



Greater Cambridge Partnership

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# CAMBOURNE TO CAMBRIDGE

Technical Report 5: Ecological Impact  
Assessment





Greater Cambridge Partnership

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# **CAMBOURNE TO CAMBRIDGE**

## Technical Report 5: Ecological Impact Assessment

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# 1 INTRODUCTION

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- 1.1.1. This impact assessment report provides the identification and assessment of likely significant environmental effects arising from the C2C Scheme on Ecology (hereafter referred to as Ecological Impact Assessment (EclA)).
- 1.1.2. The Cambourne to Cambridge (C2C) Scheme will include a 13.6km long mainly dedicated busway connecting Cambourne in the west with Cambridge in the east. A service road and maintenance track, to be used as an active travel path, will run alongside the segregated sections of busway. The C2C Scheme will use hybrid vehicles (and in due course, electric vehicles), providing a service of around 10 buses per hour each way. The Scotland Farm travel hub (a park and ride facility) will be situated along the route, just north of the A428, approximately 5km west of Cambridge. Further details about the C2C Scheme proposal are set out in Chapter 3 of the ES<sup>1</sup>.
- 1.1.3. Impacts during the construction and operation phases of the C2C Scheme are assessed. This report, its associated figures and appendices are intended to be read as part of the wider ES.
- 1.1.4. This assessment has relied on the following baseline ecology documents:
- Bat Roost Survey Report (WSP, 2023b) (Appendix TR5.6);
  - Bat Activity Report (WSP, 2023c) (Appendix TR5.5);
  - Badger Survey Report (WSP, 2023d) (Appendix TR5.2);
  - Breeding Bird Survey Report (WSP, 2023e) (Appendix TR5.8);
  - Wintering Bird Survey Report (WSP, 2023f) (Appendix TR5.15);
  - Great Crested Newt Survey Report (WSP, 2023g) (Appendix TR5.9);
  - Water Vole and Otter Report (WSP, 2023h) (Appendix TR5.12);
  - Reptile Survey Report (WSP, 2023i) (Appendix TR5.13);
  - Terrestrial Invertebrate Survey Report (WSP, 2023j) (Appendix TR5.14);
  - Aquatic Ecology Report (WSP, 2023k) (Appendix TR5.1); and
  - Arboriculture Technical Note (WSP, 2022) (Appendix TR5.16).
- 1.1.5. A Biodiversity Net Gain (BNG) Assessment (WSP, 2023a) (Appendix TR5.7) has been completed for the Scheme and assesses whether the Scheme provides BNG. It also informs the requirements for any offsite habitat creation. Any offsite habitat creation will not form mitigation to be taken into within this assessment but will aim to achieve a 20% BNG, which is an aspiration for the project and all GCP projects.
- 1.1.6. This assessment also includes or refers to information prepared as part of the Statement to inform Habitats Regulations Assessment (WSP, 2023n) (Appendix TR5.11), which in turn is informed by this assessment, technical reports and other chapters of the ES.
- 1.1.7. Other documents from previous surveys undertaken for the Scheme between 2018 and 2021 by Mott MacDonald, Thomson Environmental Consultants and Cambridge Ecology have informed this assessment. The results of these surveys are included in the following reports:
- Badger Survey Report (Cambridge Ecology, 2018a);

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<sup>1</sup> Environmental Statement (Document reference: C2C-10-00-Environmental Statement (Volume 1))

- Barn Owl Survey and Mitigation Considerations, Cambourne to Cambridge (C2C) and Cambridge Southeast Transport (CSET) Phase 2 (The Greater Cambridgeshire Partnership, 2020);
- Barn Owl Survey Report (Cambridge Ecology, 2019a);
- Botany Survey Report (Cambridge Ecology, 2018b);
- Brown Hare Survey Report (Cambridge Ecology, 2019b);
- C2C Bat Activity Survey Summary (Thomson Environmental Consultants, 2021);
- Cambourne to Cambridge Better Public Transport: Phase 1 Habitat Survey, Hedgerow and Invertebrate Assessment (Cambridge Ecology, 2021a);
- Cambourne to Cambridge Better Public Transport: Stage 1 Bat Inspection Survey 2021 (Cambridge Ecology, 2021c);
- Cambourne to Cambridge Better Public Transport: Breeding Bird Survey 2021 (Cambridge Ecology, 2021d);
- Cambourne to Cambridge Better Public Transport: Great Crested Newt eDNA Survey, 2021 Update (Cambridge Ecology, 2021e);
- Cambourne to Cambridge Better Public Transport: Phase 2 Vegetation (NVC) Survey of Semi-natural Woodland, Un-improved Grassland and Arable Field Margins 2021 (Cambridge Ecology, 2021f);
- Cambourne to Cambridge Better Public Transport: Reptile Survey 2021 (Cambridge Ecology, 2021g);
- Cambourne to Cambridge Better Public Transport: Stage 2 Bat Activity 2021 (Cambridge Ecology, 2021h);
- Cambourne to Cambridge Better Public Transport: Water Vole and Eurasian Otter Presence Absence Survey 2021 (Cambridge Ecology, 2021i);
- Cambourne to Cambridge Better Public Transport: White-clawed Crayfish Presence Absence Survey 2021 (Draft) (Cambridge Ecology, 2021j);
- eDNA Great Crested Newt Report (and associated updated report) (Cambridge Ecology, 2018c);
- Great Crested Newt Survey Report (Cambridge Ecology, 2018d);
- Invertebrate Survey Report (Cambridge Ecology, 2018e);
- Phase 1 Habitat Survey Report (Cambridge Ecology, 2018f); and
- Stage 2 Bat Activity Survey Report 2020 final (Cambridge Ecology, 2020).

1.1.8. This Technical Report:

- Summarises the legislative and policy framework;
- Describes consultation undertaken to date;
- Describes the methodology followed for the assessment;
- Identifies the potential impacts from the Scheme;
- Details the mitigation and enhancement measures that have been identified;
- Reports the assessment of likely significant effects of the Scheme; and
- Details the monitoring that is recommended to be carried out for the Scheme.

1.1.9. The Scheme has the potential to affect Ecology as a result of the following.

- During construction:
  - Site and vegetation clearance;
  - Noise and vibration impacts;
  - Visual disturbance of species including by artificial lighting;
  - Accidental pollution via hydrological pathways; and



- Sediment pollution via hydrological pathways.
- During operation:
  - Habitat interruption and fragmentation;
  - Road traffic collision/mortality;
  - Visual disturbance of species including by artificial lighting; and
  - Releases of pollution via hydrological pathways.

## 2 LEGISLATIVE AND POLICY FRAMEWORK

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### 2.1 LEGISLATIVE FRAMEWORK

2.1.1. The applicable legislative framework is summarised as follows.

#### INTERNATIONAL

2.1.2. Within English law, international law obligations are given effect through government policy and legislation enacted or approved by Parliament.

2.1.3. The United Nations Convention on Biological Diversity 1992 was ratified by the UK in 1994. Under the Convention, the Strategic Plan for Biodiversity 2011–2020 (the 'Aichi' targets) established a legal framework for biodiversity conservation with the goals of conserving biological diversity, sustainable use of its components, and the fair and equitable sharing of the benefits arising from the use of genetic resources. Within England the 2011 strategy "Biodiversity 2020" aligned with the Aichi targets. Other related policies published for England include the 25-year environment plan and the target to protect 30% of UK land by 2030. Legislation includes the Environment Act 2021.

2.1.4. The Bern Convention on the Conservation of European Wildlife and Natural Habitats came into force in 1982 and is concerned with the conservation of wild flora and fauna and their natural habitats. Within the European Union, whilst the UK was a member state, the Bern Convention was implemented by the Habitats Directive (92/43/EEC) and the Birds Directive (2009/147/EC). Within the UK the Bern Convention is implemented for species protection by the Wildlife and Countryside Act 1981.

2.1.5. The Bonn Convention on the Conservation of Migratory Species of Wild Animals aims to conserve terrestrial, marine and avian migratory species throughout their ranges. Within the European Union, whilst the UK was a member state, the Bonn Convention was partly implemented by the Habitats Directive (92/43/EEC) and the Birds Directive (2009/147/EC). Within the UK the Bern Convention is implemented for species protection by the Wildlife and Countryside Act 1981.

#### NATIONAL

##### The Environment Act 2021

2.1.6. The Environment Act 2021 requires the Secretary of State to produce for England and Wales environmental targets for specific measures and an environment improvement plan that must seek to significantly improve the natural environment over at least 15 years. One of the new, legally binding targets is in respect of increasing species abundance of British species by 2030. Most planning permissions granted pursuant to applications submitted after November 2023 will be subject to a deemed planning condition requiring the provision of 10% biodiversity net gain.

##### Conservation of Habitats and Species Regulations 2017 (as amended) (Habitats Regulations)

2.1.7. In the UK, the Habitats Directive was originally transposed into national law by means of the Conservation (Natural Habitats, & c.) Regulations 1994 (as amended). The Regulations came into force on 30 October 1994 and have been amended several times. Subsequently the Conservation of Habitats and Species Regulations 2010, was created which consolidated all the various amendments made to the 1994 Regulations in respect of England and Wales. The 2010 regulations have now been superseded by the 2017 regulations, which have also been subject to amendment



including as a result of the UK's exit from the European Union . The Regulations provide for the designation and protection of 'European Sites' in England, the protection of 'European Protected Species', and the adaptation of planning and other controls for the protection of European Sites.

- 2.1.8. Amendments to the Habitats Regulations made as a result of the United Kingdom's exit from the European Union include the transferring of powers from the European Commission to the appropriate authorities in England and Wales. The process for Habitats Regulations Assessment and the duties of Competent Authorities as defined in the Habitats Regulations remain largely unchanged Other amendments include:
- The creation of the National Sites Network, which comprises the sites previously designated as European sites. The establishment of management requirements for the National Site Network.
  - Amendments to the Imperative Reasons of Overriding Public Interest ((IROPI) test to replace the European Commission's former role.

#### **Wildlife and Countryside Act 1981 (as amended)**

- 2.1.9. The Wildlife and Countryside Act 1981 (as amended; hereafter referred to as the 'WCA') is the principal mechanism for the legislative protection of wildlife in Great Britain. This legislation is the means by which the Bern Convention and (partially) the European Union Directives on the Conservation of Wild Birds (79/409/EEC) and Habitats Directive have been implemented in the UK. The WCA includes provisions, amongst others, for the identification and designation of protected species; for the safeguarding and designation of Sites of Special Scientific Interest (hereafter referred to as SSSI); and for the designation of invasive non-native species (INNS) and measures to control the spread of these.

#### **Countryside and Rights of Way (CRoW) Act 2000**

- 2.1.10. The Countryside and Rights of Way Act 2000 (hereafter referred to as the 'CRoW Act') extends the public's ability to enjoy the countryside whilst also providing safeguards for landowners and occupiers. It gives a statutory right of access to open country and registered common land; modernises the rights of way system; gives greater protection to SSSIs; provides better management arrangements for Areas of Outstanding Natural Beauty (AONBs); and strengthens wildlife enforcement legislation.

#### **The Natural Environment and Rural Communities (NERC) Act 2006 (as amended)**

- 2.1.11. The Natural Environment and Rural Communities Act (NERC Act) provides that any public body or statutory undertaker in England must have regard to the purpose of conservation of biological diversity in the exercise of their functions. The intention is to help ensure that biodiversity becomes an integral consideration in the development of policies and plans.
- 2.1.12. The Environment Act 2021 makes changes to the NERC Act which updated the general duty to conserve biodiversity by adding a duty to not only conserve but also enhance biodiversity. Public authorities are expected to produce reports on the action they have taken under this duty when designated by the Secretary of State.

#### **The Protection of Badgers Act 1992**

- 2.1.13. This Act (HMSO, 1992) makes it an offence to kill or take a Badger *Meles meles*, or to interfere with a Badger sett unless such action is licenced by Natural England. Sett interference includes damaging or destroying a sett, obstructing access to a sett, and disturbing a Badger whilst it is

occupying a sett. The Act defines a Badger sett as ‘any structure or place, which displays signs indicating the current use by a Badger’ and Natural England takes this definition to include seasonally used setts.

### **Salmon and Freshwater Fisheries Act 1975 (SAFFA)**

- 2.1.14. This Act covers regulation of fisheries in England and Wales and includes legislation that covers the introduction of polluting effluents, the obstruction of fish passage (screens, dams, weirs, culverts etc.) illegal means of fishing, permitted times of legal fishing and fishing licencing (which covers electric fishing).
- 2.1.15. Under this Act any person who causes or knowingly permits to flow, or puts or knowingly permits to be put, into any waters containing fish or into any tributaries of waters containing fish, any liquid or solid matter to such an extent as to cause the waters to be poisonous or injurious to fish or the spawning grounds, spawn or food of fish, shall be guilty of an offence.
- 2.1.16. The Act also requires that fish passes are installed on new and rebuilt barriers that affect waters frequented by salmon or migratory trout. In the future, it is likely that fish passage facilities will need to be designed to accommodate all fish species and life stages.

### **The Eels (England and Wales) Regulations 2009 (as amended)**

- 2.1.17. The Eels (England and Wales) Regulations 2009 implemented Council Regulation (EC) No 1100/2007 of the Council of the European Union, which required Member States to establish measures for the recovery of the stock of European eel. The Regulations apply to England and Wales.
- 2.1.18. They give powers to the regulators (the Environment Agency and Natural Resources Wales) to implement recovery measures in all freshwater and estuarine waters in England and Wales. The aim of the Regulations is to achieve 40 per cent escapement of adult eels relative to escapement levels under pristine conditions. The measures, as set out in the legislation, by which this is to be achieved is to reduce fishing pressures, improve access and habitat quality and reduce the impact of impingement and entrainment.
- 2.1.19. Under the Regulations, the regulators can serve notice to companies detailing their legal obligation to screen intakes and outfalls for eel and/or to remove or modify obstructions to eel migration. However, it is possible for companies to be granted with exemptions if the costs of works greatly exceeds the benefits. In such a situation it is likely the regulator will seek a package of more cost-effective, “alternative measures”.

## **2.2 POLICY FRAMEWORK**

- 2.2.1. The applicable policy framework is summarised as follows.

### **NATIONAL**

#### **National Planning Policy Framework**

- 2.2.2. The National Planning Policy Framework (hereafter referred to as the ‘NPPF’) (Ministry of Housing Communities and Local Government, 2021) sets out the Government’s planning policies for England. Although the NPPF does not contain specific policies for Nationally Significant Infrastructure Projects (NSIPs), such as the Scheme, it contains relevant policies specific to ecology and nature conservation (most notably section 118). Moreover, it sets out provisions for biodiversity,

including protected sites and species for which local planning authorities (LPAs) must have regard. Planning Practice Guidance (PPG) has been published alongside the NPPF, and is regularly updated, to provide guidance on the implementation of the planning policies.

## **LOCAL**

### **Cambridge Local Plan**

2.2.3. The following policies within the Cambridge Local Plan (Cambridge City Council, 2018) are relevant to biodiversity.

- Policy 69: Protection of sites of biodiversity and geodiversity importance;
- Policy 70: Protection of priority species and habitats; and
- Policy 71: Trees.

### **South Cambridge Local Plan**

2.2.4. The following policies within the South Cambridgeshire Local Plan (South Cambridgeshire District Council, 2018) are relevant to biodiversity.

- Policy NH/4: Biodiversity;
- Policy NH/5: Sites of Biodiversity or Geological Importance;
- Policy NH/6: Green Infrastructure; and
- Policy NH/7: Ancient Woodlands and Veteran Trees.

### **Cambridgeshire Green Infrastructure Strategy**

2.2.5. The Cambridgeshire Green Infrastructure Strategy has been produced to assist in shaping and coordinating the delivery of green infrastructure in the county. The first of the four main strategies relate to biodiversity: “Reversing the decline in biodiversity. The objective of this strategy is to conserve and enhancing biodiversity, through the protection and enhancement of habitats (terrestrial and aquatic) and wildlife sites and linkage of key habitats”.

### **South Cambridgeshire Biodiversity Supplementary Planning Document**

2.2.6. South Cambridgeshire District Council have produced the South Cambridgeshire Biodiversity Supplementary Planning Document, which provides detail on how policies will be implemented to ensure that biodiversity is adequately protected and enhanced throughout the development process. It seeks to ensure that biodiversity and appropriate landscaping are fully integrated to new developments to create accessible green spaces for wildlife and people, to contribute to a high quality natural and built environment, and to contribute to a better quality of life.

## 3 SCOPE OF ASSESSMENT

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3.1.1. The scope of this assessment has been established through an ongoing scoping process. Further information can be found in Chapter 6 (Biodiversity) of the Cambourne to Cambridge ES Scoping Report (WSP, 2023I) and the Consultation Report<sup>2</sup>.

### 3.2 ELEMENTS SCOPED OUT OF THE ASSESSMENT

3.2.1. Alteration and degradation of habitats within statutory designated sites as a result of air pollution from construction and operation are scoped out of this assessment. It is considered that potential impacts will not arise due to the distances from the Order Limits to any statutory designated site in excess of 200m as per information stated in the Institute of Air Quality Management's (IAQM) guidance on the assessment from demolition and construction (Institute of Air Quality Management (IAQM), 2020)).

### 3.3 ELEMENTS SCOPED INTO THE ASSESSMENT

#### Construction Phase

- 3.3.1. The following elements are considered to have the potential to give rise to likely significant effects during construction of the Scheme and have therefore been considered within this assessment.
- Permanent and temporary loss of habitats which could result in damage or loss of HPI habitats or habitats otherwise of conservation importance including the interruption of ecological networks and wildlife corridors;
  - Water-borne pollution (sediment loading and accidental release of chemicals) leading to deterioration of habitats including their supporting role for protected and otherwise notable species;
  - Killing and / or injury of protected species and their supporting habitats due to site clearance and construction activities (including excavations and lighting); and
  - Disturbance of protected species and their supporting habitats due to site clearance and construction activities (through noise, vibration, lighting).

#### Operational Phase

- 3.3.2. The following elements are considered to have the potential to give rise to significant effects during operation of the Scheme and have therefore been considered within this assessment.
- Disturbance of protected species and loss of their supporting habitats due to increased additional lighting;
  - Water-borne pollution from road run-off leading to deterioration of aquatic habitats including their supporting role for protected and otherwise notable species; and
  - Risk of traffic collision and road mortality.

### 3.4 ZONES OF INFLUENCE

3.4.1. The Scheme has been reviewed to identify the spatial scale at which Important Ecological Features (defined below) could be affected as a result of the Scheme's construction and operation. This is

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<sup>2</sup> Consultation Report (Document reference: C2C-06-00-Consultation Report).



defined as the Ecological Zone of Influence (EZoI). These EZoI are defined within the ES Scoping Report (WSP, 2023m).

