPMENT PROPOSALS

It is understood that the survey is required to inform development proposals for airport expansion. This will be a Nationally Significant Infrastructure Project. London Luton Airport Ltd conducted a non-statutory consultation on these plans in summer 2018, entitled ‘Future LuToN: making best use of our runway’, with a view to applying for a Development Consent Order in 2019 or 2020.

## 2.6 OBJECTIVES

The objectives of the survey were:

- to sample invertebrates from representative examples of the habitats and habitat features present, targeted according to their potential importance, and
- to assess the actual importance for invertebrates of the survey area and its component habitats and habitat features.

## 3 Methods

### 3.1 FIELDWORK TIMING

#### 3.1.1 Fieldwork in 2018

In 2018, one day was allocated to a scoping survey, followed by nine days of survey fieldwork. In practice, the survey effort was spread over 14 visits (Table 1).

**Table 1:** Survey dates and additional comments.

Date	Comments
10th April	Scoping visit.
26th April	Survey visit. Set 3 pitfalls in Wood W1. Set 4 bottle traps in Wood W2.
1st May	Survey visit. Serviced 3 pitfalls in Wood W1. Set 4 pitfalls at the edge of Field F11 adjacent to the ‘Pipeline Strip’. Set 2 pitfalls at the edge of Field F8.
3rd May	Brief survey visit to Winch Hill. Collected Hornbeam branches and set them up in an emergence trap.
21st May	Survey visit. Serviced all traps.
25th May	Survey visit to Wigmore Valley Park.
18th June	Survey visit. Serviced all traps.
22nd June	Survey visit.
5th July	Brief survey visit to Western Periphery.
6th July	Survey visit. Serviced all traps.
17th July	Survey visit.
23rd July	Serviced all traps.



Date	Comments
10th August	Reconnaissance and survey of airside part of the survey area. Serviced all traps.
6th September	Survey visit to airside. Retrieved all remaining traps.

### 3.1.2 Fieldwork in 2019

In 2019, five days were allocated to survey fieldwork. In practice, the survey effort was spread over six visits (Table 2).

**Table 2:** Survey dates and additional comments.

Date	Comments
23rd April	Survey visit. Winch Hill orchard, pipeline strip, Wigmore Valley Park, and the Western Periphery.
9th May	Survey visit. The pipeline strip, Wigmore Valley Park and Wood W1.
21st May	Survey visit. Winch Hill, including the orchard. The Eastern Area, targeting saproxylic habitats.
22nd May	Survey visit. Wigmore Valley Park, including the allotments. Targeted survey for Small Blue butterfly.
18th June	Survey visit. Winch Hill orchard - deployed a Noble Chafer trap. Western Periphery
21st June	Survey visit. White-letter Hairstreak butterfly survey in and near 'old car compartment'. Wigmore Valley Park allotments. Western Periphery (pond-netting in the northern corner). Winch Hill orchard - retrieved Noble Chafer trap.

## 3.2 SAMPLING TECHNIQUES

On each visit, a range of techniques was used, as appropriate, to sample for invertebrates (Table 3).

**Table 3:** Techniques employed on this survey to record invertebrates, and their target groups and target habitats.

Technique	Target groups	Target habitats
Sweep-netting with a 'butterfly net', also known as aerial netting.	Flies (Diptera), bees and wasps (Hymenoptera: Aculeata) and many other insects.	All vegetated habitats, paying particular attention to nectar and pollen sources.

Technique	Target groups	Target habitats
Sweep-netting with a stout canvas net.	Beetles (Coleoptera) and bugs (Heteroptera) and many other insects.	All vegetated habitats, paying particular attention to potential food-plants and to nectar and pollen sources.
Grubbing at ground level, turning over logs, stones, reptile felts, etc.	A wide range of ground-living invertebrates, particularly beetles, bugs, ants (Hymenoptera: Formicidae) woodlice (Isopoda) and molluscs.	Open, unshaded habitats such as grassland and bare ground. Also woodland ground cover.
Suction sampling (also known as vacuum sampling).	A wide range of ground-living invertebrates, as above. Particularly effective for species which are too small, too well-camouflaged or too quick-running to be successfully captured by hand.	Grassland and sparsely-vegetated ground.
Sieving.	Handfuls of material are sieved over a tray to reveal their inhabitants. A good technique for a very wide range of invertebrates.	Various substrates such as dead-wood, fungi, leaf-litter, wood-chip, manure, dung, carrion.
Beating.	Beetles and bugs on the branches, flowers and foliage of shrubs and trees.	Hedges, woodland and trees.
Direct observation.	Bees, wasps, flies, butterflies and moths (Lepidoptera), grasshoppers and crickets (Orthoptera), etc.	All habitats, paying particular attention to nectar and pollen sources.

Dedicated searching for White-letter Hairstreak adults was carried out on 6th July 2018 and 21st June 2019 along the elm hedges in the western boundaries of Field F13 and in the 'old car compartment'.

Wigmore Valley Park was surveyed twice in 2018 during the adult flight period of Small Blue, on 25th May and 22nd June, and again on 22nd May 2019.

### 3.2.1 Aerial Interception trapping

The aerial interception traps used by this project consist of a single 2 litre bottle (Figure 12). Two sections of nearly 180° are cut from opposite sides of the bottle and the resulting flaps joined together internally to present an interception surface (Figure 13). Any flying insects hitting this surface and dropping will end up in the diluted vehicle antifreeze in the bottom of the trap.

Hung against the trunks and major boughs of mature and veteran trees, these traps are excellent at targeting saproxylic invertebrates which fly around such trees, especially those flying into and out of hollows in trees, including many heartwood specialists.



Figure 12: The aerial interception trap design used by this project.



Figure 13: Detail of the aerial interception trap, showing the internal surface of the trap.



Four bottle traps were deployed in Wood W2 from 26th April to 6th September 2018: two on old Hornbeam coppards (TL13930 21266 (Figure 14), TL13916 21271), one on an old coppiced Ash (TL13969 21258), and one on a hollow oak (TL14001 21250).



Figure 14: Aerial interception trap *in situ* on a Hornbeam coppard.

### 3.2.2 Pitfall trapping

Pitfall trapping was carried out in 2018 using 50 cl disposable plastic tumblers, with an internal diameter at the mouth of 86 mm. These cups can be inserted neatly into holes cored with a gardeners' bulb planter, meaning minimal disturbance to the surrounding ground. Cups were set with the mouth flush with the ground surface, or slightly recessed. Each cup was filled to between a third and a half full with dilute vehicle antifreeze. Cups were covered with 12 mm square gauge galvanized wire mesh, pegged down at the edges, to inhibit access by vertebrates.

Three sets of pitfall traps were deployed (Table 4).

**Table 4:** Details of the sets of pitfall traps.

Location	Number of traps	Date span
Wood W1 (TL136213)	3 pitfall cups	26th April to 6th September 2018
Edge of Field F11 adjacent to the 'Pipeline Strip' (TL13419 21797 to TL 13425 21785) (Figure 15)	4 pitfall cups	1st May to 6th July 2018



Location	Number of traps	Date span
Edge of Field F8, south of Winch Hill (TL13722 21598 and TL13718 21609)	2 pitfall cups	1st May to 6th September 2018



Figure 15: Pitfall trap *in situ* at the edge of Field F11, viewing along the 'pipeline strip'.

### 3.2.3 Emergence trapping

An Owen emergence trap was erected in the author's garden and filled with sections of Hornbeam branches, collected from Woods W1 and W2 on 1st May 2018. Branches were selected to cover a range of decay stages from green wood with wilting leaves through to later stage, decorticating branches. Most of the branches selected were attached, self-shaded branches.

The Owen emergence trap is like a small, completely sealed ridge-tent, with a collecting vessel at the apex. Invertebrates emerging from the branches and rising to the apex will be captured and preserved in the trapping fluid (dilute vehicle antifreeze). The trap was serviced at intervals until 11th September 2018.

### 3.2.4 Noble Chafer trapping

A live trap for Noble Chafer was set on one of the Apple trees in the Winch Hill orchard on 18th June 2019 and retrieved on 21st June 2019. This trap functions on a very similar principle to the aerial interception traps above (Section 3.2.1) but with a small vial of a specific Noble Chafer pheromone used as an attractant. This pheromone has been

developed by Dr Deborah Harvey of Royal Holloway, University of London, and this trap and the pheromone were supplied and operated as part of her post-doctoral research on Noble Chafer.

### 3.3 IDENTIFICATION

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

### 3.4 CONSTRAINTS

Invertebrate activity is significantly affected by the weather, which can seriously diminish the effectiveness of some sampling techniques. During fieldwork in 2018, weather conditions only seriously hampered fieldwork on one day, 10th August, when conditions were too wet for fully effective survey, despite a dry weather forecast. On other fieldwork visits, weather conditions were almost entirely good or very good and did not hamper the invertebrate survey (Table 5). The weather conditions encountered on fieldwork in 2019 were rather better and there was only one day (9th May) on which fieldwork was slightly hampered by showers for part of the afternoon (Table 6).

July 2018 saw some extreme weather conditions, with a prolonged period of no rain, resulting in droughted vegetation and very dry ground conditions, noted on all the July visits. These conditions certainly had an impact on invertebrates, detrimental to some, beneficial to others. By contrast, the 2019 survey season saw a prolonged period of persistently wet weather during May and June. While it would always be preferable to conduct a survey during normal weather conditions, it is not clear that the abnormal weather of 2018 and 2019 has negatively impacted the results of this survey.

**Table 5:** Weather conditions during survey visits in 2018.

Date	Weather notes
10th April	Very dull weather with very wet ground conditions. Brightening up later. Cool. Dry.
26th April	Forecast maximum 12 °C. 15 - 17 mph Westerly. Sunny intervals. Dry.
1st May	Forecast maximum 12 °C. 11 - 16 mph South-westerly. Sunny intervals. Dry.
3rd May	Forecast maximum 14 °C. 6 - 7 mph Westerly. Sunny intervals. Dry.
21st May	Forecast maximum 22 °C. 9 mph North-westerly. Sunny. Dry.
25th May	Dull, cool, damp. Light air (F1).
18th June	Forecast maximum 22 °C. Light to Moderate Breeze (F2 - F4). 2/8 cloud cover. Dry.
22nd June	Forecast maximum 22 °C. Gusting to a Fresh Breeze (F5). Cloudless. Dry.
5th July	Forecast maximum 28 °C. Gentle Breeze (F3). 4/8 cloud cover. Dry. Very dry ground conditions.



Date	Weather notes
6th July	Forecast maximum 29 °C. Gentle Breeze (F3). Initially overcast but clearing. Dry. Very dry ground conditions.
17th July	Forecast maximum 29 °C. Light Breeze (F2). 1/8 cloud cover. Dry. Very dry ground conditions, now comparable with the drought of 1976.
23rd July	Forecast maximum 29 °C. Light Breeze (F2). Cloudless. Dry. Very dry ground conditions.
10th August	Forecast maximum 18 °C. Fresh Breeze (F5). 7/8 cloud cover. Wet ground conditions from recent rain. More rain from 10.30.
6th September	Forecast 13 - 18 °C. 9 - 12 mph North-westerly. Partly cloudy. Dry, with brief showers from 15.40.

**Table 6:** Weather conditions during survey visits in 2019.

Date	Weather notes
23rd April	Forecast maximum 20 °C. Gentle Breeze (F3) from the east. Cloudless. Dry.
9th May	Forecast maximum 11 °C. Light Air (F1). Overcast (8/8) and dull. Damp after a wet day on 8th; showery from 13:40 onwards.
21st May	Forecast maximum 19 °C. Light Breeze (F2). 1/8 cumulus cloud cover. Dry and sunny.
22nd May	Forecast maximum 19 °C. Gentle Breeze (F3) from the south-west. 4/8 cloud cover. Dry with sunny intervals.
18th June	Forecast maximum 15 °C. Gentle Breeze (F3) from the south. Overcast and dull. Humid conditions but no rainfall.
21st June	Forecast maximum 25 °C. Variable light winds up to a Gentle Breeze (F3). 4/8 cloud cover. Dry with sunny intervals.

### 3.5 ANALYSIS

#### 3.5.1 Key Species

To assess the importance of a site for invertebrate conservation, the number and percentage of rare or scarce species found may be calculated. Sites of greater importance support higher percentages of rare or scarce species, and this percentage is a useful starting point for assessing the overall importance of a site, in comparison to other sites surveyed using similar techniques.

A standard definition of 'rare or scarce' is essential to allow a fair comparison to be made between sites. For the analyses in this report, species were only included which have been assigned an official rare or scarce conservation status as defined in the box below, and all such species are here called 'Key Species'.

### **Conservation status categories of invertebrates**

A system of conservation statuses has been in use since the British Red Data Book for insects (Shirt, 1987), amended and supplemented by a series of JNCC Nature Conservation reviews. By this system, the rarest and most threatened British species are given one of the Red Data Book (RDB) statuses. Species which do not qualify as RDB but are nonetheless uncommon are given one of the Nationally Scarce statuses. The status categories and criteria of this first version are defined in Appendix 1.1.

A second version of British conservation statuses published in the Species Status series from Natural England and Natural Resources Wales is now gradually replacing the first version. For butterflies, dragonflies, water beetles and several other groups, the most up-to-date British conservation statuses are based on the International Union for Conservation of Nature (IUCN) Red List categories and criteria (IUCN, 2001). This system places less emphasis on rarity and more on factors which suggest a risk of extinction (such as severe declines in range or population). The status categories and criteria of this second version are defined in Appendix 1.2.

A third version of British conservation statuses operates in parallel with the second and is a very simplified version of the first, having just two categories: Nationally Rare or Nationally Scarce. This version is defined in Appendix 1.3.

**Key Species** are here defined as Red Data Book and Nationally Scarce species from version 1, Threatened, Near Threatened and Data Deficient species from version 2, and Nationally Rare or Nationally Scarce species from version 3.

The Key Species may be further divided into **Rare Key Species** (here defined as Red Data Book species from version 1, Threatened and Data Deficient species from version 2, and Nationally Rare species from version 3) and **Scarce Key Species** (the remainder).

There are frequent examples of invertebrates which have been given a conservation status and have subsequently been found to be more widespread and abundant. This may arise either as a result of an actual increase in range or population size, or as a result of improved understanding by entomologists of how to find or identify them. Where the author regards the official conservation status to be out of date, this is indicated in the species accounts (Section 4.6) and is taken into account in the survey area assessment (Section 5).

### **3.5.2 Pantheon**

Pantheon is an analytical tool developed by Natural England and the Centre for Ecology & Hydrology to assist invertebrate nature conservation in England. Users import lists of invertebrates into Pantheon, which can then be used to analyse the species, attaching associated habitats and resources, conservation statuses and other data against them.

Following a testing phase, Pantheon has been available online since April 2018 as a first version (<http://www.brc.ac.uk/pantheon/>).

Some of the most informative outputs of Pantheon are the calculations of Species Quality Index (SQI). Precisely how SQI is calculated is no longer transparent but in Natural England's ISIS application (the predecessor to Pantheon), each species had been allocated to one of six rarity scores (0, 1, 2, 4, 8, 16), with the commonest species scoring 0 and the rarest scoring 16. For an assemblage of species, the mean of their rarity scores, multiplied by 100, yielded

an ISIS Rarity Score for the assemblage. For example, if a survey recorded 46 species from a particular assemblage, and the sum of their 46 species rarity scores was 106, the average of all the individual species rarity scores would be 2.30 (= 106/46) and the ISIS Rarity Score would be 230, derived by multiplying that average by 100. It is presumed that the online Pantheon system calculates SQI by a similar method.

### 3.5.3 Assessing the importance of the survey area

Natural England's pamphlet *Organising surveys to determine site quality for invertebrates: a framework guide for ecologists* (Anon., 2005) advises that 'A survey should classify a site as one of the following:

- 1 Little/ no importance,
- 2 Local/ county importance,
- 3 Regional importance,
- 4 National importance,
- 5 European importance'.

## 4 Results

### 4.1 OVERALL RESULTS

The 2015-16 survey recorded 855 species. The 2018-19 survey recorded 988 species of which 695 were additional to those already recorded in 2015-16. The total combined species list for the 2015-16 and 2018-19 surveys is 1,550 (Appendix 2).

In combination, the 2015-16 and 2018-19 surveys identified invertebrates from a very wide range of groups: water-fleas, woodlice, spiders, harvestmen, mites, centipedes, millipedes, springtails, dragonflies, earwigs, bush-crickets, groundhoppers, grasshoppers, barkflies, psyllids, adelgids, aphids, froghoppers, leafhoppers, planthoppers, bugs, beetles, sawflies, ants, bees, wasps, lacewings, scorpion-flies, flies, fleas, moths, butterflies, slugs and snails.

The 2015-16 survey focused on Lepidoptera, with 313 species recorded, representing 37% of the 2015-16 total species list of 855. The 2018-19 survey aimed to complement the taxonomic coverage achieved by the earlier survey and focused on Coleoptera, with 532 species recorded, representing 54% of the 2018-19 total species list of 988.

### 4.2 SECTION 41 SPECIES

Twenty-one Section 41 insects were recorded by the 2015-16 and 2018-19 surveys combined and are listed in Table 7. Eighteen of the twenty-one are moths or butterflies that are still widespread and common though declining, and belong to the 'research-only' set of Section 41 species. Conservation action for these species is focused on further research rather than protection of individual sites.

Three of the Section 41 insects recorded by the 2015-16 and 2018-19 surveys combined are not 'research-only' species: the Set-aside Downy-back beetle *Ophonus laticollis*, the picture-winged fly *Dorycera graminum*, and the Dingy Skipper butterfly *Erynnis tages*. Further information about these three species is provided in Section 4.5 below.



#### **4.2.1 *Satyrrium w-album* (Lepidoptera: Lycaenidae) White-letter Hairstreak, not recorded**

White-letter Hairstreak was not recorded by this survey, despite targeted survey of elms for adults. It would be incautious to assert that White-letter Hairstreak is definitely absent from the survey area but it is certainly not abundant and easily recorded. It is probably absent but could be present as a small, sparse population, or could occur sporadically as individuals wander from populations nearby.

#### **4.2.2 *Cupido minimus* (Lepidoptera: Lycaenidae) Small Blue, not recorded**

Small Blue was not recorded by this survey. The southern part of Wigmore Valley Park, where this species was recorded in June 2009, supports small areas of short, herb-rich grassland but no Kidney Vetch was seen and in the absence of its host plant, the habitat can no longer be regarded as suitable. It is possible that the extent and quality of habitat for Small Blue has declined since 2009 in the absence of grazing by livestock. More extensive and more detailed survey could reveal this species to be present somewhere within the survey area, but this report concludes that Small Blue is probably absent.

### **4.3 KEY SPECIES**

#### **4.3.1 Overall Key Species results**

The 2015-16 survey recorded 16 Key Species (using the criteria defined in Section 3.5.1) out of a total species list of 855 species. The 2018-19 survey recorded a much greater number of Key Species, 81, out of a rather larger total species list of 988. All the Key Species are listed in Table 8. These rather different results reflect a difference in approach between the two surveyors.

Considering the dataset for the 2015-16 and 2018-19 surveys combined, 91 Key Species were recorded out of a total combined species list of 1,550. Six Key Species were recorded by both the 2015-16 and 2018-19 surveys.

#### **4.3.2 Key Species analysis**

Key Species analysis has been applied only to the results of the 2018-19 survey, as this is the only dataset for which the author has comparable data from other surveys carried out under comparable circumstances.

Amongst the 988 species recorded by the 2018-19 survey, 81 species are here regarded as Key Species. These 81 species comprise 8.2% of the total species list of 988.

Within the 81 Key Species, there were 10 Rare Key Species. These 10 species comprise 1.0% of the total species list of 988. Species accounts for all of the Rare Key Species are provided in Section 4.6.

Note that four of the 21 Section 41 species recorded are also Key Species.

**Table 7:** The Section 41 Species of insect recorded by the 2015-16 and 2018-19 surveys combined. The table is in taxonomic order. The final two columns indicate which species were recorded by the 2015-16 and 2018-19 surveys.

Order	Family	Species (scientific name)	Species (English name)	Section 41 Status	Other Conservation Statuses	2015-16	2018-19
Coleoptera	Carabidae	<i>Ophonus laticollis</i>	Set-aside Downy-back	S41	NT, NS		✓
Diptera	Ulidiidae	<i>Dorycera graminum</i>	a picture-winged fly	S41	pNT <sup>2</sup>	✓	✓
Lepidoptera	Hepialidae	<i>Hepialus humuli</i>	Ghost Moth	S41 (research only)		✓	
Lepidoptera	Hesperiidae	<i>Erynnis tages</i>	Dingy Skipper	S41	VU		✓
Lepidoptera	Satyridae	<i>Coenonympha pamphilus</i>	Small Heath	S41 (research only)	NT		✓
Lepidoptera	Drepanidae	<i>Watsonalla binaria</i>	Oak Hook-tip	S41 (research only)		✓	
Lepidoptera	Geometridae	<i>Timandra comae</i>	Blood-vein	S41 (research only)		✓	✓
Lepidoptera	Geometridae	<i>Scotopteryx chenopodiata</i>	Shaded Broad-bar	S41 (research only)		✓	
Lepidoptera	Geometridae	<i>Ennomos fuscantaria</i>	Dusky Thorn	S41 (research only)		✓	
Lepidoptera	Arctiidae	<i>Spilosoma lubricipeda</i>	White Ermine	S41 (research only)		✓	
Lepidoptera	Arctiidae	<i>Spilosoma lutea</i>	Buff Ermine	S41 (research only)		✓	
Lepidoptera	Arctiidae	<i>Tyria jacobaeae</i>	Cinnabar	S41 (research only)		✓	✓
Lepidoptera	Noctuidae	<i>Diarsia rubi</i>	Small Square-spot	S41 (research only)		✓	
Lepidoptera	Noctuidae	<i>Leucania comma</i>	Shoulder-striped Wainscot	S41 (research only)		✓	
Lepidoptera	Noctuidae	<i>Allophytes oxyacanthae</i>	Green-brindled Crescent	S41 (research only)		✓	
Lepidoptera	Noctuidae	<i>Agrochola litura</i>	Brown-spot Pinion	S41 (research only)		✓	
Lepidoptera	Noctuidae	<i>Acronicta psi</i>	Grey Dagger	S41 (research only)		✓	
Lepidoptera	Noctuidae	<i>Amphipyra tragopoginis</i>	Mouse Moth	S41 (research only)		✓	
Lepidoptera	Noctuidae	<i>Apamea remissa</i>	Dusky Brocade	S41 (research only)		✓	
Lepidoptera	Noctuidae	<i>Litoligia literosa</i>	Rosy Minor	S41 (research only)		✓	
Lepidoptera	Noctuidae	<i>Caradrina morpheus</i>	Mottled Rustic	S41 (research only)		✓	

<sup>2</sup> The 'p' prefix indicates that this is a provisional status assessment.

Invertebrate survey at London Luton Airport in 2018 and 2019

**Table 8:** The Key Species of invertebrates recorded by the 2015-16 and 2018-19 surveys combined. The table is ordered by conservation status category starting with the rarest/ most threatened species. The final two columns indicate which species were recorded by the 2015-16 and 2018-19 surveys.

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015-16	2018-19
Insecta	Lepidoptera	Hesperiidae	<i>Erynnis tages</i>	Dingy Skipper	VU, S41		✓
Insecta	Coleoptera	Salpingidae	<i>Lissodema cursor</i>	a beetle	LC, NR		✓
Insecta	Coleoptera	Coccinellidae	<i>Clitostethus arcuatus</i>	a ladybird	RDB1		✓
Insecta	Coleoptera	Coccinellidae	<i>Nephus quadrimaculatus</i>	a ladybird	RDB2		✓
Insecta	Hemiptera: Heteroptera	Miridae	<i>Lygus pratensis</i>	a mirid bug	RDB3		✓
Insecta	Coleoptera	Throscidae	<i>Trixagus gracilis</i>	a beetle	RDB3		✓
Insecta	Lepidoptera	Noctuidae	<i>Calophasia lunula</i>	Toadflax Brocade	RDB3		✓
Insecta	Coleoptera	Leiodidae	<i>Ptomaphagus varicornis</i>	a beetle	RDBK		✓
Insecta	Coleoptera	Staphylinidae	<i>Amarochara forticornis</i>	a rove-beetle	RDBK		✓
Insecta	Coleoptera	Cryptophagidae	<i>Atomaria lohsei</i>	a beetle	RDBK		✓
Insecta	Lepidoptera	Noctuidae	<i>Hecatera dysodea</i>	Small Ranunculus	RDBK	✓	
Insecta	Diptera	Tachinidae	<i>Cistogaster globosa</i>	a parasitic fly	NT (Falk, Pont & Chandler, 2005)		✓
Insecta	Coleoptera	Carabidae	<i>Ophonus laticollis</i>	Set-aside Downy-back	NT, NS, S41		✓
Insecta	Lepidoptera	Satyridae	<i>Coenonympha pamphilus</i>	Small Heath	NT, S41 (research only)		✓
Insecta	Diptera	Ulidiidae	<i>Dorycera graminum</i>	a picture-winged fly	pNT, S41	✓	✓
Arachnida	Araneae	Mimetidae	<i>Ero aphana</i>	a spider	LC, NS		✓
Arachnida	Araneae	Dictynidae	<i>Argenna subnigra</i>	a spider	LC, NS		✓
Insecta	Coleoptera	Carabidae	<i>Amara montivaga</i>	a ground beetle	LC, NS		✓
Insecta	Coleoptera	Carabidae	<i>Amara consularis</i>	a ground beetle	LC, NS		✓
Insecta	Coleoptera	Carabidae	<i>Ophonus azureus</i>	a ground beetle	LC, NS		✓
Insecta	Coleoptera	Carabidae	<i>Brachinus crepitans</i>	Bombardier Beetle	LC, NS		✓
Insecta	Coleoptera	Cantharidae	<i>Rhagonycha lutea</i>	a soldier-beetle	LC, NS		✓



Invertebrate survey at London Luton Airport in 2018 and 2019

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015-16	2018-19
Insecta	Coleoptera	Cantharidae	<i>Malthodes pumilus</i>	a soldier-beetle	LC, NS	✓	✓
Insecta	Coleoptera	Dermestidae	<i>Dermestes murinus</i>	a beetle	LC, NS		✓
Insecta	Coleoptera	Mycetophagidae	<i>Pseudotriphyllus suturalis</i>	a beetle	LC, NS		✓
Insecta	Coleoptera	Mycetophagidae	<i>Triphyllus bicolor</i>	a beetle	LC, NS		✓
Insecta	Coleoptera	Melandryidae	<i>Orchesia micans</i>	a false darkling beetle	LC, NS		✓
Insecta	Coleoptera	Melandryidae	<i>Orchesia minor</i>	a false darkling beetle	LC, NS		✓
Insecta	Coleoptera	Melandryidae	<i>Abdera biflexuosa</i>	a false darkling beetle	LC, NS		✓
Insecta	Coleoptera	Melandryidae	<i>Anisoxya fuscula</i>	a false darkling beetle	LC, NS		✓
Insecta	Coleoptera	Mordellidae	<i>Mordellistena neuwaldeggiana</i>	a tumbling flower-beetle	LC, NS	✓	✓
Insecta	Coleoptera	Mordellidae	<i>Mordellistena parvula</i>	a tumbling flower-beetle	LC, NS		✓
Insecta	Coleoptera	Mordellidae	<i>Mordellistena variegata</i>	a tumbling flower-beetle	LC, NS	✓	
Insecta	Coleoptera	Aderidae	<i>Aderus populneus</i>	a beetle	LC, NS		✓
Insecta	Coleoptera	Scraptiidae	<i>Anaspis thoracica</i>	a beetle	LC, NS	✓	✓
Insecta	Coleoptera	Chrysomelidae	<i>Phyllotreta cruciferae</i>	a flea-beetle	LC, NS		✓
Insecta	Coleoptera	Chrysomelidae	<i>Longitarsus strigicollis</i>	a flea-beetle	LC, NS		✓
Insecta	Coleoptera	Chrysomelidae	<i>Longitarsus ganglbaueri</i>	a flea-beetle	LC, NS		✓
Insecta	Coleoptera	Chrysomelidae	<i>Psylliodes luteola</i>	a flea-beetle	LC, NS		✓
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Iassus scutellaris</i>	a leafhopper	Nationally Scarce (Na)		✓
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Aphanus rolandri</i>	a ground-bug	Nationally Scarce (Na)		✓
Insecta	Coleoptera	Staphylinidae	<i>Ocyopus nitens</i>	a rove-beetle	Nationally Scarce (Na)		✓
Insecta	Coleoptera	Silvanidae	<i>Uleiota planatus</i>	a beetle	Nationally Scarce (Na)		✓
Insecta	Coleoptera	Anthribidae	<i>Anthribus fasciatus</i>	a weevil	Nationally Scarce (Na)		✓
Insecta	Coleoptera	Curculionidae	<i>Polydrusus formosus</i>	a weevil	Nationally Scarce (Na)		✓
Insecta	Coleoptera	Curculionidae	<i>Rhinocyllus conicus</i>	a weevil	Nationally Scarce (Na)	✓	✓

Invertebrate survey at London Luton Airport in 2018 and 2019

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015-16	2018-19
Insecta	Coleoptera	Curculionidae	<i>Magdalis barbicornis</i>	a weevil	Nationally Scarce (Na)		✓
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Lasius brunneus</i>	Brown Tree Ant	Nationally Scarce (Na)		✓
Insecta	Hymenoptera: Aculeata	Apidae	<i>Lasioglossum pauxillum</i>	Lobe-spurred Furrow-bee	Nationally Scarce (Na)	✓	✓
Insecta	Lepidoptera	Yponomeutidae	<i>Ochsenheimeria vacculella</i>	Cereal Stem-moth	Nationally Scarce A		✓
Insecta	Hemiptera: Auchenorrhyncha	Delphacidae	<i>Asiraca clavicornis</i>	a planthopper	Nationally Scarce (Nb)		✓
Insecta	Hemiptera: Heteroptera	Berytidae	<i>Berytinus hirticornis</i>	a stiltbug	Nationally Scarce (Nb)		✓
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Megalonotus antennatus</i>	a ground-bug	Nationally Scarce (Nb)		✓
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Raglius alboacuminatus</i>	a ground-bug	Nationally Scarce (Nb)		✓
Insecta	Coleoptera	Silphidae	<i>Nicrophorus interruptus</i>	a sexton beetle	Nationally Scarce (Nb)		✓
Insecta	Coleoptera	Elateridae	<i>Athous campyloides</i>	a click-beetle	Nationally Scarce (Nb)		✓
Insecta	Coleoptera	Cerylonidae	<i>Cerylon fagi</i>	a beetle	Nationally Scarce (Nb)		✓
Insecta	Coleoptera	Coccinellidae	<i>Scymnus femoralis</i>	a ladybird	Nationally Scarce (Nb)	✓	
Insecta	Coleoptera	Coccinellidae	<i>Hippodamia variegata</i>	Adonis' Ladybird	Nationally Scarce (Nb)		✓
Insecta	Coleoptera	Corylophidae	<i>Orthoperus nigrescens</i>	a beetle	Nationally Scarce (Nb)		✓
Insecta	Coleoptera	Ciidae	<i>Cis festivus</i>	a beetle	Nationally Scarce (Nb)		✓
Insecta	Coleoptera	Anthribidae	<i>Anthribus nebulosus</i>	a weevil	Nationally Scarce (Nb)		✓
Insecta	Coleoptera	Apionidae	<i>Protapion filirostre</i>	a weevil	Nationally Scarce (Nb)		✓
Insecta	Coleoptera	Apionidae	<i>Catapion pubescens</i>	a weevil	Nationally Scarce (Nb)		✓
Insecta	Coleoptera	Curculionidae	<i>Larinus carlinae</i>	a weevil	Nationally Scarce (Nb)		✓
Insecta	Coleoptera	Curculionidae	<i>Magdalis cerasi</i>	a weevil	Nationally Scarce (Nb)		✓

Invertebrate survey at London Luton Airport in 2018 and 2019

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015-16	2018-19
Insecta	Coleoptera	Curculionidae	<i>Acalles ptinoides</i>	a weevil	Nationally Scarce (Nb)		✓
Insecta	Coleoptera	Curculionidae	<i>Orthochaetes setiger</i>	a weevil	Nationally Scarce (Nb)		✓
Insecta	Coleoptera	Curculionidae	<i>Glocianus punctiger</i>	a weevil	Nationally Scarce (Nb)		✓
Insecta	Coleoptera	Curculionidae	<i>Tychius pusillus</i>	a weevil	Nationally Scarce (Nb)		✓
Insecta	Coleoptera	Curculionidae	<i>Scolytus mali</i>	a bark-beetle	Nationally Scarce (Nb)		✓
Insecta	Coleoptera	Platypodidae	<i>Platypus cylindrus</i>	Oak Pin-hole Borer	Nationally Scarce (Nb)		✓
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Ponera coarctata</i>	an ant	Nationally Scarce (Nb)		✓
Insecta	Hymenoptera: Aculeata	Eumenidae	<i>Microdynerus exilis</i>	a mason wasp	Nationally Scarce (Nb)		✓
Insecta	Hymenoptera: Aculeata	Apidae	<i>Lasioglossum malachurum</i>	Sharp-collared Furrow-bee	Nationally Scarce (Nb)		✓
Insecta	Hymenoptera: Aculeata	Apidae	<i>Melitta tricincta</i>	Red Bartsia Bee	Nationally Scarce (Nb)	✓	
Insecta	Lepidoptera	Gracillariidae	<i>Leucospilapteryx omissella</i>	Mugwort Slender	Nationally Scarce B	✓	
Insecta	Lepidoptera	Sesiidae	<i>Synanthedon tipuliformis</i>	Currant Clearwing	Nationally Scarce (Nb)		✓
Insecta	Lepidoptera	Sesiidae	<i>Bembecia ichneumoniformis</i>	Six-belted Clearwing	Nationally Scarce (Nb)	✓	
Insecta	Lepidoptera	Tortricidae	<i>Cydia conicolana</i>	Pine-cone Piercer	Nationally Scarce B	✓	
Insecta	Lepidoptera	Pterophoridae	<i>Gillmeria ochrodactyla</i>	Tansy Plume	Nationally Scarce B	✓	
Insecta	Lepidoptera	Noctuidae	<i>Xestia stigmatica</i>	Square-spotted Clay	Nationally Scarce (Nb)	✓	
Insecta	Coleoptera	Leiodidae	<i>Catops longulus</i>	a beetle	Nationally Scarce		✓
Insecta	Coleoptera	Staphylinidae	<i>Sepedophilus testaceus</i>	a rove-beetle	Nationally Scarce		✓
Insecta	Coleoptera	Staphylinidae	<i>Oxypoda spectabilis</i>	a rove-beetle	Nationally Scarce		✓
Insecta	Coleoptera	Staphylinidae	<i>Anotylus insecatus</i>	a rove-beetle	Nationally Scarce		✓
Insecta	Coleoptera	Staphylinidae	<i>Sunius melanocephalus</i>	a rove-beetle	Nationally Scarce		✓



Invertebrate survey at London Luton Airport in 2018 and 2019

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015-16	2018-19
Insecta	Coleoptera	Nitidulidae	<i>Meligethes atramentarius</i>	a pollen beetle	Nationally Scarce	✓	
Insecta	Coleoptera	Cryptophagidae	<i>Atomaria punctithorax</i>	a beetle	Nationally Scarce		✓
Insecta	Diptera	Tipulidae	<i>Ctenophora pectinicornis</i>	a long-palped crane fly	Nationally Scarce		✓
Insecta	Diptera	Hybotidae	<i>Platypalpus rapidus</i>	a hybotid fly	Nationally Scarce		✓

#### 4.4 PANTHEON RESULTS

The list of 1,550 species from the 2015-16 and 2018-19 surveys combined was entered into Pantheon. Two species were unmatched, so Pantheon processed a list of 1,548 species. Pantheon covers 1,369 of the 1,548 taxa processed.