## 4 ASSESSMENT METHODOLOGY

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### 4.1 OVERVIEW

- 4.1.1. The EclA has been carried out pursuant to the relevant legislation, planning policy detailed in section 2 and appropriate ecological guidance. The assessment will determine the potential effects arising from the construction and operational phases of the Scheme on Important Ecological Features (as defined below), both with and without consideration of secondary mitigation measures.
- 4.1.2. The following guidance documents and data sources have been used during the preparation of this impact assessment:
- Guidelines on Ecological Impact Assessment (CIEEM, 2018);
  - Advice Note on Lifespan of Ecological Reports and Surveys (CIEEM, 2019); and
  - Guidelines for Accessing, Sharing and Using Biodiversity Data in the UK (CIEEM, 2020).
- 4.1.3. In accordance with the CIEEM EclA Guidelines (2018), the assessment carried out collates relevant baseline information to predict the effects of the Scheme on Important Ecological Features. These are defined as:
- Statutory designated sites;
  - Non-statutory designated sites;
  - Habitats of Principal Importance (HPI) and Species of Principal Importance (SPI); and
  - Protected and notable habitats and species.
- 4.1.4. This assessment is based on the Scheme boundary presented in **Figure 5.1, Appendix A**. The Scheme boundary comprises the land required for the Scheme and its construction and excludes areas of land that will need to be temporarily acquired during construction due to being landlocked throughout the duration of construction. This definition of the Scheme boundary differs from that of the Limit of land to be acquired or used (LLAU) and the limits of deviation (LoD).
- 4.1.5. A significant effect is defined as an effect that could have an impact upon the structure, form, function and conservation status of a designated site, habitat and ecosystem or species population where these are defined as Important Ecological Features. The relative importance of ecological features is valued against a geographic frame of reference.
- 4.1.6. Mitigation is developed on an iterative basis, with the mitigation hierarchy followed; preference is first given to avoiding effects, then reducing remaining effects, before applying targeted mitigation where necessary. Where residual effects remain after application of targeted mitigation measures, compensation is then be considered.

### 4.2 ASSESSMENT OF IMPORTANCE

- 4.2.1. The importance of an Important Ecological Feature is determined on a geographical scale described below.
- International (within Europe);
  - National (relating to the UK, specifically England);
  - County (Cambridgeshire); and
  - Local (features that are of importance at a local level such as District).

- 4.2.2. This assessment methodology expands upon approach detailed within the EIA Scoping Report (WSP, 2023I). The assessment of importance now excludes Regional importance, which was included in the scoping methodology. This is in part because there are no regional designations that can be referred to when assessing the importance of important features, and because it is rare that species and habitat data is compiled at a regional level.
- 4.2.3. The geographical scale of importance for statutory and non-statutory designated sites is assigned based on their designation. For example, sites designated under the National Sites Network and Ramsar Sites are considered of international importance, because they are designated on the basis of supporting habitats and / or species which are of importance for nature conservation at an international level (pursuant to the Habitats Regulations ). Sites of Special Scientific Interest and National Nature Reserves are considered to be of 'National' importance because they are designated for supporting habitats, species, and other features of importance for nature conservation at a UK level.
- 4.2.4. The geographical scale of importance for habitats and species is assigned with reference to any designations or policy provisions that apply. For example, HPI, as identified by the provisions of Section 41 of the NERC Act, are considered of particular importance to the conservation of biodiversity in England. That is not to say that all HPI are considered of 'National Importance'. Extents of such habitats that form an appreciable part of the English resource, would however be considered of 'National Importance'.
- 4.2.5. The Cambridgeshire and Peterborough County Wildlife Site (CWS) Selection Criteria (Cambridgeshire & Peterborough CWS Panel, 2020) have been referenced where appropriate in order to aid the determination of County importance. The Selection Criteria are based on the JNCC Guidelines for selection of biological SSSIs, 1989. Appropriate modifications have been made to accommodate the aim of selecting a lower tier of sites, i.e., those sites of County rather than National importance.
- 4.2.6. The same approach applies to protected or otherwise notable species. For example, Great Crested Newt *Triturus cristatus* is recognised as a priority for nature conservation at an international level, by way of its identification as a protected species under the Habitats Regulations. Very large populations that make up an appreciable proportion of the European population might rightly be identified as of 'International Importance'. Smaller populations that are not exceptional in the locality they occur and do not contribute particularly to the maintenance of wider populations would be of lesser importance.
- 4.2.7. The geographical scale of importance for habitats and species is reliant upon expert judgement and accounts for:
- Legal protection;
  - Planning policies;
  - Distribution including relative to the Scheme;
  - Conservation status (i.e., is the habitat/species common and widespread, or rare with a highly localised distribution); and
  - Population trends.

### 4.3 CHARACTERISING ECOLOGICAL IMPACTS AND EFFECTS

4.3.1. When describing ecological impacts and effects, reference will be made to the following characteristics as required:

- Beneficial or adverse;
- Extent;
- Magnitude;
- Duration;
- Frequency and timing; and
- Reversibility.

### 4.4 ASSESSMENT OF SIGNIFICANT EFFECTS

4.4.1. In the context of the EclA, the significance of an effect is assessed as either significant (an appreciable effect on the structure, form, function and conservation status) or not significant (no or negligible effect on structure, form, function and conservation status).

4.4.2. The significance of effects are defined against the geographical scale described in Section 4.2. Significant effects on Important Ecological Features are assessed as either beneficial or adverse. Where an effect is neither beneficial nor adverse (neutral), this is assessed as not significant. Each significant effect is assessed based on a number of factors including the magnitude of potential impacts (incorporating intensity, frequency and spatial range) and the sensitivity of habitats and species to developmental changes.

4.4.3. For the purposes of this assessment, ecological features of 'Local' importance or higher are assessed as being "Important Ecological Features" that can therefore experience significant effects.

4.4.4. The significance of an effect is determined based on the extent to which the integrity or conservation status of an Important Ecological Feature is compromised (i.e. the magnitude of the effect) and the importance of the Important Ecological Feature, defined through the geographical scale.

4.4.5. **Table TR5-4-1** below sets out how an effect is classified in other ES chapters for the Scheme using the EIA Classification terminology and how it relates to the CIEEM EclA Guidelines (2018) based on professional judgement.

**Table TR5-4-1 - Impact Assessment Classification**

EIA Significance	Related CIEEM Assessment Significance Terminology	
Significant (beneficial) Very Large to Moderate	Significant (beneficial)	Beneficial effect on conservation status of an Important Ecological Feature at a county, national or international scale
		Beneficial effect on conservation status, structure, form or function of an Important Ecological Feature at a Local scale
Not significant Slight to Neutral	Not significant	No effect on structure, form, function or conservation status of an Important Ecological Receptor
Significant (adverse) Moderate to Very Large	Significant (adverse)	Adverse effect on structure, form, function or conservation status of an Important Ecological Feature at a Local scale



EIA Significance	Related CIEEM Assessment Significance Terminology	
		Adverse effect on structure, form, function or conservation status of an Important Ecological Feature at a County scale
		Adverse effect on structure, form, function or conservation status an Important Ecological Feature at a National or International scale

## 4.5 BIODIVERSITY NET GAIN

- 4.5.1. A BNG Assessment Report (WSP, 2023o) (Appendix TR5.7) has been completed alongside this report. The BNG assessment has completed using the Biodiversity Metric 3.1 and associated guidance material published by Natural England. The BNG strategy is developed with reference to best practice guidance detailed in CIEEM, IEMA and CIRIA’s BNG: Good Practice Principles for Development (2016), British Standard 8683:2021: Process for designing and implementing Biodiversity Net Gain.
- 4.5.2. Baseline habitat data collected through habitat surveys have been used to inform the habitat calculations for the BNG assessment.

## 4.6 METHOD OF BASELINE DATA COLLECTION

### DESK STUDY

- 4.6.1. A desk-based assessment was undertaken as part of the EIA scoping exercise and is detailed within the ES Scoping Report (WSP, 2023p). As part of the desk-based assessment a request for biological records was made to Cambridge and Peterborough Biological Records Centre (CPERC) for designated sites and protected and notable species within a 2km buffer of the Scheme boundary. The request included non-statutory designated sites, ancient woodland, (HPI / SPI, internationally and nationally protected species, species protected by planning policy and species of local conservation interest.
- 4.6.2. Freely available Natural England datasets were used to search for internationally designated sites within 2km of the Scheme boundary. This distance was extended up to 30km from the Scheme boundary for sites designated for bats, specifically Barbastelle bat *Barbastella barbastellus*.
- 4.6.3. Fish, aquatic macroinvertebrate and macrophyte survey data for relevant watercourses was obtained from the Environment Agency’s Ecology and Fish Data Explorer.

### FIELD SURVEYS

#### Habitats and Botany

- 4.6.4. A range of habitat surveys have been undertaken for the Scheme between 2017 and 2022. These surveys have included Phase 1 Habitat Surveys undertaken in 2017 and updated in 2021. The results of these surveys were updated to the UK Habitat Classification which is now the industry standard for habitat surveys. The UK Habitat Classification is also more closely aligned to the habitat types described in the BNG Metric.
- 4.6.5. Habitat surveys of areas that were not surveyed previously were undertaken in 2022. A condition assessment of habitats was also undertaken to inform the BNG Assessment.

- 4.6.6. The habitat surveys included all habitats within the Scheme boundary. Surveys were completed with reference to the following guidelines:
- Handbook for Phase 1 Habitat Survey: A Technique for Environmental Audit (JNCC, 2010);
  - UK Habitat Classification User Manual Version 1.1 (Butcher, Carey, Edmonds, Norton, & Treweek, 2020); and
  - DEFRA Biodiversity Metric 3.1 (Natural England, 2022).
- 4.6.7. The methodology for these surveys is summarised within the following reports:
- WSP Biodiversity Net Gain Assessment (WSP, 2023a) (Appendix TR5.7);
  - Cambridge Ecology (2021a). Cambourne to Cambridge Better Public Transport: Phase 1 Habitat Survey, Hedgerow and Invertebrate Assessment; and
  - Cambridge Ecology (2018f). Phase 1 Habitat Survey Report.
- 4.6.8. The UK Habitat Classification System will be used when referring to broad habitat types within this impact assessment, as this is widely considered to the industry standard for habitat surveys of this type, is the most up to date habitat assessment for the Scheme and is the closest likeness to the habitat types used in the Biodiversity Metric.
- 4.6.9. In addition to the habitat survey classifications above, National Vegetation Classification (NVC) surveys of woodland and grasslands were undertaken along with botanical surveys to assess for the presence of important arable field margins. These surveys were undertaken with reference to the following guidance material:
- British Plant Communities Volume 1: Woodland and Scrub (Rodwell, 1998a);
  - British Plant Communities Volume 3: Grasslands and Montane Communities. (Rodwell, 1998b);
  - Important Arable Plant Areas. (Plantlife, 2022a);
  - Important Arable Plant Areas Threatened Species (Criterion A). (Plantlife, 2022b); and
  - Important Arable Plant Areas Outstanding Assemblages (Criterion B). (Plantlife, 2022c)
- 4.6.10. The full methodology for these surveys is described in the following ecological reports:
- WSP Botanical Survey Report (WSP, 2023q) (Appendix TR5.4); and
  - Cambridge Ecology (2021f). Cambourne to Cambridge Better Public Transport: Phase 2 Vegetation (NVC) Survey of Semi-natural Woodland, Un-improved Grassland and Arable Field Margins 2021.
- 4.6.11. Hedgerow surveys were undertaken for all hedgerows directly impacted by the Scheme. Surveys included condition assessments to inform the BNG Assessment. Hedgerows were also assessed against the biodiversity criteria for important hedgerows under the Hedgerow Regulations. Hedgerow surveys were undertaken with reference to the following guidelines:
- DEFRA Hedgerow Survey Handbook (2nd edition) (DEFRA, 2007); and
  - DEFRA Biodiversity Metric 3.1 (Natural England, 2022).
- 4.6.12. The full methodology for these surveys is included in the following reports:
- WSP Hedgerow Survey Report (WSP, 2023r) (Appendix TR5.10);
  - WSP Biodiversity Net Gain Assessment (WSP, 2023a) (Appendix TR5.7);
  - Cambridge Ecology (2021a). Cambourne to Cambridge Better Public Transport: Phase 1 Habitat Survey, Hedgerow and Invertebrate Assessment; and

- Cambridge Ecology (2021k). Cambourne to Cambridge Better Public Transport: Phase 1 Habitat Survey Appendix 5: Hedgerow Assessment 2021.

4.6.13. Throughout the habitat surveys and ecological surveys undertaken for the Scheme, incidental records of invasive non-native plant species were recorded. This was limited to those species listed in Schedule 9 of the Wildlife and Countryside Act.

### Protected and Notable Species

4.6.14. A range of surveys have been undertaken throughout the design and assessment process for the Scheme. The historical reports and assessments undertaken by Cambridge Ecology, Thomson Environmental Consultants and Mott MacDonald are detailed in the ES Scoping Report (WSP, 2023p). A range of surveys were also completed in 2022 by WSP to establish a robust ecological baseline to inform this assessment. In addition, data shared by Thomson Environmental Consultants for the Bourn Airfield development and for East West Rail (EWR) have also been used to establish the ecological baseline for the Scheme.

4.6.15. The relevant survey guidelines and baseline reports for each of the Important Ecological Features scoped into this assessment are summarised below.

### Aquatic Features

#### Aquatic Ecology Scoping

4.6.16. Aquatic ecology scoping assessments were conducted on all watercourses and water bodies with potential to be affected by the Scheme. Surveys were undertaken for all water bodies within and up to 250m beyond the Scheme Boundary. The full methodology for these surveys can be found in the following report:

- WSP Aquatic Ecology Report (WSP, 2023k) (Appendix TR5.1).

#### Aquatic Macroinvertebrates

4.6.17. Aquatic macroinvertebrate surveys were undertaken on Bin Brook in May and September 2022. Survey locations were chosen based on the proposed location of the Bin Brook crossing point. Surveys were completed with reference to the following guidelines:

- Freshwater macroinvertebrate sampling in rivers: Operational Instruction 018 08. (Environment Agency, 2017); and
- BS EN ISO 10870:2012 Water Quality – Guidelines for the selection of sampling methods and devices for benthic macroinvertebrates in fresh waters. (British Standards Institution, 2012).

4.6.18. Surveys for White-clawed Crayfish *Austropotamobius pallipes* were undertaken for the Scheme in 2021. Surveys were targeted at sections of Bin Brook that have the potential to support the species, but for which no information on their presence was available. Further surveys were undertaken in 2022 in one section of Bin Brook (Robinson College) that were not accessible in 2021. Surveys were completed with reference to the following procedures:

- Guidance on Habitat for White-clawed Crayfish. R&D Technical Report w1-067/TR. (Environment Agency, 2002).

4.6.19. The full methodology for these surveys can be found in the following report:

- WSP Aquatic Ecology Report (WSP, 2023k) (Appendix TR5.1); and

- Cambourne to Cambridge Better Public Transport: White-clawed Crayfish Presence/Absence Survey 2021. Cambridge Ecology (2021j).

## Mammals

### Badger

4.6.20. Badger surveys were undertaken in 2018 which comprised all land up to 250m of the Scheme where access was possible. Update Badger surveys were undertaken in 2022 up to 250m of the Scheme boundary to identify any new setts and field signs and confirm the activity status of previously identified setts. Surveys were undertaken with reference to the following guidelines:

- Surveying Badgers (Harris, Cresswell, & Jefferies, 1989);
- Guidance on Current Use of a Badger Sett (Natural England, 2009); and
- Design Manual for Roads and Bridges: Biodiversity Design (Highways Agency, 2020).

4.6.21. The full methodology for these surveys is presented in the following reports:

- WSP Badger Survey Report (WSP, 2023d) (Appendix TR5.2); and
- Cambridge Ecology Badger Survey Report (2018a).

### Bats

4.6.22. A range of survey techniques have been deployed to inform that impact assessment for the Scheme across various survey areas at different stages of the design for the Scheme. The surveys have included static bat detector monitoring during summer and winter, tree and structure surveys for hibernation and summer roosts, and activity transect surveys. These surveys have been undertaken between 2018 and 2021. Bat crossing point surveys were also undertaken in 2021 and 2022.

- Good Practice Guidelines: Bat Surveys for Professional Ecologists. (Bat Conservation Trust, 2016); and
- Development of A Cost-Effective Method for Monitoring The Effectiveness Of Mitigation For Bats Crossing Linear Transport Infrastructure. (Berthinussen & Altringham, 2015).

4.6.23. The full methodology for these surveys that are considered relevant to this assessment are presented in the following reports:

- WSP Bat Roost Survey Report (WSP, 2023b) (Appendix TR5.6);
- WSP Bat Activity Survey Report (WSP, 2023c) (Appendix TR5.5);
- C2C Bat Activity Survey Summary (Thomson Environmental Consultants, 2021);
- Cambourne to Cambridge Better Public Transport: Stage 2 Bat Activity 2021 (Cambridge Ecology, 2021h);
- Cambourne to Cambridge Better Public Transport: Stage 1 Bat Inspection Survey 2021 (Cambridge Ecology, 2021c); and
- Stage 2 Bat Activity Survey Report 2020 final (Cambridge Ecology, 2020).

4.6.24. Advanced bat survey techniques were employed for the East West Rail project, the Bourn Airfield development near Cambourne and for the A428 Black Cat to Caxton Gibbett Road Improvement Scheme. These survey techniques included bat radio tracking under Natural England project licenses.

- 4.6.25. Cambridgeshire Bat Group undertook trapping, tagging and radio-tracking in 2010 at Madingley Wood SSSI (located north of Scheme). The surveys confirmed that the woodland supported maternity roost of Barbastelle of at least 15 bats (Vine, 2010).

### **Brown Hare**

- 4.6.26. Surveys for Brown Hare *Lepus europaeus* were undertaken between 2018 and 2019 within all land within and up to 250m of the Scheme boundary. In addition, incidental sightings were recorded throughout the ecology surveys undertaken in 2022. The 2018 to 2019 surveys were complete with reference to the following survey guidelines:

- Brown Hare Surveys 2015-2016. (Wiltshire Mammal Group, 2015); and
- Developing a mammal monitoring programme for the UK. (BTO, 1999).

- 4.6.27. The full methodology for these surveys is presented in the following report:

- Brown Hare Survey Report (Cambridge Ecology, 2019b).

### **Otter**

- 4.6.28. Surveys for Otter *Lutra lutra* were undertaken in 2022 within all water bodies with potential to be impacted by the Scheme. Surveys were undertaken for all water bodies within and up to 250 m beyond Scheme boundary. These surveys were undertaken with reference to the following guidelines:

- Monitoring the Otter *Lutra lutra*. Conserving Natura 2000 Rivers Monitoring Series No. 10. (English Nature, 2003).

- 4.6.29. The full methodology for these surveys is included in the following reports:

- WSP Water Vole and Otter Report (WSP, 2023h) (Appendix TR5.12); and
- Cambourne to Cambridge Better Public Transport: Water Vole and Eurasian Otter Presence Absence Survey 2021. Cambridge Ecology (2021i).

### **Water Vole**

- 4.6.30. Surveys for Water Vole *Arvicola terrestris* were undertaken in 2022 within all water bodies with potential to be affected by the Scheme. Surveys were undertaken within and up to 250 m from the Scheme. Surveys were completed with reference to the following guidelines:

- Water Vole Conservation Handbook. (Strachan, Moorhouse, & Gelling, 2006 ); and
- The Water Vole Mitigation Handbook. (Dean, Strachan, Gow, & Andrews, 2016).

### **Birds**

#### **Barn Owl**

- 4.6.31. Barn Owl surveys were undertaken in 2019 which comprised Stage 1 and Stage 2 surveys. Further Stage 2 and 3 surveys were also completed in 2022. Surveys were completed up to 1.5km from the Scheme boundary with reference to the following guidelines:

- Barn Owl *Tyto alba* Survey Methodology and Techniques for use in Ecological Assessment (Shawyer, 2011); and
- Survey Techniques, Leaflet no. 8. (Barn Owl Trust, 2010).

- 4.6.32. The full methodology for these surveys is presented in the following reports:

- WSP Barn Owl Survey Report (WSP, 2023s) (Appendix TR5.3);
- Barn Owl Survey and Mitigation Considerations, Cambourne to Cambridge (C2C) and Cambridge Southeast Transport (CSET) Phase 2 (The Greater Cambridgeshire Partnership, 2020); and
- Cambridge Ecology Barn Owl Survey Report (Cambridge Ecology, 2019a).

### **Breeding Birds**

4.6.33. Breeding bird surveys were completed in 2021 and 2022. These were conducted within and up to 250 of the Scheme boundaries where access was possible. The 2022 surveys were completed within land within the survey area that was not surveyed in 2021. These surveys were completed with reference to the following guidelines:

- Common Bird Census, British Trust for Ornithology (Marchant, 1983).

4.6.34. The full methodology for these surveys is described within the following reports:

- WSP Breeding Bird Survey Report (WSP, 2023e) (Appendix TR5.8); and
- Cambourne to Cambridge Better Public Transport: Breeding Bird Survey 2021 (Cambridge Ecology, 2021d).

4.6.35. The Bourne Airfield site was not surveyed during the 2022 breeding bird surveys, as this area has been extensively surveyed as part of the proposed residential development of this site. The following additional reports informing the Bourne Airfield development are relied upon to inform the ecological baseline for the Scheme:

- Bourn Airfield, Cambridge, Cambridgeshire. Interim Breeding Bird Survey (Thomson Environmental Consultants, 2015) BCOU109 / 008 / 001; and
- Bourn Airfield. ES Volume 3: Ecology Survey Technical Reports (Thomson Environmental Consultants, 2018) BCOU110/001 10.1.

### **Wintering Birds**

4.6.36. Wintering bird surveys were complete in winter 2021 to 2022 within the Scheme boundary and up to 250m where access was possible. Wintering bird surveys were also completed over a wider area between November 2018 and March 2019. However, this survey area referenced a different scheme boundary. The surveys were completed with reference to the following guidelines:

- Bibby et al (2000) Bird Census Techniques (2nd Edition).

4.6.37. The full methodology for these surveys is described within the following reports:

- WSP Wintering Bird Survey Report (WSP, 2023f) (Appendix TR5.15); and
- Cambridge Ecology Winter Bird Survey Report (2019c).

### **Reptiles**

4.6.38. Reptile presence/likely absence surveys were undertaken throughout the Scheme boundary in 2018 and 2021. Update surveys were completed in 2022 where survey data was no longer considered valid, or surveys had not yet been completed. The 2022 surveys consisted of suitable habitats within the Scheme boundary whilst previous surveys had been completed over a wider survey area. Surveys were completed with reference to the following guidelines:

- Froglife (1999) Advice Sheet 10: Reptile Survey;

4.6.39. The full methodology for these surveys can be found in the following reports:

- WSP Reptile Survey Report (WSP, 2023i) (Appendix TR5.13);
- Cambridge Ecology (2021g). Cambourne to Cambridge Better Public Transport: Reptile Survey 2021; and
- Cambridge Ecology (2018g). Cambourne to Cambridge Better Public Transport: Reptile Survey Report.

## Amphibians

### Great Crested Newts

4.6.40. Surveys for Great Crested Newt were completed in 2017, 2018, 2019 and 2021 within and up to 250m from the Scheme boundary. These surveys consisted of a variety of methods include environmental DNA (eDNA) sampling surveys along with traditional survey methods (aquatic funnel traps, nocturnal aquatic and terrestrial searches, and egg surveys) to determine population size.

4.6.41. The surveys were completed with reference to the following best practice guidelines:

- ARG UK (2010). ARG UK Advice Note 5: Great Crested Newt Habitat Suitability Index. UK: Amphibian and Reptile Groups of the United Kingdom;
- English Nature (2001). Great Crested Newt Mitigation Guidelines;
- Biggs J, Ewald N, Valentini A, Gaboriaud C, Griffiths RA, Foster J, Wilkinson J, Arnett A, Williams P and Dunn F (2014). 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; and
- Oldham, R., Keeble, J., Swan, M., & Jeffcote, M. (2000). Evaluating the suitability of habitat for the great crested newt. *Herpetological Journal*(10), 143-155.

4.6.42. The full methodology for these surveys is presented in the following reports:

- WSP Great Crested Newt Survey Report (WSP, 2023g) (Appendix TR5.9);
- Cambridge Ecology (2021e). Cambourne to Cambridge Better Public Transport: Great Crested Newt eDNA Survey Report, 2021 Update;
- Cambridge Ecology (2019d). Cambourne to Cambridge Better Public Transport: Great Crested Newt eDNA Survey Report Update;
- Cambridge Ecology . Cambourne to Cambridge Better Public Transport: Great Crested Newt eDNA Survey Report;
- Cambridge Ecology (2018d). Cambourne to Cambridge Better Public Transport: Great Crested Newt Survey Report;
- Cambridge Ecology. (2017a). Cambourne to Cambridge Better Public Transport: Protected Species Constraints Survey 2017 FINAL REPORT. Cambridge; and
- Cambridge Ecology. (2017b). Cambourne to Cambridge Better Public Transport: Great Crested Newt eDNA Survey.

## Terrestrial Invertebrates

4.6.43. Invertebrate surveys were undertaken for the Scheme in 2018 which were targeted at potentially important habitats for invertebrates within zone of influence of the Scheme. An updated invertebrate habitat assessment was also undertaken in 2021. Invertebrate surveys were undertaken in 2022 within Coton Orchard, which is an area of the site that could not be accessed in previous surveys.

- 4.6.44. Invertebrate surveys were undertaken with reference to the following guidelines:
- Natural England (Drake, Lott, Alexander, & Webb, 2007) Surveying terrestrial and freshwater invertebrates for conservation evaluation; and
  - English Nature (2005). Organising surveys to determine site quality for invertebrates. A framework guide for ecologists. English Nature.
- 4.6.45. A range of resources were also used to identify species and to determine the importance of the invertebrate populations identified through the surveys. The full methodology and resources are included in the following reports:
- WSP Terrestrial Invertebrate Survey Report (WSP, 2023j) (Appendix TR5.14);
  - Cambridge Ecology (2021k). Cambourne to Cambridge Better Public Transport: Phase 1 Habitat Survey, Hedgerow and Invertebrate Assessment;
  - Cambridge Ecology (2021l). Cambourne to Cambridge Better Public Transport: Phase 1 Habitat Survey Appendix 4: Invertebrate Habitat Assessment 2021; and
  - Cambridge Ecology (2018e). Invertebrate Survey Report.

## 4.7 ASSESSMENT ASSUMPTIONS AND LIMITATIONS

- 4.7.1. The following assumptions and limitations apply to this Technical Report:

### ASSUMPTIONS

- Detailed construction information is not yet available for the Scheme and this assessment therefore draws on the professional experience of the assessor of other similar projects; and
  - Where the Scheme extends into woodland north of St Neots Road at the existing junction with Long Road, it is assumed that this area of habitat will not be impacted by the Scheme. From discussions with the design team, it is understood that this will be designed out at detailed design stage. This assumption is not detailed within the Mitigation and Enhancement Section of this report.
- 4.7.2. Limitations are discussed in species specific reports. Where limitations were considered to be material, these have been detailed below.
- Breeding birds - Coton Orchard, which includes traditional orchard, grassland and scrub habitats, could not be accessed during the surveys. However, the majority of the habitats in the orchard will be retained in the Scheme (see Chapter 5: The environment along the route in the ES); and
  - Wintering bat surveys – access restrictions lead to 42% of bat data not being collected throughout the survey period. This is a limitation that has been taken into account when interpreting the winter static detector data.
- 4.7.3. Invertebrates -The surveys undertaken at Coton Orchard in 2022 were subject to a minor limitation by the fact that no survey visits were undertaken in May or June due to access issues. Extending the surveys across the spring, summer and early autumn would likely provide additional species data due to the seasonal ecology of some species. This is not however considered to affect the assessment of importance of the invertebrate assemblage.



## 5 BASELINE CONDITIONS

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- 5.1.1. This section outlines the ecological baseline of the Scheme, which has been obtained from various ecological surveys and assessments undertaken between 2017 and 2022.

### 5.2 DESIGNATED SITES

- 5.2.1. Sites included in the National Sites Network are assessed as being of international importance and include Special Areas of Conservation (SAC), Special Protection Areas (SPA), candidate Special Areas of Conservation (cSAC), potential Special Protection Areas (pSPA), possible Special Areas of Conservation (pSAC) and Ramsar Sites. Nationally designated sites, including Sites of Special Scientific Interest (SSSI) and National Nature Reserves (NNR) are assessed as being of National importance. Local Nature Reserves (LNR) are valued as being of County importance, as are non-statutory designated sites (County and City Wildlife Sites).
- 5.2.2. This reflects the geographical basis of the designations, i.e., site within the National Sites Network support habitats and species that are deemed important at an international biogeographical level, whilst SSSI are designated on the basis of supporting the best examples of particular habitats, species and ecosystems at a National level.
- 5.2.3. All designated sites identified as part of the desk-based assessment are listed below and are presented in **Figure 5.2, Appendix A**.

#### INTERNATIONALLY DESIGNATED SITES

- 5.2.4. The only internationally designated site for bats located within 30km of the C2C Scheme is Eversden and Wimpole Woods SAC, located approximately 7km to the south. This site is designated as a result of the presence of a summer maternity roost of Barbastelle Bats.

#### NATIONALLY DESIGNATED SITES

- 5.2.5. Three statutory designated sites are located within 2km of the C2C Scheme and are described below, with distances relative to the Scheme limits:
- Madingley Wood Site of Special Scientific Interest (SSSI) 0.26km to the north;
  - Caldecote Meadows SSSI 1.6km to the south; and
  - Hardwick Wood SSSI 1.7km to the south.

#### NON-STATUTORY DESIGNATED SITES

- 5.2.6. Eleven non-statutory designated sites are located within 1km of the C2C Scheme and are described below:
- Scrubland east of the M11 City Wildlife Site (CiWS) is within the footprint of the C2C Scheme;
  - Coton Path Hedgerow CWS) is within the footprint of the C2C Scheme;
  - Madingley Slip Road RSV CWS to the north of the C2C Scheme opposite the Long Road/St Neots Road junction – separated from the C2C Scheme by the existing carriageway of A428;
  - Bin Brook CiWS is located within 45m of the point where the C2C Scheme joins Grange Road;
  - Adams Road Sanctuary CiWS is located 0.14km to the north of Adams Road;
  - Trinity Meadows CiWS is located 0.23km to the east of Grange Road;
  - Drain at Garret Hostel Lane CiWS is located 0.42km to the east;
  - Meadow and Ditch Opposite King's College CiWS is located 0.47km to the east;

- Bird Sanctuary, Conduit Head CiWS is located 0.45km to the north;
- Hedgerows East of M11 CWS is located 0.5km to the south of the C2C Scheme; and
- Bucket Hill Plantation Grassland CWS is located 0.9km to the south on Bourn Airfield.

## 5.3 HABITATS AND BOTANY

### SURVEY SUMMARY

#### UK Habitat Classification

- 5.3.1. The habitat types present within the construction boundary of the Scheme according to the UK Habitat Classification are presented in **Table TR5-5-1**. Included is the approximate area of each habitat in hectares (linear habitats are measured in kilometres), the primary habitat codes and the relevant secondary habitat codes. The habitat types and areas correlate with those within the BNG Assessment.

**Table TR5-5-1 - Summary of Habitats within the Scheme Limits**

Habitat Type	Habitat Code	Area/length
Cereal crops	c1c	40.89ha
Developed land; sealed surface	u1b	10.64ha
<i>Arrhenatherum</i> neutral grassland	g3c5	6.78ha
Other neutral grassland	g3c	5.56ha
Modified grassland	g4	4.98ha
Other broadleaved woodland (non-priority habitat woodland)	w1g7	3.896ha
Sparsely vegetated land with ruderal/ephemeral vegetation	s 17	3.80ha
Other lowland mixed deciduous woodland	w1f7	1.82ha
Non-traditional orchard ( <i>Arrhenatherum</i> Neutral Grassland)	g3c51 920	1.33ha
Mixed scrub	h3h	0.57ha
Hawthorn scrub	h3f	0.12ha
Traditional orchard	w1g 21 and g3c5 21	0.42ha
<b>Area Habitat Total</b>		<b>80.93ha</b>
Hedgerow (priority habitat)	h2a	4.87km

## National Vegetation Classification

- 5.3.2. A number of the habitats recorded through the 2021 NVC surveys are no longer within the Scheme boundary and are therefore no longer relevant to the Scheme. A summary of the 2021 NVC survey findings relevant to the current Scheme boundary is presented below.
- 5.3.3. Open mosaic habitats on previously developed land were recorded within the 2021 NVC surveys, particularly in areas associated construction of the A428 dual carriageway. This habitat was recorded within areas of recently disturbed ground near to the balancing pond south of the A428 and north of St Neots Road, where it was determined that this was the best fit for the mosaic of habitat present within this area of the Scheme. Open mosaic habitats on previously developed land is typically associated with former industrial sites. Although the habitats within this area have similar characteristics to Open mosaic, it is not considered to be an appropriate habitat classification, given that the characteristics are primarily due to the fact that they are recently established habitats following the construction of the A428. This area of the site is therefore classified and mapped using the individual UK Habitat Classification habitat types. These include sparsely developed land, other broadleaved woodland (non-priority habitat woodland), *Arrhenatherum* neutral grassland and hedgerows.
- 5.3.4. Three grassland communities were referenced in the 2021 NVC survey report which were considered likely to be Lowland Meadow which are a Habitat of Principal Importance HPI under the NERC Act. These grasslands were assessed to closely resemble the following grassland communities.
- MG1d *Arrhenatherum elatius* grassland, *Pastinaca sativa* sub-community;
  - MG1e *Arrhenatherum elatius* grassland, *Centaurea nigra* sub-community; and
  - MG5b *Centaurea nigra* – *Cynosurus cristatus* grassland, *Galium verum* sub-community.
- 5.3.5. The grassland types were associated with recently disturbed land along the embankments of the A428 and near to the Hardwick roundabouts. It was considered likely that the assemblage of plant species may have arisen from the use of seed mixes alongside pioneer vegetation on recently developed areas. The updated UK Habitat Classification surveys undertaken in 2022 have been used to provide an up-to-date baseline to inform this assessment. These areas have been reclassified and are not considered to meet the criteria for Lowland Meadow. In addition, these areas are no longer within the construction boundary for the Scheme.
- 5.3.6. Two woodland communities were recorded during the 2021 NVC surveys, these included the following:
- W8a *Fraxinus excelsior* – *Acer campestre* – *Mercurialis perennis* woodland, *Primula vulgaris* – *Glechoma hederacea* sub-community; and
  - W8d *Fraxinus excelsior* – *Acer campestre* – *Mercurialis perennis* woodland, *Hedera helix* sub-community.
- 5.3.7. Both of these woodlands have been classified as other lowland mixed deciduous woodland (HPI).
- 5.3.8. As part of these detailed surveys, an assessment for important arable field margins was also undertaken. No important arable field margins were recorded within the areas surveyed.
- 5.3.9. An assessment of grasslands against the CWS Criteria was also undertaken as part of the NVC report. Most surveyed grassland sites contained multiple indicator species set out within the Selection Guidelines for CWS in Cambridgeshire and Peterborough. Key sites relevant to the

current Scheme boundary with a diverse assemblage of grassland indicator species above the threshold for CWS selection include the Childerley Gate (Site A, reference (Cambridge Ecology, 2021f). This is an area of disturbed ground adjacent to woodland, north of Wellington Way and South of St Neots Road.

- 5.3.10. An area of grassland south of Madingley Wood SSSI and number of field boundaries that were not surveyed in 2021 were subject to NVC surveys and assessment for Important Field Margins in 2022. The grasslands and field boundaries surveyed in 2022 did not fit well into any NVC community, this could be partly due to the young age of the habitat. Through MAVIS analysis and reference to NVC keys and community descriptions in British Plant Communities, it was concluded that the grassland best fit MG6c but was likely previously OV23c. MG6c is a relatively species poor grassland with constant species including Perennial Rye-grass, Smaller Cat's-tail, Common Mouse Ear and Red Fescue. OV23c is more species poor than MG6c and is generally associated with urban and amenity grasslands, with constant species including Perennial Rye-Grass and forbs such as Dandelion which indicate poor condition habitat.

#### **Invasive Non-native Plant Species**

- 5.3.11. Himalayan Balsalm *Impatiens glandulifera* was recorded within Bin Brook near to the location of the existing overbridge, and near to Grange Road further north of the Scheme. It is considered likely that this plant species will be widely distributed through this watercourse.

#### **Evaluation**

- 5.3.12. The following habitat types and areas within the Scheme construction boundary are considered Important Ecological Features within this assessment. This is due to their status as Habitats of Principal Importance under Section 41 of the NERC Act or because they meet the CWS Selection criteria. The location of these habitat areas is presented in **Figure 5.3, Appendix A**.

- Hedgerows;
- Lowland mixed deciduous woodland;
- Traditional orchard; and
- Childerley Gate (Site A).

#### Hedgerow (Priority Habitat)

- 5.3.13. A total of 29 distinct hedgerows are present within the Scheme boundary. This includes the Coton Path Hedgerow CWS in the east of the Scheme, which was designated due to the presence of two nationally scarce plant species.
- 5.3.14. The other hedgerows were assessed against the CWS section criteria. These criteria describe the following qualifying features for assessing county importance for hedgerows:
- At least 500m in length and more than 2m in width;
  - With 5 or more woody species; and
  - With at least part of the hedgerow allowed to flower and fruit. (Normal hedgerow management of coppicing or laying may mean that at least part of the system will not be at the optimum size or condition for wildlife at all times).
- 5.3.15. This has been adapted for the purpose of this assessment to require five or more woody species on average per 30m length determined by field survey. This is due to the methods by which typical hedgerow surveys area completed.

5.3.16. Of the 29 hedgerows within the Scheme boundary, a single hedgerow meets the CWS selection criteria. This is hedgerow H8 from the 2021 hedgerow report (Cambridge Ecology, 2021k).

Lowland Mixed Deciduous Woodland

5.3.17. A total of 1.82ha of lowland mixed deciduous woodland is located within the Scheme boundary. All areas of this habitat have been assessed against the CWS selection criteria and none are considered to meet these criteria, none are listed within the ancient woodland inventory. Lowland mixed deciduous woodland is HPI under the NERC Act and is relatively widespread, but uncommon within Cambridgeshire.

Traditional Orchard

5.3.18. Approximately 0.42ha of traditional orchard is located within the Scheme boundary. This habitat is located within Coton Orchard, west of the M11 and east of Cambridge Road, Coton. Coton Orchard contains a mix of hedgerows, lines of trees (including the poplar shelterbelt at the eastern boundary), scrub, traditional orchard and a larger expanse of formerly intensive orchard (herein referred to as 'other orchard').

5.3.19. The other orchard habitat can be distinguished from the traditional orchard by the presence of densely planted dwarf fruit trees. Traditional orchards are characterised by fruit trees on vigorous root stocks and are less densely planted. Areas of the orchard that contain densely planted dwarf trees do not meet the JNCC definition of traditional orchard (JNCC, 2008) and are therefore classified separately.

5.3.20. The other orchard habitat is described by the People's Trust for Endangered Species (PTES) as Abandoned or Organic Bush Orchard (PTES, 2023). These sites are formerly intensive sites that have been neglected or managed less intensively and therefore fall outside the definition of traditional orchards, however they can still be important for biodiversity.