Within that subset, three Broad Biotopes were well-represented (i.e., represented by 15 or more species), and are detailed in Table 9. The only other Broad Biotope represented in the survey data was, anomalously, the coastal Broad Biotope with only three species recorded.

The 91 Key Species recorded from the survey area have each been assigned to a broad biotope where possible, informed by Pantheon but also drawing upon personal knowledge and other sources (Appendix 3).

**Table 9:** The Broad Biotopes represented in the survey area, with the number of included species, the percentage of the national assemblage this represents and the Species Quality Index (SQI). The numbers of Section 41 and Key Species are derived from Pantheon and other sources.

Broad Biotope	No. of species	% representation	SQI	No. of S41 Species (excluding 'research only')	No. of Key Species (Appx 3)
open habitats	709	16	122	3	48
tree-associated	474	13	134	0	38
wetland	48	2	100	0	0

The broad biotopes may be further subdivided, revealing important variation between the subsets. Within the 'open habitats' broad biotope, the 'tall sward & scrub' subset supports many more species (557) than the 'short sward & bare ground' subset (147 species) but with a much lower Species Quality Index (116 versus 153 for 'short sward & bare ground') (Table 10). Amongst the 'tree-associated' species, those which belong to the 'decaying wood' subset are not the most numerous but they have a much higher Species Quality Index (166) than either the 'arboreal' (SQI = 120) or 'shaded woodland floor' (SQI = 104) subsets.

**Table 10:** The subsets of Broad Biotopes represented in the survey area, with the number of included species, the percentage of the national assemblage this represents and the Species Quality Index (SQI).

Broad Biotope	Subset	No. of species	% representation	SQI
open habitats	tall sward & scrub	557	21	116
open habitats	short sward & bare ground	147	11	153
tree-associated	arboreal	254	19	120
tree-associated	decaying wood	150	13	166

Broad Biotope	Subset	No. of species	% representation	SQI
tree-associated	shaded woodland floor	79	7	104

#### 4.5 SECTION 41 SPECIES ACCOUNTS

Species accounts are provided here for all of the S41 Species which are not ‘research-only’ species, describing the ecology and distribution of the species in Britain, followed by details of their occurrence during the current survey. Accounts are presented in the same order as in Table 7.

These accounts may make reference to ‘vice-counties’: a fixed set of 112 areas covering the whole of Britain which have been used by biological recorders since 1852 (see box). The London Luton Airport survey area straddles the boundary between two vice-counties: Bedfordshire (VC 30) and Hertfordshire (VC 20). The vice-county boundary largely follows the boundary between Luton Borough and North Hertfordshire District but deviates for a short section at the eastern end of the runway (Figure 16).

**Vice-counties** are subdivisions of Great Britain used largely for the purposes of biological recording and other scientific data-gathering.

The vice-counties are based on the ancient counties of Britain, but often subdividing these boundaries to create smaller, more uniform units, and considering exclaves to be part of the vice-county in which they locally lie. They provide a stable basis for recording using similarly-sized units, and, although grid-based recording has grown in popularity, they remain a standard in the vast majority of ecological surveys, allowing data collected over long periods of time to be compared easily.

The vice-counties (often referred to as ‘Watsonian vice-counties’) were introduced by Hewett Cottrell Watson who first used them in the third volume of his *Cybele Britannica* published in 1852. He refined the system in later volumes. The vice-counties remain unchanged by subsequent local government reorganisations, allowing historical and modern data to be more accurately compared.

Every vice-county in Britain has a name, and additionally, they are numbered from 1 to 112.



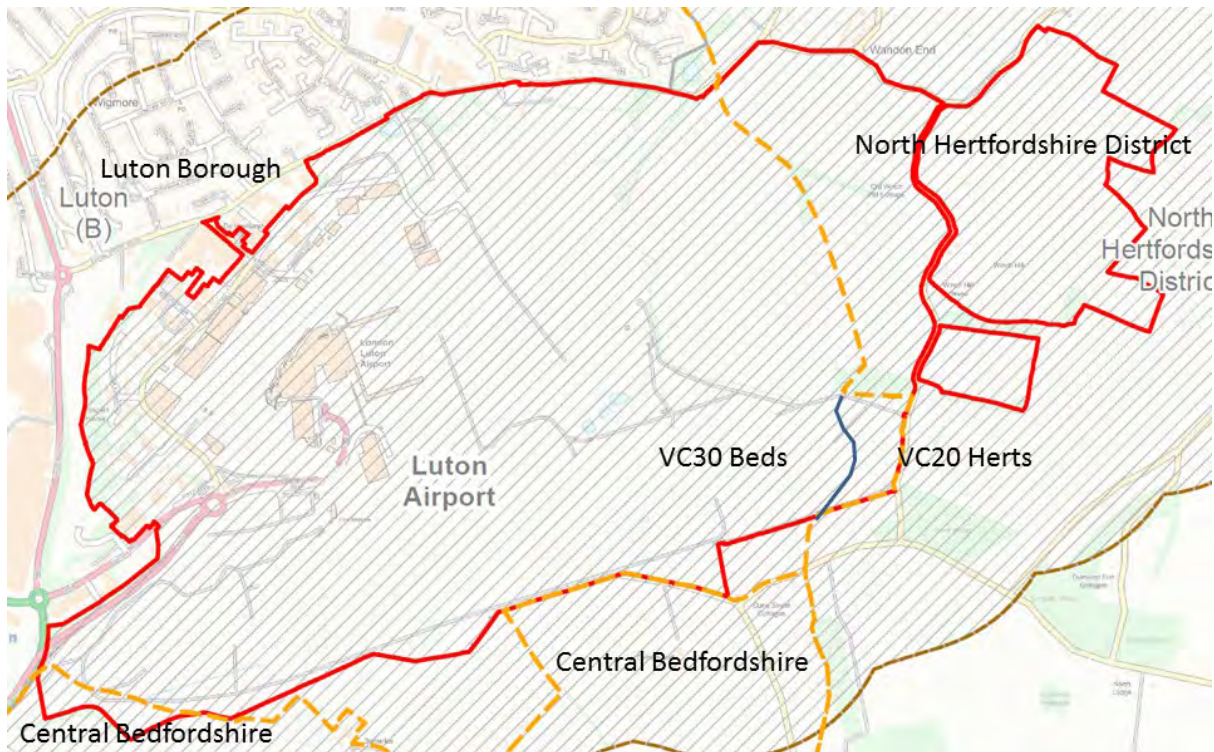


Figure 16: The survey area showing the vice-county boundary (blue line) where it deviates from the modern administrative boundary. Contains Ordnance Survey data © Crown copyright and database right 2017.

***Ophonus laticollis* (Coleoptera: Carabidae) Set-aside Downy-back, NT, NS, S41**

A seed-feeding ground beetle (Figure 17) of arable field edges and margins and other disturbed ground on calcareous soils. Typically found adjacent to thick hedges with tussocks and accumulations of leaf litter. In the review of the Biodiversity Action Plan ground beetles carried out by the author in 2005, *Ophonus laticollis* was estimated to have declined by 74% over a 25-year period, contracting from a formerly wide scatter across southern England before 1970 to just the counties of Oxfordshire, Cambridgeshire, Norfolk and Suffolk since 1970 (Telfer, 2009). There have been subsequent records from South Hampshire, Buckinghamshire and Hertfordshire. There has thus been an amelioration or reversal of the decline and this beetle is currently assessed as Near Threatened (Telfer, 2016).



Figure 17: Set-aside Downy-back *Ophonus laticollis*.

On the current survey, two individuals were pitfall-trapped on the chalky edge of arable field F8 between 21st May and 18th June 2018.

***Dorycera graminum* (Diptera: Ulidiidae) a picture-winged fly, pNT, S41**

Often called the Phoenix Fly, this is a large picture-winged fly (Figure 18) with a southern British distribution concentrated in the Thames Estuary but extending northwards to Warwickshire. Its ecological requirements are not well understood. It occurs on a wide range of grasslands, growing on a range of soil types, typically with some anthropogenic disturbance (Ismay, 2000). *D. graminum* was assessed as Rare (RDB3) by Falk (1991) but the provisional assessment of Falk *et al.* (2016) is of a Near Threatened species. Adults may be found from mid-May to the end of June, exceptionally into July.





Figure 18: The picture-winged fly *Dorycera graminum*.

Recorded from Area A (Wigmore Valley Park) by the 2015-16 survey. On the current survey, a singleton was seen on shrub foliage at the western edge of Field F11 (adjacent to Wigmore Valley Park) on 22nd June 2018.

***Erynnis tages* (Lepidoptera: HesperIIDae) Dingy Skipper, VU, S41**

The Dingy Skipper butterfly *Erynnis tages* (Figure 19) occurs in a wide range of habitats in Britain which support its usual foodplant, Common Bird's-foot-trefoil *Lotus corniculatus*. Habitats include downland, coastal cliffs and grassland, and disturbed sites such as verges, sidings and post-industrial sites. Ideal conditions occur where there is a good population of the host plant, growing in a sparse sward, often including some bare ground, and in a sunny, sheltered microclimate. Colonies tend to be small and very restricted (Asher *et al.*, 2001). Dingy Skipper was listed as Vulnerable in Britain by Fox *et al.* (2010), indicating that on the best available evidence it is facing a high risk of extinction in the wild.





Figure 19: Dingy Skipper butterfly photographed at Wigmore Valley Park.

On the current survey, five individuals were observed on the southernmost, south-facing slope of Wigmore Valley Park on 22nd May 2019.

#### 4.6 RARE KEY SPECIES ACCOUNTS

Species accounts are provided here for each of the Rare Key Species. Accounts are presented in the same order as in Table 8.

##### ***Erynnis tages* (Lepidoptera: Hesperiiidae) Dingy Skipper, VU, S41**

See Section 41 species accounts (Section 4.5).

##### ***Lissodema cursor* (Coleoptera: Salpingidae) a beetle, LC, NR**

A saproxylic beetle which is exclusively associated with Ash, occurring on dead and dying twigs and branches, typically in the high canopy. Usually found on mature trees. It is a predatory insect in both the adult and larval stages. It has a mostly south-eastern and eastern distribution in England, extending westwards to Oxfordshire and northwards to Derbyshire and Cheshire (Hyman and Parsons, 1992; Alexander, 2002).

On the current survey, four individuals were beaten from a veteran Ash at the corner of Fields F2/F5/F6 (TL14282169) on 17th July 2018. It is exceptional to record this rare species in numbers.

***Clitostethus arcuatus* (Coleoptera: Coccinellidae) a ladybird, RDB1**

One of the smaller coccinellids, and one which is readily identifiable from the paler 'horseshoe mark' on the elytra. It is a predator of whitefly and may be found on ivy and a range of other trees, shrubs and climbers. Most records are from Surrey but there are scattered records in southern Britain with outliers in south Wales, East Norfolk and the north Midlands (Roy *et al.*, 2011).

On the current survey, one was found by beating ivy on an oak tree in the Eastern Area on 21st May 2019.

***Nephus quadrimaculatus* (Coleoptera: Coccinellidae) a ladybird, RDB2**

This is one of the smaller coccinellids, black with four orange spots on the wing-cases. This species has been known from Britain since the 19th century but only as a rare species. It was regarded as Vulnerable (RDB2) by Hyman and Parsons (1992). However, it was discovered in Kent in the early 1990s and by the turn of the millennium had become common in much of Surrey (Hawkins, 2000) being found on ivy on trees and walls. It has continued to become commoner and more widespread in recent years, though it is still largely restricted to south-east England and East Anglia (Roy *et al.*, 2011). It undoubtedly no longer merits RDB status, and this is recognised within Pantheon which lists its status in square brackets: '[RDB2]'.

On the current survey, one was beaten from an ivy-clad oak on the south side of Darley Road (north edge of Field F13) on 22nd June 2018.

***Lygus pratensis* (Hemiptera: Heteroptera: Miridae) a mirid bug, RDB3**

This is a large mirid bug (Figure 20). It was formerly known in southern England from Kent to Hampshire and north to Berkshire, mostly confined to rides in ancient woodland, open herb-rich areas and heathland. However, in recent years this bug has undergone a dramatic range expansion. It is now widespread throughout much of southern Britain and undoubtedly no longer merits rare or even scarce conservation status. This is recognised within Pantheon which lists its status in square brackets: '[RDB3]'. On the continent it is known to be polyphagous (Kirby, 1992).



Figure 20: The mirid bug *Lygus pratensis*.

On the current survey, this species was recorded quite widely from the airside part of the airport, from Wigmore Valley Park, and from the Eastern Area, during July to September 2018 and April to May 2019.

***Trixagus gracilis* (Coleoptera: Throscidae) a beetle, RDB3**

This species was known until recently by British coleopterists as *Trixagus elateroides*. It is not regarded as a saproxylic but probably develops at the roots of trees and shrubs, feeding on ectotrophic mycorrhizae. In the past it has most often been recorded from coastal shingle, saltmarsh and other coastal and estuarine habitats but also inland from parkland and wood-pasture habitats. This occurrence in dual habitats is peculiar and raises the question of whether all records relate to a single species. More recently, and adding further confusion, there has been a distinct increase in inland records, including from man-made habitats such as urban shrubberies, green roofs and post-industrial habitats.

On the current survey, a male was swept at the Fire Training Area (airside) on 6th September 2018.

***Calophasia lunula* (Lepidoptera: Noctuidae) Toadflax Brocade, RDB3**

This moth was first recorded in Britain on the West Sussex coast in 1939 as a suspected immigrant. Caterpillars were first found in Britain at Dungeness, West Kent in 1952 and the breeding range has since extended along the south coast into West Sussex. Adult moths have been recorded more widely from Dorset to Suffolk, mostly on the coast, and with outlying records in Cornwall, South Wales and northern England (Waring and Townsend, 2003; ukmoths.org.uk; NBN). It inhabits shingle beaches and other disturbed habitats with



extensive bare ground. The distinctive caterpillars (Figure 21) feed on Purple Toadflax as well as other species of toadflax. It undoubtedly no longer merits its conservation status, and this is recognised within Pantheon which lists its status in square brackets: '[RDB3]'.



Figure 21: Caterpillar of Toadflax Brocade.

On the current survey, a caterpillar was recorded from disturbed ground within the airside part of the airport on 6th September 2018.

***Ptomaphagus varicornis* (Coleoptera: Leiodidae) a beetle, RDBK**

Beetles of this genus are thought to be associated with the nests and runs of small mammals where they are presumed to be scavengers. *P. varicornis* is usually recorded on chalk soils by sampling moss or leaf-litter but information on its habitat preferences is very poor. There are scattered old (pre-1970) records from southern England. Since 1970 it has been recorded from at least South Wiltshire, Surrey, Hertfordshire and West Norfolk (Hyman and Parsons, 1994; Darby, 2009; Andrew Duff, pers. comm., May 2012; James, 2018).

On the current survey, a female was pitfall-trapped from chalky arable field edge habitat between the 'pipeline strip' and Field F11, between 21st May and 18th June 2018.

***Amarochara forticornis* (Coleoptera: Staphylinidae) a rove-beetle, RDBK**

This is an aleocharine rove-beetle but is a relatively distinctive species within a difficult group. The species has been recorded from coastal habitats (an estuary and from coastal shingle) and inland from sandpits and in flood debris in riverine floodplains. Its ecological requirements are rather obscure. This seems to be a poorly known species which may spend most of its time deep in the soil, perhaps in mammal burrows, with rare visits to the soil surface (Tronquet, 2006). Adults have been recorded in March and April (Hyman and Parsons, 1994).

On the current survey, four were pitfall-trapped from chalky arable field edge habitat between the 'pipeline strip' and Field F11, between 1st and 21st May 2018.

***Atomaria lohsei* (Coleoptera: Cryptophagidae) a beetle, RDBK**

*Atomaria* is quite a large and difficult genus of small, mostly brown beetles. *Atomaria lohsei* was first collected in Britain in the New Forest in 1972 (Johnson, 1976). By the publication of Johnson (1993), it could be mapped from six hectads in South Hampshire, Buckinghamshire, East Suffolk, West Norfolk and South-west Yorkshire. It has continued to establish in Britain and expand its range, with additional records now known from Surrey, Anglesey and north Norfolk. This species is associated with planted conifers and the evidence now points strongly to this being a non-native species in Britain. Were the conservation status of this species to be reassessed, it would no longer be a Key Species for the purposes of this report.

On the current survey, one was recorded at the edge of field F7 on 21st May 2019, where it is probably associated with the Larch and pines in the plantation woodland to the north of this field.

***Hecatera dysodea* (Lepidoptera: Noctuidae) Small Ranunculus, RDBK**

This once common moth apparently became extinct in Britain with no records between 1939 and 1997. In the latter year, two adults were recorded from a garden in Kent, heralding a rapid recolonisation of southern Britain centred on the Thames Estuary in Kent and Essex but extending westwards to Monmouthshire and northwards to South Lancashire (Waring and Townsend, 2003; NBN). If its conservation status were to be revised, it would no longer merit RDB status. Caterpillars (Figure 22) feed on wild and cultivated species of lettuce *Lactuca* and can be found in vegetable plots as well as in a wide range of open, disturbed habitats.



Figure 22: Caterpillar of Small Ranunculus.

Recorded from Area B (the Eastern Area) by the 2015-16 survey.

**4.7 NEW AND SIGNIFICANT COUNTY RECORDS**

For site assessment purposes, any survey area which yields a large number or proportion of species which are new for the county, or are significant county records, is likely to be of at least county importance.

Beetles were well covered, particularly by the 2018 survey, and there are recent documents available on the beetle faunas of both Bedfordshire (vice-county (VC) 30) and Hertfordshire (VC 20). For Bedfordshire, reference has been made to a draft county checklist prepared in October 2016 and updated to March 2018 by the county weevil recorder Dr Wilf Powell. For Hertfordshire, beetle recording has been more thorough and the results have been collated by Trevor James (2018) in *Beetles of Hertfordshire*. Hertfordshire Rare (HR) and Hertfordshire Extinct (HE) conservation statuses are assigned in James (2018) for species which have no national conservation status but are rare (thought to occur in five or fewer localities) or extinct in Hertfordshire.

Of the 570 species of beetle recorded from the survey area by the 2015-16 and 2018-19 surveys combined, 49 species are not known from Bedfordshire (Table 11).

For the more thoroughly recorded fauna of Hertfordshire, 11 beetle species were recorded for which there is no previous Hertfordshire record (Table 11). In addition to the Key Species, a further 29 species were recorded which have Hertfordshire Rare (HR) status, two species were recorded which were thought to be possibly Hertfordshire Extinct (HE?) and at least four other species are noteworthy records for the county with few previous records or no records for several decades.

No equivalent effort has been made to compare the results of these surveys with the county checklists for other invertebrate groups. However, it may be noted that one of the Key Species, the Cereal Stem-moth *Ochsenheimeria vacculella* was recorded new to Bedfordshire.



**Table 11:** New and significant county beetle records for the vice-counties of Bedfordshire (VC 30) and Hertfordshire (VC 20).

Family	Species (scientific name)	Species (English name)	Conservation Status	2016	2018	Known from Beds?	Known from Herts?	Herts Conservation Status	Herts comment
Carabidae	<i>Nebria salina</i>	a ground beetle	LC		✓			HR	
Carabidae	<i>Poecilus versicolor</i>	a ground beetle	LC	✓				HR	
Carabidae	<i>Amara montivaga</i>	a ground beetle	LC, NS		✓		No		
Carabidae	<i>Amara consularis</i>	a ground beetle	LC, NS		✓		No		
Carabidae	<i>Harpalus rubripes</i>	a ground beetle	LC		✓			HR?	
Carabidae	<i>Harpalus tardus</i>	a ground beetle	LC		✓			HR?	
Carabidae	<i>Ophonus azureus</i>	a ground beetle	LC, NS		✓			HE?	Not since 1926.
Carabidae	<i>Ophonus puncticeps</i>	a ground beetle	LC		✓			HR	
Histeridae	<i>Plegaderus vulneratus</i>	a beetle	LC		✓	No	No		
Histeridae	<i>Onthophilus striatus</i>	a beetle	LC		✓			HR	
Ptiliidae	<i>Ptenidium laevigatum</i>	a featherwing beetle	None		✓	No			
Ptiliidae	<i>Acrotrichis rosskotheni</i>	a featherwing beetle	None		✓	No			
Leiodidae	<i>Catops fuscus</i>	a beetle	None		✓	No			
Silphidae	<i>Necrodes littoralis</i>	a sexton beetle	None	✓		No			
Staphylinidae	<i>Tachyporus tersus</i>	a rove-beetle	None		✓	No			1 record, 1945
Staphylinidae	<i>Parabolitobius inclinans</i>	a rove-beetle	None		✓				Not since 1923
Staphylinidae	<i>Oxypoda acuminata</i>	a rove-beetle	None		✓	No			
Staphylinidae	<i>Amarochara forticornis</i>	a rove-beetle	RDBK		✓	No	No		
Staphylinidae	<i>Phloeopora scribae</i>	a rove-beetle	None		✓	No			
Staphylinidae	<i>Amischa nigrofusca</i>	a rove-beetle	None		✓		No		

Invertebrate survey at London Luton Airport in 2018 and 2019

Family	Species (scientific name)	Species (English name)	Conservation Status	2016	2018	Known from Beds?	Known from Herts?	Herts Conservation Status	Herts comment
Staphylinidae	<i>Cadaverota cadaverina</i>	a rove-beetle	None		✓	No			Not since 1930
Staphylinidae	<i>Atheta divisa</i>	a rove-beetle	None		✓	No			
Staphylinidae	<i>Aleochara lata</i>	a rove-beetle	None		✓	No			
Staphylinidae	<i>Aleochara funebris</i>	a rove-beetle	None		✓	No			
Staphylinidae	<i>Leptusa ruficollis</i>	a rove-beetle	None		✓	No			
Staphylinidae	<i>Bolitochara bella</i>	a rove-beetle	None		✓	No			
Staphylinidae	<i>Placusa pumilio</i>	a rove-beetle	None		✓	No			
Scarabaeidae	<i>Hoplia philanthus</i>	Welsh Chafer	LC		✓	No			
Throscidae	<i>Trixagus gracilis</i>	a beetle	RDB3		✓	No			
Sphindidae	<i>Aspidiphorus orbiculatus</i>	a beetle	None	✓				HR	
Nitidulidae	<i>Soronia grisea</i>	a beetle	None		✓			HR	
Nitidulidae	<i>Meligethes brunnicornis</i>	a pollen beetle	None		✓	No			
Nitidulidae	<i>Meligethes ruficornis</i>	a pollen beetle	None		✓	No			
Nitidulidae	<i>Meligethes symphyti</i>	a pollen beetle	None		✓	No			
Phalacridae	<i>Phalacrus corruscus</i>	a beetle	None		✓			HR	
Cryptophagidae	<i>Henoticus serratus</i>	a beetle	None	✓				HR	
Cryptophagidae	<i>Cryptophagus denticulatus</i>	a beetle	None		✓	No			
Cryptophagidae	<i>Antherophagus similis</i>	a beetle	None		✓	No			
Cryptophagidae	<i>Atomaria lohsei</i>	a beetle	RDBK		✓	No	No		
Cryptophagidae	<i>Atomaria rubella</i>	a beetle	None		✓	No			
Cerylonidae	<i>Cerylon fagi</i>	a beetle	Nationally Scarce (Nb)		✓	No			

Invertebrate survey at London Luton Airport in 2018 and 2019

Family	Species (scientific name)	Species (English name)	Conservation Status	2016	2018	Known from Beds?	Known from Herts?	Herts Conservation Status	Herts comment
Alexiidae	<i>Sphaerosoma pilosum</i>	a beetle	None		✓			HR	
Coccinellidae	<i>Rhyzobius forestieri</i>	a ladybird	None		✓	No	No		
Coccinellidae	<i>Rhyzobius lophanthae</i>	a ladybird	None		✓	No			
Coccinellidae	<i>Nephus redtenbacheri</i>	a ladybird	None	✓	✓			HR	
Coccinellidae	<i>Clitostethus arcuatus</i>	a ladybird	RDB1		✓	No			
Coccinellidae	<i>Scymnus haemorrhoidalis</i>	a ladybird	None		✓			HR	
Coccinellidae	<i>Henosepilachna argus</i>	Bryony Ladybird	None		✓	No	No		
Corylophidae	<i>Orthoperus aequalis</i>	a beetle	None		✓		No		
Corylophidae	<i>Orthoperus corticalis</i>	a beetle	None		✓	No			
Latridiidae	<i>Corticarina similata</i>	a beetle	None		✓	No			
Mycetophagidae	<i>Mycetophagus piceus</i>	a beetle	LC		✓			HR	
Mycetophagidae	<i>Eulagius filicornis</i>	a beetle	NA		✓	No			
Ciidae	<i>Cis fagi</i>	a beetle	None		✓			HR	
Ciidae	<i>Cis festivus</i>	a beetle	Nationally Scarce (Nb)		✓	No			
Ciidae	<i>Cis pygmaeus</i>	a beetle	None		✓	No		HR	
Ciidae	<i>Cis vestitus</i>	a beetle	None		✓			HR	
Ciidae	<i>Orthocis alni</i>	a beetle	None		✓			HR?	
Melandryidae	<i>Abdera biflexuosa</i>	a false darkling beetle	LC, NS		✓	No			



Invertebrate survey at London Luton Airport in 2018 and 2019

Family	Species (scientific name)	Species (English name)	Conservation Status	2016	2018	Known from Beds?	Known from Herts?	Herts Conservation Status	Herts comment
Melandryidae	<i>Anisoxya fuscula</i>	a false darkling beetle	LC, NS		✓	No			
Tenebrionidae	<i>Nalassus laevioctostriatus</i>	a darkling beetle	LC	✓				HR	
Salpingidae	<i>Lissodema cursor</i>	a beetle	LC, NR		✓	No			
Salpingidae	<i>Sphaeriestes castaneus</i>	a beetle	LC		✓			HR (HE?)	1st since 1924
Aderidae	<i>Aderus populneus</i>	a beetle	LC, NS		✓	No			
Cerambycidae	<i>Molorchus minor</i>	Spruce Shortwing Beetle	None		✓			HR	
Cerambycidae	<i>Obrium brunneum</i>	Brown Longhorn	None		✓			HR	
Chrysomelidae	<i>Bruchidius imbricornis</i>	a seed-beetle	NA		✓	No			
Chrysomelidae	<i>Chrysolina banksii</i>	a leaf-beetle	LC		✓	No		HR	
Chrysomelidae	<i>Longitarsus exsoletus</i>	a flea-beetle	LC		✓			HR?	
Chrysomelidae	<i>Longitarsus strigicollis</i>	a flea-beetle	LC, NS		✓	No			
Chrysomelidae	<i>Longitarsus ganglbaueri</i>	a flea-beetle	LC, NS		✓	No			
Chrysomelidae	<i>Longitarsus gracilis</i>	a flea-beetle	LC	✓	✓	No		HR	
Chrysomelidae	<i>Psylliodes luteola</i>	a flea-beetle	LC, NS		✓	No			
Attelabidae	<i>Apoderus coryli</i>	Hazel Leaf-roller Weevil	None		✓			HR	
Apionidae	<i>Holotrichapion aethiops</i>	a weevil	None		✓			HR	
Curculionidae	<i>Otiorhynchus aurifer</i>	a weevil	None		✓	No			
Curculionidae	<i>Sitona lineellus</i>	a weevil	None	✓			No		

Invertebrate survey at London Luton Airport in 2018 and 2019

Family	Species (scientific name)	Species (English name)	Conservation Status	2016	2018	Known from Beds?	Known from Herts?	Herts Conservation Status	Herts comment
Curculionidae	<i>Amalus scortillum</i>	a weevil	None		✓			HR	
Curculionidae	<i>Glocianus distinctus</i>	a weevil	None		✓			HR	
Curculionidae	<i>Ceutorhynchus chalybaeus</i>	a weevil	None		✓			HR	Not since 1940-47
Curculionidae	<i>Hylastes attenuatus</i>	a bark-beetle	None		✓	No	No		
Curculionidae	<i>Scolytus mali</i>	a bark-beetle	Nationally Scarce (Nb)		✓				Not since c. 1920-30
Curculionidae	<i>Pityophthorus pubescens</i>	a bark-beetle	None		✓	No			
Platypodidae	<i>Platypus cylindrus</i>	Oak Pin-hole Borer	Nationally Scarce (Nb)		✓	No			

## 5 Survey area assessment

This survey area assessment is based on a species list of 1,550 species from the 2015-16 and 2018-19 surveys combined, and on a species list of 988 species from the 2018-19 survey alone. These are long species lists and should be more than adequate for making a robust and accurate assessment of the survey area.

### 5.1 OVERALL ASSESSMENT

Key Species analysis was applied to the results of the 2018-19 survey. 81 Key Species were found, comprising 8.2% of the 988 species found by this survey in total. Compared to other sites proposed for development (i.e., excluding sites in nature conservation management) which the author has surveyed under comparable circumstances, this is high and clearly above average, the mean being 5.26% (standard deviation = 3.26, sample size = 70). This statistic suggests that the Luton Airport survey area is a site of county importance for invertebrate conservation.

As mentioned in Section 3.5.1, there are frequent examples of invertebrate conservation statuses which are becoming out of date and inaccurate. Such is the case for 22 of the Key Species recorded by this survey: see Appendix 3. The remaining 59 Key Species may be regarded as having accurate conservation statuses.

Any potential bias caused by the out of date and inaccurate conservation statuses of some of the Key Species needs to be pointed out here and needs to be taken into account when making the site assessment. This survey recorded a rather high proportion (just over a quarter) of Key Species with out of date and inaccurate conservation statuses. However, the 59 accurately-rated Key Species make up 6.0% of the total species list of 988, and this still clearly indicates a survey area of importance at the county level.

Ten Rare Key Species were found, comprising 1.0% of the 988 species found by this survey in total. Compared to other sites proposed for development which the author has surveyed, this is rather above average, the mean being 0.72% (standard deviation = 0.93, sample size = 70). However, five of the ten may be regarded as having out of date and inaccurate conservation statuses (Appendix 3), which would reduce the percentage to 0.50%. This suggests that the survey area is not of national importance, but is still consistent with county importance.

The overall assessment should also take account of the presence of three Section 41 species (discounting the 18 'research only' moths and butterflies): the Set-aside Downy-back beetle *Ophonus laticollis*, the picture-winged fly (or Phoenix Fly) *Dorycera graminum*, and the Dingy Skipper butterfly *Erynnis tages*. All three are of principal importance for invertebrate conservation at a national level.

The survey area has been found to support 49 beetle species for which there is no previous Bedfordshire record and 11 beetle species with no previous Hertfordshire record, as well as at least 35 beetles which are Rare, Extinct or noteworthy in a Hertfordshire context. These figures provide strong supporting evidence of a survey area of county importance.

Taking all this evidence into account, the overall assessment of the Luton Airport survey area is of a site of high importance for invertebrate conservation at the county level.

This assessment is consistent with the assessment by Telfer (2012) that both the wooded habitats and the open grassland habitats at Luton Airport are of county importance for



invertebrate conservation. It is also consistent with the assessment by Plant (2017) that the areas surveyed 'warrant the label of County Significance'.

## 5.2 KEY HABITATS AND HABITAT FEATURES

Pantheon identified that the survey area supports a large assemblage of species of 'open habitats' and a large assemblage of 'tree-associated' species; both these broad biotopes will be the subject of more detailed treatment in this section.

The representation of 'wetland' species is comparatively very small. Pantheon recognises only 48 wetland species compared to 709 species of 'open habitats' and 474 'tree-associated' species. None of the Key Species is associated with wetland habitats. Consequently the various ponds within the survey area which provide wetland habitats do not contribute to the county importance of the survey area for invertebrates, and are not here regarded as Key Habitats. Wetland habitats within the survey area may, of course, receive different assessments regarding their importance for vertebrates or plants.

### 5.2.1 Open habitats

The 'open habitats' are probably the most important habitat for invertebrates at the Luton Airport survey area. The Species Quality Index for the broad biotope is not high at 122 but 48 Key Species and all three of the Section 41 species are associated with 'open habitats'. A high proportion of the Key Species are more particularly associated with the 'short sward & bare ground' habitat with a high Species Quality Index of 153. Open habitats with taller swards and less disturbance, including grassland habitats which are developing into scrub, were of relatively lower importance with a Species Quality Index of 116.

Thus, a Key Habitat for invertebrates within the survey area is 'short sward & bare ground', which covers the following.

- Arable margins, field edges and field corners, especially on drier, chalkier soils (Figure 23). Such habitat is restricted to the arable farmland of the Eastern Area, and it is here that the Section 41 species Set-aside Downy-back beetle *Ophonus laticollis* was recorded, as well as two of the accurately-rated Rare Key Species of open habitats (the beetle *Ptomaphagus varicornis* and the rove-beetle *Amarochara forticornis*).
- Disturbed areas with much bare ground, and sparsely developed ruderal vegetation. The most important examples of such habitat were around the edges of the airside part of the airport, seemingly where the ground has been disturbed by work to remove scrub (Figure 24). Such habitats may be quite short-lived and the example shown in Figure 24 had been replaced by fresh earthworks by May 2019 (Figure 25).
- Shorter, more flower-rich grassland swards. Such grasslands occur in small patches in all parts of the survey area (Figure 26). The most important patch of this habitat was in the southern part of Wigmore Valley Park, where a population of Dingy Skipper was found (Figure 27). Although short-sward grassland may be maintained on a small scale by trampling or by very dry soil conditions, it is usually the grazing activities of rabbits which allows short grasslands to develop and persist, without succeeding to taller grassland and scrub.



Figure 23: Chalky arable margin of Field F8. Set-aside Downy-back *Ophonus laticollis* was found here.



Figure 24: Disturbed ground with ruderal vegetation, following scrub removal on the airside part of the survey area.





Figure 25: Fresh earthworks near the north-eastern periphery of the airside zone in May 2019.



Figure 26: Flower-rich, short grassland within the old car compartment of the Eastern Area.





Figure 27: Grassland in the southernmost part of Wigmore Valley Park supporting a population of Dingy Skipper butterfly.