5.3.21. The traditional orchard and other orchard habitats are currently managed through a relatively intensive mowing regime throughout most of Coton Orchard. The grassland understorey is therefore classified as other neutral grassland and in areas may be progressing towards modified grassland, with Perennial Rye Grass *Lolium perenne* frequently encountered. A large area of the traditional orchard in the east of Coton Orchard has been left unmanaged, with the majority of this area succeeding to woodland, which is dominated by a closed canopy of Common Ash *Fraxinus excelsior*, with lines of Apple *Malus domestica* trees still present. This area is still mapped as traditional orchard.

5.3.22. In the far east of Coton Orchard, the former orchard is dominated by dense Damson *Prunus domestica* scrub. From historical aerial imagery, the orchard in this area appears to have been cleared before 1999 and has subsequently grown back as mixed scrub habitat.

5.3.23. The CWS selection criteria suggest that the areas of traditional orchard would qualify for selection as a CWS based on the following selection criteria:

- A group of five or more top fruit or nut trees;
- The presence of a nationally rare or scarce species or species rare in the county (see terrestrial invertebrate section); and
- Associated natural or semi-natural habitat, within or adjacent to the site (e.g., woodland, unimproved grassland, ponds, hedgerows).

- 5.3.24. The traditional orchard contains 11 trees that date back to the original orchard which was planted at Coton Orchard around 1922. Seven of these trees are within the Scheme boundary. These trees contain various veteran features including rot sites, holes and water pockets, dead branches, hollow limbs and trunks, and fungal fruiting bodies. The arboriculture assessment of these trees determined, that although they contain veteran features, they did not meet the definition of veteran trees due to the lack of receded crown.

Childerley Gate (Site A)

- 5.3.25. Childerley Gate (Site A) is an area of sparsely vegetated land northeast of Bourn Airfield, between St Neots Road and Wellington Way. This area was part of the existing A428/St Neots Road that was removed during the construction of the A428. A wide range of annual species was present in 2021 including Upright Pearlwort *Sagina procumbens*, Field Forget-me-not *Myosotis arvensis*, Lesser Trefoil *Trifolium dubium*, Wall Speedwell *Veronica arvensis*, Fern-grass *Catapodium rigidum* and Squirrel-tail Fescue *Vulpia bromoides*. This type of vegetation supported significant populations of two notable species, Wall Bedstraw *Galium parisiense* and Common Cudweed *Filago vulgaris*. This area was considered to meet the CWS selection criteria within the 2021 NVC Survey Report (Cambridge Ecology, 2021f) due to the presence of seven neutral grassland and four strong neutral grassland indicators species along with three calcareous grassland indicators.
- 5.3.26. Areas of the habitat within the Scheme meet the criteria for CWS selection. As such, habitats can be assessed as being of County importance. It should be noted that approximately 51ha (63.1%) of the LLAU (the area anticipated to be impacted by the Scheme construction) comprises cereal crops and developed land; sealed surfaces which are not considered to be Important Ecological Features in their own right. Approximately 13.09ha (16.2%) of the Scheme construction boundary comprises *Arrhenatherum* neutral grassland and modified grassland, which are also common and ubiquitous habitats.

## 5.4 PROTECTED AND NOTABLE SPECIES

### AQUATIC ECOLOGY

#### **Aquatic Macroinvertebrates**

- 5.4.1. A search of the Environment Agency's Ecology and Fish Data Explorer returned data from Environment Agency aquatic macroinvertebrate surveys carried out in the Bin Brook and Bourn Brook in 2019. The sites were located 1km and 4km from the Scheme boundary, respectively. No protected or notable species were identified at either site, however the INNS New Zealand Mud Snail *Potamopyrgus antipodarum* and American Signal Crayfish *Pacifastacus leniusculus* were recorded in the Bourn Brook sample.
- 5.4.2. The 2022 aquatic macroinvertebrate surveys of Bin Brook classified the communities found in the two sampled locations as having low conservation importance, with no protected or notable species identified in any sample. During the 2022 aquatic ecology scoping assessments, the remaining watercourses and water bodies within 250m of the Scheme Boundary were assessed to provide poor/unsuitable habitat for aquatic macroinvertebrates or deemed unlikely to be affected by the Scheme. Additionally, there are no locally or nationally designated sites within 2km of the Scheme that are designated for aquatic macroinvertebrates.

- 5.4.3. Due to the absence of protected and notable species, low conservation importance of aquatic macroinvertebrate communities, and absence of suitable/high quality habitat, the aquatic macroinvertebrate assemblage is considered to be of Local importance.

### **White-clawed Crayfish**

- 5.4.4. Bin Brook is located at a significant distance from any of the few remaining isolated populations of White-clawed Crayfish present in Cambridgeshire.
- 5.4.5. The 2021 surveys of Bin Brook concluded that no White-clawed Crayfish or signs of White-clawed Crayfish presence were identified in the survey area. White-clawed Crayfish were determined to be absent in the section of Bin Brook that was surveyed and in proximity to the proposed route. On white section of Bin Brook, within Robinson College, could not be surveyed in 2021 and was subsequently surveyed in 2022. Within this location, the brook was spilt by a weir system potentially limiting the movement of aquatic fauna, including crayfish. It was concluded that this downstream section had limited potential to support a viable population of the species.
- 5.4.6. The assessment of other waterbodies (linear and individual) within 250m of the proposed route, determined that they mostly comprised man-made and/or heavily engineered features associated with arable field and road drainage ditches or landscaped lakes and ponds associated with residential, commercial and road scheme developments. The likelihood of a population of White-clawed Crayfish being present in any of the waterbodies within the survey area was considered negligible. It can therefore be concluded that White-clawed Crayfish are likely absent from the Scheme.

### **Fish**

- 5.4.7. A search of the Environment Agency's' Ecology and Fish Data Explorer returned data from an Environment Agency catch depletion survey carried out on Bourn Brook in 2019, approximately 4.5km from the Scheme boundary. A total of 46 fish were caught during the survey, with three species being detected: European Bullhead *Cottus gobio*, Stone Loach *Barbatula barbatula*, and Minnow *Phoxinus phoxinus*. None of these species are protected or notable. No fish survey data was found for any other water bodies and watercourses within the survey area, including Bin Brook. Aquatic ecology scoping assessments were conducted in 2022 on all watercourses and water bodies within 250m of the Scheme boundary. This determined that Bin Brook provided suitable refugia and spawning habitat for fish, however notable features such as undercut banks, large deep pools and exposed tree roots were limited in occurrence. The West Cambridge Canal also provided habitat suitable for fish. This watercourse is connected to the West Cambridge Lake, which contained large *Cyprinids*. These fish are likely stocked and would not occur naturally, however can likely access the western section of the canal. The remaining watercourses and water bodies were deemed to not provide suitable habitat for fish or were unlikely to be affected due to distance from the Scheme and/or absence of hydrological connection (WSP, 2023k) (Appendix TR5.1).
- 5.4.8. There are watercourses within 250m of the Scheme boundary (notably Bin Brook) that are hydrologically connected to Fenland SAC (which is outside of the 2km Study Area), in which Spined Loach *Cobitis taenia* is an Annex II species present as a qualifying feature. Despite the hydrological connectivity, multiple barriers to fish passage are present in the section of the River Cam that connects Fenland SAC to the watercourses in the Scheme Boundary. Consequently, it is unlikely this species is present within the Scheme Boundary.

- 5.4.9. Due to poor habitat suitability and limited permeability for fish passage within the affected watercourses/waterbodies, the fish assemblage is considered unlikely to include protected or rare fish species. In the absence of fish survey data it is assumed, on a precautionary basis, that the fish population is at most of Local importance.

### **Macrophytes**

- 5.4.10. A search of the Environment Agency's Ecology and Fish Data Explorer returned data from Environment Agency macrophyte surveys carried out in the Bourn Brook in 2012, approximately 3.5km from the Scheme boundary. A total of 10 taxa were recorded. No protected or notable species were noted; however, the INNS Himalayan balsam was present. No records were found from the past 10 years for Bin Brook or the other water bodies and watercourses within 250m of the Scheme boundary.
- 5.4.11. During the 2022 aquatic ecology scoping assessments, none of the surveyed watercourses or water bodies within 250m of the Scheme boundary provided suitable habitat for protected or notable macrophyte species/communities. Additionally, there are no locally or nationally designated sites within 2km of the Scheme that are designated for macrophytes.
- 5.4.12. Based on the likely absence of protected and notable species, and low habitat suitability in the watercourses/water bodies, the macrophyte assemblage is considered to be of Local importance.

### **MAMMALS**

#### **Badger**

- 5.4.13. The desk study from CPERC returned 48 records of Badger within the 2km Study Area. Previous surveys undertaken for the scheme between 2018 and 2021 also identified 93 Badger setts within the 2km Study Area.
- 5.4.14. The field surveys identified a total of 33 setts within the survey area from the updated 2022 field surveys and those undertaken by Thomson Environmental Consultants and Cambridge Ecology. These comprised six main setts, two annex setts, seven subsidiary and 18 outlier setts.
- 5.4.15. A total of five setts are located within the Scheme boundary. These included one main sett, one subsidiary sett and three outlier setts. A further three setts are located within 30m of the Scheme boundary, including two outlier setts and one subsidiary sett.
- 5.4.16. For Badger welfare purposes, information on locations of setts is not disclosed here. This information has been provided within the Confidential Badger Survey Report (WSP, 2023d) (Appendix TR5.2).
- 5.4.17. Badgers are common and widespread across the UK and are not identified as a Species of Principal Importance under the NERC Act or a Priority Species in Cambridgeshire. The legislation protecting them is in place largely for reasons of preventing animal cruelty rather than because they are considered a priority for conservation. The populations associated with the Scheme are not of any particular importance.

#### **Bats**

#### **Survey Summary**

- 5.4.18. A range of bat surveys have been undertaken throughout the Scheme at various stages of the project lifecycle. The results of these surveys that are considered relevant to the current Scheme



have been summarised herein. In addition, surveys undertaken for the Bourn Airfield housing development, East West Rail, the A428 Black Cat to Caxton Gibbett Road Improvement Scheme and by Cambridgeshire Bat Group are also summarised.

5.4.19. Within previous surveys and assessments undertaken for the Scheme in 2019 and 2020, some bats have been detected to species level through sounds analysis. It is inherently difficult to distinguish species through sound analysis alone, particularly for species in the *Myotis* genus. As such, species have been grouped where appropriate for this assessment. Serotine and species in the genus *Nyctalus* have been grouped as 'big bat species' due to the similarity in the potential impacts from roads on these species. The following species and species groups were confirmed and will be included within this assessment.

- Barbastelle Bat;
- Big bat species (*Noctule Nyctalus noctula*, Leisler's *Nyctalus leisleri* and Serotine *Eptesicus serotinus*);
- Brown Long-eared Bat *Plecotus auratus*;
- Common Pipistrelle *Pipistrellus pipistrellus*;
- *Myotis* species (Brandt's Bat *Myotis brandtii*; Daubenton's Bat *Myotis daubentonii*; Natterer's Bat *Myotis nattereri*; and Whiskered Bat *Myotis mystacinus*);
- Nathusius' Pipistrelle *Pipistrellus nathusii*; and
- Soprano Pipistrelle *Pipistrellus pygmaeus*.

### **Bat Roost Surveys**

#### 2021-2022 Structure and Tree Roost Surveys

- 5.4.20. Ground level tree assessment and aerial tree inspections were carried out in winter 2021 to 2022. A total of 14 high suitability trees, 34 moderate suitability trees, 37 low suitability trees and 21 negligible suitability trees were located within the winter survey area. Aerial or ground level endoscope inspection surveys of 11 trees were inconclusive due to features not being accessible. No bat roosts were identified in any other trees during hibernation inspections.
- 5.4.21. Due to a refinement of the Scheme boundary, a modified summer survey area was adopted for the summer tree surveys. One tree, C2C-019, within the winter and summer survey area, was identified as having a confirmed roost of a single Brown Long-eared bat. This tree was also identified by Cambridge Ecology as supporting a Common Pipistrelle roost in 2019 and 2021 (Cambridge Ecology, 2021h) (Cambridge Ecology, 2020) (T38, Cambridge Ecology, 2020b and 2021b). A single Common Pipistrelle re-entered this tree at dawn on the 18 May 2021. During the previous bat activity surveys in 2019, the roost in tree T38 had been identified as supporting three Common Pipistrelle bats. This roost was considered a non-breeding summer roost, rather than a maternity roost. The tree is located on the eastern boundary of Coton Orchard and will not be directly impacted by the proposals.
- 5.4.22. The desk-based assessment identified 22 buildings that could provide suitability for potentially important hibernating bat roosts, of these only six buildings or sites were surveyed due to access constraints. All buildings surveyed were assessed as being unsuitable for hibernating bats. None of these buildings will be lost to the Scheme.
- 5.4.23. Eight buildings were identified within the summer survey area. Seven were assessed as having high suitability for roosting bats and one was assessed as having negligible suitability for roosting bats. This survey consisted of an external inspection only.

### 2020-2021 Tree Roost Surveys

- 5.4.24. Cambridge Ecology previously undertook a suite of bat roost suitability surveys between 2017 and 2021, comprising of preliminary bat roost assessments of trees and buildings as well as dusk emergence and dawn re-entry surveys of trees and buildings.
- 5.4.25. During these surveys, a total of six non-breeding summer roosts were identified in trees between 2020 and 2021. Species roosts identified included Common Pipistrelle and Soprano Pipistrelle. Two roosts are considered to be relevant to the current Scheme alignment.
- 5.4.26. Tree roosts were identified in C2C-019 (T38), discussed above, and C2C-184 (T51). A Common Pipistrelle emerged from C2C-184 (T51) on 04 June 2021 from behind ivy. The roost location could not be identified; however, the tree is clad in ivy and has multiple areas of lifted bark. This roost was considered a non-breeding summer roost, rather than part of a maternity roost.

### **Static Bat Detector Surveys**

#### 2021-2022 Static Bat Detector Surveys

- 5.4.27. Eight distinct bat species or groups were recorded within the Survey Area during the summer and winter automated bat detector surveys, including Barbastelle Bat.
- 5.4.28. A total of 32,446 call registrations were recorded across the route for the summer deployment period. The locations of summer automated detectors are presented in **Figure 5.4, Appendix A**. Of these calls, the most commonly registered species were Common Pipistrelle and Soprano Pipistrelle, accounting for 71.89% and 19.22% of all total bat passes, respectively. Barbastelle accounted for 2.91%, with most of those recorded at point 21. Point 21 is located to the east of Hardwick, adjacent to the proposed balancing pond at the bus gate. The most bat registrations were recorded at this location, accounting for 26.37% of bat passes in the summer.
- 5.4.29. Point 27 recorded the second highest number of bat registrations, accounting for 15.20% of bat passes in the summer. The majority of this activity was from Common Pipistrelle, and Barbastelle Bat activity was extremely low. The third highest levels of bat activity throughout the Scheme were recorded at point 22, with similar levels to point 27, however Barbastelle Bat were frequently recorded at this location, with the second highest activity levels for the species recorded at this location.
- 5.4.30. A total of 10,589 call registrations were recorded across the route for the winter deployment period. Of these calls, the most commonly registered species were Common Pipistrelle and Soprano Pipistrelle accounting for 81.51% and 10.63% of total bat passes, respectively. The least registered species was Serotine, accounting for 0.04% of total bat passes. Barbastelle Bats accounted for 3.28%, with a peak of activity at Point 13 recording an average of 3.87ppn. Point 9 also had notable Barbastelle activity, with an average of 2.53ppn. It should be noted that this dataset includes data recorded in April 2022.

#### 2020-2021 Static Bat Detector Surveys

- 5.4.31. Previous surveys completed by Cambridge Ecology in 2019 and 2020 identified 12 species of bat utilising linear features within the survey area. Common Pipistrelle and Soprano Pipistrelle were the most prevalent species recorded during bat activity surveys previously undertaken. However, of note, results of all previous surveys completed identified high levels of Barbastelle Bats at numerous

locations along the survey area, with key areas identified which were subject to crossing point surveys in 2021 and 2022.

### **Crossing Point Surveys**

#### 2022 Crossing Point Surveys

- 5.4.32. A total of 23 crossing point locations were surveyed. These locations are referenced numerically as CP1 to CP23, with CP referring to 'crossing point'. Eight bat species were recorded using habitats within the Survey Area during the 2022 crossing point surveys.
- 5.4.33. The 2022 crossing point surveys concluded that four landscape features provided commuting habitat for Barbastelle Bats. These locations are described below and presented in **Figure 5.5, Appendix A**.
- CP 5 – Hedgerow south of Madingley Windmill, north of Coton Primary School;
  - CP 16 - Hedgerow south of the American Cemetery/Coton Court;
  - CP 18 - Located where the Scheme will have a new junction with Long Road, east of Hardwick; and
  - CP 19 – Located near the proposed St Neots Rd bus gate junction.
- 5.4.34. Crossing points where Barbastelle Bats were identified using the landscape features to commute recorded a maximum of one commuting Barbastelle on any survey. Crossing point locations CP6, CP10 and CP11 recorded no commuting bats, whilst all remaining crossing point locations provided intermittent commuting habitat for species such as Common and Soprano Pipistrelle, with the most commuting passes observed at CP9, recording a peak of six bat commuting. A total of 17 commuting bats were recorded at CP1. Two of these bats were recorded commuting over the feature in a north/south direction and 15 were recorded commuting east/west.
- 5.4.35. All features recorded low levels of foraging by bats, usually associated with the feature itself which provided foraging habitat within the landscape or associated with adjacent habitats such as grassland and woodland. A range of bat species were also frequently recorded foraging over orchard trees within Coton Orchard, including Barbastelle Bat.

#### 2021 Crossing Point Surveys

- 5.4.36. Eight crossing point locations were surveyed by Thomson Ecology in 2021 that are relevant to the current Scheme alignment. Of these eight crossing point locations, six were surveyed between May and October 2021. The remaining two locations were within Coton Orchard, and access was not permitted at this time.
- 5.4.37. Ten bat species were identified during these surveys, the most prevalent being Common Pipistrelle, Soprano Pipistrelle and Noctule, with significant activity recorded from Barbastelle Bat, followed by Brown Long-eared Bat and Myotis species.
- 5.4.38. A total of 2,686 passes were recorded during the crossing point surveys. Of all the crossing points, crossing point 1 had the most activity recorded (568 passes, over 21% of all activity)
- 5.4.39. Barbastelles Bat were recorded on crossing points 2, 5 and 10, and on transects 1, 3, 4 and 6, using linear habitat features such as tree lines, woodland edges and hedgerows along arable field margins as commuting and particularly foraging routes.

5.4.40. Four locations for both Barbastelle Bat and general bat activity were considered to be important for foraging and commuting bats. This was determined with reference to the DEFRA guidelines (Berthinussen & Altringham, 2015) where a single commuting rare species (Barbastelle) or ten commuting bats of any other species were detected in any one survey, would determine the requirement for mitigation.

- CP 1 – Located in the east of the Scheme at the intersection between the Scheme and existing hedgerows;
- CP 2 – Located along the eastern boundary of Coton Orchard;
- CP 5 – A hedgerow south of Madingley Wood;
- CP 6 – A ditch line southwest of Madingley Wood;
- CP 9 – Area of woodland plantation northeast of Bourn Airfield; and
- CP 10 – The entrance to Bourn Airfield.

### **Bat Activity Transect Surveys**

5.4.41. Six walked transect sites were mapped across the scheme to survey and record further bat activity throughout the Scheme that could be affected by the Scheme. All six of the transect routes were surveyed five times between May and October 2021. Ten identified bat species were recorded during these surveys, the most prevalent being Common Pipistrelle, Soprano Pipistrelle and Noctule, with notable Barbastelle Bat activity recorded, followed by Brown Long-eared Bat and Myotis species.

5.4.42. A total of 1,214 passes were recorded during the walked transect surveys. Of all the activity transects, transect 5 recorded the most activity (322 passes, over 26% of all activity).

5.4.43. Barbastelle Bat were recorded on transects 1, 3, 4 and 6, using linear habitat features such as tree lines, woodland edges and hedgerows along arable field margins as commuting and particularly foraging routes.

5.4.44. Two key locations for both Barbastelle Bat and general bat activity were considered to be important areas for foraging and commuting bats. Those locations that remain relevant to the Scheme boundary are:

- Transect 2, leg 3 (hedgerow south of Madingley Windmill, north of Coton Primary School); and
- Transect 3, leg 4 (eastern boundary of Coton Orchard).

### **Bat Trapping Radio Tracking Surveys**

#### *Bourn Airfield Data*

5.4.45. The Bourn Airfield housing development is located within Bourn Airfield in the western extent of the Scheme. The development is immediately south of the Scheme to the east of Cambourne. Trapping and radio-tracking surveys were completed by Thompson Ecology and IDW Ecology at Bucket Hill Plantation (within the southeast of the airfield boundary) in May, August and September 2016 (Thomson Environmental Consultants, 2018). Bat trapping surveys were undertaken in July, August and September 2015, however no radio tracking was undertaken alongside this trapping effort.

5.4.46. Six bat species were caught during 2015 and 2016 trapping sessions including Natterer's Bat, Daubenton's Bat, Common Pipistrelle, Soprano Pipistrelle, Barbastelle Bat and Brown Long-eared Bat.

- 5.4.47. The 2016 surveys identified a total of 18 roosts (including five maternity roosts) from 11 tracked bats of three species (Natterer's, Brown Long-eared Bat and Barbastelle Bat). The Natterer's maternity roost was located within Bucket Hill Plantation and the Brown Long-eared maternity roost was located within a shed adjacent to St Neots Road approximately 1.5km northeast of Bucket Hill Plantation and 150m south of the Scheme boundary. Barbastelle Bat were tracked back to maternity roosts at Kingston Wood SSSI, located approximately 4.2km southeast of Bucket Hill Plantation and Hayley Wood SSSI which is located approximately 72km southwest of Bucket Hill Plantation.
- 5.4.48. A pregnant female Barbastelle Bat was caught in Bucket Hill plantation in May 2016 and was subsequently recorded roosting within Hayley Wood where a peak count of 21 bats was recorded. This bat also roosted in Honey Hill Wood, which is located approximately 1.7km north of Bucket Hill Plantation, where a peak count of two bats was recorded. This bat was not recorded interacting with the Eversden and Wimpole SAC. A post-lactating, breeding female Barbastelle Bat was caught at Bucket Hill Plantation in September 2016 and was subsequently recorded roosting within Kingston Wood. The bat was also recorded flying between Bourn Airfield, Kingston Wood and over the Eversden and Wimpole SAC.
- 5.4.49. Key bat flight lines were identified through the radio tracking surveys. These included the southern and eastern boundaries of Bourn Airfield. The flight lines along the eastern boundary extended north from Bucket Hill Plantation, over Childerley Gate (St Neots Road) and over the A428.

East West Rail Data

- 5.4.50. The radio tracking surveys were undertaken for the East West Rail scheme in 2020 and 2022 (BSG & Corylus, December 2020; East West Rail, 2023). The primary focus of these surveys was to establish potential links between the Barbastelle Bat colonies at Eversden and Wimpole SAC and woodlands within the wider landscape. Bat trapping and radio tracking was undertaken in 2022 at Waresley and Gransden Wood, Elsworth Wood, Kingston Wood, Knapwell Wood, Hardwick Wood, Madingley Hall, Madingley Wood and Hauxton Wood. Radio tracking of bats from Eversden and Wimpole SAC was also undertaken in 2020. The location of these trapping areas in relation to the Scheme are presented in **Figure 5.6, Appendix A**.
- 5.4.51. Woodland transect surveys were also completed by EWR over 2020 and 2021 to identify potential Barbastelle Bat colonies, potentially warranting further trapping and tracking. Nine woodlands were surveyed, and the highest levels of Barbastelle Bat activity were recorded at Madingley Wood, Hayley Wood and Hardwick Wood. Static bat detector monitoring surveys were deployed by EWR around the SAC and associated woodland complex in 2020 to identify important flight lines.
- 5.4.52. The radio tracking surveys also confirmed the presence of other Barbastelle Bat colonies in Hayley Wood SSSI and Waresley and Gransden Woods SSSI, to the west of the SAC. Bats tracked from Hayley Wood were recorded using the local landscape to the north as far as Cambourne. Bats from the SAC were also identified northeast of the SAC towards Grantchester and Haslingfield. Only a single bat was trapped and tracked from Waresley Wood and the results from this single animal are inconclusive as to the nature of the roost or how a colony within this woodland might interact with the SAC.
- 5.4.53. A total of 42 roosts were identified within their survey area (23 confirmed roost locations and 19 approximate locations) which included seven maternity roosts. The maximum count from any one roost was 28 bats, in a roost within Madingley Wood is approximately 8km from Eversden and Wimpole SAC (and approximately 250m north of the Scheme boundary). A total of Five Barbastelle

Bat tree roosts were identified in Madingley Wood. Five roosts were also identified within Hardwick Wood with a maximum count of 27 bats recorded. Seven roosts were recorded within Waresley and Gransden Wood, one in Kingston Wood, one at Rectory Farm near Hauxton and one at Hauxton Gravel Pit Wood.

- 5.4.54. The core foraging areas for bats from the Madingley Wood colony were within the deciduous woodland within Madingley Wood, wood pasture and parkland at Madingley Hall and the ditch and hedgerow lined agricultural fields to the northeast of Madingley village.
- 5.4.55. The radio-tracking surveys undertaken for the East West Rail project have not established that the breeding colonies at Madingley Wood, Hardwick Wood and Waresley and Gransden Wood directly interact with the Eversden and Wimpole Woods SAC maternity colony with respect to roost switching. The surveys indicate that these are four distinct breeding colonies. The surveys did however indicate that foraging resources are shared by the breeding colonies at Hardwick Wood, Madingley Wood and the Eversden and Wimpole Woods SAC population.
- 5.4.56. The potential breeding colony within Kingston Wood identified during the Bourn Airfield radio tracking surveys in 2016 was not found during the East West Rail radio tracking surveys. No breeding females were caught in Kingston Wood during the radio-tracking surveys in 2022 and none of the breeding females caught in other woodlands were recorded roosting in Kingston Wood.

#### A428 Black Cat to Caxton Gibbett Road Improvement Scheme Data

- 5.4.57. The A428 Black Cat to Caxton Gibbett Road Improvement Scheme runs to the west of the Scheme between St Neots and Cambourne. The radio-tracking surveys undertaken for the Black Cat scheme did not identify any interaction with Barbastelle Bat populations in proximity to the Black Cat scheme and those within Eversden and Wimpole SAC.
- 5.4.58. Bat trapping and radio tracking was undertaken within Boys Wood, south of St Neots and approximately 14.5km west of the SAC. One Barbastelle Bat was caught but not radio-tagged in Boys Wood in October 2018, three Barbastelle Bats were caught and radio-tagged in Boys Wood in October 2019. Two of the radio-tagged bats in Boys Wood in 2019 were radio-tracked back to roosts (one in a tree on edge of Boys Wood and the second in a derelict building).
- 5.4.59. A further four females and three male Barbastelle Bats were caught, radio-tagged and radio-tracked at Eversden and Wimpole SAC in September 2021. It was concluded that Barbastelle Bat from the SAC were not commuting or roosting close to the Black Cat scheme and were flying north of the SAC towards Toft (golf course and woods), which is approximately 1.5km southeast of Hardwick Wood.

#### Cambridgeshire Bat Group Data

- 5.4.60. Cambridgeshire Bat Group undertook trapping, tagging and radio-tracking in 2010 at Madingley Wood SSSI (located north of Scheme). The surveys confirmed that the woodland supported maternity roost of Barbastelle of at least 15 bats (Vine, 2010).

### **Species Evaluation**

#### **Barbastelle Bat**

- 5.4.61. Extensive radiotracking surveys of Barbastelle Bats throughout the wider landscape have identified the use of multiple woodland sites for foraging and roosting, including for maternity roosts. The data has shown that Barbastelle Bat appear to use landscape features such as woodland, tree lines and

hedgerows when travelling to reach woodland blocks and foraging areas, but they are also able to cross open areas, including the A428. Breeding colonies have been identified at Madingley Wood (approximately 250m north of the Scheme) and Hardwick Wood (approximately 1.7km south of the Scheme), peak counts of 28 and 27 bats respectively. Eversden and Wimpole SAC is also designated for its Barbastelle breeding colony. No link between these breeding colonies has been identified through the surveys, however they do share the same foraging resources.

- 5.4.62. The home range and core foraging areas for Barbastelle Bat within Madingley Wood are primarily north of the woodland, within the Madingley Hall estate, south of Madingley village and the woodland itself. They also extend south of the woodland and extend within the Scheme boundary. The home range and core foraging areas for Barbastelle Bat from the Hardwick Wood colony primarily extend north of the woodland east of Highfield Caldecote and Bourn Airfield, and extended beyond St Neots Road and the A428, and within the Scheme boundary. This also corresponds with static detector data collected in 2022, where the highest levels of Barbastelle Bat activity (relative to the areas surveyed) were at the detector locations east of Hardwick (adjacent to Cambridge Road and the tree line east of the proposed St Neots Road bus gate junction).
- 5.4.63. Barbastelle Bats trapped at Bucket Hill Plantation within Bourn Airfield have been tracked further south to Hayley Wood and flying over the SAC, as well as flying north towards Honeyhill Wood along the eastern boundary of the proposed airfield development, with key flight lines potentially extending through the Scheme boundary and over the A428.
- 5.4.64. No Barbastelle Bat roosts were recorded throughout the surveys for the Scheme. Foraging and commuting Barbastelle Bats were identified during crossing point and activity transect surveys, and throughout the Scheme using static detector surveys. The following areas within the Scheme were considered to be potentially important foraging and or commuting features for the species.
- Crossing point 10 – The entrance to Bourn Airfield;
  - Crossing point 9 – Area of woodland plantation northeast of Bourn Airfield;
  - Crossing point 19 and static location 13 - The proposed St Neots Rd bus gate junction;
  - Crossing point 18 – The proposed new junction with Long Road, east of Hardwick;
  - Crossing point 6 – The ditch line southwest of Madingley Wood;
  - Crossing point 16 and static point 10 - Hedgerow south of the American Cemetery and Madingley Wood;
  - Crossing point 5 and activity transect 2, leg 3 – Hedgerow south of Madingley Windmill, north of Coton Primary School;
  - Crossing point 2 and activity transect 3, leg 4 – The eastern boundary of Coton Orchard; and
  - Crossing point 1 – located in the east of the Scheme at the intersection between the Scheme and existing hedgerows south of the University Sports Ground.
- 5.4.65. Barbastelle Bats are considered rare in the UK and are listed as a Species of Principal Importance (under the NERC Act 2006). As species listed on Annex 2 of the Habitats Directive they are also identified in the designation of SACs that now form part of the NSN to support the conservation of this species. In Cambridgeshire this species is rare, although considered widespread, but restricted to wooded parts of the county (Cambridgeshire Mammal Group, 2016). Given the regular use of the site by Barbastelle Bats, the potentially use of the Scheme as commuting and core foraging habitat for bats associated with maternity roosts at Madingley Wood and Hardwick Wood and potential overlap with Barbastelle Bat colonies at Eversden and Wimpole Woods SAC, it is considered that Barbastelle Bat are of International importance.

### **Big Bat Species (Common Noctule, Leisler's Bat and Serotine Bat)**

- 5.4.66. Noctule were regularly detected throughout the Scheme during crossing point surveys, activity transect surveys and bat static surveys. Noctule were regularly observed flying at height (typically >20m) during crossing point surveys which is very typical of big bat species. Breeding female Noctule were also caught during trapping and radio tracking surveys at Bucket Hill Plantation during the 2016 surveys for the Bourn Airfield development. A single bat was trapped and tracked towards Cambourne. Serotine and Leisler's bat (as well as bats identified to *Nyctalus* genus) were occasionally recorded by static bat detectors.
- 5.4.67. No roosts of any big bat species were identified during the bat roost surveys for the Scheme. The desk study returned no records of roosting bats within the Scheme boundary, however Serotine roosts were identified within the desk study area.
- 5.4.68. Noctule and Leisler's bats are widespread in Cambridgeshire and although they are found throughout England, they are likely to be relatively sparsely populated throughout their range due to the large home ranges they occupy. Leisler's are uncommon but widely distributed. Noctules are widely distributed and fairly common in Cambridgeshire where suitable habitat is present. Serotines are thinly distributed in Cambridgeshire - at the northern limit of their UK range (Cambridgeshire Mammal Group, 2016).
- 5.4.69. Noctule are a Species of Principal Importance (under the NERC Act 2006), however Noctule and Serotine populations in England are considered stable and data on Leisler's is deficient so it is difficult to establish whether the population sizes are increasing, decreasing or remaining stable, although their habitat remains stable (Bat Conservation Trust, 2021). Given that Noctule are relatively common and widespread in Cambridgeshire, and Serotine and Leisler's were only occasionally encountered, which is typical of their distribution in the county, it is considered that big bat species are of Local importance.

### **Brown Long-eared Bat**

- 5.4.70. Brown Long-eared bats were frequently recorded throughout the Scheme during crossing point surveys and static detector surveys. They were often observed foraging over long grassland habitats near to Bin Brook and south of Madingley Wood, and single commuting Brown Long-eared Bats were observed on three occasions at crossing point 14, where they were also observed gleaning prey from the hedgerow. The species made up only a small proportion of the bat calls detected by static bat detectors, however due to their quiet echolocation calls, no conclusions can be made from this. A single Brown Long-eared bat was identified within a tree roost (tree number C2C-019) on the eastern boundary of Coton Orchard in summer 2022.
- 5.4.71. Brown Long-eared Bats are a Species of Principal Importance (under the NERC Act 2006), however they are a relatively common species and their populations are considered to be stable in England (Bat Conservation Trust, 2021). They are widespread in England and a common bat in Cambridgeshire found in most suitable habitat. The species is generally considered to be a woodland bat, using trees and a wide variety of building types for roosting.
- 5.4.72. Given that locally the species is widespread and common, and no significant roosts of the species were identified, Brown Long-eared Bat is considered to be of Local importance.



### Common Pipistrelle

- 5.4.73. Common Pipistrelle were the most frequently recorded species throughout the static bat detector, bat activity transects and crossing point surveys, accounting for 71.89% of call registration in summer 2022 and 81.51% of call registration in the winter 2021-2022 surveys across the Scheme. A single tree (C2C-019) within the current Scheme survey area was identified as having a Common Pipistrelle roost in 2019 and 2021 (Cambridge Ecology, 2020) (Cambridge Ecology, 2021h). The majority of desk study records were for Common Pipistrelle, Soprano Pipistrelle and *Pipistrellus* species, accounting for 57% of all roost records returned within the desk study area.
- 5.4.74. Common Pipistrelle populations are considered to be increasing in England and are widely distributed throughout Cambridgeshire (Cambridgeshire Mammal Group, 2016). Given that Common Pipistrelle area considered to be a relatively common and widespread species in both Cambridgeshire and England, and no significant roosts (maternity or hibernation roosts) of the species were identified, it is considered that Common Pipistrelle are of Local importance.

### Soprano Pipistrelle

- 5.4.75. Soprano Pipistrelle were the second most frequently recorded bat species by static detectors in winter 2021-2022, accounting for 10.63% of all call registrations and 19.22% during summer 2022 static detector surveys. They were also frequently recorded during the crossing point and bat activity transect surveys. No roosts of the species were identified in the current Scheme survey buffers and the majority of desk study records were for Common Pipistrelle, Soprano Pipistrelle and *Pipistrellus* species, accounting for 57% of all roost records returned within the desk study area.
- 5.4.76. Soprano Pipistrelle are a Species of Principal Importance (under the NERC Act 2006), however they are a relatively common species and their populations are considered to be stable in England (Bat Conservation Trust, 2021). They are widespread in England and a common bat in Cambridgeshire.
- 5.4.77. Given that locally the species was frequently recorded across the Scheme, is widespread and common, and no significant roosts of the species were identified, it is considered that Soprano Pipistrelle are of Local importance.

### Nathusius' Pipistrelle

- 5.4.78. Nathusius' Pipistrelle were occasionally recorded during crossing point and transect activity surveys. Low levels of activity were identified throughout the Scheme during the summer static detector surveys and were occasionally recorded at a number of locations during the winter static surveys. No roosts of the species were identified through roost surveys undertaken for the Scheme and no records of roosts were returned by the desk study.
- 5.4.79. According to the Cambridgeshire Mammal Atlas (Cambridgeshire Mammal Group, 2016), there are only a handful of records in Cambridgeshire, all associated with freshwater bodies.
- 5.4.80. Nathusius' Pipistrelle is rarer than other pipistrelle species in the UK, though records have increased in recent years. Nathusius' Pipistrelle is rare but widespread throughout Great Britain and more common in Northern Ireland.
- 5.4.81. Given that Nathusius' Pipistrelle were only occasionally encountered during surveys, it is likely that there is small population in the vicinity of the Scheme and it is therefore considered that Nathusius' Pipistrelle are of Local importance.

## Myotis Species

- 5.4.82. For the purpose of this assessment, all bat species in the Myotis genus have been grouped together. This is partly due to the difficulty in separating the species from analysis of echolocation calls alone, but also because the effects of roads on these species is generally similar for all species in the genus, particularly for those species that are known to be present in Cambridgeshire. The Cambridgeshire Bat Group lists four Myotis species that are known to be present in the county. Species that are considered within this assessment include:
- Daubenton's Bat;
  - Natterer's Bat;
  - Whiskered Bat; and
  - Brandt's Bat.
- 5.4.83. Myotis bats were occasionally recorded during crossing point surveys and activity transect surveys throughout the Scheme. Myotis were occasionally recorded throughout the summer static detector surveys, with the highest levels recorded at static points 10, south of Madingley Wood and 22, east of Hardwick. They were also recorded throughout the static detector surveys during winter 2021 and spring 2022.
- 5.4.84. No Myotis bat roosts were identified through the surveys for the Scheme and none were returned by the desk study. A Natterer's maternity roosts was identified within Bucket Hill Plantation approximately 1km south of the Scheme in Bourn Airfield during trapping and radio tracking for the proposed housing development.
- 5.4.85. Daubenton's Bat are considered to be common and widespread throughout Britain and Ireland (Russ, 2012) with their population in England considered to be stable (Bat Conservation Trust, 2021). Daubenton's Bats are widely distributed and fairly common in Cambridgeshire. They are particularly common near areas with freshwater.
- 5.4.86. Natterer's Bat are considered to be widespread across Britain (Russ, 2012) and populations in England are considered to be increasing (Bat Conservation Trust, 2021). Natterer's Bats are widely distributed and fairly common in Cambridgeshire. They are particularly common in areas of woodland (Cambridgeshire Mammal Group, 2016).
- 5.4.87. Whiskered Bat and Brandt's Bat have a combined population trend within the National Bat Monitoring Programme due to the difficulty separating them with confidence in the field. The two species are uncommon but widespread in England. Populations of Whiskered and Brandt's bat combined are considered to have been stable in England. The handful of records of Whiskered Bats in Cambridgeshire are from the southern part of the county (Cambridgeshire Mammal Group, 2016) and information on Brandt's Bat is limited.
- 5.4.88. Given that no Myotis roosts were identified through surveys for the Scheme and that they were recorded occasionally during activity surveys, it is likely that populations of these species in the vicinity of the Scheme are small, therefore it is considered that Myotis bats are of Local importance.