### 5.2.2 Trees, hedges and woodland

The assemblage of 'tree-associated' invertebrates recorded from the Luton Airport survey area is smaller, with 474 recorded species (compared to 709 species of 'open habitats') and supports slightly fewer of the Key Species (38, compared to 48 for 'open habitats') but with a slightly higher Species Quality Index of 134 (compared to 122 for 'open habitats'). None of the Section 41 species was a 'tree-associated' species and only two of the accurately-rated Rare Key Species belong to this assemblage: the ladybird *Clitostethus arcuatus* and the beetle *Lissodema cursor*. The Luton Airport survey area supports an important assemblage of 'tree-associated' invertebrates but of slightly lesser importance than the 'open habitats' assemblage.

Trees are particularly important for saproxylic invertebrates within the Luton Airport survey area. Saproxylic invertebrates (Pantheon's 'decaying wood' assemblage) yielded a high Species Quality Index of 166, the highest of any assemblage subset (Table 10). Of the 38 'tree associated' Key Species, 24 are saproxylic species. The remaining subsets of the 'tree-associated' assemblage cover phytophagous species of the arboreal canopy and species of the 'shaded woodland floor', both with low Species Quality Indices (120 and 104 respectively) and supporting the remaining 14 Key Species between them.

Saproxylic invertebrates can be associated with trees and shrubs of all ages, growing in isolation or within hedges and woods, provided there is some damage or decay. However,

the rarer saproxylic species tend to be associated with ‘veteran trees’<sup>3</sup>: large-girth trees which are mature or over-mature and exhibiting decay features such as hollows, sap-runs, rot-holes and decaying branches. It is the veteran trees which are of greatest conservation importance at the Luton Airport survey area.

The Key Habitats for tree-associated invertebrates at the Luton Airport survey area are the broad-leaved woods of the Eastern Area and Wigmore Valley Park as well as the hedges and field boundary trees. Some of the most important individual trees occur in field boundaries but the woodlands also contain a number of veteran trees, especially at their boundaries.

## 6 Recommendations

In view of the Luton Airport survey area’s high importance for invertebrate conservation in a county context, and to have regard for the presence of Section 41 species, the following recommendations are made.

### 6.1 OPEN HABITATS

Impacts of development on the ‘short sward & bare ground’ Key Habitats should be avoided as far as possible. Any unavoidable losses should be minimised.

There is scope to compensate for any losses. The invertebrate habitats found in arable margins, field edges and field corners are relatively simple to create and maintain. For example, areas of arable land on chalky soil could be taken out of crop production while continuing with annual cultivation. The resulting habitat should develop a rich flora of arable plants and would provide a block of habitat analogous to the narrow line of arable edge habitat currently found around the fields.

The invertebrates of other disturbed and sparsely-vegetated habitats (e.g., Figure 5, Figure 24) could also be provided with compensatory habitat by similar means. Even quite small patches of land may provide valuable habitat for invertebrates, including interstitial greenspace within and around developments. Where possible, the extent of managed lawn and shrubbery should be minimised, in favour of unmanaged natural colonisation by plants and invertebrates.

Where existing habitat is to be lost, and compensatory habitat is to be created, the compensatory habitat should be available and suitable for colonisation, before the loss of existing habitat. This would give invertebrates a chance of persisting by colonising the compensatory habitat before their existing habitat is lost. In the case of these arable edge and other disturbed, sparsely-vegetated habitats, any compensatory habitat created could be expected to be suitable in the first full growing season after creation.

Shorter, flower-rich grassland swards are less easy to re-create so there should be a greater impetus to avoid or minimise impacts on these patches of habitat. Rabbit populations should be allowed to persist alongside the shorter, flower-rich grasslands on which they graze.

If the area which supports a population of Dingy Skipper butterfly, at the southern end of Wigmore Valley Park (Figure 28), cannot be retained, then it is strongly recommended that an area of compensatory habitat of similar area should be provided to ensure the persistence of this population of the butterfly. Suitable compensatory habitat may best be

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<sup>3</sup> The use of the term ‘veteran trees’ in this report follows the Natural England guidance (Read, 2000).



provided by translocating turfs from the existing habitat, containing Common Bird's-foot Trefoil, the butterfly's foodplant.



Figure 28: The area at the south end of Wigmore Valley Park which supports a population of Dingy Skipper. Map data ©2019 Google Imagery ©2019 , DigitalGlobe, Getmapping plc, Infoterra Ltd & Bluesky, The GeoInformation Group.

## 6.2 TREES, HEDGES AND WOODLAND

It is recommended that the proposed development should, as far as possible, retain all the broad-leaved woods of the Eastern Area and Wigmore Valley Park as well as the hedges and field boundary trees. It is important that the hedgerows are retained as well as the trees which they contain, as the hedgerows provide important resources such as flowering shrubs, and facilitate dispersal of invertebrates between trees.

It is particularly important to avoid impacts to woods, hedges and trees as these are habitats which cannot be re-created either quickly or simply, especially given that the most important features are the veteran trees.

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## 8 References

- Alexander, K.N.A. (2002). *The invertebrates of living and decaying timber in Britain and Ireland. A provisional annotated checklist*. English Nature Research Reports, number 467. Peterborough: English Nature.
- Anon. (2005). *Organising surveys to determine site quality for invertebrates: a framework guide for ecologists*. Peterborough: English Nature.
- Asher, J., Warren, M., Fox, R., Harding, P., Jeffcoate, G. and Jeffcoate, S. (2001). *The millennium atlas of butterflies in Britain and Ireland*. Oxford: Oxford University Press.
- Darby, M. (2009). *Wiltshire beetles. History, status, distribution and use in site assessment*. Sutton Mandeville: Malthouse Books.
- Falk, S. (1991). *A review of the scarce and threatened flies of Great Britain (part 1)*. Research and survey in nature conservation, number 39. Peterborough: Nature Conservancy Council.
- Falk, S.J., Ismay, J.W. and Chandler, P.J. (2016). *A provisional assessment of the status of Acalyptatae flies in the UK*. Natural England Commissioned Reports number 217. Natural England.
- Fox, R., Warren, M.S., Brereton, T.M., Roy, D.B. and Robinson, A. (2010). A new Red List of British butterflies. *Insect Conservation and Diversity*, **4**, 159 - 172.
- Hawkins, R.D. (2000). *Ladybirds of Surrey*. Woking: Surrey Wildlife Trust.
- Hyman, P.S. (revised by Parsons, M.S.) (1992). *A review of the scarce and threatened Coleoptera of Great Britain. Part 1*. UK Nature Conservation, number 3. Peterborough: Joint Nature Conservation Committee.
- Hyman, P.S. (revised by Parsons, M.S.) (1994). *A review of the scarce and threatened Coleoptera of Great Britain. Part 2*. UK Nature Conservation, number 12. Peterborough: Joint Nature Conservation Committee.
- Ismay, J.W. (2000). *The status, distribution and biology of Dorycera graminum (Fabricius) (Diptera, Ulidiidae)*. English Nature Research Reports number 395. Peterborough: English Nature.
- IUCN (2001). *IUCN Red List Categories and Criteria: version 3.1. Prepared by the IUCN Species Survival Commission*. Gland, Switzerland: International Union for Conservation of Nature.
- James, T.J. (2018). *Beetles of Hertfordshire*. St Albans: Hertfordshire Natural History Society.
- Johnson, C. (1976). Nine species of Coleoptera new to Britain. *Entomologist's monthly magazine*, **111** (for 1975), 177 - 183.
- Johnson, C. (1993). *Provisional atlas of the Cryptophagidae-Atomariinae (Coleoptera) of Britain and Ireland*. Huntingdon: Biological Records Centre.

- Kirby, P. (1992). *A review of the scarce and threatened Hemiptera of Great Britain*. UK Nature Conservation number 2. Peterborough: Joint Nature Conservation Committee.
- Plant, C. (2017). *Luton Airport Invertebrate Survey Report (R.0)*. Report by Capita for LLAL.
- Read, H. (2000). *Veteran Trees: A guide to good management*. IN13. Peterborough: Natural England.
- Roy, H., Brown, P., Frost, R. and Poland, R. (2011). *The ladybirds (Coccinellidae) of Britain and Ireland*. Wallingford: Biological Records Centre.
- Shirt, D.B. (ed.) (1987). *British Red Data Books: 2. Insects*. Peterborough: Nature Conservancy Council.
- Telfer, M.G. (2009). *Monitoring Ophonus laticollis at Gallows Hill, Thetford*. Unpublished report for the Norfolk Biodiversity Partnership.
- Telfer, M.G. (2012). *Invertebrate survey of Luton Airport: final report*. Survey report to Arup.
- Telfer, M.G. (2016). *Species Status Review. A review of the beetles of Great Britain: Ground Beetles (Carabidae)*. Species Status, number 25. Natural England Commissioned Reports, number 189. Peterborough: Natural England.
- Telfer, M.G. (2018). *Invertebrate survey at London Luton Airport*. Report to Ove Arup & Partners Ltd.
- Tronquet, M. (2006). *Catalogue iconographique des Coléoptères des Pyrénées-Orientales. Vol. 1: Staphylinidae*. Supplément au Tome XV de la Revue de l'Association Roussillonnaise d'Entomologie. Perpignan: Association Roussillonnaise d'Entomologie.
- Waring, P. and Townsend, M. (2003). *Field guide to the moths of Great Britain and Ireland*. Hook: British Wildlife Publishing.

## **Appendix 1: British Conservation Status Categories – Definitions.**

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

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

#### **Red Data Book category EXTINCT (RDB Extinct)**

Definition Species which were formerly native to Britain but have not been recorded since 1900.

#### **Red Data Book category 1, Endangered (RDB1)**

Definition Species in danger of extinction and whose survival is unlikely if causal factors continue to operate. Endangered species either (a) occur as only a single population within one 10-km square, or (b) only occur in especially vulnerable habitats, or (c) have been declining rapidly or continuously for twenty years or more to the point where they occur in five or fewer 10-km squares, or (d) may already have become extinct.

#### **Red Data Book category 2, Vulnerable (RDB2)**

Definition Species which are likely to move into the Endangered category in the near future if causal factors continue to operate. Vulnerable species are declining throughout their range or occupy vulnerable habitats.

#### **Red Data Book category 3, Rare (RDB3)**

Definition Species which occur in small populations and although not currently either Endangered or Vulnerable are at risk. Rare species exist in 15 or fewer 10-km squares, or are more widespread than this but dependent on small areas of especially vulnerable habitat.

#### **Red Data Book category I, Indeterminate (RDBi)**

Note: Best written as 'RDBi' rather than 'RDBI' as the latter is easily confused with 'RDB1' (Endangered).

Definition Species considered to be either Endangered, Vulnerable or Rare but with insufficient information to say which.

#### **Red Data Book category K, Insufficiently Known (RDBK)**

Definition Species suspected to merit either Endangered, Vulnerable, Rare or Indeterminate status but lacking sufficient information. Species included in this category may have only recently been discovered in Britain, or may be very poorly recorded for a variety of reasons.

#### **Nationally Scarce Category A (Na)**

Definition Species which do not fall within Red Data Book categories but which are nonetheless uncommon in Great Britain and thought to occur in 30 or fewer (typically between 16 and 30) 10-km squares of the National Grid, or for less well-recorded groups, in seven or fewer vice-counties.

#### **Nationally Scarce Category B (Nb)**

Definition Species which do not fall within Red Data Book categories but which are nonetheless uncommon in Great Britain and thought to occur in between 31 and 100 10-km



squares of the National Grid, or for less well-recorded groups, between eight and twenty vice-counties.

**Nationally Scarce (N)**

**Definition** Species which do not fall within Red Data Book categories but which are nonetheless uncommon in Great Britain. This status category has been used where information has not been sufficient to allocate a species to either Na or Nb. These species are thought to occur in between 16 and 100 10-km squares of the National Grid.

**Note:** the terms 'Nationally Scarce' and 'Nationally Notable' are synonymous. For consistency in this report, the term 'Nationally Scarce' is preferred, even where the original source used 'Nationally Notable'.

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

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

### **Critically Endangered (CR)**

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

### **Endangered (EN)**

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

### **Vulnerable (VU)**

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

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

### **Data Deficient (DD)**

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

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

### **Near Threatened (NT)**

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

### **Least Concern (LC)**

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

### **Not Applicable (NA)**

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

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

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

#### **Nationally Rare (NR)**

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

#### **Nationally Scarce (NS)**

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



## Appendix 2: List of invertebrates recorded at London Luton Airport by Colin Plant Associates (2015-16) and Mark G. Telfer (2018-19).

Key Species and Section 41 species are listed in **red text**. The table is in taxonomic sequence. Full details of all records generated by the 2018 and 2019 surveys are held in a computer database by the author that may be consulted if required to provide further information such as precise localities, grid references, quantity, sex and life-stage.

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015-16	2018-19
Branchiopoda	Cladocera	Daphniidae	<i>Daphnia magna</i>	a water-flea	None		1
Malacostraca	Isopoda	Trichoniscidae	<i>Trichoniscus provisorius/pusillus</i>	Common Pygmy Woodlouse	LC	1	1
Malacostraca	Isopoda	Philosciidae	<i>Philoscia muscorum sens. str.</i>	a common striped woodlouse	LC	1	1
Malacostraca	Isopoda	Platyarthridae	<i>Platyarthrus hoffmannseggii</i>	Ant Woodlouse	LC		1
Malacostraca	Isopoda	Oniscidae	<i>Oniscus asellus</i>	Common Shiny Woodlouse	LC	1	1
Malacostraca	Isopoda	Armadillidiidae	<i>Armadillidium nasatum</i>	a pill-woodlouse	LC		1
Malacostraca	Isopoda	Armadillidiidae	<i>Armadillidium vulgare</i>	Common Pill-woodlouse	LC	1	1
Malacostraca	Isopoda	Porcellionidae	<i>Porcellio scaber</i>	Common Rough Woodlouse	LC	1	1
Malacostraca	Isopoda	Trachelipidae	<i>Trachelipus rathkii</i>	a woodlouse	LC		1
Arachnida	Araneae	Dysderidae	<i>Dysdera erythrina</i>	a spider	LC		1
Arachnida	Araneae	Dysderidae	<i>Harpactea hombergi</i>	a spider	LC		1
<b>Arachnida</b>	<b>Araneae</b>	<b>Mimetidae</b>	<b><i>Ero aphana</i></b>	<b>a spider</b>	<b>LC, NS</b>		<b>1</b>
Arachnida	Araneae	Theridiidae	<i>Steatoda nobilis</i>	a spider	LC		1
Arachnida	Araneae	Theridiidae	<i>Phylloneta sisyphia</i>	a spider	LC	1	
Arachnida	Araneae	Theridiidae	<i>Enoplognatha thoracica</i>	a spider	LC		1
Arachnida	Araneae	Linyphiidae	<i>Walckenaeria acuminata</i>	a spider	LC		1
Arachnida	Araneae	Linyphiidae	<i>Dismodicus bifrons</i>	a spider	LC		1
Arachnida	Araneae	Linyphiidae	<i>Maso sundevalli</i>	a spider	LC		1

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Arachnida	Araneae	Linyphiidae	<i>Oedothorax fuscus</i>	a spider	LC	1	
Arachnida	Araneae	Linyphiidae	<i>Oedothorax retusus</i>	a spider	LC	1	
Arachnida	Araneae	Linyphiidae	<i>Cnephalocotes obscurus</i>	a spider	LC		1
Arachnida	Araneae	Linyphiidae	<i>Tiso vagans</i>	a spider	LC	1	
Arachnida	Araneae	Linyphiidae	<i>Monocephalus fuscipes</i>	a spider	LC		1
Arachnida	Araneae	Linyphiidae	<i>Diplocephalus latifrons</i>	a spider	LC		1
Arachnida	Araneae	Linyphiidae	<i>Diplocephalus picinus</i>	a spider	LC		1
Arachnida	Araneae	Linyphiidae	<i>Erigone atra</i>	a spider	LC	1	1
Arachnida	Araneae	Linyphiidae	<i>Microneta viaria</i>	a spider	LC		1
Arachnida	Araneae	Linyphiidae	<i>Diplostyla concolor</i>	a spider	LC		1
Arachnida	Araneae	Linyphiidae	<i>Tenuiphantes tenuis</i>	a spider	LC	1	1
Arachnida	Araneae	Linyphiidae	<i>Tenuiphantes zimmermanni</i>	a spider	LC		1
Arachnida	Araneae	Linyphiidae	<i>Tenuiphantes flavipes</i>	a spider	LC		1
Arachnida	Araneae	Linyphiidae	<i>Linyphia hortensis</i>	a spider	LC	1	
Arachnida	Araneae	Linyphiidae	<i>Neriene peltata</i>	a spider	LC		1
Arachnida	Araneae	Tetragnathidae	<i>Tetragnatha montana</i>	a spider	LC	1	
Arachnida	Araneae	Tetragnathidae	<i>Pachygnatha degeeri</i>	a spider	LC		1
Arachnida	Araneae	Araneidae	<i>Gibbaranea gibbosa</i>	a spider	LC	1	1
Arachnida	Araneae	Araneidae	<i>Araneus diadematus</i>	a spider	LC	1	
Arachnida	Araneae	Araneidae	<i>Araneus quadratus</i>	a spider	LC	1	
Arachnida	Araneae	Araneidae	<i>Nuctenea umbratica</i>	a spider	LC	1	1
Arachnida	Araneae	Araneidae	<i>Araniella opisthographa</i>	a spider	LC	1	
Arachnida	Araneae	Lycosidae	<i>Pardosa palustris</i>	a spider	LC		1
Arachnida	Araneae	Lycosidae	<i>Pardosa pullata</i>	a spider	LC	1	1
Arachnida	Araneae	Lycosidae	<i>Pardosa prativaga</i>	a spider	LC	1	1
Arachnida	Araneae	Lycosidae	<i>Pardosa amentata</i>	a spider	LC		1

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Arachnida	Araneae	Lycosidae	<i>Pardosa nigriceps</i>	a spider	LC		1
Arachnida	Araneae	Lycosidae	<i>Pardosa saltans</i>	a spider	LC		1
Arachnida	Araneae	Lycosidae	<i>Alopecosa pulverulenta</i>	a spider	LC		1
Arachnida	Araneae	Lycosidae	<i>Trochosa ruricola</i>	a spider	LC		1
Arachnida	Araneae	Lycosidae	<i>Trochosa terricola</i>	a spider	LC		1
Arachnida	Araneae	Pisauridae	<i>Pisaura mirabilis</i>	a spider	LC	1	1
Arachnida	Araneae	Agelenidae	<i>Eratigena duellica</i>	a spider	LC		1
Arachnida	Araneae	Agelenidae	<i>Eratigena agrestis</i>	a spider	LC	1	
Arachnida	Araneae	Hahniidae	<i>Hahnia nava</i>	a spider	LC		1
Arachnida	Araneae	Dictynidae	<i>Dictyna arundinacea</i>	a spider	LC	1	1
Arachnida	Araneae	Dictynidae	<i>Argenna subnigra</i>	a spider	LC, NS		1
Arachnida	Araneae	Clubionidae	<i>Clubiona lutescens</i>	a spider	LC		1
Arachnida	Araneae	Clubionidae	<i>Clubiona compta</i>	a spider	LC	1	
Arachnida	Araneae	Gnaphosidae	<i>Zelotes latreillei</i>	a spider	LC		1
Arachnida	Araneae	Gnaphosidae	<i>Drassyllus pusillus</i>	a spider	LC		1
Arachnida	Araneae	Gnaphosidae	<i>Micaria pulicaria</i>	a spider	LC		1
Arachnida	Araneae	Philodromidae	<i>Philodromus dispar</i>	a spider	LC		1
Arachnida	Araneae	Philodromidae	<i>Philodromus cespitum</i>	a spider	LC	1	
Arachnida	Araneae	Philodromidae	<i>Philodromus albidus</i>	a spider	LC	1	
Arachnida	Araneae	Philodromidae	<i>Tibellus oblongus</i>	a spider	LC	1	
Arachnida	Araneae	Thomisidae	<i>Diaea dorsata</i>	a spider	LC		1
Arachnida	Araneae	Thomisidae	<i>Xysticus cristatus</i>	a spider	LC		1
Arachnida	Araneae	Thomisidae	<i>Xysticus kochi</i>	a spider	LC		1
Arachnida	Araneae	Thomisidae	<i>Ozyptila sanctuaria</i>	a spider	LC		1
Arachnida	Araneae	Salticidae	<i>Euophrys frontalis</i>	a jumping spider	LC	1	
Arachnida	Araneae	Salticidae	<i>Talavera aequipes</i>	a jumping spider	LC		1
Arachnida	Opiliones	Nemastomatidae	<i>Nemastoma bimaculatum</i>	a harvestman	None		1



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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Arachnida	Opiliones	Trogulidae	<i>Anelasmacephalus cambridgei</i>	a harvestman	None		1
Arachnida	Opiliones	Sclerosomatidae	<i>Homalenotus quadridentatus</i>	a harvestman	None		1
Arachnida	Opiliones	Phalangidae	<i>Paroligolophus agrestis</i>	a harvestman	None	1	
Arachnida	Opiliones	Phalangidae	<i>Mitopus morio</i>	a harvestman	None	1	
Arachnida	Opiliones	Phalangidae	<i>Phalangium opilio</i>	a harvestman	None	1	1
Arachnida	Opiliones	Phalangidae	<i>Platybunus triangularis</i>	a harvestman	None		1
Arachnida	Opiliones	Leiobunidae	<i>Dicranopalpus caudatus/ramosus</i>	a harvestman	None		1
Arachnida	Opiliones	Leiobunidae	<i>Leiobunum rotundum</i>	a harvestman	None	1	1
Arachnida	Acari	Eriophyidae	<i>Aceria macrorhynchus</i>	a mite	None	1	
Arachnida	Acari	Eriophyidae	<i>Colomerus vitis</i>	a mite	None		1
Arachnida	Acari	Eriophyidae	<i>Eriophyes convolvens</i>	a mite	None		1
Arachnida	Acari	Eriophyidae	<i>Phyllocoptes goniothorax</i>	a mite	None	1	
Chilopoda	Geophilomorpha	Geophilidae	<i>Geophilus flavus</i>	a centipede	LC	1	
Chilopoda	Geophilomorpha	Geophilidae	<i>Strigamia crassipes</i>	a centipede	LC		1
Chilopoda	Geophilomorpha	Himantariidae	<i>Stigmatogaster subterranea</i>	a centipede	LC		1
Chilopoda	Lithobiomorpha	Lithobiidae	<i>Lithobius forficatus</i>	a centipede	LC	1	1
Chilopoda	Lithobiomorpha	Lithobiidae	<i>Lithobius melanops</i>	a centipede	LC		1
Chilopoda	Lithobiomorpha	Lithobiidae	<i>Lithobius microps</i>	a centipede	LC		1
Diplopoda	Polyxenida	Polyxenidae	<i>Polyxenus lagurus</i>	Bristly Millipede	LC		1
Diplopoda	Glomerida	Glomeridae	<i>Glomeris marginata</i>	Pill Millipede	LC	1	1
Diplopoda	Julida	Nemasomatidae	<i>Nemasoma varicorne</i>	a millipede	LC		1
Diplopoda	Julida	Julidae	<i>Tachypodoiulus niger</i>	White-legged Millipede	LC	1	1
Diplopoda	Julida	Julidae	<i>Cylindroiulus caeruleocinctus</i>	a millipede	LC		1

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Diplopoda	Julida	Julidae	<i>Ophiulus pilosus</i>	a millipede	LC		1
Diplopoda	Julida	Julidae	<i>Brachyiulus pusillus</i>	a millipede	LC		1
Diplopoda	Polydesmida	Polydesmidae	<i>Polydesmus angustus</i>	Common Flat-backed Millipede	LC		1
Diplopoda	Polydesmida	Polydesmidae	<i>Polydesmus coriaceus</i>	a flat-backed millipede	LC		1
Diplopoda	Polydesmida	Polydesmidae	<i>Brachydesmus superus</i>	a flat-backed millipede	LC		1
Insecta	Collembola	Entomobryidae	<i>Orchesella cincta</i>	a springtail	None		1
Insecta	Collembola	Sminthuridae	<i>Sminthurus viridis</i>	a springtail	None		1
Insecta	Odonata	Aeshnidae	<i>Aeshna grandis</i>	Brown Hawker	LC		1
Insecta	Dermaptera	Forficulidae	<i>Forficula auricularia</i>	Common Earwig	LC	1	1
Insecta	Orthoptera	Meconematidae	<i>Meconema thalassinum</i>	Oak Bush-cricket	LC	1	1
Insecta	Orthoptera	Tettigoniidae	<i>Pholidoptera griseoaptera</i>	Dark Bush-cricket	LC		1
Insecta	Orthoptera	Tettigoniidae	<i>Metrioptera roeselii</i>	Roesel's Bush-cricket	LC		1
Insecta	Orthoptera	Phaneropteridae	<i>Leptophyes punctatissima</i>	Speckled Bush-cricket	LC	1	1
Insecta	Orthoptera	Tetrigidae	<i>Tetrix subulata</i>	Slender Groundhopper	LC		1
Insecta	Orthoptera	Acrididae	<i>Omocestus viridulus</i>	Common Green Grasshopper	LC		1
Insecta	Orthoptera	Acrididae	<i>Chorthippus brunneus</i>	Field Grasshopper	LC	1	1
Insecta	Orthoptera	Acrididae	<i>Chorthippus parallelus</i>	Meadow Grasshopper	LC	1	1
Insecta	Psocoptera	Caeciliusidae	<i>Valenzuela flavidus</i>	a barkfly	None		1
Insecta	Psocoptera	Ectopsocidae	<i>Ectopsocus axillaris</i>	a barkfly	None		1
Insecta	Psocoptera	Ectopsocidae	<i>Ectopsocus petersi</i>	a barkfly	None	1	1
Insecta	Psocoptera	Elipsocidae	<i>Elipsocus hyalinus</i>	a barkfly	None	1	1
Insecta	Psocoptera	Psocidae	<i>Loensia fasciata</i>	a barkfly	None		1
Insecta	Psocoptera	Psocidae	<i>Metylophorus nebulosus</i>	a barkfly	None		1
Insecta	Psocoptera	Stenopsocidae	<i>Graphopsocus cruciatus</i>	a barkfly	None	1	1
Insecta	Psocoptera	Stenopsocidae	<i>Stenopsocus immaculatus</i>	a barkfly	None	1	
Insecta	Psocoptera	Trichopsocidae	<i>Trichopsocus brincki</i>	a barkfly	None		1

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Hemiptera: Sternorrhyncha	Psyllidae	<i>Cacopsylla peregrina</i>	a psyllid	None	1	
Insecta	Hemiptera: Sternorrhyncha	Psyllidae	<i>Psylla buxi</i>	Box Psyllid	None		1
Insecta	Hemiptera: Sternorrhyncha	Psyllidae	<i>Psylloopsis fraxini</i>	a psyllid	None	1	1
Insecta	Hemiptera: Sternorrhyncha	Psyllidae	<i>Psylloopsis fraxinicola</i>	a psyllid	None		1
Insecta	Hemiptera: Sternorrhyncha	Psyllidae	<i>Rhinocola aceris</i>	a psyllid	None	1	
Insecta	Hemiptera: Sternorrhyncha	Triozidae	<i>Trichohermes walkeri</i>	a psyllid	None		1
Insecta	Hemiptera: Sternorrhyncha	Triozidae	<i>Trioza urticae</i>	Nettle Psyllid	None	1	1
Insecta	Hemiptera: Sternorrhyncha	Adelgidae	<i>Adelges laricis</i>	Larch Woolly Aphid	None		1
Insecta	Hemiptera: Sternorrhyncha	Aphididae	<i>Aphis fabae</i>	an aphid	None		1
Insecta	Hemiptera: Auchenorrhyncha	Cercopidae	<i>Aphrophora alni</i>	a froghopper	None	1	1
Insecta	Hemiptera: Auchenorrhyncha	Cercopidae	<i>Philaenus spumarius</i>	a froghopper	None	1	1
Insecta	Hemiptera: Auchenorrhyncha	Cercopidae	<i>Neophilaenus campestris</i>	a froghopper	None		1
Insecta	Hemiptera: Auchenorrhyncha	Cercopidae	<i>Neophilaenus lineatus</i>	a froghopper	None	1	1
Insecta	Hemiptera: Auchenorrhyncha	Membracidae	<i>Centrotus cornutus</i>	a treehopper	None	1	
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Megophthalmus scanicus</i>	a leafhopper	None	1	1



Invertebrate survey at London Luton Airport in 2018 and 2019

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Ledra aurita</i>	a leafhopper	None		1
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Iassus lanio</i>	a leafhopper	None	1	1
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Iassus scutellaris</i>	a leafhopper	Nationally Scarce (Na)		1
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Oncopsis carpini</i>	a leafhopper	None		1
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Oncopsis subangulata</i>	a leafhopper	None	1	
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Macropsis scutellata</i>	a leafhopper	None	1	
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Anaceratagallia ribauti</i>	a leafhopper	None	1	1
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Eupelix cuspidata</i>	a leafhopper	None		1
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Aphrodes makarovi</i>	a leafhopper	None	1	1
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Anoscopus albifrons</i>	a leafhopper	None		1
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Arthaldeus pascuellus</i>	a leafhopper	None		1
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Psammotettix cephalotes</i>	a leafhopper	None		1
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Psammotettix confinis</i>	a leafhopper	None	1	
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Allygus mixtus</i>	a leafhopper	None	1	
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Euscelis incisus</i>	a leafhopper	None	1	1

Invertebrate survey at London Luton Airport in 2018 and 2019

Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Streptanus aemulans</i>	a leafhopper	None		1
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Athysanus argentarius</i>	a leafhopper	None		1
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Mocydia crocea</i>	a leafhopper	None		1
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Lamprotettix nitidulus</i>	a leafhopper	None	1	
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Cicadula persimilis</i>	a leafhopper	None	1	
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Grypotes puncticollis</i>	a leafhopper	None	1	
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Balclutha punctata</i>	a leafhopper	None	1	
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Alebra albostriella</i>	a leafhopper	None	1	1
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Empoasca vitis</i>	a leafhopper	None	1	
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Eurhadina concinna</i>	a leafhopper	None	1	
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Eurhadina pulchella</i>	a leafhopper	None	1	
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Eupteryx aurata</i>	a leafhopper	None	1	1
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Eupteryx florida</i>	a leafhopper	None	1	
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Eupteryx urticae</i>	a leafhopper	None	1	1
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Wagneripteryx germari</i>	a leafhopper	None	1	

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Ribautiana debilis</i>	a leafhopper	None	1	
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Typhlocyba quercus</i>	a leafhopper	None	1	1
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Edwardsiana crataegi</i>	a leafhopper	None	1	
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Alnetoidea alneti</i>	a leafhopper	None	1	
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Zyginidia scutellaris</i>	a leafhopper	None		1
Insecta	Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Zygina angusta</i>	a leafhopper	None	1	
Insecta	Hemiptera: Auchenorrhyncha	Cixiidae	<i>Tachycixius pilosus</i>	a lacehopper	None	1	1
Insecta	Hemiptera: Auchenorrhyncha	Cixiidae	<i>Cixius nervosus</i>	a lacehopper	None	1	1
Insecta	Hemiptera: Auchenorrhyncha	Delphacidae	<i>Asiraca clavicornis</i>	a planthopper	Nationally Scarce (Nb)		1
Insecta	Hemiptera: Auchenorrhyncha	Delphacidae	<i>Stenocranus minutus</i>	a planthopper	None	1	
Insecta	Hemiptera: Auchenorrhyncha	Delphacidae	<i>Criomorphus albomarginatus</i>	a planthopper	None		1
Insecta	Hemiptera: Auchenorrhyncha	Delphacidae	<i>Hyledelphax elegantulus</i>	a planthopper	None		1
Insecta	Hemiptera: Auchenorrhyncha	Delphacidae	<i>Javesella pellucida</i>	a planthopper	None	1	1
Insecta	Hemiptera: Auchenorrhyncha	Issidae	<i>Issus coleoptratus</i>	a planthopper	None		1
Insecta	Hemiptera: Heteroptera	Corixidae	<i>Sigara limitata</i>	an aquatic bug	LC		1



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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Hemiptera: Heteroptera	Notonectidae	<i>Notonecta glauca</i>	Common Backswimmer	LC		1
Insecta	Hemiptera: Heteroptera	Tingidae	<i>Acalypta parvula</i>	a lacebug	None	1	1
Insecta	Hemiptera: Heteroptera	Tingidae	<i>Derephysia foliacea</i>	a lacebug	None	1	
Insecta	Hemiptera: Heteroptera	Tingidae	<i>Kalama tricornis</i>	a lacebug	None		1
Insecta	Hemiptera: Heteroptera	Tingidae	<i>Physatocheila dumetorum</i>	a lacebug	None	1	1
Insecta	Hemiptera: Heteroptera	Tingidae	<i>Tingis ampliata</i>	a lacebug	None		1
Insecta	Hemiptera: Heteroptera	Tingidae	<i>Tingis cardui</i>	a lacebug	None	1	1
Insecta	Hemiptera: Heteroptera	Microphysidae	<i>Loricula elegantula</i>	a bug	None		1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Campyloneura virgula</i>	a mirid bug	None	1	1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Dicyphus epilobii</i>	a mirid bug	None	1	
Insecta	Hemiptera: Heteroptera	Miridae	<i>Dicyphus stachydis</i>	a mirid bug	None		1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Alloeotomus gothicus</i>	a mirid bug	None		1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Deraeocoris ruber</i>	a mirid bug	None	1	
Insecta	Hemiptera: Heteroptera	Miridae	<i>Deraeocoris flavilinea</i>	a mirid bug	None	1	1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Deraeocoris lutescens</i>	a mirid bug	None	1	1

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Hemiptera: Heteroptera	Miridae	<i>Adelphocoris lineolatus</i>	a mirid bug	None		1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Closterotomus norwegicus</i>	a mirid bug	None	1	1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Grypocoris stysi</i>	a mirid bug	None	1	1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Rhabdomiris striatellus</i>	a mirid bug	None		1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Capsus ater</i>	a mirid bug	None	1	1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Liocoris tripustulatus</i>	a mirid bug	None	1	1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Apolygus lucorum</i>	a mirid bug	None	1	
Insecta	Hemiptera: Heteroptera	Miridae	<i>Apolygus spinolae</i>	a mirid bug	None	1	1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Lygocoris pabulinus</i>	a mirid bug	None	1	
Insecta	Hemiptera: Heteroptera	Miridae	<i>Neolygus viridis</i>	a mirid bug	None	1	
Insecta	Hemiptera: Heteroptera	Miridae	<i>Lygus pratensis</i>	a mirid bug	RDB3		1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Lygus rugulipennis</i>	a mirid bug	None		1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Miris striatus</i>	a mirid bug	None	1	1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Orthops basalis</i>	a mirid bug	None	1	
Insecta	Hemiptera: Heteroptera	Miridae	<i>Orthops campestris</i>	a mirid bug	None	1	1