## Brown Hare

- 5.4.89. Brown Hare records were collated through incidental sightings during 2021-2022 surveys by surveyors whilst out on a variety of other surveys across the Scheme. The desk study from CPERC returned 22 records of Brown Hare within the 2km Study Area. Previous surveys undertaken for the

Scheme during Winter 2018-2019 by Cambridge Ecology also identified Brown Hare across the Scheme.

- 5.4.90. The Cambridgeshire Mammal Atlas describes the distribution of Brown Hare within Cambridgeshire as widespread in the county, with the exception of the Fens, where they are less common.
- 5.4.91. Brown Hare are not described within the selection criteria for CWS in Cambridgeshire (Cambridgeshire & Peterborough CWS Panel, 2020) and as such, an element of professional judgement has been applied to determining the importance of Brown Hare associated with the Scheme. Given conservation status of Brown Hare within Cambridgeshire and that relatively low levels of evidence of the species within isolated areas of the Scheme have been identified, Brown Hare are considered to be of Local importance.

#### **Otter**

- 5.4.92. The desk study from CPERC returned 16 records of Otter within the 2km Study Area.
- 5.4.93. The 2022 surveys recorded potential field signs of Otter within the Bin Brook. These included partial prints and feeding remains (Freshwater Pearl Mussel shells). Whilst these field signs are not definitive evidence of Otter, as they could have been from other species, the presence of Otter in the Bin Brook cannot be discounted. On this precautionary basis, Otter are considered to be of Local importance.

#### **Water Vole**

- 5.4.94. The Water Vole Study Area, including water course locations across the Scheme, is shown in **Figure 5.7, Appendix A**. The desk study from CPERC returned 53 records of Water Vole within the 2km Study Area. Previous surveys undertaken for the Scheme between 2014 and 2017 by Thomson Environmental Consultants also identified Water Vole field signs on Bourn Airfield, within the 2km Study Area. A total of 17 waterbodies are located within the Survey Area which comprised 15 watercourses and two ponds. Water Vole presence was confirmed within Callow Brook and Bin Brook through field surveys.
- 5.4.95. The Cambridgeshire Mammal Atlas (Cambridgeshire Mammal Group, 2016) describes the distribution of Water Vole within Cambridgeshire as widespread in the county but with isolated populations. Water Vole are listed as a priority species within the South Cambridgeshire district (South Cambridgeshire District Council, 2009) where they are described as being widespread within some parishes. The Cambridge City Council Biodiversity Strategy 2022 – 2030 (Cambridge City Council, 2022), describes Water voles as having suffered significant declines as a species but Cambridgeshire, and Cambridge in particular, remains a stronghold for the species.
- 5.4.96. Water Vole are not described within the selection criteria for CWS in Cambridgeshire (Cambridgeshire & Peterborough CWS Panel, 2020) and as such, an element of professional judgement has been applied to determining the importance of Water Vole associated with the Scheme. Given conservation status of Water Vole within Cambridgeshire and that relatively low levels of evidence of the species within isolated areas of the Scheme have been identified, Water Vole are considered to be of Local importance.

## **BIRDS**

### **Desk Study**

5.4.97. CPERC returned 540 records for birds within the 2km desk study area. Records of 53 bird species were returned, including the following:

- 18 species listed on Annex 1 of the EU Birds Directive (Directive 79/409/EEC);
- 21 species listed on Schedule 1 of the Wildlife and Countryside Act (1981 as amended);
- 24 species listed on Section 41 (Species of Principal Importance) of the Natural Environment and Rural Communities (NERC) Act, 2006 (Her Majesty's Stationary Office (HMSO), 2006); and
- 30 species included in the Birds of Conservation Concern (BoCC) Red List; and 37 species included in the Birds of Conservation Concern (BoCC) Amber List.

### **Barn Owl**

- 5.4.98. The desk study from CPERC identified 16 records from the last 10 years within 2km of the Scheme Boundary. Previous survey and desk studies completed by Wildlife Conservation Partnership and Thomson Environmental Consultants confirmed three Observed Breeding Sites (OBS) and four Potential Nesting Sites (PNS) within nest boxes within 1.5km of the Site. In addition, two PNSs within nest boxes and one Active Roost Site (ARS) were also returned within the Scheme Boundary.
- 5.4.99. The Stage 2 and Stage 3 field surveys undertaken in 2022 identified five PNS within the Scheme Boundary (one building and four Barn Owl nest boxes). Three PNS (two trees and one building) and one TRS were identified within 500m of the Scheme Boundary. Six PNS (one tree, one building and four Barn Owl nest boxes) and three TRS (one building and two trees) were identified between 500 and 1km of the Scheme Boundary and 10 PNSs (four trees, one building and four Barn Owl nest boxes) and seven TRS (six trees and one building) were identified between 1km and 1.5km of the Scheme Boundary.
- 5.4.100. Despite previous desk study and survey reports recording three OBS and one ARS and the 2022 field surveys recording multiple Potential Nest Sites and TRS within and immediately beyond the Scheme Boundary, the Stage 2 and 3 field surveys recorded no conclusive evidence of Barn Owl, with no breeding sites or active roost sites present within the Scheme Boundary or within a 1.5km radius, where access could be granted.
- 5.4.101. Optimal foraging habitat (Type 1) was found to be limited within the Scheme Boundary and restricted to Coton Orchard and suboptimal habitat (Type 2) was scattered around the Survey Area with higher prevalence within the east of Cambourne, southwest of the Scheme.
- 5.4.102. No active breeding sites were recorded within the Scheme boundary or within 500m of the Scheme, as such it is considered unlikely that Barn Owl are breeding within the Scheme or immediate surrounding area. Foraging resources are limited within the Scheme to small, isolated areas of the Scheme. Barn Owl are therefore considered to be of Local importance.

### **Breeding Birds**

- 5.4.103. The breeding bird surveys recorded a total of 66 bird species within the survey area, which are described below:
- Three species listed on Annex 1 of the EU Birds Directive (Directive 79/409/EEC);
  - Three species listed on Schedule 1 of the Wildlife and Countryside Act (1981 as amended);

- 16 species listed on Section 41 (Species of Principal Importance) of the Natural Environment and Rural Communities (NERC) Act, 2006;
- 15 species included in the Birds of Conservation Concern (BoCC) Red List; and
- Two species included in the BoCC Amber List.

5.4.104. This includes all species recorded for the Scheme in 2021 and 2022, as well as species recorded during the breeding bird surveys of the Bourn Airfield development in 2018. All species recorded within the survey area along with their breeding status are presented in **Table TR5-B-1, Appendix B**; excluding Pheasant *Phasianus colchicus*, Red-legged Partridge *Alectoris rufa* and Canada Goose *Branta canadensis* which were recorded during these surveys but are introduced species and as such are not considered Important Ecological Features.

5.4.105. Of the 67 bird species recorded within the survey area, 44 species were confirmed breeding and a further three species were probable breeders. Six species were possible breeders and 13 were non-breeding.

5.4.106. The three species listed on Annex 1 of the EU Birds Directive and Schedule 1 of the Wildlife and Countryside Act included Kingfisher *Alcedo atthis*, Red Kite *Milvus milvus*, and Peregrine Falcon *Falco peregrinus*. Of these species, only Kingfisher were confirmed breeding.

5.4.107. The Cambridge and Peterborough CWS Section Guidelines (Cambridgeshire & Peterborough CWS Panel, 2020) were used to assess whether the assemblage of bird species or the populations of individual species meet the criteria for CWS qualification, and as such could be considered of County importance. These guidelines use six selection criteria (A to C) which the survey results were assessed against and summarised below.

- a) *No species met or exceeded 0.5% of the total British non-breeding population.*
- b) *No habitats supported the required range of breeding birds to meet the habitat indices.*
- c) *No breeding species were considered to be rare breeding birds in Cambridgeshire.*
- d) *No large colonies of breeding colonial seabirds, sand martins or herons were recorded.*
- e) *No wet meadows are present within the survey area.*
- f) *The total of breeding species did not exceed 50.*

5.4.108. None of the species recorded or the assemblage of breeding species meet the CWS selection criteria, as such all of the bird species recorded, and the overall breeding bird assemblage are considered to be of Local importance.

### Wintering Birds

5.4.109. A total of 67 species were recorded on or over the Survey Area during both types of wintering bird survey. A summary of the survey results and the list of bird species recorded are summarised in **Table TR5-B-2, Appendix B**.

5.4.110. A total of 36 'notable' species were recorded throughout the surveys. The number of notable species in each category is listed below, it should be noted that these categories are not exclusive, and a species can be listed in more than one conservation category. For example, a species listed as both a Species of Principal Importance in accordance with the Natural Environment and Rural Communities (NERC) Act 2006 (Her Majesty's Stationary Office (HMSO), 2006) and a UK

Biodiversity Action Plan (BAP) (JNCC, 2007) species and as either a red or amber list BoCC) The notable species assemblage included:

- Three species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended);
- Fifteen species listed as SPI in accordance with Section 41 of the NERC Act 2006 (also UKBAP species);
- Fifteen BoCC red list species;
- Twenty BoCC amber list species; and
- Thirteen LBAP species.

5.4.111. A total of 35 notable species were recorded during the diurnal wintering bird surveys and a total of 22 notable species were recorded during the dusk wintering bird surveys. During the dusk wintering bird surveys, golden plover roosts were recorded towards the west of the Scheme, with a peak count of 35 individuals.

5.4.112. According to the data from the wintering bird survey, the Scheme does not qualify as a CWS according to the CWS criteria for the selection of avian sites (Cambridgeshire & Peterborough CWS Panel, 2020). Two of the CWS criteria (a and f) were considered for this evaluation:

- a) Using APEM 4 Population estimated of birds in Great Britain and the United Kingdom as a measure of the total British population of a species, the Scheme does not support 0.5% or more of the total British non-breeding population.*
- f) Of the 67 species recorded during the surveys, only 19 species were recorded as wintering populations on the APEM 4. As such it is considered that the Scheme does not support enough wintering species to qualify as a CWS.*

5.4.113. Criteria B – E were not considered for this evaluation as they are relevant to breeding bird species only.

5.4.114. Surveys have established the wintering bird community is mostly comprised of a mixture of common and widespread species, however more notable species are present, with some being listed as Schedule 1, Species of Principal Importance and BoCC. None of the species recorded or the assemblage of wintering species meet the CWS selection criteria, as such all of the bird species recorded, and the overall wintering bird assemblage are considered to be of Local importance.

## **REPTILES**

5.4.115. The surveys carried out in 2018, 2021 and 2022 identified no reptiles within the Scheme boundary.

5.4.116. Low populations of Common Lizard were recorded in 2018 and 2021 on the grassland associated with the covered reservoir south of the A1303 at Madingley Rise next to Long Road. This is approximately 70m outside of the Scheme boundary.

5.4.117. Low populations of Grass Snake were recorded in 2018 and 2021 within the eastern end of the survey area, adjacent to the University Sports Ground. This is approximately 40m outside of the Scheme boundary.

5.4.118. It is considered unlikely that significant reptile populations are present within the Scheme boundary. However, given the close proximity of Grass Snake records and that suitable habitat (such as field margins and aquatic habitat) is present within the Scheme boundary which may be used in a transitory nature by this species, it cannot be concluded that they are absent from the Scheme.

Grass Snake are likely to be present in very low numbers within the Scheme boundary and are considered to be of Local importance.

## **AMPHIBIANS**

### **Great Crested Newt**

- 5.4.119. A total of 36 water bodies were present within the Great Crested Newt Survey area. A summary of the results of surveys undertaken for the Scheme are presented in **Table TR5-B-3, Appendix B**.
- 5.4.120. Great Crested Newts are considered likely present within three water bodies (34, 35 and 36), The desk study confirmed that a peak count of nine Great Crested Newts were recorded within water body 34 in 2015. This peak count is indicative of 'small' population size class (English Nature, 2001). However, these water bodies are no longer relevant to the Scheme as they are approximately 2km north of the current Scheme boundary.
- 5.4.121. No access was granted to survey four water bodies (16, 19, 26 and 27). Water body 16 is located within a residential land parcel, south of the A1303 Madingley Road. This a small garden pond that, from a review of historical aerial imagery, appears to have been excavated around 2015. No ponds existed within this area prior to the excavation of the pond and there are no other water bodies within 250m that are suitable aquatic breeding habitat for Great Crested Newts. It is therefore considered that it is highly unlikely that the species could have colonised this water body.
- 5.4.122. Water body 19 could not be identified through current or historic aerial imagery and was therefore considered to no longer be present. Water body 27 is no longer within the 250m buffer of the Scheme boundary and is therefore no longer considered within this assessment. St Neots Road is considered to be a partial barrier to dispersal of Great Crested Newts from water body 26. In addition, a large arable field is located between the Scheme and this water body is likely to act as a significant barrier to dispersal of the species and there is extensive suitable habitat in the local vicinity of this water body. It is therefore considered highly unlikely that any Great Crested Newt populations associated within water body 26 would be present within the Scheme.
- 5.4.123. Through the assessment of ponds using the HSI and eDNA, Great Crested Newts are considered to be likely absent from the remaining 29 water bodies. It can therefore be concluded that Great Crested Newts are likely absent from the Scheme and are not considered further within this assessment.

## **TERRESTRIAL INVERTEBRATES**

### **Desk Study**

- 5.4.124. CPERC returned multiple records of invertebrate species for groups including, but not limited to; *Coleoptera* (beetles), *Diptera* (true flies), *Hemiptera* (true bugs), *Hymenoptera* (ants, bees, wasps and sawflies) and *Lepidoptera* (butterflies and moths). Many of these include species that are assigned conservation statuses, i.e., red list species that are Nationally Rare or Scarce, or are considered Section 41 Priority Species. The full list of species returned by the data search is presented in the Appendix A of the 2022 Terrestrial Invertebrate Report (WSP, 2023j) (Appendix TR5.14).

### **2022 Coton Orchard Surveys**

- 5.4.125. The terrestrial invertebrates survey and assessment at Coton Orchard in 2022, identified the Site to likely have an important invertebrate assemblage based on the survey data and invertebrate

specimens collected across the months of April, July and August. A summary of the survey results are described below.

- The Invertebrate Habitat Potential (IHP) assessment concluded that the Habitat Elements best represented across the Survey Area were HE3 - Nectar Resources (Grade A), followed by HE1 - Decaying Wood (Grade B) and HE11 – Bare Earth (Grade B).
- The collection or recording of over 600 specimens allowing 239 species to be identified, of which:
  - 119 species recorded were Lepidoptera (butterflies and moths, with the majority being moths);
  - 38 species recorded were Coleoptera (beetles);
  - 25 species recorded were Hymenoptera (bees, wasps, ants and sawflies);
  - 13 species recorded were Hemiptera (true bugs);
  - 12 species recorded were Diptera (true flies); and
  - A small number of other invertebrate orders, no more than two represented in each group.
- The most well represented habitat is that of ‘tall sward and scrub’ within the ‘open habitats’ biotope, with 76 species.
- The habitat with the best SQI score is ‘decaying wood’ which has a score of 222. It is likely this score would be further increased with additional sampling in May and June.
- Pantheon has also recognised the ‘rich flower resource’ SAT component to the Survey Area as being ‘favourable’ and therefore likely one of the more important habitats features orchard. It is likely that the ‘decaying wood’ SATs, e.g. ‘bark & sapwood decay’ and ‘heartwood decay’, would also achieve favourable condition with additional sampling efforts of the deadwood habitats, i.e. the mature orchard trees.

5.4.126. The Coton Orchard survey results were assessed against the CWS selection criteria for invertebrates (Cambridgeshire & Peterborough CWS Panel, 2020). Criterion 11 describes the thresholds for invertebrates when evaluating sites and Coton Orchard meets two of the selection criteria. A summary of the qualifying criteria is included herein.

5.4.127. Small Heath butterfly *Coenonympha pamphilus* were recorded through surveys, which are listed as a Vulnerable species under the Butterfly Conservation Red List (Butterfly Conservation, 2023) and are a Species of Principal Importance under Section 41 of the NERC Act. Coton Orchard therefore meets criteria 1a Due to the presence of a vulnerable butterfly species.

5.4.128. A total of 14 nationally Scarce invertebrate species were recorded. Using the invertebrate index described within the CWS selection criteria, which assigns a score of 50 for each nationally scarce species, the invertebrate index score for Coton Orchard is 700, which exceeds the threshold score of 500. The following nationally scarce species were recorded through the surveys; a Tumbling Flower Beetle *Variimorda villosa*, a Darkling Beetle *Mycetochara humeralis*, a Clown Beetle *Gnathoncus buyssoni*, a Clown Beetle *Aeletes atomarius*, and a Checkered Beetle *Tillus elongatus*. The following Category B Nationally Scarce species were recorded; Large Fruit Bark Beetle *Scolytus mali*, a Click Beetle *Athous campyloides*, a False Click Beetle *Melasis buprestoides*, Two-coloured Mason Bee *Osmia bicolor*, Pantaloon Bee *Dasypoda hirtipes*, Waste Grass-veneer *Pediasia contaminella*, Brindled Groundling *Recurvaria nanella*, Rosy-striped Knot-horn *Oncocera semirubella*, and Alder Signal *Stathmopoda pedella*.



## 2018 Invertebrate Surveys

5.4.129. The 2018 invertebrate surveys identified 14 distinct areas that were of 'high interest' within the survey areas and met the selection criteria. These areas were assessed against the CWS selection criteria for invertebrates (Cambridgeshire & Peterborough CWS Panel, 2020). Of these areas, three are present within the current Scheme boundary and are considered likely to be affected by the Scheme. These areas are referenced as Area 2, 3, and 14 within the 2018 Terrestrial Invertebrate Report (Cambridge Ecology, 2018e). The description and reason for qualification are summarised below.

### Area 2. The Coton Path Hedgerow

5.4.130. A long and almost continuous old mixed hedgerow, with varied and sometimes well-structured transitions to open vegetation, and variously associated with a shaded drainage channel and with areas of plantation. It is tall and reasonably dense throughout its length, includes varying densities of trees, contains a considerable amount of dead wood, and in places is elm-rich. It is bordered throughout by a footpath/cycleway. Much of its length is designated as a CWS.

5.4.131. Survey data was collected from the entire length of the hedgerow, which extends beyond the current Scheme boundary. As such, the high invertebrate interest of this hedgerow may be due to its length rather than its habitat quality.

Criteria for inclusion: Invertebrate Index: 700

### Area 3. West Cambridge Canal

5.4.132. The drainage channel along the south side of the pedestrian/cycle corridor which runs east-west from Ada Lovelace Way is the linking feature in this area, which is otherwise quite varied. It includes several ponds along the course of the channel, mature oaks, recent ornamental planting of both herbaceous and woody vegetation, and recently established flower-rich grassland. It provides a habitat corridor across the site and links other areas of high interest.

5.4.133. High interest is justified here only because of the combination of features and the fact they form a corridor. None of the component parts are individually of very high value, and though the West Cambridge Lake achieves an assessment of high conservation value using the Community Conservation Index it does so only because of a single capture of the scarce whirligig beetle *Gyrinus paykulli*. Both the aquatic and the marginal fauna of the lake seemed generally unexceptional and are likely to decline in interest through marginal shading; alder-dominated woody vegetation is already crowding much of the margin.

5.4.134. Criteria for inclusion: Invertebrate Index: 850 and Community Conservation Index for West Cambridge Lake: high conservation value.

### Area 14. The Highfields Complex (eastern entrance to Bourn Airfield)

5.4.135. A varied set of habitats at the western end of the survey area. Most important is an area of elm (*Ulmus* sp.)-rich woodland along the northern side of the old line of the A428. This includes substantial elms and large pieces of standing and fallen dead wood. The line of the former road has colonised with open-structured ruderal vegetation, and is an interesting habitat in its own right, as well as forming a well-structured edge to the woodland. Mature trees and scrub on the opposite side of the former road form an additional "old countryside" component. Recently created habitat includes grassland along the verges of Wellington Way, open-structured vegetation beneath and beside

young plantation at the junction of Wellington Road and St Neots Road, and rabbit-grazed grassland and open-structured mosaic vegetation on the verge of St Neots Road just west of the roundabout. The woody vegetation and the open mosaic/grassland habitats would each individually reach threshold CWS values for the Invertebrate Index.

5.4.136. Criteria for inclusion: Invertebrate Index: 1700

#### **Invertebrate Importance**

5.4.137. Four areas of Scheme, surveyed in 2018 and 2022, meet a number of the CWS selection criteria in Cambridgeshire. The survey data has been reviewed cautiously, given that the invertebrate interest of the Scheme is influenced by the extensive survey effort that has been completed. Taking into account all of the survey data and range of notable species identified, it is considered that the assemblage of invertebrates is likely of County importance.

## 6 PRELIMINARY ASSESSMENT OF LIKELY IMPACTS AND EFFECTS

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6.1.1. This section details the assessment of significant effects in the absence of any mitigation. Proposed mitigation and its consequence within the residual effect is described in the Sections 7: mitigation measures and 8: assessment of significant effects.

### 6.2 DESIGNATED SITES

#### INTERNATIONALLY DESIGNATED SITES

6.2.1. The HRA Report (WSP, 2023n) (Appendix TR5.11) has been compiled to provide information on the identification and assessment of effects on internationally designated sites. These matters are assessed in the HRA report. A summary of the pre-mitigation effects of the Scheme is provided below.

6.2.2. In the absence of mitigation measures, the HRA Report identifies potential Likely Significant Effects on the Eversden and Wimpole Woods SAC arising from the following impact pathways upon Barbastelle Bats:

6.2.3. Construction:

- Interruption of Barbastelle Bat commuting routes through habitat severance and lighting impacts; and
- Loss of foraging habitat and functional linked land/supporting habitat of Barbastelle Bat colonies.

6.2.4. Operation:

- Interruption of Barbastelle Bat commuting routes through lighting impacts; and
- Vehicle collision risk with Barbastelle Bats.

6.2.5. These impacts are further discussed within the relevant protected and notable species section of this assessment. Due to the potential for increase in road traffic mortality from the Scheme, the rarity of Barbastelle Bats and the low numbers of Barbastelle Bats present within the known maternity roosts at the SAC and Madingley Wood SSSI, impacts upon the SAC population are predicted to lead to a permanent adverse effect that is significant up to an International scale.

6.2.6. All other internationally designated sites were screened out of the HRA as there are no potential impacts or likely significant effects upon these sites as a result of the Scheme.

#### NATIONALLY DESIGNATED SITES

6.2.7. There are no predicted impacts upon any statutory designated sites, including Madingley Wood SSSI, Caldecote Meadows SSSI and Hardwick Wood SSSI as a result of construction or operation of the C2C Scheme.

#### NON-STATUTORY DESIGNATED SITES

6.2.8. Of the 11 non-statutory sites located within 1km of the Scheme, three are located within the Scheme boundary and are described below.

- Scrubland east of the M11 CiWS;
- Coton Path Hedgerow CWS; and

- Bin Brook CiWS.

### Construction

#### Site and Vegetation Clearance

- 6.2.9. Habitat loss will occur at each of the three non-statutory designated sites as a result of site clearance and vegetation clearance during construction of the Scheme. An approximation of the extent of this habitat loss has been calculated using the indicative construction footprint for the Scheme.
- 6.2.10. Coton Path Hedgerow CWS is a linear habitat feature approximately 0.9ha in area (1,250m in length). It is anticipated that a maximum 0.03ha (50m in length) of this CWS will be affected by the Scheme during construction. No rare or notable plant species were present within this area that is expected to be lost to the Scheme.
- 6.2.11. Scrub east of M11 CiWS is approximately 2.3ha in area, however approximately 0.9ha of this wildlife site has already been removed within the West Cambridge Site. A further 0.4ha is anticipated to be lost to the Scheme.
- 6.2.12. Bin Brook is a linear habitat feature approximately 0.8ha in area. Approximately 30m<sup>2</sup> of this habitat is anticipated to be affected, however this area calculation includes the existing overbridge which has brick stanchions built into the banks of the brook. This site is in part designated for the presence of pollard willow trees and due to the presence of Water Vole. No willow pollards are anticipated to be affected by the Scheme. Water Vole are discussed within the Protected and Notable Species sections of this assessment.
- 6.2.13. Although a small extent of habitat will be lost in comparison to the size of the sites and many of their qualifying features will remain largely unaffected by the construction of the Scheme (see Water Vole section for additional information pertaining to Bin Brook), it is considered that impacts upon non-statutory designated sites would lead to permanent adverse effects that are significant at a County scale.

### Operation

- 6.2.14. There are no anticipated impacts upon these designated sites during the operation of the Scheme.

## 6.3 HABITATS AND BOTANY

### HABITATS

#### Construction

#### Site and Vegetation Clearance

- 6.3.1. Construction of the Scheme and associated construction site and vegetation clearance work is expected to lead to permanent removal of a proportion of habitats within the Scheme boundary. This includes both common and widespread habitats and HPis which include traditional orchard, hedgerows and lowland mixed deciduous woodland.
- 6.3.2. The predicted magnitude of habitat loss within the LLAU is listed in **Table TR5-6-1**, below. It should be noted that these areas are approximate areas of loss and based on a reasonable worst-case scenario for the construction of the Scheme. A more precise area of habitat loss will be able to be determined at detailed design stage. Hardstanding and urban features such as buildings, roads

have not been included in the table. The predicted extent of habitat change at this stage is presented in the BNG Assessment (WSP, 2023a) (Appendix TR5.7).

**Table TR5-6-1 - Predicted Habitat Change**

Habitat Type	Area/Length	Area Retained
Cereal crops	40.89ha	0ha
<i>Arrhenatherum</i> neutral grassland	6.78ha	0ha
Other neutral grassland	5.56ha	0.02ha
Modified grassland	4.98ha	0.01ha
Other broadleaved woodland (non-priority habitat woodland)	3.896ha	0.04ha
Sparsely vegetated land with ruderal/ephemeral vegetation	3.80ha	0ha
Other lowland mixed deciduous woodland	1.82ha	0.49ha
Non-traditional orchard ( <i>Arrhenatherum</i> neutral grassland)	1.32ha	0ha
Mixed scrub	0.57ha	0.9ha
Hawthorn scrub	0.12ha	0ha
Traditional orchard	0.42ha	0ha
Hedgerow (priority habitat)	4.87km	2.62km

- 6.3.3. Considering the extent of habitat loss within the Scheme boundary and presence of habitats of County importance within areas of the Scheme it is considered that the impacts upon habitats in the absence of mitigation would lead to permanent adverse effects that are significant at a County scale.

### Operation

- 6.3.4. No further impacts upon habitats are predicted during the operation of the Scheme.

### Invasive Non-Native Species

#### Construction

##### Site and Vegetation Clearance

- 6.3.5. Construction activities near to Bin Brook could potentially result in the spread of Himalayan Balsam into areas they do not currently occupy. This could be via movement of spoil as part of earthworks operations, or via plant and personnel if clothing and equipment is not suitably cleaned following work in areas supporting invasive non-native plant species.
- 6.3.6. The accidental spread of INNS could result in a breach of legislation pertaining to preventing the spread of INNS, including Section 14 of the Wildlife and Countryside Act (HMSO, 1981).

### Operation

- 6.3.7. There are no anticipated impacts from the operation of the Scheme with regards to INNS.

## 6.4 PROTECTED AND NOTABLE SPECIES

### AQUATIC ECOLOGY

#### Aquatic Macroinvertebrates

#### Construction

##### Site and Vegetation Clearance

- 6.4.1. Removal or disturbance of riparian vegetation could lead to the reduction in food supply and refugia for a range of aquatic invertebrate species. Additionally, vegetation clearance could reduce bank stability and release fine sediment into suspension, resulting in the direct injury or mortality, and the degradation or loss of habitat. The effects are therefore likely to be permanent but reversible, with the aquatic macroinvertebrate community recovering once vegetation has re-established.

##### Pollution

- 6.4.2. There is the potential for pollutants to enter watercourses and waterbodies during construction that could have an adverse impact on water quality and sensitive aquatic macroinvertebrates. Potential contaminants during construction could include silt, oils and fuel from plant and vehicles, which can be directly harmful, and cause habitat loss or degradation.
- 6.4.3. The unmitigated impacts on the aquatic macroinvertebrate assemblage during the construction phase of the Scheme would lead to permanent adverse effects that would be significant at a Local scale.

#### Operation

##### Pollution

- 6.4.4. Increased surface water run-off from the transport route entering Bin Brook and Callow Brook could increase levels of suspended sediment and pollutants within the watercourses. This could have an adverse effect on the aquatic macroinvertebrate assemblage within the watercourses. The unmitigated impacts on the aquatic macroinvertebrate assemblage during the operation of the Scheme would lead to a permanent adverse effect that would be significant at a Local scale.

#### Fish

#### Construction

##### Site and Vegetation Clearance

- 6.4.5. Removal or disturbance of riparian vegetation at Bin Brook and West Cambridge Canal could result in adverse effects from reduced channel shading and the loss of marginal refugia for fish. Additionally, vegetation clearance could reduce bank stability and release fine sediment into suspension, resulting in direct injury and/or degradation of habitat. The effects are likely to be temporary and reversible, with habitats and fish species recovering once vegetation has re-established.

### Pollution

- 6.4.6. There is potential for pollutants to enter Bin Brook and West Cambridge Canal during the construction phase that could adversely impact the fish assemblage. Potential contaminants during construction could include silt, oils and fuel from plant and vehicle. Additionally, earthworks near Bin Brook could result in fine sediments being introduced to the watercourse. Pollutants and fine sediment can cause direct injury (e.g. gill irritation) or mortality, and cause habitat loss or degradation.
- 6.4.7. The unmitigated impacts of pollution on fish during the construction of the Scheme would lead to a permanent adverse effect that would be significant at a Local scale.

### Visual (Lighting) Disturbance and, Noise and Vibration

- 6.4.8. Artificial lighting, noise and/or vibrations produced during construction may also arise from plant movements and construction activities such as CFA piling which is proposed for the Bin Brook crossing. These impacts could result in temporary disturbance, abandonment of suitable habitats and dispersal from the affected areas. However, effects on fish will be negligible due to their ability to move away from the disturbance temporarily, returning once works have ceased. As such, these impacts are not considered to be significant.

## **Operation**

### Pollution

- 6.4.9. Increased surface water run-off from the transport route entering Bin Brook could increase levels of suspended sediment and pollutants within the watercourse. This could have an adverse effect on fish within Bin Brook. The unmitigated Scheme would lead to a permanent adverse effect that would be significant at a Local scale.

## **Macrophytes**

### **Construction**

#### Site and Vegetation Clearance

- 6.4.10. Removal or disturbance of riparian vegetation could alter channel shading, which may impact algal and plant growth. Additionally, vegetation clearance could reduce bank stability and release fine sediment into suspension, resulting in the direct mortality, and the degradation or loss of habitat. The impacts are likely to be temporary, with the macrophyte community recovering once vegetation has re-established.

### Pollution

- 6.4.11. There is the potential for pollutants to enter watercourses and waterbodies during construction that could have an adverse effect on macrophytes. Potential contaminants during construction could include silt, oils and fuel from plant and vehicles, which can be directly harmful, and cause habitat loss or degradation.
- 6.4.12. The unmitigated impacts on the macrophyte assemblage during the construction phase of the Scheme would lead to a temporary adverse effect that would be significant at a Local scale.

## Operation

- 6.4.13. There are no anticipated impacts and no likely significant effects upon macrophytes from the operation of the Scheme.

## MAMMALS

### Badger

## Construction

### Site and Vegetation Clearance

- 6.4.14. Badgers are considered for assessment due to their legal protection. A total of five Badger setts are located within the Scheme boundary and three setts are located within 30m of the Scheme boundary. These include one main sett, five outlier setts and two subsidiary setts. Potential impacts upon Badger setts are likely to arise from construction activities, including vegetation, site clearance, plant movement and excavation which could lead to damage and destruction of setts within the Scheme boundary. Impacts upon setts also have the potential to kill or injure Badgers.

### Noise and Vibration

- 6.4.15. Disturbance impacts through noise and vibration may also arise from plant movements and construction activities such as piling. Generally, disturbance impacts from construction are most likely to occur to setts within 30m of the construction boundary, however vibration impacts from piling may also cause impacts up to 100m from the location the activity. As such, further setts beyond the boundary of the Scheme may be impacted by construction that have not been identified within this assessment.
- 6.4.16. It may be possible to avoid any such impacts subject to detailed design and the status of Badger in the vicinity of the Scheme. However, based on a worst-case scenario it is considered likely that offences under the Badger Act (HMSO, 1992) are likely to arise during construction in the absence of mitigation.
- 6.4.17. The unmitigated impacts during the construction of the Scheme would be temporary and could occur throughout the duration of construction. These impacts would lead to a permanent adverse effect upon Badgers.

## Operation

### Road Traffic Collision and Habitat Interruption and Fragmentation

- 6.4.18. Road traffic collisions could occur during the operation of the Scheme which will be a particular risk where the Scheme intersects regularly used pathways, foraging areas and Badger territories. Areas of the Scheme that require mitigation will need to be determined at detailed design stage and potentially following further survey. However, it is considered likely that the section for the Scheme that runs through Coton Orchard is one area that this impact is most likely to occur due to the proximity to main setts and due to the high levels of Badger field signs, including Badger sightings. It is considered that this impact will have a permanent adverse effect.



## Bats

### Construction

#### Site and Vegetation Clearance

- 6.4.19. No confirmed roosts are anticipated to be affected by the current Scheme proposals; however this should be reassessed if any changes to the Scheme alignment or boundaries and if additional tree clearance is required. Although no confirmed roosts are anticipated to be lost, a total of five high suitability, 12 moderate suitability and 28 low suitability trees are anticipated to be lost to the Scheme, which could affect the local roost resource.
- 6.4.20. The construction of the Scheme including site and vegetation clearance would result in the removal of habitat within the Scheme boundary. The approximate extent of habitats to be lost as a result of construction of Scheme is detailed in **Table TR5-6-1**. Of the habitats lost, ditches and other water bodies, broadleaved woodland, scattered trees, lines of trees, hedgerows, orchard, scrub and grassland represent the majority of highly suitable habitat for commuting and foraging bats. Areas of hard standing (e.g., roads) and arable fields are generally considered to provide low suitability foraging and commuting habitats.
- 6.4.21. Removal of areas of high suitability habitats would reduce the availability of foraging habitats within the Scheme boundary. This habitat removal may also cause minor interruption of commuting routes used by bats to commute between their roosting sites and other habitats in the wider landscape. This includes habitat regularly used as commuting routes for Barbastelle Bats, however it is anticipated that Barbastelle Bats would be capable of crossing habitat gaps during construction, given that they typically cross open habitats. The habitats that would be removed are widely represented in the wider local landscape. Additionally, it is anticipated that there would be no removal of bat roosts as a result of construction as no trees roosts are present within areas to be cleared and no buildings will be lost to the Scheme.

#### Visual (Lighting) Disturbance

- 6.4.22. Lighting from the construction phase could deter bats from using areas of habitat that have previously been unlit. This could comprise suitable commuting and foraging habitat for bats as well as potential roost sites in buildings outside of the Scheme boundary.
- 6.4.23. Unmitigated impacts that occur during construction of the Scheme could lead to permanent (habitat loss and fragmentation) and temporary (lighting disturbance) impacts resulting in adverse effects on foraging and commuting bats. There is also potential for permanent impacts upon tree and building roosting bats that lead to adverse effects that are likely significant up to a National scale for Barbastelle Bats and Local scale for all other bat species.

### Operation

- 6.4.24. No additional habitat loss beyond the habitats cleared during construction, fragmentation, or disruption would take place during the operational phase.

#### Road Traffic Collision

- 6.4.25. Bats are susceptible to mortality associated with collisions with road vehicles. Where the Scheme interrupts a bat flight path this may increase the mortality risk. Where bat commuting routes such as hedgerows and tree lines are interrupted by the Scheme, this may result in increased bat mortality at locations where bats have been observed crossing the landscape using these features. Areas of the

Scheme that do not use existing roadways will also introduce traffic into areas where there are no roads at present.

- 6.4.26. The Scheme will run single decker buses that have a typical body height of 3.1m. As such, collision risk is highest for those species that typically fly below this height. Noctule, Leisler's and Serotine are species that are known to fly high and to forage in open spaces that is likely to make them less susceptible to the barrier effects of roads and to collision mortality. Most other bat species fly at low speeds, close to the ground between 0-4m, particularly when crossing open spaces (Berthinussen & Altringham, 2015).

#### Visual (Lighting) Disturbance

- 6.4.27. Artificial lighting associated with operation of the Scheme could deter light-sensitive species of bat from using habitats that are newly illuminated including areas used by commuting bats. A number of areas were identified during bat surveys for the Scheme as being potential important commuting roost for Barbastelle Bats including areas requiring lighting within the Scheme design. Areas of the Scheme requiring lighting are anticipated to be junctions along the Scheme that interact with existing road networks, such as Long Road and St Neots Road. This impact is considered unlikely to occur where street lighting is already present.
- 6.4.28. Studies have shown that Noctule, Leisler's Bat, Serotine and pipistrelle bats can congregate around certain types of streetlights, feeding on the insects attracted to the light, but this behaviour is not true for all bat species (BCT and ILP, 2018). It should also be noted that this behaviour could increase collision risk due to higher levels of activity near to the route and existing road. The slower flying broad winged species such as Brown Long-eared Bats, Myotis species and Barbastelle Bats generally avoid all streetlights (BCT and ILP, 2018).
- 6.4.29. Barbastelle Bats are a rare bat species in Cambridgeshire, as well as in England as whole. Commuting and foraging habitats for Barbastelle Bats have been identified throughout the Scheme. The maternity roosts within Madingley Wood and other woodlands in the wider landscape, for which commuting and foraging habitat within the Scheme may form part of the core sustenance zone, has been considered with regards to Barbastelle Bats and other bat species. Conversely, the risk of collision with buses which will be single decker and running intermittently has been taken into consideration when assessing the significance of effect.
- 6.4.30. Taking into account these risks and the importance of the Barbastelle Bat population, the unmitigated impacts from operation of the Scheme upon Barbastelle Bats would lead to permanent adverse effects that would be significant up to a National scale.
- 6.4.31. The unmitigated impacts from the operation of the Scheme would lead to permanent adverse effects upon all other bat species that would be significant at a Local scale.