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Hemiptera: Heteroptera	Miridae	<i>Orthops kalmii</i>	a mirid bug	None		1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Pantilius tunicatus</i>	a mirid bug	None	1	
Insecta	Hemiptera: Heteroptera	Miridae	<i>Phytocoris ulmi</i>	a mirid bug	None	1	
Insecta	Hemiptera: Heteroptera	Miridae	<i>Phytocoris varipes</i>	a mirid bug	None		1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Phytocoris tiliae</i>	a mirid bug	None		1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Pinalitus cervinus</i>	a mirid bug	None	1	1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Polymerus nigrita</i>	a mirid bug	None	1	
Insecta	Hemiptera: Heteroptera	Miridae	<i>Stenotus binotatus</i>	a mirid bug	None	1	1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Leptopterna dolabrata</i>	a mirid bug	None	1	1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Megaloceroea recticornis</i>	a mirid bug	None	1	1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Notostira elongata</i>	a mirid bug	None	1	
Insecta	Hemiptera: Heteroptera	Miridae	<i>Pithanus maerkelii</i>	a mirid bug	None		1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Stenodema laevigata</i>	a mirid bug	None	1	1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Halticus luteicollis</i>	a mirid bug	None	1	
Insecta	Hemiptera: Heteroptera	Miridae	<i>Orthocephalus coriaceus</i>	a mirid bug	None		1



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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Hemiptera: Heteroptera	Miridae	<i>Orthocephalus saltator</i>	a mirid bug	None		1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Cyllecoris histrionius</i>	a mirid bug	None	1	
Insecta	Hemiptera: Heteroptera	Miridae	<i>Dryophilocoris flavoquadrimaculatus</i>	a mirid bug	None		1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Heterotoma planicornis</i>	a mirid bug	None	1	1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Orthotylus flavosparsus</i>	a mirid bug	None	1	1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Orthotylus marginalis</i>	a mirid bug	None	1	1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Orthotylus ochrotrichus</i>	a mirid bug	None	1	1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Pseudoloxops coccineus</i>	a mirid bug	None		1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Pilophorus perplexus</i>	a mirid bug	None		1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Amblytulus nasutus</i>	a mirid bug	None	1	1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Atractotomus mali</i>	a mirid bug	None	1	1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Atractotomus parvulus</i>	a mirid bug	None		1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Europiella artemisiae</i>	a mirid bug	None	1	
Insecta	Hemiptera: Heteroptera	Miridae	<i>Harpocera thoracica</i>	a mirid bug	None	1	1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Lopus decolor</i>	a mirid bug	None	1	

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Hemiptera: Heteroptera	Miridae	<i>Orthonotus rufifrons</i>	a mirid bug	None	1	
Insecta	Hemiptera: Heteroptera	Miridae	<i>Phoenicocoris obscurellus</i>	a mirid bug	None	1	1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Phylus coryli</i>	a mirid bug	None	1	1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Phylus melanocephalus</i>	a mirid bug	None	1	1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Plagiognathus arbustorum</i>	a mirid bug	None	1	1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Plagiognathus chrysanthemi</i>	a mirid bug	None	1	1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Plesiodema pinetella</i>	a mirid bug	None	1	
Insecta	Hemiptera: Heteroptera	Miridae	<i>Psallus lepidus</i>	a mirid bug	None	1	
Insecta	Hemiptera: Heteroptera	Miridae	<i>Psallus mollis</i>	a mirid bug	None		1
Insecta	Hemiptera: Heteroptera	Miridae	<i>Psallus varians</i>	a mirid bug	None	1	1
Insecta	Hemiptera: Heteroptera	Nabidae	<i>Himacerus major</i>	Grey Damsel-bug	None		1
Insecta	Hemiptera: Heteroptera	Nabidae	<i>Himacerus mirmicoides</i>	Ant Damsel-bug	None	1	1
Insecta	Hemiptera: Heteroptera	Nabidae	<i>Himacerus apterus</i>	Tree Damsel-bug	None	1	1
Insecta	Hemiptera: Heteroptera	Nabidae	<i>Nabis limbatus</i>	Marsh Damsel-bug	None		1
Insecta	Hemiptera: Heteroptera	Nabidae	<i>Nabis flavomarginatus</i>	Broad Damsel-bug	None		1

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Hemiptera: Heteroptera	Nabidae	<i>Nabis fesus</i>	Field Damsel-bug	None		1
Insecta	Hemiptera: Heteroptera	Nabidae	<i>Nabis rugosus</i>	Common Damsel-bug	None		1
Insecta	Hemiptera: Heteroptera	Anthocoridae	<i>Acompocoris alpinus</i>	a flower bug	None	1	1
Insecta	Hemiptera: Heteroptera	Anthocoridae	<i>Anthocoris confusus</i>	a flower bug	None	1	1
Insecta	Hemiptera: Heteroptera	Anthocoridae	<i>Anthocoris nemoralis</i>	a flower bug	None	1	1
Insecta	Hemiptera: Heteroptera	Anthocoridae	<i>Anthocoris nemorum</i>	a flower bug	None	1	1
Insecta	Hemiptera: Heteroptera	Anthocoridae	<i>Anthocoris simulans</i>	a flower bug	None		1
Insecta	Hemiptera: Heteroptera	Anthocoridae	<i>Elatophilus nigricornis</i>	a flower bug	None		1
Insecta	Hemiptera: Heteroptera	Anthocoridae	<i>Temnostethus pusillus</i>	a flower bug	None		1
Insecta	Hemiptera: Heteroptera	Anthocoridae	<i>Orius laticollis</i>	a flower bug	None		1
Insecta	Hemiptera: Heteroptera	Anthocoridae	<i>Orius majusculus</i>	a flower bug	None	1	
Insecta	Hemiptera: Heteroptera	Anthocoridae	<i>Orius vicinus</i>	a flower bug	None	1	
Insecta	Hemiptera: Heteroptera	Anthocoridae	<i>Orius laevigatus</i>	a flower bug	None		1
Insecta	Hemiptera: Heteroptera	Anthocoridae	<i>Orius niger</i>	a flower bug	None	1	1
Insecta	Hemiptera: Heteroptera	Anthocoridae	<i>Buchananiella continua</i>	a flower bug	None		1



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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Hemiptera: Heteroptera	Anthocoridae	<i>Cardiastethus fasciiventris</i>	a flower bug	None	1	1
Insecta	Hemiptera: Heteroptera	Anthocoridae	<i>Xylocoris cursitans</i>	a flower bug	None		1
Insecta	Hemiptera: Heteroptera	Aradidae	<i>Aradus depressus</i>	a flatbug	None		1
Insecta	Hemiptera: Heteroptera	Berytidae	<i>Berytinus hirticornis</i>	a stiltbug	Nationally Scarce (Nb)		1
Insecta	Hemiptera: Heteroptera	Berytidae	<i>Berytinus minor</i>	a stiltbug	None		1
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Nysius huttoni</i>	a ground-bug	None		1
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Nysius senecionis</i>	a ground-bug	None		1
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Orsillus depressus</i>	a ground-bug	None		1
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Kleidocerys resedae</i>	a ground-bug	None	1	1
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Ischnodemus sabuleti</i>	European Chinch-bug	None		1
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Heterogaster urticae</i>	a ground-bug	None	1	1
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Metopoplax ditomoides</i>	a ground-bug	None		1
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Stygnocoris fuliginus</i>	a ground-bug	None		1
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Stygnocoris rusticus</i>	a ground-bug	None		1
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Stygnocoris sabulosus</i>	a ground-bug	None	1	

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Drymus brunneus</i>	a ground-bug	None		1
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Drymus ryei</i>	a ground-bug	None		1
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Drymus sylvaticus</i>	a ground-bug	None		1
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Gastrodes grossipes</i>	a ground-bug	None	1	1
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Scolopostethus affinis</i>	a ground-bug	None	1	1
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Scolopostethus decoratus</i>	a ground-bug	None		1
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Scolopostethus grandis</i>	a ground-bug	None		1
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Scolopostethus thomsoni</i>	a ground-bug	None	1	1
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Taphropeltus contractus</i>	a ground-bug	None		1
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Aphanus rolandri</i>	a ground-bug	Nationally Scarce (Na)		1
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Megalonotus antennatus</i>	a ground-bug	Nationally Scarce (Nb)		1
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Megalonotus emarginatus</i>	a ground-bug	None		1
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Peritrechus geniculatus</i>	a ground-bug	None		1
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Peritrechus nubilus</i>	a ground-bug	None		1
Insecta	Hemiptera: Heteroptera	Lygaeidae	<i>Raglius alboacuminatus</i>	a ground-bug	Nationally Scarce (Nb)		1

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Hemiptera: Heteroptera	Coreidae	<i>Coreus marginatus</i>	Dock Bug	LC	1	1
Insecta	Hemiptera: Heteroptera	Coreidae	<i>Gonocerus acuteangulatus</i>	Box Bug	LC		1
Insecta	Hemiptera: Heteroptera	Coreidae	<i>Coriomeris denticulatus</i>	Denticulate Leatherbug	LC	1	1
Insecta	Hemiptera: Heteroptera	Rhopalidae	<i>Corizus hyoscyami</i>	a rhopalid bug	LC	1	1
Insecta	Hemiptera: Heteroptera	Rhopalidae	<i>Rhopalus subrufus</i>	a rhopalid bug	LC		1
Insecta	Hemiptera: Heteroptera	Rhopalidae	<i>Myrmus miriformis</i>	a rhopalid bug	LC		1
Insecta	Hemiptera: Heteroptera	Cydnidae	<i>Legnotus limbosus</i>	Bordered Shieldbug	LC		1
Insecta	Hemiptera: Heteroptera	Cydnidae	<i>Tritomegas bicolor</i>	Pied Shieldbug	LC		1
Insecta	Hemiptera: Heteroptera	Cydnidae	<i>Sehirus luctuosus</i>	Forget-me-not Shieldbug	LC		1
Insecta	Hemiptera: Heteroptera	Pentatomidae	<i>Podops inuncta</i>	Knobbed Shieldbug	LC	1	1
Insecta	Hemiptera: Heteroptera	Pentatomidae	<i>Aelia acuminata</i>	Bishop's Mitre Shieldbug	LC		1
Insecta	Hemiptera: Heteroptera	Pentatomidae	<i>Dolycoris baccarum</i>	Hairy Shieldbug	LC	1	1
Insecta	Hemiptera: Heteroptera	Pentatomidae	<i>Eysarcoris venustissimus</i>	Woundwort Shieldbug	LC		1
Insecta	Hemiptera: Heteroptera	Pentatomidae	<i>Palomena prasina</i>	Common Green Shieldbug	LC	1	1
Insecta	Hemiptera: Heteroptera	Pentatomidae	<i>Pentatoma rufipes</i>	Red-legged Shieldbug	LC	1	1



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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Hemiptera: Heteroptera	Pentatomidae	<i>Eurydema oleracea</i>	Crucifer Shieldbug	LC		1
Insecta	Hemiptera: Heteroptera	Pentatomidae	<i>Zicrona caerulea</i>	Blue Shieldbug	LC		1
Insecta	Hemiptera: Heteroptera	Acanthosomatidae	<i>Acanthosoma haemorrhoidale</i>	Hawthorn Shieldbug	LC	1	1
Insecta	Hemiptera: Heteroptera	Acanthosomatidae	<i>Elasmostethus interstinctus</i>	Green Birch Shieldbug	LC	1	1
Insecta	Hemiptera: Heteroptera	Acanthosomatidae	<i>Cyphostethus tristriatus</i>	Juniper Shieldbug	LC		1
Insecta	Hemiptera: Heteroptera	Acanthosomatidae	<i>Elasmucha grisea</i>	Parent Shieldbug	LC	1	1
Insecta	Coleoptera	Dytiscidae	<i>Laccophilus minutus</i>	a diving beetle	LC		1
Insecta	Coleoptera	Dytiscidae	<i>Hyphydrus ovatus</i>	The Cherrystone Beetle	LC		1
Insecta	Coleoptera	Dytiscidae	<i>Hydroglyphus geminus</i>	a diving beetle	LC		1
Insecta	Coleoptera	Dytiscidae	<i>Hygrotus impressopunctatus</i>	a diving beetle	LC		1
Insecta	Coleoptera	Dytiscidae	<i>Colymbetes fuscus</i>	a diving beetle	LC		1
Insecta	Coleoptera	Dytiscidae	<i>Acilius sulcatus</i>	a diving beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Carabus violaceus</i>	Violet Ground Beetle	LC	1	
Insecta	Coleoptera	Carabidae	<i>Cychrus caraboides</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Leistus rufomarginatus</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Leistus spinibarbis</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Leistus fulvibarbis</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Leistus ferrugineus</i>	a ground beetle	LC	1	1
Insecta	Coleoptera	Carabidae	<i>Nebria brevicollis</i>	a ground beetle	LC	1	1
Insecta	Coleoptera	Carabidae	<i>Nebria salina</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Notiophilus biguttatus</i>	a ground beetle	LC	1	1

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Coleoptera	Carabidae	<i>Notiophilus palustris</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Notiophilus rufipes</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Notiophilus substriatus</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Loricera pilicornis</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Trechus quadristriatus</i>	a ground beetle	LC	1	1
Insecta	Coleoptera	Carabidae	<i>Bembidion lunulatum</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Bembidion lampros</i>	a ground beetle	LC	1	1
Insecta	Coleoptera	Carabidae	<i>Bembidion quadrimaculatum</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Bembidion obtusum</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Poecilus cupreus</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Poecilus versicolor</i>	a ground beetle	LC	1	1
Insecta	Coleoptera	Carabidae	<i>Pterostichus madidus</i>	a ground beetle	LC	1	1
Insecta	Coleoptera	Carabidae	<i>Pterostichus niger</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Pterostichus melanarius</i>	a ground beetle	LC	1	1
Insecta	Coleoptera	Carabidae	<i>Pterostichus strenuus</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Abax parallelepipedus</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Calathus rotundicollis</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Calathus fuscipes</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Calathus melanocephalus</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Synuchus vivalis</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Anchomenus dorsalis</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Amara plebeja</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Amara aenea</i>	a ground beetle	LC	1	
Insecta	Coleoptera	Carabidae	<i>Amara communis</i>	a ground beetle	LC	1	
Insecta	Coleoptera	Carabidae	<i>Amara convexior</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Amara familiaris</i>	a ground beetle	LC	1	

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Coleoptera	Carabidae	<i>Amara montivaga</i>	a ground beetle	LC, NS		1
Insecta	Coleoptera	Carabidae	<i>Amara ovata</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Amara similata</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Amara bifrons</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Amara consularis</i>	a ground beetle	LC, NS		1
Insecta	Coleoptera	Carabidae	<i>Curtonotus aulicus</i>	a ground beetle	LC	1	1
Insecta	Coleoptera	Carabidae	<i>Harpalus affinis</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Harpalus rubripes</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Harpalus tardus</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Harpalus rufipes</i>	a ground beetle	LC	1	1
Insecta	Coleoptera	Carabidae	<i>Ophonus ardosiacus</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Ophonus azureus</i>	a ground beetle	LC, NS		1
Insecta	Coleoptera	Carabidae	<i>Ophonus laticollis</i>	Set-aside Downy-back	NT, NS, S41		1
Insecta	Coleoptera	Carabidae	<i>Ophonus puncticeps</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Ophonus rufibarbis</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Bradycellus verbasci</i>	a ground beetle	LC	1	1
Insecta	Coleoptera	Carabidae	<i>Acupalpus meridianus</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Badister bullatus sens. lat.</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Demetrias atricapillus</i>	a ground beetle	LC	1	1
Insecta	Coleoptera	Carabidae	<i>Paradromius linearis</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Dromius meridionalis</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Dromius quadrimaculatus</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Calodromius spilotus</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Syntomus foveatus</i>	a ground beetle	LC	1	1
Insecta	Coleoptera	Carabidae	<i>Microlestes maurus</i>	a ground beetle	LC	1	1
Insecta	Coleoptera	Carabidae	<i>Microlestes minutulus</i>	a ground beetle	LC		1
Insecta	Coleoptera	Carabidae	<i>Brachinus crepitans</i>	Bombardier Beetle	LC, NS		1



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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Coleoptera	Hydrophilidae	<i>Cercyon impressus</i>	a beetle	None		1
Insecta	Coleoptera	Hydrophilidae	<i>Megasternum concinnum</i>	a beetle	None	1	1
Insecta	Coleoptera	Histeridae	<i>Plegaderus vulneratus</i>	a beetle	LC		1
Insecta	Coleoptera	Histeridae	<i>Saprinus semistriatus</i>	a beetle	LC		1
Insecta	Coleoptera	Histeridae	<i>Paromalus flavicornis</i>	a beetle	LC		1
Insecta	Coleoptera	Histeridae	<i>Onthophilus striatus</i>	a beetle	LC		1
Insecta	Coleoptera	Histeridae	<i>Margarinotus striola</i>	a beetle	LC		1
Insecta	Coleoptera	Ptiliidae	<i>Ptenidium laevigatum</i>	a featherwing beetle	None		1
Insecta	Coleoptera	Ptiliidae	<i>Ptenidium pusillum</i>	a featherwing beetle	None		1
Insecta	Coleoptera	Ptiliidae	<i>Acrotrichis rosskotheni</i>	a featherwing beetle	None		1
Insecta	Coleoptera	Leiodidae	<i>Anisotoma humeralis</i>	a beetle	None		1
Insecta	Coleoptera	Leiodidae	<i>Agathidium laevigatum</i>	a beetle	None		1
Insecta	Coleoptera	Leiodidae	<i>Ptomaphagus sericatus</i>	a beetle	None		1
Insecta	Coleoptera	Leiodidae	<i>Ptomaphagus subvillosus</i>	a beetle	None		1
Insecta	Coleoptera	Leiodidae	<i>Ptomaphagus varicornis</i>	a beetle	RDBK		1
Insecta	Coleoptera	Leiodidae	<i>Nargus velox</i>	a beetle	None		1
Insecta	Coleoptera	Leiodidae	<i>Nargus wilkini</i>	a beetle	None		1
Insecta	Coleoptera	Leiodidae	<i>Sciodrepoides fumatus</i>	a beetle	None		1
Insecta	Coleoptera	Leiodidae	<i>Sciodrepoides watsoni</i>	a beetle	None	1	1
Insecta	Coleoptera	Leiodidae	<i>Catops fuliginosus</i>	a beetle	None		1
Insecta	Coleoptera	Leiodidae	<i>Catops fuscus</i>	a beetle	None		1
Insecta	Coleoptera	Leiodidae	<i>Catops grandicollis</i>	a beetle	None		1
Insecta	Coleoptera	Leiodidae	<i>Catops longulus</i>	a beetle	Nationally Scarce		1
Insecta	Coleoptera	Leiodidae	<i>Catops nigricans</i>	a beetle	None		1
Insecta	Coleoptera	Leiodidae	<i>Catops tristis</i>	a beetle	None		1
Insecta	Coleoptera	Silphidae	<i>Necrodes littoralis</i>	a sexton beetle	None	1	
Insecta	Coleoptera	Silphidae	<i>Thanatophilus rugosus</i>	a beetle	None		1

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Coleoptera	Silphidae	<i>Thanatophilus sinuatus</i>	a beetle	None		1
Insecta	Coleoptera	Silphidae	<i>Ablattaria laevigata</i>	a beetle	None		1
Insecta	Coleoptera	Silphidae	<i>Nicrophorus humator</i>	a sexton beetle	None	1	1
Insecta	Coleoptera	Silphidae	<i>Nicrophorus interruptus</i>	a sexton beetle	Nationally Scarce (Nb)		1
Insecta	Coleoptera	Silphidae	<i>Nicrophorus investigator</i>	a sexton beetle	None		1
Insecta	Coleoptera	Silphidae	<i>Nicrophorus vespillo</i>	a sexton beetle	None		1
Insecta	Coleoptera	Silphidae	<i>Nicrophorus vespilloides</i>	a sexton beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Cephennium gallicum</i>	a scydmaenine rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Neuraphes elongatulus</i>	a scydmaenine rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Anthobium atrocephalum</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Anthobium unicolor</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Lesteva sicula</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Dropephylla ioptera</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Dropephylla koltzei</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Omalius caesum</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Omalius septentrionis</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Phloeonomus pusillus</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Coryphium angusticolle</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Metopsia clypeata</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Megarthrus depressus (= sinuatocollis)</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Micropeplus staphylinoides</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Brachygluta fossulata</i>	a pselaphine rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Sepedophilus marshami</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Sepedophilus nigripennis</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Sepedophilus testaceus</i>	a rove-beetle	Nationally Scarce		1

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Coleoptera	Staphylinidae	<i>Tachyporus atriceps</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Tachyporus chrysomelinus</i>	a rove-beetle	None	1	
Insecta	Coleoptera	Staphylinidae	<i>Tachyporus dispar</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Tachyporus hypnorum</i>	a rove-beetle	None	1	1
Insecta	Coleoptera	Staphylinidae	<i>Tachyporus nitidulus</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Tachyporus obtusus</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Tachyporus solutus</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Tachyporus tersus</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Tachinus humeralis</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Tachinus laticollis</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Tachinus marginellus</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Tachinus rufipes</i>	a rove-beetle	None	1	1
Insecta	Coleoptera	Staphylinidae	<i>Tachinus subterraneus</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Parabolitobius inclinans</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Oxypoda acuminata</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Oxypoda brevicornis</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Oxypoda spectabilis</i>	a rove-beetle	Nationally Scarce		1
Insecta	Coleoptera	Staphylinidae	<i>Haploglossa villosula</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Amarochara forticornis</i>	a rove-beetle	RDBK		1
Insecta	Coleoptera	Staphylinidae	<i>Phloeopora scribae</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Callicerus obscurus</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Callicerus rigidicornis</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Aloconota gregaria</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Amischa analis</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Amischa decipiens</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Amischa nigrofusca</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Dinaraea aequata</i>	a rove-beetle	None	1	



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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Coleoptera	Staphylinidae	<i>Dinaraea angustula</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Liogluta longiuscula</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Cadaverota cadaverina</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Mocyta fungi</i> agg.	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Atheta crassicornis</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Atheta divisa</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Atheta vaga</i>	a rove-beetle	None	1	1
Insecta	Coleoptera	Staphylinidae	<i>Mycetota laticollis</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Acrotona pygmaea</i>	a rove-beetle	None	1	
Insecta	Coleoptera	Staphylinidae	<i>Aleochara curtula</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Aleochara lata</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Aleochara funebris</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Aleochara sparsa</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Drusilla canaliculata</i>	a rove-beetle	None	1	1
Insecta	Coleoptera	Staphylinidae	<i>Falagrioma thoracica</i>	a rove-beetle	None	1	
Insecta	Coleoptera	Staphylinidae	<i>Autalia impressa</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Autalia rivularis</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Leptusa fumida</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Leptusa ruficollis</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Bolitochara bella</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Placusa pumilio</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Cypha longicornis</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Carpelimus elongatulus</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Anotylus insecatus</i>	a rove-beetle	Nationally Scarce		1
Insecta	Coleoptera	Staphylinidae	<i>Anotylus sculpturatus</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Anotylus tetracarinatus</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Stenus clavicornis</i>	a rove-beetle	None		1

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Insecta	Coleoptera	Staphylinidae	<i>Stenus junco</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Stenus brunnipes</i>	a rove-beetle	None	1	1
Insecta	Coleoptera	Staphylinidae	<i>Stenus fulvicornis</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Stenus bifoveolatus</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Stenus binotatus</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Stenus flavipes</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Stenus picipes</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Stenus aceris</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Stenus impressus</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Stenus ossium</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Rugilus rufipes</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Sunius melanocephalus</i>	a rove-beetle	Nationally Scarce		1
Insecta	Coleoptera	Staphylinidae	<i>Sunius propinquus</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Lathrobium brunnipes</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Philonthus concinnus</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Philonthus decorus</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Philonthus politus</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Philonthus succicola</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Bisnius fimetarius</i>	a rove-beetle	None	1	1
Insecta	Coleoptera	Staphylinidae	<i>Ocypus olens</i>	Devil's Coach-horse	None		1
Insecta	Coleoptera	Staphylinidae	<i>Ocypus brunnipes</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Ocypus nitens</i>	a rove-beetle	Nationally Scarce (Na)		1
Insecta	Coleoptera	Staphylinidae	<i>Tasgius ater</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Tasgius melanarius</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Tasgius winkleri</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Heterothops praeivius</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Quedius cruentus</i>	a rove-beetle	None	1	1

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Coleoptera	Staphylinidae	<i>Quedius curtipennis</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Quedius levicollis</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Quedius picipes</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Quedius schatzmayri</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Quedius scintillans</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Quedius semiaeneus</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Quedius semiobscurus</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Othius laeviusculus</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Othius punctulatus</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Othius subuliformis</i>	a rove-beetle	None		1
Insecta	Coleoptera	Staphylinidae	<i>Xantholinus linearis</i>	a rove-beetle	None	1	1
Insecta	Coleoptera	Staphylinidae	<i>Xantholinus longiventris</i>	a rove-beetle	None		1
Insecta	Coleoptera	Trogidae	<i>Trox scaber</i>	a beetle	LC	1	
Insecta	Coleoptera	Scarabaeidae	<i>Aphodius prodromus</i>	a dung beetle	LC		1
Insecta	Coleoptera	Scarabaeidae	<i>Serica brunnea</i>	Brown Chafer	LC		1
Insecta	Coleoptera	Scarabaeidae	<i>Hoplia philanthus</i>	Welsh Chafer	LC		1
Insecta	Coleoptera	Scarabaeidae	<i>Phyllopertha horticola</i>	Bracken Chafer	LC		1
Insecta	Coleoptera	Clambidae	<i>Clambus armadillo</i>	a beetle	None		1
Insecta	Coleoptera	Scirtidae	<i>Contacyphon ochraceus</i>	a beetle	LC		1
Insecta	Coleoptera	Buprestidae	<i>Agilus sinuatus</i>	Hawthorn Jewel Beetle	LC		1
Insecta	Coleoptera	Throscidae	<i>Trixagus dermestoides</i>	a beetle	None		1
Insecta	Coleoptera	Throscidae	<i>Trixagus gracilis</i>	a beetle	RDB3		1
Insecta	Coleoptera	Elateridae	<i>Limonius poneli</i>	a click-beetle	None	1	1
Insecta	Coleoptera	Elateridae	<i>Denticollis linearis</i>	a click-beetle	None		1
Insecta	Coleoptera	Elateridae	<i>Athous bicolor</i>	a click-beetle	None	1	1
Insecta	Coleoptera	Elateridae	<i>Athous campyloides</i>	a click-beetle	Nationally Scarce (Nb)		1
Insecta	Coleoptera	Elateridae	<i>Athous haemorrhoidalis</i>	a click-beetle	None	1	1



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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Coleoptera	Elateridae	<i>Hemicrepidius hirtus</i>	a click-beetle	None	1	
Insecta	Coleoptera	Elateridae	<i>Agriotes acuminatus</i>	a click-beetle	None	1	1
Insecta	Coleoptera	Elateridae	<i>Agriotes lineatus</i>	a click-beetle	None	1	1
Insecta	Coleoptera	Elateridae	<i>Agriotes obscurus</i>	a click-beetle	None		1
Insecta	Coleoptera	Elateridae	<i>Agriotes pallidulus</i>	a click-beetle	None	1	1
Insecta	Coleoptera	Elateridae	<i>Agriotes sputator</i>	a click-beetle	None	1	1
Insecta	Coleoptera	Elateridae	<i>Melanotus villosus sens. str.</i>	a click-beetle	None		1
Insecta	Coleoptera	Cantharidae	<i>Cantharis cryptica</i>	a soldier-beetle	LC	1	1
Insecta	Coleoptera	Cantharidae	<i>Cantharis decipiens</i>	a soldier-beetle	LC		1
Insecta	Coleoptera	Cantharidae	<i>Cantharis flavilabris</i>	a soldier-beetle	LC	1	1
Insecta	Coleoptera	Cantharidae	<i>Cantharis nigricans</i>	a soldier-beetle	LC		1
Insecta	Coleoptera	Cantharidae	<i>Cantharis rufa</i>	a soldier-beetle	LC		1
Insecta	Coleoptera	Cantharidae	<i>Cantharis rustica</i>	a soldier-beetle	LC		1
Insecta	Coleoptera	Cantharidae	<i>Rhagonycha nigriventris</i>	a soldier-beetle	LC	1	1
Insecta	Coleoptera	Cantharidae	<i>Rhagonycha fulva</i>	a soldier-beetle	LC	1	1
Insecta	Coleoptera	Cantharidae	<i>Rhagonycha lignosa</i>	a soldier-beetle	LC	1	1
Insecta	Coleoptera	Cantharidae	<i>Rhagonycha lutea</i>	a soldier-beetle	LC, NS		1
Insecta	Coleoptera	Cantharidae	<i>Malthinus flaveolus</i>	a soldier-beetle	LC	1	1
Insecta	Coleoptera	Cantharidae	<i>Malthinus seriepunctatus</i>	a soldier-beetle	LC	1	1
Insecta	Coleoptera	Cantharidae	<i>Malthodes minimus</i>	a soldier-beetle	LC	1	1
Insecta	Coleoptera	Cantharidae	<i>Malthodes pumilus</i>	a soldier-beetle	LC, NS	1	1
Insecta	Coleoptera	Dermestidae	<i>Dermestes murinus</i>	a beetle	LC, NS		1
Insecta	Coleoptera	Dermestidae	<i>Ctesias serra</i>	Cobweb Beetle	LC		1
Insecta	Coleoptera	Dermestidae	<i>Anthrenus verbasci</i>	Varied Carpet Beetle	NA	1	1
Insecta	Coleoptera	Ptinidae	<i>Ptinomorphus imperialis</i>	a woodworm	LC		1
Insecta	Coleoptera	Ptinidae	<i>Grynobius planus</i>	a woodworm	LC		1

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Coleoptera	Ptinidae	<i>Dryophilus pusillus</i>	a woodworm	NA, LC		1
Insecta	Coleoptera	Ptinidae	<i>Ochina ptinoides</i>	a woodworm	LC		1
Insecta	Coleoptera	Ptinidae	<i>Stegobium paniceum</i>	Biscuit Beetle	LC		1
Insecta	Coleoptera	Ptinidae	<i>Anobium inexpectatum</i>	a woodworm	LC		1
Insecta	Coleoptera	Ptinidae	<i>Anobium punctatum</i>	The Woodworm	LC	1	1
Insecta	Coleoptera	Ptinidae	<i>Hemicoelus fulvicornis</i>	a woodworm	LC		1
Insecta	Coleoptera	Ptinidae	<i>Ptilinus pectinicornis</i>	Fan-bearing Wood-borer	LC		1
Insecta	Coleoptera	Cleridae	<i>Thanasimus formicarius</i>	Ant Beetle	LC		1
Insecta	Coleoptera	Melyridae	<i>Dasytes aeratus</i>	a beetle	LC		1
Insecta	Coleoptera	Melyridae	<i>Malachius bipustulatus</i>	Malachite Beetle	LC		1
Insecta	Coleoptera	Melyridae	<i>Cordylepherus viridis</i>	a malachite beetle	LC		1
Insecta	Coleoptera	Sphindidae	<i>Aspidiphorus orbiculatus</i>	a beetle	None	1	
Insecta	Coleoptera	Kateretidae	<i>Brachypterus glaber</i>	a nettle pollen beetle	None	1	1
Insecta	Coleoptera	Kateretidae	<i>Brachypterus urticae</i>	a nettle pollen beetle	None	1	1
Insecta	Coleoptera	Nitidulidae	<i>Eपुरaea aestiva</i>	a beetle	None		1
Insecta	Coleoptera	Nitidulidae	<i>Eपुरaea biguttata</i>	a beetle	None		1
Insecta	Coleoptera	Nitidulidae	<i>Eपुरaea melanocephala</i>	a beetle	None	1	1
Insecta	Coleoptera	Nitidulidae	<i>Eपुरaea melina</i>	a beetle	None		1
Insecta	Coleoptera	Nitidulidae	<i>Omosita discoidea</i>	a beetle	None		1
Insecta	Coleoptera	Nitidulidae	<i>Soronia grisea</i>	a beetle	None		1
Insecta	Coleoptera	Nitidulidae	<i>Meligethes aeneus</i>	Common Pollen Beetle	None	1	1
Insecta	Coleoptera	Nitidulidae	<i>Meligethes atramentarius</i>	a pollen beetle	Nationally Scarce	1	
Insecta	Coleoptera	Nitidulidae	<i>Meligethes atratus</i>	a pollen beetle	None		1
Insecta	Coleoptera	Nitidulidae	<i>Meligethes brunnicornis</i>	a pollen beetle	None		1
Insecta	Coleoptera	Nitidulidae	<i>Meligethes carinulatus</i>	a pollen beetle	None		1
Insecta	Coleoptera	Nitidulidae	<i>Meligethes difficilis</i>	a pollen beetle	None		1
Insecta	Coleoptera	Nitidulidae	<i>Meligethes flavimanus</i>	a pollen beetle	None		1

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Coleoptera	Nitidulidae	<i>Meligethes morosus</i>	a pollen beetle	None		1
Insecta	Coleoptera	Nitidulidae	<i>Meligethes nigrescens</i>	a pollen beetle	None		1
Insecta	Coleoptera	Nitidulidae	<i>Meligethes ruficornis</i>	a pollen beetle	None		1
Insecta	Coleoptera	Nitidulidae	<i>Meligethes symphyti</i>	a pollen beetle	None		1
Insecta	Coleoptera	Monotomidae	<i>Rhizophagus dispar</i>	a beetle	None		1
Insecta	Coleoptera	Silvanidae	<i>Uleiota planatus</i>	a beetle	Nationally Scarce (Na)		1
Insecta	Coleoptera	Silvanidae	<i>Silvanus unidentatus</i>	a beetle	None		1
Insecta	Coleoptera	Phalacridae	<i>Phalacrus corruscus</i>	a beetle	None		1
Insecta	Coleoptera	Phalacridae	<i>Olibrus aeneus</i>	a beetle	None		1
Insecta	Coleoptera	Phalacridae	<i>Olibrus affinis</i>	a beetle	None		1
Insecta	Coleoptera	Phalacridae	<i>Olibrus corticalis</i>	a beetle	None		1
Insecta	Coleoptera	Phalacridae	<i>Olibrus liquidus</i>	a beetle	None		1
Insecta	Coleoptera	Phalacridae	<i>Stilbus testaceus</i>	a beetle	None		1
Insecta	Coleoptera	Cryptophagidae	<i>Henoticus serratus</i>	a beetle	None	1	
Insecta	Coleoptera	Cryptophagidae	<i>Cryptophagus acutangulus</i>	a beetle	None		1
Insecta	Coleoptera	Cryptophagidae	<i>Cryptophagus dentatus</i>	a beetle	None	1	1
Insecta	Coleoptera	Cryptophagidae	<i>Cryptophagus denticulatus</i>	a beetle	None		1
Insecta	Coleoptera	Cryptophagidae	<i>Micrambe ulicis</i>	a beetle	None		1
Insecta	Coleoptera	Cryptophagidae	<i>Antherophagus similis</i>	a beetle	None		1
Insecta	Coleoptera	Cryptophagidae	<i>Atomaria linearis</i>	a beetle	None		1
Insecta	Coleoptera	Cryptophagidae	<i>Atomaria lohsei</i>	a beetle	RDBK		1
Insecta	Coleoptera	Cryptophagidae	<i>Atomaria punctithorax</i>	a beetle	Nationally Scarce		1
Insecta	Coleoptera	Cryptophagidae	<i>Atomaria atricapilla</i>	a beetle	None	1	1
Insecta	Coleoptera	Cryptophagidae	<i>Atomaria fuscata</i>	a beetle	None		1
Insecta	Coleoptera	Cryptophagidae	<i>Atomaria nitidula</i>	a beetle	None		1
Insecta	Coleoptera	Cryptophagidae	<i>Atomaria rubella</i>	a beetle	None		1
Insecta	Coleoptera	Cryptophagidae	<i>Atomaria testacea</i>	a beetle	None		1



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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Coleoptera	Byturidae	<i>Byturus tomentosus</i>	Raspberry Beetle	None	1	1
Insecta	Coleoptera	Cerylonidae	<i>Cerylon fagi</i>	a beetle	Nationally Scarce (Nb)		1
Insecta	Coleoptera	Cerylonidae	<i>Cerylon ferrugineum</i>	a beetle	None		1
Insecta	Coleoptera	Alexiidae	<i>Sphaerosoma pilosum</i>	a beetle	None		1
Insecta	Coleoptera	Coccinellidae	<i>Rhyzobius chrysomeloides</i>	a ladybird	None	1	1
Insecta	Coleoptera	Coccinellidae	<i>Rhyzobius forestieri</i>	a ladybird	None		1
Insecta	Coleoptera	Coccinellidae	<i>Rhyzobius litura</i>	a ladybird	None	1	1
Insecta	Coleoptera	Coccinellidae	<i>Rhyzobius lophanthae</i>	a ladybird	None		1
Insecta	Coleoptera	Coccinellidae	<i>Nephus quadrimaculatus</i>	a ladybird	RDB2		1
Insecta	Coleoptera	Coccinellidae	<i>Nephus redtenbacheri</i>	a ladybird	None	1	1
Insecta	Coleoptera	Coccinellidae	<i>Clitostethus arcuatus</i>	a ladybird	RDB1		1
Insecta	Coleoptera	Coccinellidae	<i>Scymnus femoralis</i>	a ladybird	Nationally Scarce (Nb)	1	
Insecta	Coleoptera	Coccinellidae	<i>Scymnus frontalis</i>	a ladybird	None		1
Insecta	Coleoptera	Coccinellidae	<i>Scymnus interruptus</i>	a ladybird	None		1
Insecta	Coleoptera	Coccinellidae	<i>Scymnus auritus</i>	a ladybird	None		1
Insecta	Coleoptera	Coccinellidae	<i>Scymnus haemorrhoidalis</i>	a ladybird	None		1
Insecta	Coleoptera	Coccinellidae	<i>Scymnus suturalis</i>	a ladybird	None	1	1
Insecta	Coleoptera	Coccinellidae	<i>Stethorus pusillus</i>	a ladybird	None		1
Insecta	Coleoptera	Coccinellidae	<i>Chilocorus renipustulatus</i>	Kidney-spot Ladybird	None		1
Insecta	Coleoptera	Coccinellidae	<i>Exochomus quadripustulatus</i>	Pine Ladybird	None		1
Insecta	Coleoptera	Coccinellidae	<i>Halyzia sedecimguttata</i>	Orange Ladybird	None	1	1
Insecta	Coleoptera	Coccinellidae	<i>Psyllobora vigintiduopunctata</i>	22-spot Ladybird	None		1
Insecta	Coleoptera	Coccinellidae	<i>Myrrha octodecimguttata</i>	18-spot Ladybird	None	1	1
Insecta	Coleoptera	Coccinellidae	<i>Calvia quattuordecimguttata</i>	Cream-spot Ladybird	None	1	1

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Coleoptera	Coccinellidae	<i>Propylea quattuordecimpunctata</i>	14-spot Ladybird	None	1	1
Insecta	Coleoptera	Coccinellidae	<i>Harmonia quadripunctata</i>	Cream-streaked Ladybird	None		1
Insecta	Coleoptera	Coccinellidae	<i>Harmonia axyridis</i>	Harlequin Ladybird	None	1	1
Insecta	Coleoptera	Coccinellidae	<i>Adalia bipunctata</i>	2-spot Ladybird	None	1	1
Insecta	Coleoptera	Coccinellidae	<i>Adalia decempunctata</i>	10-spot Ladybird	None	1	1
Insecta	Coleoptera	Coccinellidae	<i>Coccinella septempunctata</i>	7-spot Ladybird	None	1	1
Insecta	Coleoptera	Coccinellidae	<i>Hippodamia variegata</i>	Adonis' Ladybird	Nationally Scarce (Nb)		1
Insecta	Coleoptera	Coccinellidae	<i>Tytthaspis sedecimpunctata</i>	16-spot Ladybird	None		1
Insecta	Coleoptera	Coccinellidae	<i>Henosepilachna argus</i>	Bryony Ladybird	None		1
Insecta	Coleoptera	Coccinellidae	<i>Subcoccinella vigintiquatuor punctata</i>	24-spot Ladybird	None	1	1
Insecta	Coleoptera	Corylophidae	<i>Orthoperus aequalis</i>	a beetle	None		1
Insecta	Coleoptera	Corylophidae	<i>Orthoperus corticalis</i>	a beetle	None		1
Insecta	Coleoptera	Corylophidae	<i>Orthoperus nigrescens</i>	a beetle	Nationally Scarce (Nb)		1
Insecta	Coleoptera	Corylophidae	<i>Sericoderus brevicornis</i>	a beetle	None		1
Insecta	Coleoptera	Latridiidae	<i>Enicmus testaceus</i>	a beetle	None		1
Insecta	Coleoptera	Latridiidae	<i>Enicmus transversus</i>	a beetle	None		1
Insecta	Coleoptera	Latridiidae	<i>Latridius porcatus</i>	a beetle	None		1
Insecta	Coleoptera	Latridiidae	<i>Stephostethus lardarius</i>	a beetle	None	1	
Insecta	Coleoptera	Latridiidae	<i>Cartodere bifasciata</i>	a beetle	None	1	1
Insecta	Coleoptera	Latridiidae	<i>Cartodere nodifer</i>	a beetle	None	1	1
Insecta	Coleoptera	Latridiidae	<i>Corticaria impressa</i>	a beetle	None		1
Insecta	Coleoptera	Latridiidae	<i>Corticarina minuta</i>	a beetle	None		1
Insecta	Coleoptera	Latridiidae	<i>Corticarina similata</i>	a beetle	None		1
Insecta	Coleoptera	Latridiidae	<i>Corticaria gibbosa</i>	a beetle	None	1	1
Insecta	Coleoptera	Mycetophagidae	<i>Pseudotriphyllus suturalis</i>	a beetle	LC, NS		1

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Insecta	Coleoptera	Mycetophagidae	<i>Triphyllus bicolor</i>	a beetle	LC, NS		1
Insecta	Coleoptera	Mycetophagidae	<i>Litargus connexus</i>	a beetle	LC		1
Insecta	Coleoptera	Mycetophagidae	<i>Mycetophagus multipunctatus</i>	a beetle	LC		1
Insecta	Coleoptera	Mycetophagidae	<i>Mycetophagus piceus</i>	a beetle	LC		1
Insecta	Coleoptera	Mycetophagidae	<i>Eulagius filicornis</i>	a beetle	NA		1
Insecta	Coleoptera	Ciidae	<i>Cis bilamellatus</i>	a beetle	None		1
Insecta	Coleoptera	Ciidae	<i>Cis boleti</i>	a beetle	None	1	1
Insecta	Coleoptera	Ciidae	<i>Cis fagi</i>	a beetle	None		1
Insecta	Coleoptera	Ciidae	<i>Cis castaneus</i>	a beetle	None		1
Insecta	Coleoptera	Ciidae	<i>Cis festivus</i>	a beetle	Nationally Scarce (Nb)		1
Insecta	Coleoptera	Ciidae	<i>Cis pygmaeus</i>	a beetle	None		1
Insecta	Coleoptera	Ciidae	<i>Cis vestitus</i>	a beetle	None		1
Insecta	Coleoptera	Ciidae	<i>Orthocis alni</i>	a beetle	None		1
Insecta	Coleoptera	Ciidae	<i>Ennearthron cornutum</i>	a beetle	None		1
Insecta	Coleoptera	Ciidae	<i>Octotemnus glabriculus</i>	a beetle	None		1
Insecta	Coleoptera	Melandryidae	<i>Orchesia micans</i>	a false darkling beetle	LC, NS		1
Insecta	Coleoptera	Melandryidae	<i>Orchesia minor</i>	a false darkling beetle	LC, NS		1
Insecta	Coleoptera	Melandryidae	<i>Abdera biflexuosa</i>	a false darkling beetle	LC, NS		1
Insecta	Coleoptera	Melandryidae	<i>Anisoxya fuscula</i>	a false darkling beetle	LC, NS		1
Insecta	Coleoptera	Mordellidae	<i>Mordellistena neuwaldeggiana</i>	a tumbling flower-beetle	LC, NS	1	1
Insecta	Coleoptera	Mordellidae	<i>Mordellistena parvula</i>	a tumbling flower-beetle	LC, NS		1
Insecta	Coleoptera	Mordellidae	<i>Mordellistena variegata</i>	a tumbling flower-beetle	LC, NS	1	
Insecta	Coleoptera	Mordellidae	<i>Mordellochroa abdominalis</i>	a tumbling flower-beetle	LC		1
Insecta	Coleoptera	Zopheridae	<i>Synchita undata</i>	a beetle	LC		1
Insecta	Coleoptera	Zopheridae	<i>Bitoma crenata</i>	a beetle	LC		1



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Insecta	Coleoptera	Tenebrionidae	<i>Lagria hirta</i>	a darkling beetle	LC		1
Insecta	Coleoptera	Tenebrionidae	<i>Nalassus laevioctostriatus</i>	a darkling beetle	LC	1	
Insecta	Coleoptera	Tenebrionidae	<i>Prionychus ater</i>	a darkling beetle	LC		1
Insecta	Coleoptera	Tenebrionidae	<i>Isomira murina</i>	a darkling beetle	LC		1
Insecta	Coleoptera	Tenebrionidae	<i>Scaphidema metallica</i>	a darkling beetle	LC		1
Insecta	Coleoptera	Oedemeridae	<i>Oedemera nobilis</i>	Swollen-thighed Beetle	LC	1	1
Insecta	Coleoptera	Oedemeridae	<i>Oedemera lurida</i>	a beetle	LC	1	1
Insecta	Coleoptera	Pyrochroidae	<i>Pyrochroa coccinea</i>	Black-headed Cardinal Beetle	LC		1
Insecta	Coleoptera	Pyrochroidae	<i>Pyrochroa serraticornis</i>	Common Cardinal Beetle	LC	1	1
Insecta	Coleoptera	Salpingidae	<i>Lissodema cursor</i>	a beetle	LC, NR		1
Insecta	Coleoptera	Salpingidae	<i>Sphaeriestes castaneus</i>	a beetle	LC		1
Insecta	Coleoptera	Salpingidae	<i>Salpingus planirostris</i>	a beetle	LC	1	1
Insecta	Coleoptera	Anthicidae	<i>Anthicus antherinus</i>	an ant-like flower beetle	LC		1
Insecta	Coleoptera	Aderidae	<i>Aderus populneus</i>	a beetle	LC, NS		1
Insecta	Coleoptera	Scraptiidae	<i>Anaspis frontalis</i>	a beetle	LC	1	1
Insecta	Coleoptera	Scraptiidae	<i>Anaspis garneysi</i>	a beetle	LC	1	1
Insecta	Coleoptera	Scraptiidae	<i>Anaspis fasciata</i>	a beetle	LC	1	1
Insecta	Coleoptera	Scraptiidae	<i>Anaspis lurida</i>	a beetle	LC	1	
Insecta	Coleoptera	Scraptiidae	<i>Anaspis maculata</i>	a beetle	LC		1
Insecta	Coleoptera	Scraptiidae	<i>Anaspis pulicaria</i>	a beetle	LC		1
Insecta	Coleoptera	Scraptiidae	<i>Anaspis regimbarti</i>	a beetle	LC	1	1
Insecta	Coleoptera	Scraptiidae	<i>Anaspis thoracica</i>	a beetle	LC, NS	1	1
Insecta	Coleoptera	Scraptiidae	<i>Anaspis rufilabris</i>	a beetle	LC		1
Insecta	Coleoptera	Cerambycidae	<i>Rhagium mordax</i>	Black-spotted Longhorn	None	1	
Insecta	Coleoptera	Cerambycidae	<i>Grammoptera ruficornis</i>	Common Grammoptera	None		1
Insecta	Coleoptera	Cerambycidae	<i>Pseudovadonia livida</i>	Fairy-ring Longhorn	None		1
Insecta	Coleoptera	Cerambycidae	<i>Rutpela maculata</i>	Black-and-yellow Longhorn	None	1	1

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Insecta	Coleoptera	Cerambycidae	<i>Molorchus minor</i>	Spruce Shortwing Beetle	None		1
Insecta	Coleoptera	Cerambycidae	<i>Obrium brunneum</i>	Brown Longhorn	None		1
Insecta	Coleoptera	Cerambycidae	<i>Phymatodes testaceus</i>	Tanbark Borer	None		1
Insecta	Coleoptera	Cerambycidae	<i>Clytus arietis</i>	Wasp Beetle	None	1	1
Insecta	Coleoptera	Cerambycidae	<i>Pogonocherus hispidus</i>	Lesser Thorn-tipped Longhorn	None		1
Insecta	Coleoptera	Cerambycidae	<i>Leiopus nebulosus</i>	a longhorn beetle	None		1
Insecta	Coleoptera	Cerambycidae	<i>Agapanthia villosviridescens</i>	Golden-bloomed Grey Longhorn	None	1	
Insecta	Coleoptera	Cerambycidae	<i>Tetrops praeustus</i>	Plum Longhorn	None		1
Insecta	Coleoptera	Chrysomelidae	<i>Bruchidius imbricornis</i>	a seed-beetle	NA		1
Insecta	Coleoptera	Chrysomelidae	<i>Bruchidius varius</i>	a seed-beetle	NA		1
Insecta	Coleoptera	Chrysomelidae	<i>Bruchidius villosus</i>	a seed-beetle	LC		1
Insecta	Coleoptera	Chrysomelidae	<i>Bruchus loti</i>	a seed-beetle	LC		1
Insecta	Coleoptera	Chrysomelidae	<i>Bruchus rufimanus</i>	a seed-beetle	LC	1	1
Insecta	Coleoptera	Chrysomelidae	<i>Bruchus rufipes</i>	a seed-beetle	LC		1
Insecta	Coleoptera	Chrysomelidae	<i>Crioceris asparagi</i>	Asparagus Beetle	LC		1
Insecta	Coleoptera	Chrysomelidae	<i>Oulema duftschmidi</i>	a leaf-beetle	LC	1	1
Insecta	Coleoptera	Chrysomelidae	<i>Cassida rubiginosa</i>	Thistle Tortoise Beetle	LC	1	1
Insecta	Coleoptera	Chrysomelidae	<i>Cassida vibex</i>	a tortoise beetle	LC		1
Insecta	Coleoptera	Chrysomelidae	<i>Chrysolina americana</i>	Rosemary Leaf-beetle	NA		1
Insecta	Coleoptera	Chrysomelidae	<i>Chrysolina banksii</i>	a leaf-beetle	LC		1
Insecta	Coleoptera	Chrysomelidae	<i>Chrysolina hyperici</i>	a leaf-beetle	LC	1	
Insecta	Coleoptera	Chrysomelidae	<i>Gastrophysa polygoni</i>	a leaf-beetle	LC		1
Insecta	Coleoptera	Chrysomelidae	<i>Phaedon tumidulus</i>	a leaf-beetle	LC		1
Insecta	Coleoptera	Chrysomelidae	<i>Pyrrhalta viburni</i>	a leaf-beetle	LC		1
Insecta	Coleoptera	Chrysomelidae	<i>Lochmaea crataegi</i>	Hawthorn Leaf-beetle	LC	1	

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Coleoptera	Chrysomelidae	<i>Phyllotreta atra</i>	a flea-beetle	LC	1	1
Insecta	Coleoptera	Chrysomelidae	<i>Phyllotreta cruciferae</i>	a flea-beetle	LC, NS		1
Insecta	Coleoptera	Chrysomelidae	<i>Phyllotreta astrachanica</i>	a flea-beetle	LC		1
Insecta	Coleoptera	Chrysomelidae	<i>Phyllotreta nigripes</i>	a flea-beetle	LC	1	1
Insecta	Coleoptera	Chrysomelidae	<i>Phyllotreta undulata</i>	a flea-beetle	LC	1	1
Insecta	Coleoptera	Chrysomelidae	<i>Phyllotreta vittula</i>	a flea-beetle	LC		1
Insecta	Coleoptera	Chrysomelidae	<i>Aphthona euphorbiae</i>	a flea-beetle	LC	1	1
Insecta	Coleoptera	Chrysomelidae	<i>Aphthona nonstriata</i>	a flea-beetle	LC		1
Insecta	Coleoptera	Chrysomelidae	<i>Longitarsus dorsalis</i>	a flea-beetle	LC		1
Insecta	Coleoptera	Chrysomelidae	<i>Longitarsus exsoletus</i>	a flea-beetle	LC		1
Insecta	Coleoptera	Chrysomelidae	<i>Longitarsus flavicornis</i>	a flea-beetle	LC	1	1
Insecta	Coleoptera	Chrysomelidae	<i>Longitarsus strigicollis</i>	a flea-beetle	LC, NS		1
Insecta	Coleoptera	Chrysomelidae	<i>Longitarsus ganglbaueri</i>	a flea-beetle	LC, NS		1
Insecta	Coleoptera	Chrysomelidae	<i>Longitarsus gracilis</i>	a flea-beetle	LC	1	1
Insecta	Coleoptera	Chrysomelidae	<i>Longitarsus luridus</i>	a flea-beetle	LC	1	1
Insecta	Coleoptera	Chrysomelidae	<i>Longitarsus melanocephalus</i>	a flea-beetle	LC		1
Insecta	Coleoptera	Chrysomelidae	<i>Longitarsus parvulus</i>	a flea-beetle	LC		1
Insecta	Coleoptera	Chrysomelidae	<i>Longitarsus pratensis</i>	a flea-beetle	LC	1	1
Insecta	Coleoptera	Chrysomelidae	<i>Longitarsus rubiginosus</i>	a flea-beetle	LC	1	
Insecta	Coleoptera	Chrysomelidae	<i>Longitarsus suturellus</i>	a flea-beetle	LC		1
Insecta	Coleoptera	Chrysomelidae	<i>Hermaeophaga mercurialis</i>	a flea-beetle	LC		1
Insecta	Coleoptera	Chrysomelidae	<i>Altica lythri</i>	a flea-beetle	LC	1	
Insecta	Coleoptera	Chrysomelidae	<i>Altica palustris</i>	a flea-beetle	LC		1
Insecta	Coleoptera	Chrysomelidae	<i>Crepidodera aurea</i>	a flea-beetle	LC		1
Insecta	Coleoptera	Chrysomelidae	<i>Crepidodera plutus</i>	a flea-beetle	LC		1



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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Coleoptera	Chrysomelidae	<i>Chaetocnema concinna</i>	a flea-beetle	LC		1
Insecta	Coleoptera	Chrysomelidae	<i>Chaetocnema picipes</i>	a flea-beetle	LC		1
Insecta	Coleoptera	Chrysomelidae	<i>Chaetocnema hortensis</i>	a flea-beetle	LC	1	1
Insecta	Coleoptera	Chrysomelidae	<i>Sphaeroderma rubidum</i>	a flea-beetle	LC	1	1
Insecta	Coleoptera	Chrysomelidae	<i>Sphaeroderma testaceum</i>	a flea-beetle	LC	1	1
Insecta	Coleoptera	Chrysomelidae	<i>Psylliodes chrysocephala</i>	a flea-beetle	LC	1	1
Insecta	Coleoptera	Chrysomelidae	<i>Psylliodes luteola</i>	a flea-beetle	LC, NS		1
Insecta	Coleoptera	Chrysomelidae	<i>Cryptocephalus fulvus</i>	a leaf-beetle	LC	1	1
Insecta	Coleoptera	Chrysomelidae	<i>Cryptocephalus moraei</i>	a leaf-beetle	LC		1
Insecta	Coleoptera	Chrysomelidae	<i>Cryptocephalus pusillus</i>	a leaf-beetle	LC		1
Insecta	Coleoptera	Anthribidae	<i>Anthribus fasciatus</i>	a weevil	Nationally Scarce (Na)		1
Insecta	Coleoptera	Anthribidae	<i>Anthribus nebulosus</i>	a weevil	Nationally Scarce (Nb)		1
Insecta	Coleoptera	Rhynchitidae	<i>Tatianaerhynchites aequatus</i>	a weevil	None		1
Insecta	Coleoptera	Rhynchitidae	<i>Deporaus betulae</i>	Birch Leaf-roller Weevil	None		1
Insecta	Coleoptera	Attelabidae	<i>Apoderus coryli</i>	Hazel Leaf-roller Weevil	None		1
Insecta	Coleoptera	Apionidae	<i>Ceratapion onopordi</i>	a weevil	None		1
Insecta	Coleoptera	Apionidae	<i>Ceratapion carduorum</i>	a weevil	None		1
Insecta	Coleoptera	Apionidae	<i>Ceratapion gibbirostre</i>	a weevil	None	1	1
Insecta	Coleoptera	Apionidae	<i>Taeniapion urticarium</i>	a weevil	None		1
Insecta	Coleoptera	Apionidae	<i>Malvapion malvae</i>	a weevil	None	1	1
Insecta	Coleoptera	Apionidae	<i>Protapion apricans</i>	a weevil	None		1
Insecta	Coleoptera	Apionidae	<i>Protapion assimile</i>	a weevil	None		1
Insecta	Coleoptera	Apionidae	<i>Protapion filirostre</i>	a weevil	Nationally Scarce (Nb)		1
Insecta	Coleoptera	Apionidae	<i>Protapion fulvipes</i>	White Clover Seed Weevil	None		1
Insecta	Coleoptera	Apionidae	<i>Protapion nigrifarse</i>	a weevil	None	1	1
Insecta	Coleoptera	Apionidae	<i>Protapion trifolii</i>	a weevil	None	1	

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Coleoptera	Apionidae	<i>Perapion curtirostre</i>	a weevil	None		1
Insecta	Coleoptera	Apionidae	<i>Perapion hydrolapathi</i>	a weevil	None	1	
Insecta	Coleoptera	Apionidae	<i>Perapion violaceum</i>	a weevil	None	1	
Insecta	Coleoptera	Apionidae	<i>Apion frumentarium</i>	a weevil	None		1
Insecta	Coleoptera	Apionidae	<i>Catapion pubescens</i>	a weevil	Nationally Scarce (Nb)		1
Insecta	Coleoptera	Apionidae	<i>Catapion seniculus</i>	a weevil	None	1	
Insecta	Coleoptera	Apionidae	<i>Betulapion simile</i>	a weevil	None	1	1
Insecta	Coleoptera	Apionidae	<i>Stenopterapion tenue</i>	a weevil	None	1	1
Insecta	Coleoptera	Apionidae	<i>Ischnopterapion loti</i>	a weevil	None	1	
Insecta	Coleoptera	Apionidae	<i>Ischnopterapion virens</i>	a weevil	None		1
Insecta	Coleoptera	Apionidae	<i>Holotrichapion pisi</i>	a weevil	None		1
Insecta	Coleoptera	Apionidae	<i>Holotrichapion aethiops</i>	a weevil	None		1
Insecta	Coleoptera	Apionidae	<i>Eutrichapion vorax</i>	a weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Otiorhynchus aurifer</i>	a weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Otiorhynchus singularis</i>	a weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Otiorhynchus sulcatus</i>	Vine Weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Otiorhynchus crataegi</i>	a weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Phyllobius roboretanus</i>	Small Green Nettle Weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Phyllobius maculicornis</i>	Green Leaf Weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Phyllobius pyri</i>	Common Leaf Weevil	None	1	1
Insecta	Coleoptera	Curculionidae	<i>Phyllobius virideaeris</i>	Green Nettle Weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Phyllobius pomaceus</i>	a weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Phyllobius argentatus</i>	Silver-green Leaf Weevil	None	1	1
Insecta	Coleoptera	Curculionidae	<i>Pachyrhinus lethierryi</i>	a weevil	None	1	1
Insecta	Coleoptera	Curculionidae	<i>Polydrusus cervinus</i>	a weevil	None	1	1
Insecta	Coleoptera	Curculionidae	<i>Polydrusus formosus</i>	a weevil	Nationally Scarce (Na)		1
Insecta	Coleoptera	Curculionidae	<i>Polydrusus pterygomalis</i>	a weevil	None	1	1

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Coleoptera	Curculionidae	<i>Exomias araneiformis</i>	a weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Exomias pellucidus</i>	a weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Liophloeus tessulatus</i>	a weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Sitona humeralis</i>	a weevil	None	1	1
Insecta	Coleoptera	Curculionidae	<i>Sitona obsoletus</i>	a weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Sitona lineatus</i>	a weevil	None	1	1
Insecta	Coleoptera	Curculionidae	<i>Sitona lineellus</i>	a weevil	None	1	
Insecta	Coleoptera	Curculionidae	<i>Larinus carlinae</i>	a weevil	Nationally Scarce (Nb)		1
Insecta	Coleoptera	Curculionidae	<i>Rhinocyllus conicus</i>	a weevil	Nationally Scarce (Na)	1	1
Insecta	Coleoptera	Curculionidae	<i>Hypera nigrirostris</i>	a weevil	None	1	
Insecta	Coleoptera	Curculionidae	<i>Hypera plantaginis</i>	a weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Hypera postica</i>	a weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Cionus scrophulariae</i>	Figwort Weevil	None	1	
Insecta	Coleoptera	Curculionidae	<i>Magdalis ruficornis</i>	a weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Magdalis barbicornis</i>	a weevil	Nationally Scarce (Na)		1
Insecta	Coleoptera	Curculionidae	<i>Magdalis cerasi</i>	a weevil	Nationally Scarce (Nb)		1
Insecta	Coleoptera	Curculionidae	<i>Euophryum confine</i>	a weevil	None	1	1
Insecta	Coleoptera	Curculionidae	<i>Acalles misellus</i>	a weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Acalles ptinoides</i>	a weevil	Nationally Scarce (Nb)		1
Insecta	Coleoptera	Curculionidae	<i>Dorytomus taeniatus</i>	a weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Orthochaetes setiger</i>	a weevil	Nationally Scarce (Nb)		1
Insecta	Coleoptera	Curculionidae	<i>Rhinoncus pericarpus</i>	a weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Amalus scortillum</i>	a weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Parethelcus pollinarius</i>	a weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Mogulones asperifoliarum</i>	a weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Glocianus distinctus</i>	a weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Glocianus punctiger</i>	a weevil	Nationally Scarce (Nb)		1



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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Coleoptera	Curculionidae	<i>Ceutorhynchus chalybaeus</i>	a weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Ceutorhynchus erysimi</i>	a weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Ceutorhynchus typhae</i>	a weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Ceutorhynchus obstrictus</i>	a weevil	None	1	
Insecta	Coleoptera	Curculionidae	<i>Ceutorhynchus pallidactylus</i>	Cabbage Stem Weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Ceutorhynchus pyrrhorhynchus</i>	a weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Ceutorhynchus turbatus</i>	a weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Trichosirocalus troglodytes</i>	a weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Nedyus quadrimaculatus</i>	Small Nettle Weevil	None	1	1
Insecta	Coleoptera	Curculionidae	<i>Anthonomus pedicularius</i>	a weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Anthonomus rubi</i>	a weevil	None	1	1
Insecta	Coleoptera	Curculionidae	<i>Curculio glandium</i>	Acorn Weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Curculio venosus</i>	a weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Archarius pyrrhoceras</i>	a weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Tychius junceus</i>	a weevil	None	1	1
Insecta	Coleoptera	Curculionidae	<i>Tychius picirostris</i>	a weevil	None		1
Insecta	Coleoptera	Curculionidae	<i>Tychius pusillus</i>	a weevil	Nationally Scarce (Nb)		1
Insecta	Coleoptera	Curculionidae	<i>Mecinus pascuorum</i>	a weevil	None	1	1
Insecta	Coleoptera	Curculionidae	<i>Orchestes quercus</i>	a weevil	None	1	
Insecta	Coleoptera	Curculionidae	<i>Rhamphus oxyacanthae</i>	a weevil	None	1	
Insecta	Coleoptera	Curculionidae	<i>Rhamphus pulicarius</i>	a weevil	None	1	
Insecta	Coleoptera	Curculionidae	<i>Hylastes attenuatus</i>	a bark-beetle	None		1
Insecta	Coleoptera	Curculionidae	<i>Hylesinus varius</i>	Ash Bark-beetle	None		1
Insecta	Coleoptera	Curculionidae	<i>Scolytus intricatus</i>	a bark-beetle	None		1
Insecta	Coleoptera	Curculionidae	<i>Scolytus mali</i>	a bark-beetle	Nationally Scarce (Nb)		1

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Coleoptera	Curculionidae	<i>Scolytus rugulosus</i>	Fruit Bark-beetle	None	1	
Insecta	Coleoptera	Curculionidae	<i>Dryocoetes villosus</i>	a bark-beetle	None		1
Insecta	Coleoptera	Curculionidae	<i>Xylocleptes bispinus</i>	a bark-beetle	None		1
Insecta	Coleoptera	Curculionidae	<i>Xyleborinus saxesenii</i>	a bark-beetle	None		1
Insecta	Coleoptera	Curculionidae	<i>Pityophthorus pubescens</i>	a bark-beetle	None		1
Insecta	Coleoptera	Platypodidae	<i>Platypus cylindrus</i>	Oak Pin-hole Borer	Nationally Scarce (Nb)		1
Insecta	Hymenoptera: Symphyta	Argidae	<i>Arge cyanocrocea</i>	a sawfly	None	1	
Insecta	Hymenoptera: Symphyta	Argidae	<i>Arge ochropus</i>	a sawfly	None	1	
Insecta	Hymenoptera: Symphyta	Argidae	<i>Arge pagana</i>	a sawfly	None	1	
Insecta	Hymenoptera: Symphyta	Tenthredinidae	<i>Nesoselandria morio</i>	a sawfly	None	1	
Insecta	Hymenoptera: Symphyta	Tenthredinidae	<i>Poodolerus aeneus</i>	a sawfly	None	1	
Insecta	Hymenoptera: Symphyta	Tenthredinidae	<i>Poodolerus niger</i>	a sawfly	None	1	
Insecta	Hymenoptera: Symphyta	Tenthredinidae	<i>Athalia bicolor</i>	a sawfly	None	1	
Insecta	Hymenoptera: Symphyta	Tenthredinidae	<i>Athalia liberta</i>	a sawfly	None	1	
Insecta	Hymenoptera: Symphyta	Tenthredinidae	<i>Athalia rosae</i>	a sawfly	None	1	
Insecta	Hymenoptera: Symphyta	Tenthredinidae	<i>Blennocampa phyllocolpa</i>	a sawfly	None	1	
Insecta	Hymenoptera: Symphyta	Tenthredinidae	<i>Profenusa pygmaea</i>	a sawfly	None	1	
Insecta	Hymenoptera: Symphyta	Tenthredinidae	<i>Tenthredopsis litterata</i>	a sawfly	None	1	

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Hymenoptera: Symphyta	Tenthredinidae	<i>Eurogaster mesomelas</i>	a sawfly	None	1	
Insecta	Hymenoptera: Symphyta	Tenthredinidae	<i>Tenthredella atra</i>	a sawfly	None	1	
Insecta	Hymenoptera: Symphyta	Tenthredinidae	<i>Tenthredella livida</i>	a sawfly	None	1	
Insecta	Hymenoptera: Symphyta	Tenthredinidae	<i>Tenthredo notha</i>	a sawfly	None	1	
Insecta	Hymenoptera: Symphyta	Tenthredinidae	<i>Macrophya alboannulata</i>	a sawfly	None	1	
Insecta	Hymenoptera: Symphyta	Tenthredinidae	<i>Cladius pectinicornis</i>	a sawfly	None	1	
Insecta	Hymenoptera: Symphyta	Tenthredinidae	<i>Hoplocampa crataegi</i>	a sawfly	None	1	
Insecta	Hymenoptera: Symphyta	Tenthredinidae	<i>Nematus lucidus</i>	a sawfly	None	1	
Insecta	Hymenoptera: Symphyta	Tenthredinidae	<i>Pteronidea ribesii</i>	a sawfly	None	1	
Insecta	Hymenoptera: Symphyta	Tenthredinidae	<i>Pachynematus kirbyi</i>	a sawfly	None	1	
Insecta	Hymenoptera: Symphyta	Cepidae	<i>Cephus spinipes</i>	a sawfly	None	1	
Insecta	Hymenoptera: Symphyta	Cepidae	<i>Cephus pygmeus</i>	Wheat Stem-borer Sawfly	None	1	
Insecta	Hymenoptera: Symphyta	Cepidae	<i>Calameuta pallipes</i>	a sawfly	None	1	
Insecta	Hymenoptera: Parasitica	Cynipidae	<i>Liposthenus glechomae</i>	a gall wasp	None		1
Insecta	Hymenoptera: Parasitica	Cynipidae	<i>Neuroterus quercusbaccarum</i>	a gall wasp	None	1	



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Insecta	Hymenoptera: Parasitica	Cynipidae	<i>Neuroterus tricolor</i>	a gall wasp	None	1	
Insecta	Hymenoptera: Parasitica	Cynipidae	<i>Neuroterus anthracinus</i>	Oyster Gall causer	None	1	
Insecta	Hymenoptera: Parasitica	Cynipidae	<i>Andricus curvator</i>	a gall wasp	None	1	
Insecta	Hymenoptera: Parasitica	Cynipidae	<i>Andricus kollari</i>	a gall wasp	None	1	
Insecta	Hymenoptera: Parasitica	Cynipidae	<i>Andricus quercuscalicis</i>	a gall wasp	None	1	
Insecta	Hymenoptera: Parasitica	Cynipidae	<i>Cynips divisa</i>	Red-wart/ Red-pea Gall causer	None	1	
Insecta	Hymenoptera: Parasitica	Cynipidae	<i>Biorhiza pallida</i>	Oak-apple Gall causer	None	1	
Insecta	Hymenoptera: Parasitica	Ichneumonidae	<i>Amblyteles armatorius</i>	an ichneumon wasp	None	1	
Insecta	Hymenoptera: Aculeata	Bethylidae	<i>Bethylus fuscicornis</i>	a solitary wasp	None		1
Insecta	Hymenoptera: Aculeata	Chrysididae	<i>Chrysis angustula</i>	a cuckoo wasp	None	1	
Insecta	Hymenoptera: Aculeata	Chrysididae	<i>Chrysis ignita</i> agg.	a cuckoo wasp	None	1	
Insecta	Hymenoptera: Aculeata	Chrysididae	<i>Trichrysis cyanea</i>	a cuckoo wasp	None	1	
Insecta	Hymenoptera: Aculeata	Tiphiidae	<i>Myrmosa atra</i>	Black-headed Velvet-ant	None	1	
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Formica fusca</i>	an ant	None	1	
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Lasius brunneus</i>	Brown Tree Ant	Nationally Scarce (Na)		1

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Lasius flavus</i>	an ant	None	1	1
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Lasius niger sens. str.</i>	an ant	None	1	1
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Temnothorax nylanderi</i>	an ant	None		1
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Myrmecina graminicola</i>	an ant	None		1
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Myrmica rubra</i>	an ant	None	1	1
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Myrmica ruginodis</i>	an ant	None		1
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Myrmica sabuleti</i>	an ant	None		1
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Myrmica scabrinodis</i>	an ant	None	1	1
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Ponera coarctata</i>	an ant	Nationally Scarce (Nb)		1
Insecta	Hymenoptera: Aculeata	Formicidae	<i>Stenamma debile</i>	an ant	None		1
Insecta	Hymenoptera: Aculeata	Pompilidae	<i>Anoplius nigerrimus</i>	a spider-hunting wasp	None		1
Insecta	Hymenoptera: Aculeata	Eumenidae	<i>Ancistrocerus gazella</i>	a mason wasp	None	1	
Insecta	Hymenoptera: Aculeata	Eumenidae	<i>Microdynerus exilis</i>	a mason wasp	Nationally Scarce (Nb)		1
Insecta	Hymenoptera: Aculeata	Eumenidae	<i>Symmorphus bifasciatus</i>	a mason wasp	None	1	
Insecta	Hymenoptera: Aculeata	Vespidae	<i>Vespa crabro</i>	The Hornet	None	1	1

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Hymenoptera: Aculeata	Vespidae	<i>Vespula germanica</i>	German Wasp	None	1	
Insecta	Hymenoptera: Aculeata	Vespidae	<i>Vespula vulgaris</i>	Common Wasp	None	1	
Insecta	Hymenoptera: Aculeata	Crabronidae	<i>Crossocerus megacephalus</i>	a digger wasp	None	1	
Insecta	Hymenoptera: Aculeata	Crabronidae	<i>Ectemnius cavifrons</i>	a digger wasp	None	1	
Insecta	Hymenoptera: Aculeata	Crabronidae	<i>Ectemnius rubicola</i>	a digger wasp	None	1	
Insecta	Hymenoptera: Aculeata	Crabronidae	<i>Passaloecus gracilis</i>	a digger-wasp	None	1	
Insecta	Hymenoptera: Aculeata	Crabronidae	<i>Pemphredon lugubris</i>	Mournful Wasp	None	1	
Insecta	Hymenoptera: Aculeata	Apidae	<i>Andrena flavipes</i>	Yellow-legged Mining-bee	None		1
Insecta	Hymenoptera: Aculeata	Apidae	<i>Andrena nitida</i>	Grey-patched Mining Bee	None		1
Insecta	Hymenoptera: Aculeata	Apidae	<i>Andrena semilaevis</i>	Shiny-margined Mini-miner	None		1
Insecta	Hymenoptera: Aculeata	Apidae	<i>Anthophora plumipes</i>	Hairy-footed Flower-bee	None		1
Insecta	Hymenoptera: Aculeata	Apidae	<i>Apis mellifera</i>	Honey Bee	None	1	1
Insecta	Hymenoptera: Aculeata	Apidae	<i>Bombus hortorum</i>	Small Garden Bumblebee	None	1	1
Insecta	Hymenoptera: Aculeata	Apidae	<i>Bombus hypnorum</i>	Tree Bumblebee	None		1
Insecta	Hymenoptera: Aculeata	Apidae	<i>Bombus lapidarius</i>	Large Red-tailed Bumblebee	None	1	1



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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Hymenoptera: Aculeata	Apidae	<i>Bombus lucorum sens. lat.</i>	White-tailed Bumblebee	None	1	1
Insecta	Hymenoptera: Aculeata	Apidae	<i>Bombus pascuorum</i>	Common Carder-bee	None	1	1
Insecta	Hymenoptera: Aculeata	Apidae	<i>Bombus pratorum</i>	Early Bumblebee	None		1
Insecta	Hymenoptera: Aculeata	Apidae	<i>Bombus terrestris</i>	Buff-tailed Bumblebee	None	1	1
Insecta	Hymenoptera: Aculeata	Apidae	<i>Bombus vestalis</i>	Vestal Cuckoo-bee	None		1
Insecta	Hymenoptera: Aculeata	Apidae	<i>Halictus tumulorum</i>	Bronze Furrow-bee	None		1
Insecta	Hymenoptera: Aculeata	Apidae	<i>Osmia spinulosa</i>	Spined Mason-bee	None		1
Insecta	Hymenoptera: Aculeata	Apidae	<i>Hylaeus dilatatus</i>	Chalk Yellow-faced Bee	None		1
Insecta	Hymenoptera: Aculeata	Apidae	<i>Hylaeus communis</i>	Common Yellow-faced Bee	None	1	1
Insecta	Hymenoptera: Aculeata	Apidae	<i>Lasioglossum fulvicorne</i>	Chalk Furrow-bee	None	1	
Insecta	Hymenoptera: Aculeata	Apidae	<i>Lasioglossum leucopus</i>	White-footed Furrow-bee	None	1	1
Insecta	Hymenoptera: Aculeata	Apidae	<i>Lasioglossum malachurum</i>	Sharp-collared Furrow-bee	Nationally Scarce (Nb)		1
Insecta	Hymenoptera: Aculeata	Apidae	<i>Lasioglossum pauxillum</i>	Lobe-spurred Furrow-bee	Nationally Scarce (Na)	1	1
Insecta	Hymenoptera: Aculeata	Apidae	<i>Lasioglossum smeathmanellum</i>	Smeathman's Furrow-bee	None	1	
Insecta	Hymenoptera: Aculeata	Apidae	<i>Melitta tricincta</i>	Red Bartsia Bee	Nationally Scarce (Nb)	1	

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Hymenoptera: Aculeata	Apidae	<i>Nomada fabriciana</i>	Fabricius' Nomad Bee	None	1	
Insecta	Hymenoptera: Aculeata	Apidae	<i>Nomada flava</i>	Flavous Nomad Bee	None	1	
Insecta	Hymenoptera: Aculeata	Apidae	<i>Nomada flavoguttata</i>	Little Nomad Bee	None	1	
Insecta	Hymenoptera: Aculeata	Apidae	<i>Nomada marshamella</i>	Marsham's Nomad Bee	None		1
Insecta	Neuroptera	Coniopterygidae	<i>Conwentzia pineticola</i>	a wax-fly	None	1	
Insecta	Neuroptera	Coniopterygidae	<i>Conwentzia psociformis</i>	a wax-fly	None		1
Insecta	Neuroptera	Coniopterygidae	<i>Coniopteryx borealis</i>	a wax-fly	None		1
Insecta	Neuroptera	Hemerobiidae	<i>Micromus variegatus</i>	a brown lacewing	None	1	1
Insecta	Neuroptera	Hemerobiidae	<i>Hemerobius humulinus</i>	a brown lacewing	None		1
Insecta	Neuroptera	Hemerobiidae	<i>Hemerobius micans</i>	a brown lacewing	None	1	
Insecta	Neuroptera	Hemerobiidae	<i>Hemerobius lutescens</i>	a brown lacewing	None	1	1
Insecta	Neuroptera	Hemerobiidae	<i>Wesmaelius subnebulosus</i>	a brown lacewing	None	1	
Insecta	Neuroptera	Chrysopidae	<i>Chrysopa perla</i>	a green lacewing	None	1	
Insecta	Neuroptera	Chrysopidae	<i>Chrysoperla carnea sens. str.</i>	a green lacewing	None	1	1
Insecta	Neuroptera	Chrysopidae	<i>Cunctochrysa albolineata</i>	a green lacewing	None	1	
Insecta	Neuroptera	Chrysopidae	<i>Dichochrysa prasina</i>	a green lacewing	None	1	
Insecta	Neuroptera	Chrysopidae	<i>Nineta flava</i>	a green lacewing	None	1	
Insecta	Mecoptera	Panorpidae	<i>Panorpa germanica</i>	a scorpion-fly	None		1
Insecta	Diptera	Tipulidae	<i>Ctenophora pectinicornis</i>	a long-palped crane fly	Nationally Scarce		1
Insecta	Diptera	Tipulidae	<i>Nephrotoma appendiculata</i>	a long-palped crane fly	None	1	
Insecta	Diptera	Tipulidae	<i>Nephrotoma flavescens</i>	a long-palped crane fly	None	1	
Insecta	Diptera	Tipulidae	<i>Nephrotoma quadrifaria</i>	a long-palped crane fly	None	1	

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Diptera	Tipulidae	<i>Tipula vernalis</i>	a long-palped crane fly	None	1	
Insecta	Diptera	Tipulidae	<i>Tipula oleracea</i>	a long-palped crane fly	None	1	
Insecta	Diptera	Tipulidae	<i>Tipula paludosa</i>	a long-palped crane fly	None	1	
Insecta	Diptera	Limoniidae	<i>Molophilus griseus</i>	a short-palped crane fly	None	1	
Insecta	Diptera	Limoniidae	<i>Austrolimnophila ochracea</i>	a short-palped crane fly	None	1	
Insecta	Diptera	Limoniidae	<i>Epiphragma ocellare</i>	a short-palped crane fly	None	1	
Insecta	Diptera	Limoniidae	<i>Limonia flavipes</i>	a short-palped crane fly	None	1	
Insecta	Diptera	Limoniidae	<i>Limonia nigropunctata</i>	a short-palped crane fly	None	1	
Insecta	Diptera	Limoniidae	<i>Limonia phragmitidis</i>	a short-palped crane fly	None	1	
Insecta	Diptera	Limoniidae	<i>Neolimonia dumetorum</i>	a short-palped crane fly	None	1	
Insecta	Diptera	Bibionidae	<i>Bibio anglicus</i>	a bibionid fly	None		1
Insecta	Diptera	Bibionidae	<i>Bibio marci</i>	St Mark's Fly	None		1
Insecta	Diptera	Bibionidae	<i>Dilophus febrilis</i>	a bibionid fly	None	1	
Insecta	Diptera	Bibionidae	<i>Dilophus femoratus</i>	a bibionid fly	None		1
Insecta	Diptera	Keroplastidae	<i>Macrorrhyncha flava</i>	a fungus gnat	None (Falk and Chandler, 2005)		1
Insecta	Diptera	Keroplastidae	<i>Orfelia ochracea</i>	a fungus gnat	None (Falk and Chandler, 2005)		1
Insecta	Diptera	Keroplastidae	<i>Platyura marginata</i>	a fungus gnat	None (Falk and Chandler, 2005)		1
Insecta	Diptera	Mycetophilidae	<i>Docosia gilvipes</i>	a fungus gnat	None (Falk and Chandler, 2005)		1
Insecta	Diptera	Cecidomyiidae	<i>Putoniella pruni</i>	a gall midge	None	1	
Insecta	Diptera	Cecidomyiidae	<i>Dasineura crataegi</i>	a gall midge	None	1	
Insecta	Diptera	Cecidomyiidae	<i>Dasineura dioicae</i>	a gall midge	None		1
Insecta	Diptera	Cecidomyiidae	<i>Iteomyia major</i>	a gall midge	None	1	
Insecta	Diptera	Anisopodidae	<i>Sylvicola cinctus</i>	a window gnat	None		1



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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Diptera	Ptychopteridae	<i>Ptychoptera albimana</i>	a phantom crane fly	None (Falk and Chandler, 2005)	1	
Insecta	Diptera	Rhagionidae	<i>Rhagio lineola</i>	Small Fleck-winged Snipefly	LC	1	1
Insecta	Diptera	Rhagionidae	<i>Rhagio scolopaceus</i>	Downlooker Snipefly	LC	1	
Insecta	Diptera	Tabanidae	<i>Haematopota pluvialis</i>	Notch-horned Cleg	LC	1	1
Insecta	Diptera	Xylomyidae	<i>Solva marginata</i>	Drab Wood-soldierfly	LC	1	1
Insecta	Diptera	Stratiomyidae	<i>Beris chalybata</i>	Murky-legged Black Legionnaire	LC	1	1
Insecta	Diptera	Stratiomyidae	<i>Beris vallata</i>	Common Orange Legionnaire	LC	1	
Insecta	Diptera	Stratiomyidae	<i>Chorisops nagatomii</i>	Bright Four-spined Legionnaire	LC	1	1
Insecta	Diptera	Stratiomyidae	<i>Chorisops tibialis</i>	Dull Four-spined Legionnaire	LC	1	1
Insecta	Diptera	Stratiomyidae	<i>Pachygaster atra</i>	Dark-winged Black	LC	1	1
Insecta	Diptera	Stratiomyidae	<i>Pachygaster leachii</i>	Yellow-legged Black	LC	1	1
Insecta	Diptera	Stratiomyidae	<i>Chloromyia formosa</i>	Broad Centurion	LC	1	1
Insecta	Diptera	Stratiomyidae	<i>Microchrysa cyaneiventris</i>	Black Gem	LC	1	
Insecta	Diptera	Stratiomyidae	<i>Microchrysa flavicornis</i>	Green Gem	LC	1	
Insecta	Diptera	Stratiomyidae	<i>Microchrysa polita</i>	Black-horned Gem	LC	1	
Insecta	Diptera	Stratiomyidae	<i>Sargus bipunctatus</i>	Twin-spot Centurion	LC	1	
Insecta	Diptera	Bombyliidae	<i>Bombylius major</i>	Dark-edged Bee-fly	LC		1
Insecta	Diptera	Asilidae	<i>Leptogaster cylindrica</i>	Striped Slender Robberfly	LC	1	
Insecta	Diptera	Asilidae	<i>Dioctria atricapilla</i>	Violet Black-legged Robberfly	LC	1	
Insecta	Diptera	Asilidae	<i>Dioctria baumhaueri</i>	Stripe-legged Robberfly	LC	1	1
Insecta	Diptera	Asilidae	<i>Dioctria rufipes</i>	Common Red-legged Robberfly	LC	1	
Insecta	Diptera	Hybotidae	<i>Platypalpus annulipes</i>	a hybotid fly	None (Falk & Crossley, 2005)	1	

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Insecta	Diptera	Hybotidae	<i>Platypalpus calceatus</i>	a hybotid fly	None (Falk & Crossley, 2005)	1	
Insecta	Diptera	Hybotidae	<i>Platypalpus minutus sens. str.</i>	a hybotid fly	None (Falk & Crossley, 2005)	1	
Insecta	Diptera	Hybotidae	<i>Platypalpus rapidus</i>	a hybotid fly	Nationally Scarce		1
Insecta	Diptera	Empididae	<i>Empis praevia</i>	a dance fly	None (Falk & Crossley, 2005)	1	
Insecta	Diptera	Empididae	<i>Empis tessellata</i>	a dance fly	None (Falk & Crossley, 2005)	1	
Insecta	Diptera	Empididae	<i>Empis livida</i>	a dance fly	None (Falk & Crossley, 2005)	1	
Insecta	Diptera	Empididae	<i>Empis trigramma</i>	a dance fly	None (Falk & Crossley, 2005)	1	
Insecta	Diptera	Dolichopodidae	<i>Dolichopus festivus</i>	a long-headed fly	LC (Drake, 2018)	1	
Insecta	Diptera	Dolichopodidae	<i>Dolichopus griseipennis</i>	a long-headed fly	LC (Drake, 2018)	1	
Insecta	Diptera	Dolichopodidae	<i>Dolichopus pennatus</i>	a long-headed fly	LC (Drake, 2018)	1	
Insecta	Diptera	Dolichopodidae	<i>Dolichopus plumipes</i>	a long-headed fly	LC (Drake, 2018)	1	
Insecta	Diptera	Dolichopodidae	<i>Dolichopus popularis</i>	a long-headed fly	LC (Drake, 2018)	1	
Insecta	Diptera	Dolichopodidae	<i>Dolichopus urbanus</i>	a long-headed fly	LC (Drake, 2018)	1	
Insecta	Diptera	Dolichopodidae	<i>Poecilobothrus nobilitatus</i>	a long-headed fly	LC (Drake, 2018)	1	
Insecta	Diptera	Dolichopodidae	<i>Scellus notatus</i>	a long-headed fly	LC (Drake, 2018)	1	
Insecta	Diptera	Dolichopodidae	<i>Medetera abstrusa</i>	a long-headed fly	LC (Drake, 2018)		1
Insecta	Diptera	Dolichopodidae	<i>Medetera saxatilis</i>	a long-headed fly	LC (Drake, 2018)	1	
Insecta	Diptera	Dolichopodidae	<i>Medetera truncorum</i>	a long-headed fly	LC (Drake, 2018)	1	1
Insecta	Diptera	Dolichopodidae	<i>Sciapus platypterus</i>	a long-headed fly	LC (Drake, 2018)	1	1
Insecta	Diptera	Lonchopteridae	<i>Lonchoptera bifurcata</i>	a lonchopterid fly	LC	1	
Insecta	Diptera	Syrphidae	<i>Baccha elongata</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Melanostoma mellinum</i>	a hoverfly	LC	1	1

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Insecta	Diptera	Syrphidae	<i>Melanostoma scalare</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Platycheirus albimanus</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Platycheirus clypeatus</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Platycheirus manicatus</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Platycheirus peltatus</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Platycheirus scutatus sens. str.</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Paragus haemorrhous</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Chrysotoxum bicinctum</i>	a hoverfly	LC	1	1
Insecta	Diptera	Syrphidae	<i>Chrysotoxum cautum</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Dasysyrphus albobstriatus</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Epistrophe eligans</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Epistrophe nitidicollis</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Episyrphus balteatus</i>	a hoverfly	LC	1	1
Insecta	Diptera	Syrphidae	<i>Eupeodes corollae</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Eupeodes latifasciatus</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Eupeodes luniger</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Leucozona lucorum</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Meligramma trianguliferum</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Sphaerophoria scripta</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Syrphus ribesii</i>	a hoverfly	LC	1	1
Insecta	Diptera	Syrphidae	<i>Syrphus vitripennis</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Xanthogramma pedissequum</i>	a hoverfly	LC	1	1
Insecta	Diptera	Syrphidae	<i>Cheilosia albitarsis sens. str.</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Cheilosia illustrata</i>	a hoverfly	LC	1	1



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Insecta	Diptera	Syrphidae	<i>Cheilosia pagana</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Cheilosia proxima</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Cheilosia variabilis</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Cheilosia vulpina</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Ferdinandea cuprea</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Rhingia rostrata</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Lejogaster tarsata</i>	a hoverfly	LC		1
Insecta	Diptera	Syrphidae	<i>Neoascia podagrica</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Eristalis arbustorum</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Eristalis nemorum</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Eristalis intricaria</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Eristalis pertinax</i>	a hoverfly	LC	1	1
Insecta	Diptera	Syrphidae	<i>Helophilus pendulus</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Myathropa florea</i>	a hoverfly	LC	1	1
Insecta	Diptera	Syrphidae	<i>Eumerus strigatus</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Pipiza noctiluca</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Pipizella viduata</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Volucella bombylans</i>	a hoverfly	LC		1
Insecta	Diptera	Syrphidae	<i>Volucella inanis</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Volucella pellucens</i>	a hoverfly	LC	1	1
Insecta	Diptera	Syrphidae	<i>Brachypalpus laphriformis</i>	a hoverfly	LC		1
Insecta	Diptera	Syrphidae	<i>Syritta pipiens</i>	a hoverfly	LC	1	1
Insecta	Diptera	Syrphidae	<i>Xylota segnis</i>	a hoverfly	LC	1	
Insecta	Diptera	Syrphidae	<i>Xylota sylvarum</i>	a hoverfly	LC	1	
Insecta	Diptera	Pipunculidae	<i>Tomosvaryella sylvatica</i>	a big-headed fly	None (Falk and Chandler, 2005)		1
Insecta	Diptera	Conopidae	<i>Conops ceriaeformis</i>	a thick-headed fly	None	1	

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Insecta	Diptera	Conopidae	<i>Thecophora atra</i>	a thick-headed fly	None	1	
Insecta	Diptera	Conopidae	<i>Sicus ferrugineus</i>	a thick-headed fly	None	1	1
Insecta	Diptera	Pallopidae	<i>Pallopia muliebris</i>	a flutter-wing fly	None (Falk, Ismay & Chandler, 2016)	1	
Insecta	Diptera	Pallopidae	<i>Pallopia quinque-maculata</i>	a flutter-wing fly	None (Falk, Ismay & Chandler, 2016)	1	
Insecta	Diptera	Pallopidae	<i>Pallopia trimaculata</i>	a flutter-wing fly	None (Falk, Ismay & Chandler, 2016)	1	
Insecta	Diptera	Pallopidae	<i>Pallopia umbellatarum</i>	a flutter-wing fly	None (Falk, Ismay & Chandler, 2016)	1	1
Insecta	Diptera	Ulidiidae	<i>Dorycera graminum</i>	a picture-winged fly	pNT, S41	1	1
Insecta	Diptera	Platystomatidae	<i>Platystoma seminatiois</i>	a fly	None (Falk, Ismay & Chandler, 2016)	1	1
Insecta	Diptera	Tephritidae	<i>Urophora cardui</i>	a picture-winged fly	None	1	
Insecta	Diptera	Tephritidae	<i>Urophora stylata</i>	a picture-winged fly	None	1	1
Insecta	Diptera	Tephritidae	<i>Tephritis bardanae</i>	a picture-winged fly	None		1
Insecta	Diptera	Tephritidae	<i>Tephritis formosa</i>	a picture-winged fly	None	1	1
Insecta	Diptera	Tephritidae	<i>Terellia ruficauda</i>	a picture-winged fly	None	1	
Insecta	Diptera	Tephritidae	<i>Acidia cognata</i>	a picture-winged fly	None		1
Insecta	Diptera	Tephritidae	<i>Anomoia purmunda</i>	a picture-winged fly	None	1	
Insecta	Diptera	Tephritidae	<i>Euleia heraclei</i>	a picture-winged fly	None	1	
Insecta	Diptera	Tephritidae	<i>Trypeta zoe</i>	a picture-winged fly	None	1	
Insecta	Diptera	Lauxaniidae	<i>Meiosimyza rorida</i>	a lauxaniid fly	None (Falk, Ismay & Chandler, 2016)		1
Insecta	Diptera	Lauxaniidae	<i>Tricholauxania praeusta</i>	a lauxaniid fly	None (Falk, Ismay & Chandler, 2016)	1	1
Insecta	Diptera	Dryomyzidae	<i>Dryomyza anilis</i>	a dryomyzid fly	None		1
Insecta	Diptera	Sciomyzidae	<i>Pherbellia cinerella</i>	a snail-killing fly	None		1

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Diptera	Sciomyzidae	<i>Coremacera marginata</i>	a snail-killing fly	None	1	
Insecta	Diptera	Sciomyzidae	<i>Tetanocera elata</i>	a snail-killing fly	None	1	
Insecta	Diptera	Sepsidae	<i>Sepsis fulgens</i>	an ensign fly	None (Falk, Ismay & Chandler, 2016)		1
Insecta	Diptera	Agromyzidae	<i>Agromyza alnibetulae</i>	a leaf-mining fly	None (Falk, Ismay & Chandler, 2016)	1	
Insecta	Diptera	Agromyzidae	<i>Agromyza nana</i>	a leaf-mining fly	None (Falk, Ismay & Chandler, 2016)	1	
Insecta	Diptera	Agromyzidae	<i>Agromyza pseudoreptans</i>	a leaf-mining fly	None (Falk, Ismay & Chandler, 2016)	1	
Insecta	Diptera	Agromyzidae	<i>Agromyza reptans</i>	a leaf-mining fly	None (Falk, Ismay & Chandler, 2016)	1	
Insecta	Diptera	Agromyzidae	<i>Amauromyza morionella</i>	a leaf-mining fly	None (Falk, Ismay & Chandler, 2016)	1	
Insecta	Diptera	Agromyzidae	<i>Amauromyza labiatarum</i>	a leaf-mining fly	None (Falk, Ismay & Chandler, 2016)	1	
Insecta	Diptera	Agromyzidae	<i>Amauromyza verbasci</i>	a leaf-mining fly	None (Falk, Ismay & Chandler, 2016)	1	
Insecta	Diptera	Agromyzidae	<i>Calycomyza artemisiae</i>	a leaf-mining fly	None (Falk, Ismay & Chandler, 2016)	1	
Insecta	Diptera	Agromyzidae	<i>Cerodontha iraeos</i>	a leaf-mining fly	None (Falk, Ismay & Chandler, 2016)		1
Insecta	Diptera	Agromyzidae	<i>Chromatomyia horticola</i>	a leaf-mining fly	None (Falk, Ismay & Chandler, 2016)	1	
Insecta	Diptera	Agromyzidae	<i>Chromatomyia syngenesiae</i>	a leaf-mining fly	None (Falk, Ismay & Chandler, 2016)	1	
Insecta	Diptera	Agromyzidae	<i>Liriomyza amoena</i>	a leaf-mining fly	None (Falk, Ismay & Chandler, 2016)	1	
Insecta	Diptera	Agromyzidae	<i>Liriomyza demeijerei</i>	a leaf-mining fly	None (Falk, Ismay & Chandler, 2016)	1	



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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Diptera	Agromyzidae	<i>Liriomyza strigata</i>	a leaf-mining fly	None (Falk, Ismay & Chandler, 2016)	1	
Insecta	Diptera	Agromyzidae	<i>Phytomyza conyzae</i>	a leaf-mining fly	None (Falk, Ismay & Chandler, 2016)	1	
Insecta	Diptera	Agromyzidae	<i>Phytomyza fulgens</i>	a leaf-mining fly	None (Falk, Ismay & Chandler, 2016)	1	
Insecta	Diptera	Agromyzidae	<i>Phytomyza ilicis</i>	a leaf-mining fly	None (Falk, Ismay & Chandler, 2016)	1	
Insecta	Diptera	Agromyzidae	<i>Phytomyza ranunculi</i>	a leaf-mining fly	None (Falk, Ismay & Chandler, 2016)	1	
Insecta	Diptera	Agromyzidae	<i>Phytomyza spondylia</i>	a leaf-mining fly	None (Falk, Ismay & Chandler, 2016)	1	
Insecta	Diptera	Opomyzidae	<i>Geomyza tripunctata</i>	an opomyzid fly	None (Falk, Ismay & Chandler, 2016)		1
Insecta	Diptera	Opomyzidae	<i>Opomyza germinationis</i>	an opomyzid fly	None (Falk, Ismay & Chandler, 2016)		1
Insecta	Diptera	Opomyzidae	<i>Opomyza petrei</i>	an opomyzid fly	None (Falk, Ismay & Chandler, 2016)		1
Insecta	Diptera	Drosophilidae	<i>Leucophenga maculata</i>	a fruit fly	None (Falk, Ismay & Chandler, 2016)		1
Insecta	Diptera	Ephydriidae	<i>Discomyza incurva</i>	a shore fly	None (Falk, Ismay & Chandler, 2016)		1
Insecta	Diptera	Scathophagidae	<i>Scathophaga stercoraria</i>	a dung fly	None (Falk, Pont & Chandler, 2005)	1	
Insecta	Diptera	Anthomyiidae	<i>Eutrichota praepotens</i>	a seed fly	None (Falk & Pont, 2017)		1
Insecta	Diptera	Fanniidae	<i>Fannia canicularis</i>	a fanniid fly	None (Falk & Pont, 2017)		1
Insecta	Diptera	Muscidae	<i>Muscina prolapsa</i>	a house fly	None (Falk & Pont, 2017)		1
Insecta	Diptera	Muscidae	<i>Helina depuncta</i>	a house fly	None (Falk & Pont, 2017)		1
Insecta	Diptera	Muscidae	<i>Helina impuncta</i>	a house fly	None (Falk & Pont, 2017)		1
Insecta	Diptera	Muscidae	<i>Helina pertusa</i>	a house fly	None (Falk & Pont, 2017)		1

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Insecta	Diptera	Muscidae	<i>Phaonia pallida</i>	a house fly	None (Falk & Pont, 2017)		1
Insecta	Diptera	Muscidae	<i>Phaonia rufiventris</i>	a house fly	None (Falk & Pont, 2017)		1
Insecta	Diptera	Calliphoridae	<i>Calliphora vicina</i>	a blowfly	None (Falk & Pont, 2017)	1	
Insecta	Diptera	Calliphoridae	<i>Calliphora vomitoria</i>	a blowfly	None (Falk & Pont, 2017)	1	
Insecta	Diptera	Calliphoridae	<i>Lucilia caesar</i>	a blowfly	None (Falk & Pont, 2017)	1	
Insecta	Diptera	Calliphoridae	<i>Lucilia illustris</i>	a blowfly	None (Falk & Pont, 2017)	1	
Insecta	Diptera	Calliphoridae	<i>Lucilia richardsi</i>	a blowfly	None (Falk & Pont, 2017)	1	
Insecta	Diptera	Calliphoridae	<i>Lucilia silvarum</i>	a blowfly	None (Falk & Pont, 2017)	1	
Insecta	Diptera	Calliphoridae	<i>Melanomya nana</i>	a blowfly	None (Falk & Pont, 2017)	1	
Insecta	Diptera	Calliphoridae	<i>Pollenia rudis</i>	a blowfly	None (Falk & Pont, 2017)	1	
Insecta	Diptera	Tachinidae	<i>Dufouria chalybeata</i>	a parasitic fly	None (Falk, Pont & Chandler, 2005)	1	
Insecta	Diptera	Tachinidae	<i>Eriothrix rufomaculata</i>	a parasitic fly	None (Falk, Pont & Chandler, 2005)	1	1
Insecta	Diptera	Tachinidae	<i>Cistogaster globosa</i>	a parasitic fly	NT (Falk, Pont & Chandler, 2005)		1
Insecta	Diptera	Tachinidae	<i>Phasia pusilla</i>	a parasitic fly	None (Falk, Pont & Chandler, 2005)		1
Insecta	Diptera	Tachinidae	<i>Siphona cristata</i>	a parasitic fly	None (Falk, Pont & Chandler, 2005)	1	
Insecta	Diptera	Tachinidae	<i>Tachina grossa</i>	a parasitic fly	None (Falk, Pont & Chandler, 2005)	1	
Insecta	Siphonaptera	Ceratophyllidae	<i>Paraceras melis</i>	Badger Flea	None		1
Insecta	Lepidoptera	Eriocraniidae	<i>Dyseriocrania subpurpurella</i>	Common Oak Purple	None		1
Insecta	Lepidoptera	Hepialidae	<i>Hepialus humuli</i>	Ghost Moth	S41 (research only)	1	
Insecta	Lepidoptera	Hepialidae	<i>Triodia sylvina</i>	Orange Swift	None	1	
Insecta	Lepidoptera	Hepialidae	<i>Korscheltellus lupulina</i>	Common Swift	None	1	

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Insecta	Lepidoptera	Nepticulidae	<i>Ectoedemia atricollis</i>	Pinch-barred Pigmy	None	1	
Insecta	Lepidoptera	Nepticulidae	<i>Ectoedemia subbimaculella</i>	Spotted Black Pigmy	None	1	
Insecta	Lepidoptera	Nepticulidae	<i>Stigmella aurella</i>	Golden Pigmy	None	1	
Insecta	Lepidoptera	Nepticulidae	<i>Stigmella lemniscella</i>	Red Elm Pigmy	None		1
Insecta	Lepidoptera	Nepticulidae	<i>Stigmella speciosa</i>	Barred Sycamore Pigmy	None	1	
Insecta	Lepidoptera	Nepticulidae	<i>Stigmella plagicolella</i>	Scrubland Pigmy	None	1	
Insecta	Lepidoptera	Nepticulidae	<i>Stigmella perpygmaeella</i>	Least Thorn Pigmy	None	1	
Insecta	Lepidoptera	Nepticulidae	<i>Stigmella atricapitella</i>	Black-headed Pigmy	None	1	
Insecta	Lepidoptera	Nepticulidae	<i>Stigmella ruficapitella</i>	Red-headed Pigmy	None	1	
Insecta	Lepidoptera	Nepticulidae	<i>Stigmella basiguttella</i>	Base-spotted Pigmy	None	1	
Insecta	Lepidoptera	Nepticulidae	<i>Stigmella hybnerella</i>	Greenish Thorn Pigmy	None	1	
Insecta	Lepidoptera	Nepticulidae	<i>Stigmella oxyacanthella</i>	Common Fruit-tree Pigmy	None	1	
Insecta	Lepidoptera	Nepticulidae	<i>Stigmella aceris</i>	Scarce Maple Pigmy	None	1	
Insecta	Lepidoptera	Nepticulidae	<i>Stigmella crataegella</i>	Common Thorn Pigmy	None	1	
Insecta	Lepidoptera	Tischeriidae	<i>Tischeria ekebladella</i>	Oak Carl	None	1	
Insecta	Lepidoptera	Tischeriidae	<i>Coptotriche marginea</i>	Bordered Carl	None	1	
Insecta	Lepidoptera	Incurvariidae	<i>Cauchas rufimitrella</i>	Meadow Long-horn	None		1
Insecta	Lepidoptera	Cossidae	<i>Zeuzera pyrina</i>	Leopard Moth	None	1	
Insecta	Lepidoptera	Zygaenidae	<i>Zygaena filipendulae</i>	Six-spot Burnet	None	1	
Insecta	Lepidoptera	Psychidae	<i>Luffia ferchaultella</i>	Virgin Smoke	None		1
Insecta	Lepidoptera	Psychidae	<i>Psyche casta</i>	Common Sweep	None	1	
Insecta	Lepidoptera	Tineidae	<i>Monopis weaverella</i>	Carrion Moth	None	1	
Insecta	Lepidoptera	Tineidae	<i>Monopis obviella</i>	Yellow-backed Clothes Moth	None	1	
Insecta	Lepidoptera	Yponomeutidae	<i>Ochsenheimeria vacculella</i>	Cereal Stem-moth	Nationally Scarce A		1
Insecta	Lepidoptera	Lyonetiidae	<i>Lyonetia clerkella</i>	Apple Leaf-miner	None	1	
Insecta	Lepidoptera	Bucculatricidae	<i>Bucculatrix ulmella</i>	Oak Bent-wing	None	1	1



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Insecta	Lepidoptera	Gracillariidae	<i>Caloptilia alchimiella</i>	Yellow-triangle Slender	None	1	
Insecta	Lepidoptera	Gracillariidae	<i>Caloptilia robustella</i>	New Oak Slender	None	1	
Insecta	Lepidoptera	Gracillariidae	<i>Caloptilia semifascia</i>	Maple Slender	None	1	
Insecta	Lepidoptera	Gracillariidae	<i>Gracillaria syringella</i>	Common Slender	None	1	
Insecta	Lepidoptera	Gracillariidae	<i>Parornix anglicella</i>	Hawthorn Slender	None	1	
Insecta	Lepidoptera	Gracillariidae	<i>Acrocercops brongniardella</i>	Brown Oak Slender	None	1	
Insecta	Lepidoptera	Gracillariidae	<i>Leucospilapteryx omissella</i>	Mugwort Slender	Nationally Scarce B	1	
Insecta	Lepidoptera	Gracillariidae	<i>Phyllonorycter harrisella</i>	White Oak Midget	None	1	
Insecta	Lepidoptera	Gracillariidae	<i>Phyllonorycter quercifoliella</i>	Common Oak Midget	None	1	
Insecta	Lepidoptera	Gracillariidae	<i>Phyllonorycter messaniella</i>	Garden Midget	None	1	
Insecta	Lepidoptera	Gracillariidae	<i>Phyllonorycter platani</i>	London Midget	None		1
Insecta	Lepidoptera	Gracillariidae	<i>Phyllonorycter oxyacanthae</i>	Common Thorn Midget	None	1	
Insecta	Lepidoptera	Gracillariidae	<i>Phyllonorycter corylifoliella</i>	Hawthorn Midget	None	1	
Insecta	Lepidoptera	Gracillariidae	<i>Phyllonorycter coryli</i>	Nut-leaf Blister Moth	None	1	
Insecta	Lepidoptera	Gracillariidae	<i>Phyllonorycter esperella</i>	Dark Hornbeam Midget	None	1	
Insecta	Lepidoptera	Gracillariidae	<i>Phyllonorycter acerifoliella</i>	Maple Midget	None	1	
Insecta	Lepidoptera	Gracillariidae	<i>Phyllonorycter geniculella</i>	Sycamore Midget	None	1	
Insecta	Lepidoptera	Gracillariidae	<i>Cameraria ohridella</i>	Horse Chestnut Leaf-miner	None	1	1
Insecta	Lepidoptera	Sesiidae	<i>Synanthedon tipuliformis</i>	Currant Clearwing	Nationally Scarce (Nb)		1
Insecta	Lepidoptera	Sesiidae	<i>Bembecia ichneumoniformis</i>	Six-belted Clearwing	Nationally Scarce (Nb)	1	
Insecta	Lepidoptera	Choreutidae	<i>Anthophila fabriciana</i>	Nettle-tap	None	1	1
Insecta	Lepidoptera	Glyphipterigidae	<i>Glyphipterix simplicella</i>	Cocksfoot Moth	None	1	
Insecta	Lepidoptera	Yponomeutidae	<i>Argyresthia brockeella</i>	Gold-ribbon Argent	None		1
Insecta	Lepidoptera	Yponomeutidae	<i>Argyresthia goedartella</i>	Golden Argent	None	1	

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Insecta	Lepidoptera	Yponomeutidae	<i>Argyresthia semifusca</i>	Brown Rowan Argent	None	1	
Insecta	Lepidoptera	Yponomeutidae	<i>Argyresthia bonnetella</i>	Hawthorn Argent	None	1	
Insecta	Lepidoptera	Yponomeutidae	<i>Prays fraxinella</i>	Ash Bud Moth	None	1	1
Insecta	Lepidoptera	Yponomeutidae	<i>Scythropia crataegella</i>	Hawthorn Moth	None	1	
Insecta	Lepidoptera	Yponomeutidae	<i>Ypsolopha parenthesella</i>	White-shouldered Smudge	None	1	
Insecta	Lepidoptera	Yponomeutidae	<i>Plutella xylostella</i>	Diamond-back Moth	None	1	1
Insecta	Lepidoptera	Coleophoridae	<i>Coleophora lutipennella</i>	Common Oak Case-bearer	None	1	
Insecta	Lepidoptera	Coleophoridae	<i>Coleophora alcyonipennella</i>	Clover Case-bearer	None	1	
Insecta	Lepidoptera	Coleophoridae	<i>Coleophora peribenanderi</i>	Pale Thistle Case-bearer	None	1	
Insecta	Lepidoptera	Elachistidae	<i>Elachista rufocinerea</i>	Red-brindled Dwarf	None	1	
Insecta	Lepidoptera	Elachistidae	<i>Elachista argentella</i>	Swan-feather Dwarf	None	1	
Insecta	Lepidoptera	Oecophoridae	<i>Esperia sulphurella</i>	Sulphur Tubic	None	1	
Insecta	Lepidoptera	Oecophoridae	<i>Carcina quercana</i>	Long-horned Flat-body	None	1	
Insecta	Lepidoptera	Oecophoridae	<i>Diurnea fagella</i>	March Tubic	None	1	
Insecta	Lepidoptera	Oecophoridae	<i>Agonopterix heracliiana</i>	Common Flat-body	None	1	
Insecta	Lepidoptera	Oecophoridae	<i>Agonopterix arenella</i>	Brindled Flat-body	None	1	
Insecta	Lepidoptera	Gelechiidae	<i>Metzneria lappella</i>	Burdock Neb	None	1	
Insecta	Lepidoptera	Gelechiidae	<i>Teleiodes luculella</i>	Crescent Groundling	None	1	
Insecta	Lepidoptera	Gelechiidae	<i>Bryotropha affinis</i>	Dark Neb	None	1	
Insecta	Lepidoptera	Gelechiidae	<i>Bryotropha terrella</i>	Cinereous Neb	None	1	
Insecta	Lepidoptera	Gelechiidae	<i>Bryotropha domestica</i>	House Neb	None	1	
Insecta	Lepidoptera	Gelechiidae	<i>Scrobipalpa costella</i>	Winter Groundling	None	1	
Insecta	Lepidoptera	Gelechiidae	<i>Scrobipalpa acuminatella</i>	Pointed Groundling	None	1	
Insecta	Lepidoptera	Gelechiidae	<i>Helcystogramma rufescens</i>	Orange Crest	None	1	
Insecta	Lepidoptera	Blastobasidae	<i>Blastobasis adustella</i>	Dingy Dowd	None	1	1
Insecta	Lepidoptera	Blastobasidae	<i>Blastobasis lacticolella</i>	London Dowd	None	1	

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Insecta	Lepidoptera	Momphidae	<i>Mompha raschkiella</i>	Little Mompha	None	1	
Insecta	Lepidoptera	Momphidae	<i>Mompha subbistrigella</i>	Garden Mompha	None	1	
Insecta	Lepidoptera	Tortricidae	<i>Cochylimorpha straminea</i>	Straw Conch	None	1	
Insecta	Lepidoptera	Tortricidae	<i>Agapeta hamana</i>	Common Yellow Conch	None	1	1
Insecta	Lepidoptera	Tortricidae	<i>Aethes smeathmanniana</i>	Yarrow Conch	None	1	
Insecta	Lepidoptera	Tortricidae	<i>Cochylis atricapitana</i>	Black-headed Conch	None	1	
Insecta	Lepidoptera	Tortricidae	<i>Pandemis corylana</i>	Chequered Fruit-tree Tortrix	None	1	
Insecta	Lepidoptera	Tortricidae	<i>Pandemis cerasana</i>	Barred Fruit-tree Tortrix	None	1	
Insecta	Lepidoptera	Tortricidae	<i>Archips podana</i>	Large Fruit-tree Tortrix	None	1	
Insecta	Lepidoptera	Tortricidae	<i>Archips xylosteana</i>	Variegated Golden Tortrix	None	1	
Insecta	Lepidoptera	Tortricidae	<i>Clepsis spectrana</i>	Cyclamen Tortrix	None	1	
Insecta	Lepidoptera	Tortricidae	<i>Clepsis consimilana</i>	Privet Tortrix	None	1	
Insecta	Lepidoptera	Tortricidae	<i>Ptycholoma lecheana</i>	Brindled Tortrix	None	1	
Insecta	Lepidoptera	Tortricidae	<i>Pseudargyrotoza conwagana</i>	Yellow-spot Tortrix	None	1	
Insecta	Lepidoptera	Tortricidae	<i>Cnephasia stephensiana</i>	Grey Tortrix	None	1	
Insecta	Lepidoptera	Tortricidae	<i>Cnephasia asseclana</i>	Flax Tortrix	None	1	
Insecta	Lepidoptera	Tortricidae	<i>Cnephasia genitalana</i>	Dover Shade	None	1	
Insecta	Lepidoptera	Tortricidae	<i>Aleimma loeflingiana</i>	Yellow Oak Button	None	1	
Insecta	Lepidoptera	Tortricidae	<i>Tortrix viridana</i>	Green Oak Tortrix	None	1	1
Insecta	Lepidoptera	Tortricidae	<i>Acleris forsskaleana</i>	Maple Button	None	1	
Insecta	Lepidoptera	Tortricidae	<i>Acleris laterana</i>	Dark-triangle Button	None	1	
Insecta	Lepidoptera	Tortricidae	<i>Acleris variegana</i>	Garden Rose Tortrix	None	1	
Insecta	Lepidoptera	Tortricidae	<i>Celypha lacunana</i>	Common Marble	None	1	
Insecta	Lepidoptera	Tortricidae	<i>Hedya pruniana</i>	Plum Tortrix	None	1	
Insecta	Lepidoptera	Tortricidae	<i>Hedya nubiferana</i>	Marbled Orchard Tortrix	None	1	
Insecta	Lepidoptera	Tortricidae	<i>Endothenia gentianaeana</i>	Teasel Marble	None	1	



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Insecta	Lepidoptera	Tortricidae	<i>Zeiraphera isertana</i>	Cock's-head Bell	None	1	
Insecta	Lepidoptera	Tortricidae	<i>Gypsonoma dealbana</i>	Common Cloaked Shoot	None	1	
Insecta	Lepidoptera	Tortricidae	<i>Notocelia cynosbatella</i>	Yellow-faced Bell	None	1	
Insecta	Lepidoptera	Tortricidae	<i>Notocelia uddmanniana</i>	Bramble Shoot	None	1	
Insecta	Lepidoptera	Tortricidae	<i>Eucosma cana</i>	Hoary Bell	None	1	
Insecta	Lepidoptera	Tortricidae	<i>Spilonota ocellana</i>	Bud Moth	None	1	
Insecta	Lepidoptera	Tortricidae	<i>Rhyacionia buoliana</i>	Pine Shoot	None	1	
Insecta	Lepidoptera	Tortricidae	<i>Lathronympha strigana</i>	Red Piercer	None	1	
Insecta	Lepidoptera	Tortricidae	<i>Grapholita compositella</i>	Triple-stripe Piercer	None	1	
Insecta	Lepidoptera	Tortricidae	<i>Cydia pomonella</i>	Codling Moth	None	1	
Insecta	Lepidoptera	Tortricidae	<i>Cydia conicolana</i>	Pine-cone Piercer	Nationally Scarce B	1	
Insecta	Lepidoptera	Tortricidae	<i>Pammene aurana</i>	Orange-spot Piercer	None	1	
Insecta	Lepidoptera	Crambidae	<i>Chrysoteuchia culmella</i>	Garden Grass-veneer	None	1	
Insecta	Lepidoptera	Crambidae	<i>Crambus pascuella</i>	Inlaid Grass-veneer	None	1	
Insecta	Lepidoptera	Crambidae	<i>Crambus lathoniellus</i>	Hook-streaked Grass-Veneer	None	1	
Insecta	Lepidoptera	Crambidae	<i>Agriphila selasella</i>	Pale-streak Grass-veneer	None	1	
Insecta	Lepidoptera	Crambidae	<i>Agriphila straminella</i>	Pearl Veneer	None	1	
Insecta	Lepidoptera	Crambidae	<i>Agriphila tristella</i>	Common Grass-veneer	None	1	1
Insecta	Lepidoptera	Crambidae	<i>Agriphila inquinatella</i>	Barred Grass-veneer	None	1	
Insecta	Lepidoptera	Crambidae	<i>Agriphila geniculea</i>	Elbow-stripe Grass-veneer	None	1	
Insecta	Lepidoptera	Crambidae	<i>Catoptria pinella</i>	Pearl Grass-veneer	None	1	
Insecta	Lepidoptera	Crambidae	<i>Catoptria falsella</i>	Chequered Grass-veneer	None	1	
Insecta	Lepidoptera	Crambidae	<i>Scoparia subfusca</i>	Large Grey	None	1	
Insecta	Lepidoptera	Crambidae	<i>Scoparia pyraella</i>	Meadow Grey	None	1	
Insecta	Lepidoptera	Crambidae	<i>Scoparia basistrigalis</i>	Base-lined Grey	None	1	
Insecta	Lepidoptera	Crambidae	<i>Eudonia lacustrata</i>	Little Grey	None	1	
Insecta	Lepidoptera	Crambidae	<i>Eudonia mercurella</i>	Small Grey	None	1	

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Lepidoptera	Crambidae	<i>Pyrausta aurata</i>	Small Purple & Gold	None	1	1
Insecta	Lepidoptera	Crambidae	<i>Ostrinia nubilalis</i>	European Corn-borer	None	1	
Insecta	Lepidoptera	Crambidae	<i>Anania hortulata</i>	Small Magpie	None	1	
Insecta	Lepidoptera	Crambidae	<i>Anania coronata</i>	Elder Pearl	None	1	
Insecta	Lepidoptera	Crambidae	<i>Udea ferrugalis</i>	Rusty-dot Pearl	None	1	
Insecta	Lepidoptera	Crambidae	<i>Nomophila noctuella</i>	Rush Veneer	None	1	
Insecta	Lepidoptera	Crambidae	<i>Pleuroptya ruralis</i>	Mother of Pearl	None	1	
Insecta	Lepidoptera	Pyralidae	<i>Hypsopygia costalis</i>	Gold Triangle	None	1	
Insecta	Lepidoptera	Pyralidae	<i>Endotricha flammealis</i>	Rosy Tabby	None	1	
Insecta	Lepidoptera	Pyralidae	<i>Aphomia sociella</i>	Bee Moth	None	1	
Insecta	Lepidoptera	Pyralidae	<i>Acrobasis repandana</i>	Warted Knot-horn	None	1	
Insecta	Lepidoptera	Pyralidae	<i>Acrobasis advenella</i>	Grey Knot-horn	None	1	
Insecta	Lepidoptera	Pyralidae	<i>Phycita roborella</i>	Dotted Oak Knot-horn	None	1	
Insecta	Lepidoptera	Pyralidae	<i>Myelois circumvoluta</i>	Thistle Ermine	None	1	
Insecta	Lepidoptera	Pyralidae	<i>Homoeosoma sinuella</i>	Twin-barred Knot-horn	None	1	
Insecta	Lepidoptera	Pyralidae	<i>Phycitodes binaevella</i>	Ermine Knot-horn	None	1	
Insecta	Lepidoptera	Pterophoridae	<i>Amblyptilia acanthadactyla</i>	Beautiful Plume	None	1	
Insecta	Lepidoptera	Pterophoridae	<i>Platyptilia gonodactyla</i>	Triangle Plume	None	1	
Insecta	Lepidoptera	Pterophoridae	<i>Gillmeria ochrodactyla</i>	Tansy Plume	Nationally Scarce B	1	
Insecta	Lepidoptera	Pterophoridae	<i>Gillmeria pallidactyla</i>	Yarrow Plume	None		1
Insecta	Lepidoptera	Pterophoridae	<i>Stenoptilia pterodactyla</i>	Brown Plume	None	1	
Insecta	Lepidoptera	Pterophoridae	<i>Emmelina monodactyla</i>	Common Plume	None	1	
Insecta	Lepidoptera	Hesperiidae	<i>Thymelicus sylvestris</i>	Small Skipper	LC		1
Insecta	Lepidoptera	Hesperiidae	<i>Thymelicus lineola</i>	Essex Skipper	LC	1	
Insecta	Lepidoptera	Hesperiidae	<i>Ochlodes sylvanus</i>	Large Skipper	LC	1	1
Insecta	Lepidoptera	Hesperiidae	<i>Erynnis tages</i>	Dingy Skipper	VU, S41		1

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Insecta	Lepidoptera	Pieridae	<i>Gonepteryx rhamni</i>	Brimstone	LC	1	1
Insecta	Lepidoptera	Pieridae	<i>Pieris brassicae</i>	Large White	LC	1	1
Insecta	Lepidoptera	Pieridae	<i>Pieris rapae</i>	Small White	LC	1	1
Insecta	Lepidoptera	Pieridae	<i>Pieris napi</i>	Green-veined White	LC	1	1
Insecta	Lepidoptera	Pieridae	<i>Anthocharis cardamines</i>	Orange-tip	LC		1
Insecta	Lepidoptera	Lycaenidae	<i>Favonius quercus</i>	Purple Hairstreak	LC	1	1
Insecta	Lepidoptera	Lycaenidae	<i>Lycaena phlaeas</i>	Small Copper	LC		1
Insecta	Lepidoptera	Lycaenidae	<i>Aricia agestis</i>	Brown Argus	LC	1	1
Insecta	Lepidoptera	Lycaenidae	<i>Polyommatus icarus</i>	Common Blue	LC	1	1
Insecta	Lepidoptera	Lycaenidae	<i>Celastrina argiolus</i>	Holly Blue	LC	1	1
Insecta	Lepidoptera	Nymphalidae	<i>Vanessa atalanta</i>	Red Admiral	LC		1
Insecta	Lepidoptera	Nymphalidae	<i>Vanessa cardui</i>	Painted Lady	LC		1
Insecta	Lepidoptera	Nymphalidae	<i>Aglais urticae</i>	Small Tortoiseshell	LC	1	1
Insecta	Lepidoptera	Nymphalidae	<i>Aglais io</i>	Peacock	LC	1	1
Insecta	Lepidoptera	Nymphalidae	<i>Polygonia c-album</i>	Comma	LC		1
Insecta	Lepidoptera	Satyridae	<i>Pararge aegeria</i>	Speckled Wood	LC	1	1
Insecta	Lepidoptera	Satyridae	<i>Melanargia galathea</i>	Marbled White	LC		1
Insecta	Lepidoptera	Satyridae	<i>Pyronia tithonus</i>	Gatekeeper	LC	1	1
Insecta	Lepidoptera	Satyridae	<i>Maniola jurtina</i>	Meadow Brown	LC	1	1
Insecta	Lepidoptera	Satyridae	<i>Coenonympha pamphilus</i>	Small Heath	NT, S41 (research only)		1
Insecta	Lepidoptera	Satyridae	<i>Aphantopus hyperantus</i>	Ringlet	LC	1	1
Insecta	Lepidoptera	Lasiocampidae	<i>Poecilocampa populi</i>	December Moth	None	1	
Insecta	Lepidoptera	Lasiocampidae	<i>Euthrix potatoria</i>	Drinker	None	1	
Insecta	Lepidoptera	Drepanidae	<i>Falcaria lacertinaria</i>	Scalloped Hook-tip	None	1	
Insecta	Lepidoptera	Drepanidae	<i>Watsonalla binaria</i>	Oak Hook-tip	S41 (research only)	1	
Insecta	Lepidoptera	Drepanidae	<i>Cilix glaucata</i>	Chinese Character	None	1	
Insecta	Lepidoptera	Thyatiridae	<i>Habrosyne pyritoides</i>	Buff Arches	None	1	



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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Lepidoptera	Geometridae	<i>Timandra comae</i>	Blood-vein	S41 (research only)	1	1
Insecta	Lepidoptera	Geometridae	<i>Idaea rusticata</i>	Least Carpet	None	1	
Insecta	Lepidoptera	Geometridae	<i>Idaea biselata</i>	Small Fan-footed Wave	None	1	
Insecta	Lepidoptera	Geometridae	<i>Idaea seriata</i>	Small Dusty Wave	None	1	
Insecta	Lepidoptera	Geometridae	<i>Idaea trigeminata</i>	Treble Brown Spot	None	1	
Insecta	Lepidoptera	Geometridae	<i>Idaea aversata</i>	Riband Wave	None	1	
Insecta	Lepidoptera	Geometridae	<i>Xanthorhoe spadicearia</i>	Red Twin-spot Carpet	None	1	
Insecta	Lepidoptera	Geometridae	<i>Xanthorhoe montanata</i>	Silver-ground Carpet	None		1
Insecta	Lepidoptera	Geometridae	<i>Xanthorhoe fluctuata</i>	Garden Carpet	None	1	
Insecta	Lepidoptera	Geometridae	<i>Scotopteryx chenopodiata</i>	Shaded Broad-bar	S41 (research only)	1	
Insecta	Lepidoptera	Geometridae	<i>Epirrhoe alternata</i>	Common Carpet	None	1	
Insecta	Lepidoptera	Geometridae	<i>Camptogramma bilineata</i>	Yellow Shell	None	1	
Insecta	Lepidoptera	Geometridae	<i>Gandaritis pyraliata</i>	Barred Straw	None	1	
Insecta	Lepidoptera	Geometridae	<i>Chloroclysta siterata</i>	Red-green Carpet	None	1	
Insecta	Lepidoptera	Geometridae	<i>Dysstroma truncata</i>	Common Marbled Carpet	None	1	
Insecta	Lepidoptera	Geometridae	<i>Thera obeliscata</i>	Grey Pine Carpet	None	1	
Insecta	Lepidoptera	Geometridae	<i>Electrophaes corylata</i>	Broken-barred Carpet	None	1	
Insecta	Lepidoptera	Geometridae	<i>Colostygia pectinataria</i>	Green Carpet	None	1	1
Insecta	Lepidoptera	Geometridae	<i>Horisme vitalbata</i>	Small Waved Umber	None	1	1
Insecta	Lepidoptera	Geometridae	<i>Horisme tersata</i>	Fern	None	1	
Insecta	Lepidoptera	Geometridae	<i>Philereme transversata</i>	Dark Umber	None		1
Insecta	Lepidoptera	Geometridae	<i>Epirrita dilutata</i>	November Moth	None	1	
Insecta	Lepidoptera	Geometridae	<i>Operophtera brumata</i>	Winter Moth	None	1	
Insecta	Lepidoptera	Geometridae	<i>Operophtera fagata</i>	Northern Winter Moth	None		1
Insecta	Lepidoptera	Geometridae	<i>Eupithecia exiguata</i>	Mottled Pug	None	1	
Insecta	Lepidoptera	Geometridae	<i>Eupithecia centaureata</i>	Lime-speck Pug	None		1
Insecta	Lepidoptera	Geometridae	<i>Eupithecia intricata</i>	Freyer's Pug	None	1	

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Insecta	Lepidoptera	Geometridae	<i>Eupithecia assimilata</i>	Currant Pug	None	1	
Insecta	Lepidoptera	Geometridae	<i>Eupithecia vulgata</i>	Common Pug	None	1	
Insecta	Lepidoptera	Geometridae	<i>Eupithecia subfuscata</i>	Grey Pug	None	1	
Insecta	Lepidoptera	Geometridae	<i>Eupithecia abbreviata</i>	Brindled Pug	None	1	
Insecta	Lepidoptera	Geometridae	<i>Eupithecia dodoneata</i>	Oak-tree Pug	None	1	
Insecta	Lepidoptera	Geometridae	<i>Chloroclystis v-ata</i>	V-Pug	None	1	
Insecta	Lepidoptera	Geometridae	<i>Pasiphila rectangulata</i>	Green Pug	None	1	
Insecta	Lepidoptera	Geometridae	<i>Gymnoscelis rufifasciata</i>	Double-striped Pug	None	1	
Insecta	Lepidoptera	Geometridae	<i>Aplocera plagiata</i>	Treble-bar	None	1	1
Insecta	Lepidoptera	Geometridae	<i>Asthena albulata</i>	Small White Wave	None	1	
Insecta	Lepidoptera	Geometridae	<i>Acasis viretata</i>	Yellow-barred Brindle	None	1	
Insecta	Lepidoptera	Geometridae	<i>Lomaspilis marginata</i>	Clouded Border	None	1	
Insecta	Lepidoptera	Geometridae	<i>Plagodis dolabraria</i>	Scorched Wing	None	1	
Insecta	Lepidoptera	Geometridae	<i>Opisthograptis luteolata</i>	Brimstone Moth	None	1	1
Insecta	Lepidoptera	Geometridae	<i>Ennomos alniaria</i>	Canary-shouldered Thorn	None	1	
Insecta	Lepidoptera	Geometridae	<i>Ennomos fuscantaria</i>	Dusky Thorn	S41 (research only)	1	
Insecta	Lepidoptera	Geometridae	<i>Selenia dentaria</i>	Early Thorn	None	1	
Insecta	Lepidoptera	Geometridae	<i>Selenia tetralunaria</i>	Purple Thorn	None	1	
Insecta	Lepidoptera	Geometridae	<i>Odontopera bidentata</i>	Scalloped Hazel	None	1	
Insecta	Lepidoptera	Geometridae	<i>Biston betularia</i>	Peppered Moth	None	1	
Insecta	Lepidoptera	Geometridae	<i>Peribatodes rhomboidaria</i>	Willow Beauty	None	1	
Insecta	Lepidoptera	Geometridae	<i>Cabera pusaria</i>	Common White Wave	None	1	
Insecta	Lepidoptera	Geometridae	<i>Cabera exanthemata</i>	Common Wave	None	1	
Insecta	Lepidoptera	Geometridae	<i>Lomographa temerata</i>	Clouded Silver	None	1	
Insecta	Lepidoptera	Geometridae	<i>Campaea margaritaria</i>	Light Emerald	None	1	
Insecta	Lepidoptera	Sphingidae	<i>Sphinx ligustri</i>	Privet Hawk-moth	None	1	
Insecta	Lepidoptera	Sphingidae	<i>Mimas tiliae</i>	Lime Hawk-moth	None	1	

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Insecta	Lepidoptera	Sphingidae	<i>Deilephila elpenor</i>	Elephant Hawk-moth	None	1	
Insecta	Lepidoptera	Notodontidae	<i>Phalera bucephala</i>	Buff-tip	None	1	
Insecta	Lepidoptera	Notodontidae	<i>Ptilodon cucullina</i>	Maple Prominent	None	1	
Insecta	Lepidoptera	Notodontidae	<i>Drymonia ruficornis</i>	Lunar Marbled Brown	None	1	
Insecta	Lepidoptera	Lymantriidae	<i>Orgyia antiqua</i>	Vapourer	None	1	1
Insecta	Lepidoptera	Lymantriidae	<i>Euproctis similis</i>	Yellow-tail	None	1	1
Insecta	Lepidoptera	Arctiidae	<i>Eilema griseola</i>	Dingy Footman	None	1	1
Insecta	Lepidoptera	Arctiidae	<i>Eilema complana</i>	Scarce Footman	None	1	
Insecta	Lepidoptera	Arctiidae	<i>Eilema depressa</i>	Buff Footman	None	1	
Insecta	Lepidoptera	Arctiidae	<i>Eilema lurideola</i>	Common Footman	None	1	
Insecta	Lepidoptera	Arctiidae	<i>Spilosoma lubricipeda</i>	White Ermine	S41 (research only)	1	
Insecta	Lepidoptera	Arctiidae	<i>Spilosoma lutea</i>	Buff Ermine	S41 (research only)	1	
Insecta	Lepidoptera	Arctiidae	<i>Phragmatobia fuliginosa</i>	Ruby Tiger	None	1	
Insecta	Lepidoptera	Arctiidae	<i>Tyria jacobaeae</i>	Cinnabar	S41 (research only)	1	1
Insecta	Lepidoptera	Noctuidae	<i>Agrotis segetum</i>	Turnip Moth	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Agrotis clavis</i>	Heart and Club	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Agrotis exclamationis</i>	Heart and Dart	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Agrotis puta</i>	Shuttle-shaped Dart	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Axylia putris</i>	Flame	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Ochropleura plecta</i>	Flame Shoulder	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Noctua pronuba</i>	Large Yellow Underwing	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Noctua comes</i>	Lesser Yellow Underwing	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Noctua fimbriata</i>	Broad-bordered Yellow Underwing	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Noctua janthe</i>	Lesser Broad-bordered Yellow Underwing	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Noctua interjecta</i>	Least Yellow Underwing	None	1	



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Insecta	Lepidoptera	Noctuidae	<i>Diarsia mendica</i>	Ingrailed Clay	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Diarsia rubi</i>	Small Square-spot	S41 (research only)	1	
Insecta	Lepidoptera	Noctuidae	<i>Xestia c-nigrum</i>	Setaceous Hebrew Character	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Xestia stigmatica</i>	Square-spotted Clay	Nationally Scarce (Nb)	1	
Insecta	Lepidoptera	Noctuidae	<i>Xestia xanthographa</i>	Square-spot Rustic	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Mamestra brassicae</i>	Cabbage Moth	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Lacanobia w-latinum</i>	Light Brocade	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Lacanobia thalassina</i>	Pale-shouldered Brocade	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Lacanobia oleracea</i>	Bright-line Brown-eye	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Hecatera bicolorata</i>	Broad-barred White	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Hecatera dysodea</i>	Small Ranunculus	RDBK	1	
Insecta	Lepidoptera	Noctuidae	<i>Hadena compta</i>	Varied Coronet	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Cerapteryx graminis</i>	Antler Moth	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Orthosia cruda</i>	Small Quaker	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Orthosia incerta</i>	Clouded Drab	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Orthosia gothica</i>	Hebrew Character	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Mythimna ferrago</i>	Clay	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Mythimna impura</i>	Smoky Wainscot	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Mythimna pallens</i>	Common Wainscot	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Leucania comma</i>	Shoulder-striped Wainscot	S41 (research only)	1	
Insecta	Lepidoptera	Noctuidae	<i>Calophasia lunula</i>	Toadflax Brocade	RDB3		1
Insecta	Lepidoptera	Noctuidae	<i>Allophyes oxyacanthae</i>	Green-brindled Crescent	S41 (research only)	1	
Insecta	Lepidoptera	Noctuidae	<i>Eupsilia transversa</i>	Satellite	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Conistra vaccinii</i>	Chestnut	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Agrochola lota</i>	Red-line Quaker	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Agrochola macilenta</i>	Yellow-line Quaker	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Agrochola litura</i>	Brown-spot Pinion	S41 (research only)	1	

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Insecta	Lepidoptera	Noctuidae	<i>Omphaloscelis lunosa</i>	Lunar Underwing	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Tiliacea aurago</i>	Barred Sallow	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Xanthia togata</i>	Pink-barred Sallow	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Acronicta tridens</i>	Dark Dagger	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Acronicta psi</i>	Grey Dagger	S41 (research only)	1	
Insecta	Lepidoptera	Noctuidae	<i>Cryphia algae</i>	Tree-lichen Beauty	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Bryophila domestica</i>	Marbled Beauty	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Amphipyra pyramidea</i>	Copper Underwing	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Amphipyra berbera</i>	Svensson's Copper Underwing	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Amphipyra tragopoginis</i>	Mouse Moth	S41 (research only)	1	
Insecta	Lepidoptera	Noctuidae	<i>Dypterygia scabriuscula</i>	Bird's Wing	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Rusina ferruginea</i>	Brown Rustic	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Thalpophila matura</i>	Straw Underwing	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Phlogophora meticulosa</i>	Angle Shades	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Cosmia trapezina</i>	Dun-bar	None		1
Insecta	Lepidoptera	Noctuidae	<i>Cosmia pyralina</i>	Lunar-spotted Pinion	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Apamea monoglypha</i>	Dark Arches	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Apamea lithoxylaea</i>	Light Arches	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Apamea crenata</i>	Clouded-bordered Brindle	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Apamea epomidion</i>	Clouded Brindle	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Apamea remissa</i>	Dusky Brocade	S41 (research only)	1	
Insecta	Lepidoptera	Noctuidae	<i>Apamea sordens</i>	Rustic Shoulder-knot	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Oligia strigilis</i>	Marbled Minor	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Oligia latruncula</i>	Tawny Marbled Minor	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Oligia fasciuncula</i>	Middle-barred Minor	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Litoligia literosa</i>	Rosy Minor	S41 (research only)	1	

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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Insecta	Lepidoptera	Noctuidae	<i>Mesapamea secalis</i>	Common Rustic	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Mesapamea didyma</i>	Lesser Common Rustic	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Eremobia ochroleuca</i>	Dusky Sallow	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Luperina testacea</i>	Flounced Rustic	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Hoplodrina octogenaria</i>	Uncertain	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Hoplodrina ambigua</i>	Vine's Rustic	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Caradrina morpheus</i>	Mottled Rustic	S41 (research only)	1	
Insecta	Lepidoptera	Noctuidae	<i>Caradrina clavipalpis</i>	Pale Mottled Willow	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Nycteola revayana</i>	Oak Nycteoline	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Colocasia coryli</i>	Nut-tree Tussock	None	1	1
Insecta	Lepidoptera	Noctuidae	<i>Diachrysia chrysitis</i>	Burnished Brass	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Autographa gamma</i>	Silver Y	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Autographa jota</i>	Plain Golden Y	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Catocala nupta</i>	Red Underwing	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Euclidia mi</i>	Mother Shipton	None		1
Insecta	Lepidoptera	Noctuidae	<i>Euclidia glyphica</i>	Burnet Companion	None		1
Insecta	Lepidoptera	Noctuidae	<i>Lygephila pastinum</i>	Blackneck	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Scoliopteryx libatrix</i>	Herald	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Laspeyria flexula</i>	Beautiful Hook-tip	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Rivula sericealis</i>	Straw Dot	None	1	
Insecta	Lepidoptera	Noctuidae	<i>Hypena proboscidalis</i>	Snout	None	1	
Gastropoda	Pulmonata	Agriolimacidae	<i>Deroceras reticulatum</i>	Netted Field Slug	LC		1
Gastropoda	Pulmonata	Agriolimacidae	<i>Deroceras invadens</i>	Tramp Slug	LC		1
Gastropoda	Pulmonata	Arionidae	<i>Arion (Mesarion) subfuscus</i>	Dusky Slug	LC		1
Gastropoda	Pulmonata	Arionidae	<i>Arion (Kobeltia) hortensis</i>	Blue-black Soil Slug	LC		1
Gastropoda	Pulmonata	Ellobiidae	<i>Carychium minimum</i>	Herald Snail	LC		1



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Class	Order	Family	Species (scientific name)	Species (English name)	Conservation Status	2015- 16	2018- 19
Gastropoda	Pulmonata	Cochlicopidae	<i>Cochlicopa lubrica</i>	Slippery Moss-snail	LC		1
Gastropoda	Pulmonata	Discidae	<i>Discus rotundatus</i>	Rounded Snail	LC		1
Gastropoda	Pulmonata	Helicidae	<i>Cepaea hortensis</i>	White-lipped Snail	LC		1
Gastropoda	Pulmonata	Helicidae	<i>Cornu aspersum</i>	Garden Snail	LC		1
Gastropoda	Pulmonata	Helicidae	<i>Ashfordia granulata</i>	Silky Snail	LC		1
Gastropoda	Pulmonata	Helicidae	<i>Candidula intersecta</i>	Wrinkled Snail	LC		1
Gastropoda	Pulmonata	Helicidae	<i>Ceriuella virgata</i>	Striped Snail	LC		1
Gastropoda	Pulmonata	Helicidae	<i>Monacha cantiana</i>	Kentish Snail	LC		1
Gastropoda	Pulmonata	Helicidae	<i>Trochulus sericeus</i>	a snail	LC		1
Gastropoda	Pulmonata	Lymnaeidae	<i>Lymnaea fuscus/palustris</i>	Marsh Pond-snail	LC/DD		1
Gastropoda	Pulmonata	Milacidae	<i>Tandonia budapestensis</i>	Budapest Keeled Slug	LC		1
Gastropoda	Pulmonata	Zonitidae	<i>Aegopinella pura</i>	Clear Glass-snail	LC		1
Gastropoda	Pulmonata	Zonitidae	<i>Nesovitrea hammonis</i>	Rayed Glass-snail	LC		1
Gastropoda	Pulmonata	Punctidae	<i>Punctum pygmaeum</i>	Dwarf Snail	LC		1
Gastropoda	Pulmonata	Pupillidae	<i>Pupilla muscorum</i>	Moss Chrysalis-snail	LC		1
Gastropoda	Pulmonata	Valloniidae	<i>Vallonia costata</i>	Ribbed Grass-snail	LC		1
Gastropoda	Pulmonata	Vertiginidae	<i>Vertigo pygmaea</i>	Common Whorl-snail	LC		1
						855	988

### Appendix 3: Ecology and habitat affinities of the Key Species.

The Key Species of invertebrate recorded by this survey, as in Table 8. Species which are here regarded as having Out Of Date and inaccurate ('OOD') conservation statuses are indicated. Additional columns give a brief summary of the ecological requirements of each species and its habitat affinities.

Order	Family	Species (scientific name)	Species (English name)	Conservation Status	OOD	2015-16	2018-19	Ecology	Open	Tree	Other
Lepidoptera	Hesperiidae	<i>Erynnis tages</i>	Dingy Skipper	VU, S41			✓	In a wide range of open habitats with Common Bird's-foot-trefoil <i>Lotus corniculatus</i> .	✓		
Coleoptera	Salpingidae	<i>Lissodema cursor</i>	a beetle	LC, NR			✓	Saproxyllic, specialising on Ash.		✓	
Coleoptera	Coccinellidae	<i>Clitostethus arcuatus</i>	a ladybird	RDB1			✓	Predator of whitefly on ivy and a range of other trees, shrubs and climbers.		✓	
Coleoptera	Coccinellidae	<i>Nephus quadrimaculatus</i>	a ladybird	RDB2	✓		✓	Ivy.		✓	
Hemiptera: Heteroptera	Miridae	<i>Lygus pratensis</i>	a mirid bug	RDB3	✓		✓	Widespread in grassland and ruderal habitats.	✓		
Coleoptera	Throscidae	<i>Trixagus gracilis</i>	a beetle	RDB3	✓		✓	Associated with trees and shrubs in a diverse range of habitats.		✓	
Lepidoptera	Noctuidae	<i>Calophasia lunula</i>	Toadflax Brocade	RDB3	✓		✓	Diverse open habitats with toadflax.	✓		
Coleoptera	Leiodidae	<i>Ptomaphagus varicornis</i>	a beetle	RDBK			✓	Grassland and other open habitats, usually on chalk.	✓		
Coleoptera	Staphylinidae	<i>Amarochara forticornis</i>	a rove-beetle	RDBK			✓	Open habitats, perhaps associated with mammal burrows.	✓		
Coleoptera	Cryptophagidae	<i>Atomaria lohsei</i>	a beetle	RDBK	✓		✓	Conifers. Saproxyllic; associated with decaying wood		✓	
Lepidoptera	Noctuidae	<i>Hecatera dysodea</i>	Small Ranunculus	RDBK	✓	✓		A wide range of open, disturbed habitats with lettuces <i>Lactuca</i> spp.	✓		
Diptera	Tachinidae	<i>Cistogaster globosa</i>	a parasitic fly	NT (Falk, Pont & Chandler, 2005)			✓	Calcareous downland and grassland. Parasitises the shieldbug <i>Aelia acuminata</i> .	✓		
Coleoptera	Carabidae	<i>Ophonus laticollis</i>	Set-aside Downy-back	NT, NS, S41			✓	Arable edges and margins on chalky soils.	✓		

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Order	Family	Species (scientific name)	Species (English name)	Conservation Status	OOD	2015-16	2018-19	Ecology	Open	Tree	Other
Lepidoptera	Satyridae	<i>Coenonympha pamphilus</i>	Small Heath	NT, S41 (research only)			✓	Grassland, favouring shorter swards of fine-leaved grasses on well-drained soils.	✓		
Diptera	Ulidiidae	<i>Dorycera graminum</i>	a picture-winged fly	pNT, S41		✓	✓	Grasslands and ruderal habitats.	✓		
Araneae	Mimetidae	<i>Ero aphana</i>	a spider	LC, NS	✓		✓	A former heathland specialist now expanding into a wide range of dry habitats including houses.			✓
Araneae	Dictynidae	<i>Argenna subnigra</i>	a spider	LC, NS			✓	At ground level in open grassland and disturbed habitats.	✓		
Coleoptera	Carabidae	<i>Amara montivaga</i>	a ground beetle	LC, NS			✓	Disturbed ground with ruderal vegetation.	✓		
Coleoptera	Carabidae	<i>Amara consularis</i>	a ground beetle	LC, NS			✓	Disturbed ground with ruderal vegetation.	✓		
Coleoptera	Carabidae	<i>Ophonus azureus</i>	a ground beetle	LC, NS			✓	Disturbed ground with ruderal vegetation, especially on chalky soils.	✓		
Coleoptera	Carabidae	<i>Brachinus crepitans</i>	Bombardier Beetle	LC, NS			✓	Disturbed ground with ruderal vegetation, especially on chalky soils.	✓		
Coleoptera	Cantharidae	<i>Rhagonycha lutea</i>	a soldier-beetle	LC, NS			✓	A predatory species of woodland, wood edges and scrub.		✓	
Coleoptera	Cantharidae	<i>Malthodes pumilus</i>	a soldier-beetle	LC, NS		✓	✓	Occurs in diverse habitats including woodland, scrub, calcareous grassland and coastal dunes.			✓
Coleoptera	Dermestidae	<i>Dermestes murinus</i>	a beetle	LC, NS			✓	Carrion specialist. Occurring in a wide range of macrohabitats, wherever carrion may occur.			✓
Coleoptera	Mycetophagidae	<i>Triphyllus bicolor</i>	a beetle	LC, NS			✓	Saproxyllic, associated with a small range of wood-decay fungi, most often Beefsteak Fungus <i>Fistulina hepatica</i> .		✓	
Coleoptera	Melandryidae	<i>Orchesia micans</i>	a false darkling beetle	LC, NS			✓	Saproxyllic, associated primarily with the bracket fungus <i>Inonotus hispidus</i> on Ash.		✓	



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Order	Family	Species (scientific name)	Species (English name)	Conservation Status	OOD	2015-16	2018-19	Ecology	Open	Tree	Other
Coleoptera	Melandryidae	<i>Orchesia minor</i>	a false darkling beetle	LC, NS			✓	A saproxylic species associated with rotten wood and polypore fungi on a range of broad-leaved trees and shrubs.		✓	
Coleoptera	Melandryidae	<i>Abdera biflexuosa</i>	a false darkling beetle	LC, NS			✓	Saproxylic, breeding in dead or decaying branch-wood and twigs, mostly of oaks.		✓	
Coleoptera	Melandryidae	<i>Anisoxya fuscula</i>	a false darkling beetle	LC, NS			✓	Saproxylic, developing in a range of broad-leaved trees and shrubs.		✓	
Coleoptera	Mordellidae	<i>Mordellistena neuwaldeggiana</i>	a tumbling flower-beetle	LC, NS		✓	✓	Saproxylic, breeding in decaying branch-wood.		✓	
Coleoptera	Mordellidae	<i>Mordellistena parvula</i>	a tumbling flower-beetle	LC, NS			✓	Chalk grassland, sandy grassland and coastal cliffs. Larvae probably develop in mines in the stems of Mugwort, Yarrow and perhaps other Asteraceae.	✓		
Coleoptera	Mordellidae	<i>Mordellistena variegata</i>	a tumbling flower-beetle	LC, NS		✓		Saproxylic, developing in decaying wood.		✓	
Coleoptera	Aderidae	<i>Aderus populneus</i>	a beetle	LC, NS			✓	Saproxylic, primarily associated with woodland and wood-pasture, breeding in red-rotten heartwood.		✓	
Coleoptera	Scraptiidae	<i>Anaspis thoracica</i>	a beetle	LC, NS		✓	✓	Saproxylic, developing in the red-rotten heartwood of large oaks.		✓	
Coleoptera	Chrysomelidae	<i>Phyllotreta cruciferae</i>	a flea-beetle	LC, NS			✓	Phytophagous on Brassicaceae, occurring in a wide range of open and disturbed habitats.	✓		
Coleoptera	Chrysomelidae	<i>Longitarsus strigicollis</i>	a flea-beetle	LC, NS			✓	Disturbed ground on calcareous soils where its foodplant is teasel.	✓		
Coleoptera	Chrysomelidae	<i>Longitarsus ganglbaueri</i>	a flea-beetle	LC, NS			✓	Feeds on ragworts <i>Senecio</i> spp., in open habitats.	✓		
Coleoptera	Chrysomelidae	<i>Psylliodes luteola</i>	a flea-beetle	LC, NS			✓	Feeds on a range of grasses in open habitats.	✓		

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Order	Family	Species (scientific name)	Species (English name)	Conservation Status	OOD	2015-16	2018-19	Ecology	Open	Tree	Other
Coleoptera	Mycetophagidae	<i>Pseudotriphyllus suturalis</i>	a beetle	LC, NS			✓	A saproxylic beetle associated with bracket fungi on trees, most often with Chicken-of-the-Woods <i>Laetiporus sulphureus</i> or Dryad's Saddle <i>Polyporus squamosus</i> .		✓	
Hemiptera: Auchenorrhyncha	Cicadellidae	<i>Iassus scutellaris</i>	a leafhopper	Nationally Scarce (Na)	✓		✓	Phytophagous on elm. Undergoing range expansion.		✓	
Hemiptera: Heteroptera	Lygaeidae	<i>Aphanus rolandri</i>	a ground-bug	Nationally Scarce (Na)			✓	Disturbed ground with ruderal vegetation.	✓		
Coleoptera	Staphylinidae	<i>Ocypus nitens</i>	a rove-beetle	Nationally Scarce (Na)			✓	Recorded from woodland, coastal shingle, and a disused limestone quarry. Associated with chalky soils.	✓	✓	
Coleoptera	Silvanidae	<i>Uleiota planatus</i>	a beetle	Nationally Scarce (Na)	✓		✓	Saproxylic, under bark.		✓	
Coleoptera	Anthribidae	<i>Anthribus fasciatus</i>	a weevil	Nationally Scarce (Na)			✓	Predator of scale-insects on a wide variety of shrubs and trees including hawthorns, oaks and Field Maple.		✓	
Coleoptera	Curculionidae	<i>Polydrusus formosus</i>	a weevil	Nationally Scarce (Na)	✓		✓	Phytophagous on the foliage of a wide range of broad-leaved trees and shrubs, particularly Hazel.		✓	
Coleoptera	Curculionidae	<i>Rhinocyllus conicus</i>	a weevil	Nationally Scarce (Na)	✓	✓	✓	Thistles in open habitats. Has become common.	✓		
Coleoptera	Curculionidae	<i>Magdalis barbicornis</i>	a weevil	Nationally Scarce (Na)			✓	Saproxylic, larvae under bark of rosaceous trees and shrubs.		✓	
Hymenoptera: Aculeata	Formicidae	<i>Lasius brunneus</i>	Brown Tree Ant	Nationally Scarce (Na)	✓		✓	Saproxylic, nesting in hollow trees.		✓	
Hymenoptera: Aculeata	Apidae	<i>Lasioglossum pauxillum</i>	Lobe-spurred Furrow-bee	Nationally Scarce (Na)	✓	✓	✓	Occurs in a wide range of open flowery habitats such as chalk grassland. Getting commoner.	✓		
Lepidoptera	Yponomeutidae	<i>Ochsenheimeria vacculella</i>	Cereal Stem-moth	Nationally Scarce A			✓	Occurs in grassland, around arable fields, and in open woodland.	✓		
Hemiptera: Auchenorrhyncha	Delphacidae	<i>Asiraca clavicornis</i>	a planthopper	Nationally Scarce (Nb)	✓		✓	Disturbed, open habitats. Has expanded and become much commoner.	✓		

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Order	Family	Species (scientific name)	Species (English name)	Conservation Status	OOD	2015-16	2018-19	Ecology	Open	Tree	Other
Hemiptera: Heteroptera	Berytidae	<i>Berytinus hirticornis</i>	a stiltbug	Nationally Scarce (Nb)			✓	Grasslands, frequently found in association with grass vetchling <i>Lathyrus nissolia</i> .	✓		
Hemiptera: Heteroptera	Lygaeidae	<i>Megalonotus antennatus</i>	a ground-bug	Nationally Scarce (Nb)			✓	A seed-feeding bug of a wide range of mostly open habitats.	✓		
Hemiptera: Heteroptera	Lygaeidae	<i>Raglius alboacuminatus</i>	a ground-bug	Nationally Scarce (Nb)			✓	Ruderal habitats with Black Horehound <i>Ballota nigra</i> .	✓		
Coleoptera	Silphidae	<i>Nicrophorus interruptus</i>	a sexton beetle	Nationally Scarce (Nb)			✓	Carrion specialist. Occurring in a wide range of macrohabitats, wherever carrion may occur.			✓
Coleoptera	Elateridae	<i>Athous campyloides</i>	a click-beetle	Nationally Scarce (Nb)			✓	Open, disturbed grasslands and ruderal habitats such as road verges, allotments, quarries and coastal cliffs.	✓		
Coleoptera	Cerylonidae	<i>Cerylon fagi</i>	a beetle	Nationally Scarce (Nb)			✓	Saproxyllic, occurring in oaks, Beech and Ash.		✓	
Coleoptera	Coccinellidae	<i>Scymnus femoralis</i>	a ladybird	Nationally Scarce (Nb)		✓		Heathland, chalk grassland and other short swards on well-drained soils.	✓		
Coleoptera	Coccinellidae	<i>Hippodamia variegata</i>	Adonis' Ladybird	Nationally Scarce (Nb)	✓		✓	Open, ruderal habitats. Has become much commoner.	✓		
Coleoptera	Corylophidae	<i>Orthoperus nigrescens</i>	a beetle	Nationally Scarce (Nb)	✓		✓	A common mould-feeding species of a wide range of habitats. Not scarce.			✓
Coleoptera	Ciidae	<i>Cis festivus</i>	a beetle	Nationally Scarce (Nb)			✓	Saproxyllic, breeding in polypore fungi on a wide range of trees and shrubs.		✓	
Coleoptera	Anthribidae	<i>Anthribus nebulosus</i>	a weevil	Nationally Scarce (Nb)			✓	Predator of scale-insects on a wide variety of shrubs and trees including oaks, limes, willows and some conifers.		✓	
Coleoptera	Apionidae	<i>Protapion filirostre</i>	a weevil	Nationally Scarce (Nb)			✓	Grassland and ruderal vegetation, typically on chalky soils. Feeding on species of <i>Medicago</i> .	✓		
Coleoptera	Apionidae	<i>Catapion pubescens</i>	a weevil	Nationally Scarce (Nb)	✓		✓	Grassland, feeding on species of <i>Trifolium</i> .	✓		
Coleoptera	Curculionidae	<i>Larinus carlinae</i>	a weevil	Nationally Scarce (Nb)			✓	Warm, sunny, open habitats with thistles ( <i>Carduus</i> and <i>Cirsium</i> ).	✓		



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Order	Family	Species (scientific name)	Species (English name)	Conservation Status	OOD	2015-16	2018-19	Ecology	Open	Tree	Other
Coleoptera	Curculionidae	<i>Magdalis cerasi</i>	a weevil	Nationally Scarce (Nb)	✓		✓	Saproxyllic, breeding in dead or decaying twigs and branches, mostly of oaks.		✓	
Coleoptera	Curculionidae	<i>Acalles ptinoides</i>	a weevil	Nationally Scarce (Nb)	✓		✓	Saproxyllic, developing in the dead or decaying branch-wood of trees and shrubs.		✓	
Coleoptera	Curculionidae	<i>Orthochaetes setiger</i>	a weevil	Nationally Scarce (Nb)	✓		✓	A ground-living, phytophagous weevil of grasslands.	✓		
Coleoptera	Curculionidae	<i>Glocianus punctiger</i>	a weevil	Nationally Scarce (Nb)	✓		✓	Grassland and ruderal habitats with dandelions.	✓		
Coleoptera	Curculionidae	<i>Tychius pusillus</i>	a weevil	Nationally Scarce (Nb)			✓	A range of grassland and other open habitats with Lesser Trefoil <i>Trifolium dubium</i> .	✓		
Coleoptera	Curculionidae	<i>Scolytus mali</i>	a bark-beetle	Nationally Scarce (Nb)			✓	Saproxyllic. A bark-beetle of hawthorn and a wide range of other trees and shrubs.		✓	
Coleoptera	Platypodidae	<i>Platypus cylindrus</i>	Oak Pin-hole Borer	Nationally Scarce (Nb)	✓		✓	Saproxyllic. Breeds in trunks, stumps and major boughs of oaks and other broad-leaves.		✓	
Hymenoptera: Aculeata	Formicidae	<i>Ponera coarctata</i>	an ant	Nationally Scarce (Nb)			✓	Dry open habitats, usually on chalk, sand or shingle; mostly coastal.	✓		
Hymenoptera: Aculeata	Eumenidae	<i>Microdynerus exilis</i>	a mason wasp	Nationally Scarce (Nb)			✓	Hunts weevils in a range of open habitats; requires deadwood for nesting sites.	✓	✓	
Hymenoptera: Aculeata	Apidae	<i>Lasioglossum malachurum</i>	Sharp-collared Furrow-bee	Nationally Scarce (Nb)	✓		✓	A wide range of open habitats. Has become much commoner.	✓		
Hymenoptera: Aculeata	Apidae	<i>Melitta tricincta</i>	Red Bartsia Bee	Nationally Scarce (Nb)	✓	✓		Chalk grassland with Red Bartsia <i>Odontites vernus</i> .	✓		
Lepidoptera	Gracillariidae	<i>Leucospilapteryx omisella</i>	Mugwort Slender	Nationally Scarce B		✓		Disturbed ground, feeding on Mugwort <i>Artemisia vulgaris</i> .	✓		
Lepidoptera	Sesiidae	<i>Synanthedon tipuliformis</i>	Currant Clearwing	Nationally Scarce (Nb)			✓	Develops in the shoots of red currant and black currant bushes, typically in gardens and allotments.			✓

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Order	Family	Species (scientific name)	Species (English name)	Conservation Status	OOD	2015-16	2018-19	Ecology	Open	Tree	Other
Lepidoptera	Sesiidae	<i>Bembecia ichneumoniformis</i>	Six-belted Clearwing	Nationally Scarce (Nb)		✓		Disturbed ground, feeding on Common Bird's-foot-trefoil <i>Lotus corniculatus</i> .	✓		
Lepidoptera	Tortricidae	<i>Cydia conicolana</i>	Pine-cone Piercer	Nationally Scarce B		✓		Breeds in pine cones.		✓	
Lepidoptera	Pterophoridae	<i>Gillmeria ochrodactyla</i>	Tansy Plume	Nationally Scarce B		✓		Open, often disturbed habitats with the foodplant, Tansy <i>Tanacetum vulgare</i> .	✓		
Lepidoptera	Noctuidae	<i>Xestia stigmatica</i>	Square-spotted Clay	Nationally Scarce (Nb)		✓		Broad-leaved woodland, often on chalk soils, and favouring clearings and woodland edges.		✓	
Coleoptera	Leiodidae	<i>Catops longulus</i>	a beetle	Nationally Scarce			✓	Ground-living in woodland.		✓	
Coleoptera	Staphylinidae	<i>Sepedophilus testaceus</i>	a rove-beetle	Nationally Scarce			✓	Woodlands, associated with decaying wood on the ground.		✓	
Coleoptera	Staphylinidae	<i>Oxyptoda spectabilis</i>	a rove-beetle	Nationally Scarce			✓	Occurs in diverse micro- and macro-habitats. Ecology not understood.			✓
Coleoptera	Staphylinidae	<i>Anotylus insecatus</i>	a rove-beetle	Nationally Scarce			✓	Open, disturbed habitats. Often deep within the soil.	✓		
Coleoptera	Staphylinidae	<i>Sunius melanocephalus</i>	a rove-beetle	Nationally Scarce			✓	Occurs in a range of open habitats.	✓		
Coleoptera	Nitidulidae	<i>Meligethes atramentarius</i>	a pollen beetle	Nationally Scarce		✓		A woodland pollen-beetle which develops on Yellow Archangel <i>Lamiastrum galeobdolon</i> .		✓	
Coleoptera	Cryptophagidae	<i>Atomaria punctithorax</i>	a beetle	Nationally Scarce			✓	Associated with grassland, especially near farms and in gardens.	✓		
Diptera	Tipulidae	<i>Ctenophora pectinicornis</i>	a long-palped crane fly	Nationally Scarce			✓	Old broad-leaved woodland with mature, decaying trees; larvae breeding in rot-holes.		✓	
Diptera	Hybotidae	<i>Platypalpus rapidus</i>	a hybotid fly	Nationally Scarce			✓	Woodland, with larvae probably breeding in soil or under moss.		✓	

## GLOSSARY AND ABBREVIATIONS

<b>Term</b>	<b>Definition</b>
AAR	Airport Access Road
AOD	Above Ordnance Datum
BCT	Bat Conservation Trust
BLBAP	Bedfordshire and Luton Local Biodiversity Action Plan
BLICL	Bat Low Impact Class Licence
BRMC	Biodiversity Recording and Monitoring Centre
BSBI	Botanical Society of Britain and Ireland
BSI	British Standards Institute
BTO	British Trust for Ornithology
°C	Degrees celcius
CPAR	Century Park Access Road
CRoW	Countryside and Rights of Way
CTA	Central Terminal Area
CWS	County Wildlife Site
DART	Direct Air Rail Transit
DCO	Development Consent Order
DNA	Deoxyribonucleic acid
DWS	District Wildlife Site
EC	European Commission
ECoW	Ecological Clerk of Works
eDNA	Environmental DNA
ES	Environmental Statement
EU	European Union
GB	Great Britain
GCN	Great crested newt
ha	Hectare
HBG	Hertfordshire Badger Group
HCC	Hertfordshire County Council
HERC	Herts Environmental Records Centre
HGBI	Herpetofauna Groups of Britain and Ireland
HLBAP	Hertfordshire Local Biodiversity Action Plan
ICAO	International Civil Aviation Organisation
ILS	Instrument Landing System



<b>Term</b>	<b>Definition</b>
IUCN	International Union for the Conservation of Nature
JNCC	Joint Nature Conservation Committee
km	Kilometre
LBAP	Local Biodiversity Action Plan
LBC	Luton Borough Council
the airport	London Luton Airport
LNR	Local Nature Reserve
LWS	Local Wildlife Site
m	Metre
m <sup>2</sup>	Metre squared
m <sup>3</sup>	Metre cubed
mm	Millimetre
mppa	Million passenger per annum
NCP	New Century Park
NE	Natural England
NERC	Natural Environment and Rural Communities
NGR	National Grid Reference
NNRs	National Nature Reserves
NSIP	Nationally Significant Infrastructure Project
NVC	National Vegetation Classification
OS	Ordnance Survey
PRoW	Public Right of Way
SAC	Special Area of Conservation
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
UK	United Kingdom
UKBAP	UK Biodiversity Action Plan
VC	Vice County

## REFERENCES

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- Ref 1 British Standards Institute (BSI) (2013). BS42020 - Biodiversity Code of Practice for Planning and Development. BSI, London.
- Ref 2 Council Directive 92/43/EEC.
- Ref 3 Council Directive 2009/147/EC (formerly 79/409/EEC).
- Ref 4 HMSO (1949) National Parks and Access to the Countryside Act 1949.
- Ref 5 HMSO (1981) Wildlife and Countryside Act 1981.
- Ref 6 HMSO (2000). Countryside and Rights of Way Act 2000.
- Ref 7 HMSO (2006). Natural Environment and Rural Communities Act 2006.
- Ref 8 Biodiversity Recording and Monitoring Centre (2019). *Biodiversity Action Plan*.
- Ref 9 Hertfordshire Environmental Forum (2006). A Biodiversity Action Plan for Hertfordshire.
- Ref 10 MAGIC website. For locations of Statutory Nature Conservation Sites and Habitats of Principal Importance..
- Ref 11 Chartered Institute for Ecology and Environmental Management (CIEEM) (2017). Guidelines for Preliminary Ecological Appraisal. 2nd Edition.
- Ref 12 Joint Nature Conservation Committee (JNCC) (2010). Handbook for Phase 1 habitat survey – a technique for environmental audit.
- Ref 13 Stace C. (2019). *New Flora of the British Isles*. Fourth edition. C&M Floristics.
- Ref 14 Botanical Society of Britain & Ireland website (2019) Accessed [2021:10].
- Ref 15 P.A. Stroh, S.J. Leach, T.A. August, K.J. Walker, D.A. Pearman, F.J. Rumsey, C.A. Harrower, M.F. Fay, J.P. Martin, T. Pankhurst, C.D. Preston, I. Taylor (2014). A Vascular Plant Red List for England. Botanical Society of Britain and Ireland, Bristol.
- Ref 16 Hertfordshire Biological Records Centre (2008). Herts Plant List and Stauses.xlsx. For details of Hertfordshire Rare Plant Register. Available on public request from Bedfordshire and Luton Biodiversity Recording and Monitoring Centre. (Received: 06/07/2018).
- Ref 17 Botanical Society of Britain & Ireland website (2018). (Accessed: 23/05/2019).
- Ref 18 British Mycological Society website (2006).  
For *BMS and JNCC*, S. Evans, A. Henrici, B. Ing (2006). Red Data List of Threatened British Fungi. (Accessed: 19/10/2020).
- Ref 19 The Biodiversity Metric 2.0 calculation tool and user guide, Natural England website Accessed: 19/10/2020.
- Ref 20 Cheffings, C.M. & Farrell, L. (Eds), Dines, T.D., Jones, R.A., Leach, S.J., McKean, D.R., Pearman, D.A., Preston, C.D., Rumsey, F.J., Taylor, I. 2005. *The Vascular Plant Red Data List for Great Britain. Species Status 7: 1-116*. Joint Nature Conservation Committee, Peterborough. Cheffings
- Ref 21 BSBI website (2018). Accessed [2019:05].
- Ref 22 Rose F. (1999). Indicators of ancient woodland – the use of vascular plants in evaluating ancient woods for nature conservation. *British Wildlife*: 10 (4) 241 – 251 and Rose, F. and O'Reilly, C. (Eds.) (2006) *The Wild Flower Key (Revised Edition)*. Frederick Warne, London.
- Ref 23 Rodwell, J.S. (ed.) (1991). *British Plant Communities*. Volume 1. Woodlands and Scrub. Cambridge University Press, Cambridge.
- Ref 24 Boon C et al. (2005). Rare plants of Bedfordshire, including appendices 6A-D. Available on public request from Bedfordshire and Luton Biodiversity Recording and Monitoring Centre. (Received: 05/07/2018).
- Ref 25 Department for Environment, Food and Rural Affairs (2007) *Hedgerow Survey Handbook: A standard procedure for local surveys in the UK*. 2nd edition. Defra, London.

- 
- Ref 26 The Hedgerows Regulations 1997.
- Ref 27 Hedgerow Survey Handbook: A standard procedure for local surveys in the UK. 2nd edition. (2007). DEFRA.
- Ref 28 HMSO (1992) Protection of Badgers Act 1992.
- Ref 29 *Land Adjacent to Luton Airport – Further surveys: Badger Bait Marking*. June 2017. Capita on behalf of London Luton Airport Limited
- Ref 30 The Mammal Society, Surveying Badgers (1989).
- Ref 31 Natural England (2009). Guidance on 'Current Use' in the definition of a Badger Sett.
- Ref 32 Delahay, R, J. et al (2000) The use of marked bait in studies of the territorial organisation of the European badger (*Meles meles*). Mammal Society.
- 33 Scottish Badgers (2018) Surveying for Badgers: Good Practice Guidelines. Version 1..
- Ref 34 The Conservation of Species and Habitats Regulations 2017 (as amended).
- Ref 35 MAGIC Website (Accessed: 08/02/2019).
- Ref 36 Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition). The Bat Conservation Trust, London.
- Ref 37 Andrews, H. (2018) Bat Roosts in Trees: A Guide to Identification and Assessment for Tree-Care and Ecology Professionals. Pelagic Publishing, Exeter.
- 38 Wray et al (2007) Valuing Bats in Ecological Impact Assessment. In Practice. Based on a presentation at the Mammal Society – Specific Issues with Bats
- Ref 39 English Nature (2006). The Dormouse Conservation Handbook 2nd edition.
- Ref 40 Bright, P.W., Mitchell, P. & Morris, P.A. (1994). Dormouse distribution: survey techniques, insular ecology and selection of sites for conservation. *Journal of Applied Ecology*. 31: 329–339.
- Ref 41 Chanin, P. and Gubert, L. (2012). Common dormouse movements in a landscape fragmented by roads.
- Ref 42 Bright, P.W and Morris, P.A., (1991). Ranging and nesting behaviour of the dormouse, *Muscardinus avellanarius*, in diverse low-growing woodland, *Journal of Zoology*, Vol 224 Issue 2.
- Ref 43 Bright, P.W and Morris, (1992). Ranging and nesting behaviour of the dormouse *Muscardinus avellanarius*, in coppice-with-standards woodland, *Journal of Zoology*, Vol 226 Issue 4.
- Ref 44 A Biodiversity Action Plan for Hertfordshire. March 2006.
- Ref 45 Bedfordshire and Luton Species Action Plan: Otter, September 2009.
- Ref 46 Chanin, P. (2003). Ecology of the European Otter. Conserving Natura 2000 Rivers Ecology Series No. 10. English Nature, Peterborough.
- Ref 47 Crawford, A. (2003). Fourth Otter Survey of England 2000-2002. Environment Agency, Bristol.
- Ref 48 Dean, M, Strachan, R., Gow, D. and Andrews, R. 2016. The Water Vole Mitigation Handbook (the Mammal Society Mitigation Guidance Series). Eds Fiona Matthews and Paul Chanin. The Mammal Society, London.
- Ref 49 Eaton, M.A., Aebischer, N.J., Brown, A.F., Hearn, R.D., Lock, L., Musgrove, A.J., Noble, D.G., Stroud, D.A. and Gregory, R.D. (2015). Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man. *British Birds*, 108, 708-746.
- 50 HMSO (1954) Protection of Birds Act 1954.
- Ref 51 Biodiversity and Recording and Monitoring Centre. Bedfordshire & Luton Local Biodiversity Action Plan.
- Ref 52 Hertfordshire Biodiversity Partnership. Hertfordshire Local Biodiversity Action Plan.
- Ref 53 Marchant, J.H. (1983). BTO Common Bird Census Instructions. British Trust for Ornithology, Tring.



- 
- Ref 54 Gilbert G., Gibbons, D.W. and Evans, J. (1998). Bird Monitoring Methods: A Manual of Techniques for Key UK Species. Royal Society for the Protection of Birds, Sandy.
- Ref 55 Hardy, J. Humphrey, C. Wernham, C. Riley, H. Etheridge, B. Thompson, D. (2013). Raptors A Field Guide for Surveys and Monitoring, 3rd Edition. The Stationary Office Limited, Edinburgh.
- Ref 56 Shawyer C.R. (2011). Barn Owl *Tyto alba* Survey Methodology and Techniques for use in Ecological Assessment. CIEEM, Winchester.
- Ref 57 Shawyer C.R. (2011). Barn Owl *Tyto alba* Survey Methodology and Techniques for use in Ecological Assessment. CIEEM, Winchester.
- Ref 58 Shawyer C.R. (2011). Barn Owl *Tyto alba* Survey Methodology and Techniques for use in Ecological Assessment. CIEEM, Winchester.
- Ref 59 British Ornithologists' Union (2019). The British List: The Official List of Bird Species Recorded in Britain.
- Ref 60 Directive 2009/147/EC of the European Parliament and of the Council.
- Ref 61 Eaton, M.A., Aebischer, N.J., Brown, A.F., Hearn, R.D., Lock L., Musgrove, A.J., Noble, D.G., Stroud, D.A. and Gregory, R.D. (2015). Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man. *British Birds*, 108, 708-746.
- Ref 62 Biodiversity Recording and Monitoring Centre. Bedfordshire & Luton Local Biodiversity Action Plan.
- Ref 63 Hertfordshire Biodiversity Partnership. Hertfordshire Local Biodiversity Action Plan.
- Ref 64 Bibby, C.J., Burgess, N.D. & Hill, D.A. (2000). Bird Census Techniques. 2nd Edition. Academic Press, London.
- Ref 65 Gilbert, G.G., Gibbons, D.W. and Evans, J. (1998). Bird Monitoring Methods: A Manual of Techniques. Royal Society for the Protection of Birds, Sandy.
- Ref 66 British Ornithologists' Union (2019). The British List: The Official List of Bird Species Recorded in Britain.
- Ref 67 Bedfordshire and Luton Species Action Plan: Adder (2010)
- Ref 68 Froglife Advice Sheet 10: Reptile Survey, November 1999.
- Ref 69 Froglife Reptile Survey Booklet (2015).
- Ref 70 Herpetofauna Workers Manual, Gent & Gibson (1998).
- Ref 71 Froglife (1999). Reptile survey: an introduction to planning, conducting and interpreting surveys for snake and lizard conservation. Froglife Advice Sheet 10. Froglife, Halesworth
- Ref 72 Herpetofauna Groups of Britain and Ireland (1998). Evaluating local mitigation/translocation programmes: maintaining best practice and lawful standards. HGBI advisory notes for amphibian and reptile groups. HGBI c/o Froglife, Halesworth. (Unpublished).
- Ref 73 Edgar, P., Foster, J. and Baker, J. (2010). Reptile Habitat Management Handbook. Amphibian and Reptile Conservation, Bournemouth.
- Ref 74 Amphibian and Reptile Group UK (2010). Advice Note 5: Great Crested Newt Habitat Suitability Index.
- Ref 75 Kinne, O. (2004). Successful re-introduction of the newts *Triturus cristatus* and *T. vulgaris*. *Endangered Species Research*, 1, pp.25-40.
- Ref 76 English Nature (2001). Great Crested Newt Mitigation Guidelines. English Nature, Peterborough.
- Ref 77 Biggs J, Ewald N, Valentini A, Gaboriaud C, Griffiths RA, Foster J, Wilkinson J, Arnett A, Williams P and Dunn F (2014). Natural England advice: Analytical and methodological development for improved surveillance of the Great Crested Newt. Appendix 5. Technical advice note for field and

---

laboratory sampling of great crested newt (*Triturus cristatus*) environmental DNA. Freshwater Habitats Trust, Oxford.

Ref 78 E.Pollard (1975). Aspects of the Ecology of *Helix pomatia* L. *Journal of Animal Ecology*. Vol 44. No.1.