### **Brown Hare**

#### **Construction**

##### Site and Vegetation Clearance

- 6.4.32. Construction of the Scheme will lead to temporary habitat loss within arable land used for construction compounds, storage areas and haul routes. The construction of the Scheme will also lead to permanent habitat loss and interruption of retained habitat for Brown Hare. However, the majority of the Scheme will run through existing roads or parallel to existing roads which will reduce

the effect of habitat loss and interruption. There is also extensive suitable habitat across the wider area. It is considered that the effects of habitat loss and interruption upon Brown Hare are not significant.

### **Operation**

#### Road Traffic Collision

- 6.4.33. Operation of the Scheme could result in additional road traffic mortality. However, as discussed above, the majority of the Scheme will run through existing roads or run parallel to existing roads such as the A428/A1303, meaning that the additional risk of traffic mortality in these areas is negligible. Where the Scheme runs through open arable land, traffic mortality risk will be higher, however given the frequency of buses and the duration of trips during operating hours relative to bat movement it is considered that the likelihood of traffic mortality will remain very low. It is considered that the effects of traffic mortality on Brown Hare are not significant.

### **Otter**

### **Construction**

#### Site and Vegetation Clearance

- 6.4.34. The construction of the Scheme including site and vegetation clearance would result in the removal of a small proportion of the habitats near to Bin Brook. No definitive evidence of otters has been recorded within this area during previous surveys however, the area may be used for the purposes of commuting and foraging. Construction is not therefore expected to lead to any perceptible impacts on suitable habitat given that no confirmed activity was recorded through surveys.

#### Noise and Visual Disturbance

- 6.4.35. Noise and visual disturbance could disturb otters from using both terrestrial and aquatic habitat. Disturbance would also be a factor as part of enhancement proposals in proximity to Bin Brook. Visual disturbance from construction could deter otters from commuting and foraging along suitable aquatic habitat, although any such disturbance would take place during daytime (otters are typically most active around dusk and dawn and overnight) and be relatively short-lived given the short duration required enhancement and construction activities for the new bridge over Bin Brook.
- 6.4.36. Potential impacts on Otter if present, would be minor and isolated to a short period during construction. Impacts upon Otter would result in temporary adverse effects that would be significant at a Local scale, though these are highly unlikely.

### **Operation**

- 6.4.37. There are no anticipated impacts and no significant effects upon Otter from the operation of the Scheme.

### **Water Vole**

### **Construction**

#### Site and Vegetation Clearance

- 6.4.38. Water Vole burrows are located within Callow Brook and are within or in proximity to the Scheme boundary. Excavation works are proposed within the Scheme boundary adjacent to Callow Brook and an outfall will be constructed from the drainage pond adjacent to the proposed park and ride.

Impacts upon Water Vole burrows may therefore occur from construction of the Scheme adjacent to the Callow Brook, which could cause damage, destruction or obstruct access to breeding and resting places, as well as death, injury or disturbance, of Water Voles.

- 6.4.39. No burrows were identified within the construction footprint of the new bridge over Bin Brook. However, water vole fields signs and burrows were identified south of this location within the brook, which is within the Scheme boundary. This area is proposed for landscaping and management of flood risk, and there is potential that enhancements to the Brook for aquatic ecology and BNG may take place along these sections of the water body, which will be determined at detailed design stage. Construction activities within Bin Brook may cause damage, destruction or obstruct access to breeding and resting places, as well as death, injury or disturbance, of Water Voles.
- 6.4.40. The unmitigated impacts during construction of the Scheme would lead to permanent adverse effects that are significant at a Local scale.

### Operation

- 6.4.41. The Scheme will include a clear span bridge across Bin Brook and no culverts will be installed. In addition, no new culverts will be constructed on the Callow Brook. As such, there are no anticipated impacts and no significant effects upon Water Vole from the operation of the Scheme.

## BIRDS

### Barn Owl

#### Construction

##### Site and Vegetation Clearance

- 6.4.42. No nest sites were recorded during surveys for the Scheme in 2022. Vegetation and site clearance will result in small scale loss of foraging habitat through loss of grassland, hedgerows and ditches. This impact is not considered to lead to a significant effect, given the extent of suitable foraging habitat within the wider landscape and that foraging resources are limited within the Scheme boundary to small, isolated areas.

#### Operation

##### Road Traffic Collision

- 6.4.43. Barn Owl are particularly susceptible to mortality associated with vehicle collision. Where the Scheme severs suitable foraging habitat or territories, potentially separating foraging areas from nest or roost locations, an increased risk of death or injury from vehicle collisions is likely, particularly where there was no main road previously. Foraging habitat is limited within the Scheme boundary and the grassland habitats that will be created alongside the Scheme are not considered likely to attract Barn Owl foraging along the route and therefore increase vehicle collision risk. In addition, the frequency and timing of bus movements is also likely to further reduce this risk. As such there are no anticipated impacts upon Barn Owl from road traffic during operation of the Scheme.

## Breeding and Wintering Birds

### Construction

#### Site and Vegetation Clearance

- 6.4.44. Site and vegetation clearance during construction works would result in the removal of a proportion of the suitable habitats within the Scheme boundary. The approximate extent of habitats lost (permanently and temporarily) to the Scheme is provided in **Table TR5-6-1**, it is expected that some habitats would be subject to a substantial level of disturbance during construction. A number of these habitats including trees, arable land, woodland, grassland, scrub and hedgerows are suitable for a range of breeding and wintering birds. All bird species recorded during previous wintering bird surveys are listed in full in **Table TR5-B-1** and **Table TR5-B-2, Appendix B**. This includes all species identified within the survey area.
- 6.4.45. Some habitat loss within the Scheme would be permanent, which is associated with the built footprint of new roads and non-motorised user route. Other habitat loss would be temporary in nature, particularly areas of arable land used for construction compounds. Removal and disturbance of habitats would reduce the availability of habitat used by a range of bird species including some species of conservation concern.
- 6.4.46. Habitats within the Scheme construction boundary provide nesting opportunities for a range of species. All wild birds are protected by the Wildlife and Countryside Act, and vegetation clearance and site clearance activities have the potential to kill or injure wild birds and cause damage or destruction of active nests if these activities are undertaken during the bird breeding season.
- 6.4.47. The unmitigated impacts upon birds from construction of the Scheme would lead to adverse effects that would be significant up to a Local scale.

### Operation

- 6.4.48. Operation of the Scheme will not result in any significant affects.

## REPTILES

### Construction

#### Site and Vegetation Clearance

- 6.4.49. Site and vegetation clearance associated with the construction of the Scheme would result in the removal of a proportion of the suitable reptile habitat within the Scheme. Suitable habitat for reptiles with potential for their presence is confined to the areas in the east of the Scheme where a Low population of Grass Snake were identified in adjacent habitat and the hedgerow and field margins along the eastern boundary of Long Road provide connective habitat to the Low population of Common Lizard that were identified within the water works to the north. It is considered that these areas are most likely to be used by reptiles, although this likelihood is considered low, given that no reptiles species were recorded within the Scheme boundary. It is expected that these habitats would be lost or subject to a substantial level of disturbance during the construction of the Scheme, which would include construction of new infrastructure, movement of machinery and vegetation clearance.
- 6.4.50. The loss of habitat suitable for reptiles in these areas would be temporary, associated with the construction of the Scheme. Disturbance to grassland and field edges and removal of habitat within this area could prevent reptiles from utilising these areas for basking and use as refuge areas. This

would only be in the short term given the nature of development, and following habitat creation, the suitability of habitats in these areas for reptiles may increase. In addition to temporary habitat loss, any reptiles present within or in proximity to areas of construction would also be at risk of injury or being killed during site and vegetation clearance operations.

- 6.4.51. The unmitigated impacts during the construction of the Scheme would lead to adverse effects that are significant at a Local scale.

### Operation

- 6.4.52. There are no anticipated impacts and no significant affects from the operation of the Scheme.

### Terrestrial Invertebrates

#### Construction

##### Site and Vegetation Clearance

- 6.4.53. The approximate extent of habitats lost within the Order Limits as a result of the Scheme (based on a worst-case scenario) is provided in **Table TR5-6-1** resulting from site and vegetation clearance and placement of new, permanent infrastructure. It is expected that these habitats would be lost or subject to a substantial level of disturbance during the construction of the Scheme. The loss of suitable habitat would decrease the availability of foodplants for terrestrial invertebrate populations, especially as the mosaic of habitats in Coton Orchard are uncommon in the context of the local landscape.
- 6.4.54. Important invertebrate habitat areas for invertebrates within the Scheme are considered to be:
- Coton Orchard;
  - West Cambridge Canal;
  - The Highfields Complex (Bourn Airfield Entrance); and
  - Coton Path Hedgerow CWS.
- 6.4.55. Approximate area of the habitat within Coton Orchard is 19.3ha. Approximately 2.2ha of this habitat mosaic will be lost to the Scheme, in the absence of mitigation and compensation.
- 6.4.56. West Cambridge Canal habitat area is approximately 3.7ha and the Highfield Complex area is approximately 1.6ha. The approximate area of habitat that will be affected by the Scheme is 0.2ha and 0.3ha respectively. Coton Path Hedgerow CWS is a linear habitat feature approximately 0.9ha in area. It is anticipated that a maximum 0.1ha of this CWS will be affected by Scheme during construction.
- 6.4.57. A large proportion of the habitats at the West Cambridge Canal, Highfield Complex and Coton Path Hedgerow fall outside of the Scheme construction boundary and would not be impacted by construction of the Scheme, with only a small proportion affected.
- 6.4.58. Approximately 2.2ha of the habitat mosaic within Coton Orchard will be impacted. This equates to approximately 11.5% of the total habitat area. It is not anticipated that this loss of habitat would cause local extinction of important species and sufficient habitat resource would be retained within the wider site.
- 6.4.59. The majority of the habitat resource assessed will not be impacted by the Scheme. The unmitigated impacts from construction of the Scheme would lead to permanent adverse impacts that would be significant up to a County scale.



## Operation

6.4.60. No significant effects upon invertebrates are anticipated as a result of the operation of the Scheme.

## 7 MITIGATION MEASURES

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- 7.1.1. This section sets out the embedded design and mitigation measures which are likely to be required to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment during Scheme construction and operation. Measures applicable to each of the Important Ecological Features are described below.
- 7.1.2. Embedded mitigation measures are those that have been incorporated in the design of the Scheme to design-out impacts and significant affects where possible. In addition, a Code of Construction Practice<sup>3</sup> (CoCP) (WSP, 2023t) has been produced for the Scheme which describes and overview of the mitigation actions and commitments during construction and how they are secured. The measures described herein are included in the CoCP and will be secured via a Construction Environmental Management Plan (CEMP).
- 7.1.3. Additional mitigation measures for the construction and operation phases of the Scheme are also described within this section. These would be secured in principle through the TWAO and deemed planning permission with and approved at detailed design stage. Additional mitigation measures during construction will include a CEMP, a Sensitive Lighting Strategy, and any Natural England mitigation licences required. Mitigation measures during the operation of the scheme will be detailed within a sensitive lighting strategy and Landscape and Ecological Management Plan.

## 7.2 DESIGNATED SITES

### International Designated Sites

- 7.2.1. Measures to mitigate impacts upon Barbastelle Bat during construction and operation are discussed within the relevant Bats Section under Protected and Notable Species mitigation below. In addition, detailed mitigation to avoid Likely Significant Effects upon Eversden and Wimpole Woods SAC is described within Appropriate Assessment as part of the HRA for the Scheme within Appendix TR5.11 (WSP, 2023n).

### Non-Statutory Designated Sites

#### Construction

##### Site and Vegetation Clearance

- 7.2.2. Due to the nature of the Scheme, it is not feasible to avoid all impacts upon non-statutory designated sites entirely. Habitat loss will be minimised by only clearing habitat that is absolutely necessary in order to construct the Scheme. The Scheme construction boundary has been refined to the ensure that these impacts are minimised. It should also be noted that the design and route of the Scheme has been specifically designed throughout the lifecycle of the project to avoid impacting on high value habitats within the wider landscape. This has led to the current Scheme alignment and location being brought forward.
- 7.2.3. Habitat compensation has been provided throughout landscaping proposal and within the Scheme boundary where feasible. This includes compensatory planting of hedgerows and scrub, as well as planting along Bin Brook. These areas of habitat compensation are described within Section 7.3. Mitigation for potential impacts upon Water Vole within Bin Brook are detailed within the relevant

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<sup>3</sup> Code of Construction Practice (Document reference: C2C-26-00-Code of Construction Practice)



Protected and Notable Species section below. Further details of habitat compensation are detailed in the following Habitats Section.

#### Pollution

7.2.4. To avoid pollutants entering the watercourse, construction work will adhere to the best practice pollution prevention guidance. Mitigation measures are detailed below, however this is not an exhaustive list, and additional pollution controls may need to be determined after detailed design as part of the CoCP:

- Identification of potential sources of watercourse pollution;
- Management and containment of surface water runoff;
- Storage and maintenance of construction materials, oils and chemicals;
- Control and management of foul drainage; and
- Pollution incident control and emergency procedures.

7.2.5. These measures are detailed further in the CoCP.

## **7.3 HABITATS AND BOTANY**

### **Habitats**

#### **Construction**

##### Site and Vegetation Clearance

##### Embedded Mitigation

7.3.1. As set out in the impact assessment section above, construction of the Scheme will lead to temporary and permanent habitat loss. The design of the Scheme has been refined where possible to minimise the loss of important habitats such as lowland mixed deciduous woodland, traditional orchard, hedgerows and trees. Construction compounds are located within lower value habitats such as neutral grassland and arable cropland, as these areas will be easiest to reinstate and have a lower ecological impact.

7.3.2. Areas have therefore been proposed for the provision of compensatory habitat. For example land will be used to mitigate landscape and visual impacts and to provide flood compensation. The landscaping within these areas has been designed to maximise biodiversity benefits through the selection of native plant species and habitats of higher ecological value such as lowland mixed deciduous woodland and scrub. Woodland habitats have been included within the landscape proposals that have been strategically placed to complement existing woodland outside of the Scheme boundary. Other areas of habitat have been included within the landscape proposals as mitigation for protected species which are described within the respective sections of this assessment.

7.3.3. A number of surface water attenuation features are required throughout the Scheme and where possible, these have been designed to frequently hold water, rather than drain away. This has been designed to create wet ponds that will be of benefit to general biodiversity and will increase habitat complexity. Some attenuation ponds have been designed to hold water on a more permanent basis. This includes the attenuation ponds:

- to the west of the Cambridge University Sports Ground;
- to the southwest of the M11 overbridge; and

- between the proposed park and ride, and Callow Brook.

7.3.4. Planting schemes for these new ponds will be developed at detailed design stage, however the use of native plant species of local prevalence will be favoured.

7.3.5. Indicative landscaping and habitat creation and enhancement proposals for these areas are provided in the landscape proposals. Proposals for habitat compensation within these plans have been conceived with regard to the impacts on HPI, primarily hedgerows, woodland and traditional orchard. A summary of the habitats to be created within the Scheme are included in **Table TR5-7-1**. This also includes pre-development and retained habitats for an overview of habitat change.

**Table TR5-7-1 - Habitat Creation**

UK Habitat Classification Type	UK Hab Code	Habitat Pre-development	Habitat Retained	Habitat Created Post-development
Developed land; sealed surface	u1b	10.64ha	10.64ha	26.04ha
Other neutral grassland	g1c	5.56ha	0.02ha	23.02ha
Cereal crops	c1c	40.89ha	0ha	9.69ha
Modified grassland	g4	4.98ha	0.01ha	8.60ha
Lowland mixed deciduous woodland	w1f7	1.82ha	0.49ha	7.04ha
Mixed scrub	h3h	0.57ha	0.9ha	2.29ha
Sparsely vegetated land with Ruderal/Ephemeral	s17	3.80ha	0ha	1.64ha
Ponds (non-priority habitat)	r1	0ha	0ha	1.50ha
Other woodland; broadleaved	w1f7	3.89ha	0.04ha	0.19ha
Artificial unvegetated, unsealed surface	u1c	0ha	0ha	0.06ha
Dense hawthorn scrub	h3f	0.12ha	0ha	0.03ha
Non-traditional orchard ( <i>Arrhenatherum</i> Neutral Grassland)	g3c5 920	1.33ha	0ha	0ha
Traditional Orchard	w1g 21 and g3c5 21	0.42ha	0ha	0ha
<i>Arrhenatherum</i> Neutral Grassland	g3c5	6.78ha	0ha	0ha
Hedgerow Priority Habitat	h2a	4.87km	2.62km	0.96km

7.3.6. A subsequent Landscape and Ecological Management Plan for these areas will be developed by the principal contractor to ensure that they reach their target habitat type and condition. Management and monitoring of these habitats will also be detailed with an outline of funding mechanisms to ensure support over a minimum of 30 years.

- 7.3.7. The measures to protect retained habitats throughout construction of the Scheme are outlined within the CoCP. The CEMP will include plans showing the location for all fences/barriers to be erected for the purpose of protecting retained habitats. Reference to the relevant procedures, including any special measures, to be implemented in the event of a pollution incident that could affect retained habitats and other Important Ecological Features. The Principal Contractor will , reduce any habitat loss within the land required for the Scheme by keeping the working area to the minimum required for construction.

#### Additional (Off-site) Measures

- 7.3.8. Offsite habitat creation options are being explored to achieve the 20% BNG aspiration for the Scheme. As these measures have not been secured, are not identified as mitigation for the effects of the C2C Scheme and are not within the Scheme limits, they are not considered as mitigation within this assessment or included within the assessment of likely significant effects. The results of the BNG assessment are included within the Biodiversity Net Gain Assessment Report.
- 7.3.9. All offsite habitat creation will be subject to a long term (30 year) management and maintenance plan. The management plan will prescribe the maintenance regimes for all different landscape / habitats considering the aims, objectives and functions of each area of planting / habitat. The management plan will also set out proposals for monitoring the condition of landscape and habitat creation areas, to assess how these develop post-construction and ensure interventions are made to achieve the desired habitat type and condition.

### **Invasive Non-Native Plant Species**

#### **Construction**

##### Site and Vegetation Clearance

- 7.3.10. Appropriate measures for the treatment and control of invasive, non-native plant species (namely Himalayan Balsam) will be implemented.
- 7.3.11. Appropriate construction, handling, treatment and disposal procedures will be implemented in relation to these, and any other species listed in Schedule 9, Part I or Part II of Section 62 the Wildlife and Countryside Act 1981, as amended, or the Weeds Act 1959 to prevent the spread of such species. Advice in the Environment Agency's publication: Managing invasive non- native plants, April 2010, will also be referenced in determining the strategy.
- 7.3.12. Route-wide measures will be implemented to promote biosecurity and minimise the risk that invasive non-native species and diseases are spread as a consequence of the project.
- 7.3.13. A programme of works will be implemented that will reflect the fact that it can take a number of years to eradicate invasive species such as Himalayan Balsam.
- 7.3.14. Removal of invasive species will take account of ecological best practice guidance and appropriate measures will be taken to identify and protect other features of environmental importance.

## 7.4 PROTECTED AND NOTABLE SPECIES

### AQUATIC ECOLOGY

#### Construction

##### Site and Vegetation Clearance

- 7.4.1. Vegetation removal will be limited to that which is needed for safe and expedient construction of the Scheme. Additionally, restoration and replacement planting will be implemented at the earliest opportunity to reinstate affected areas. This will reduce further erosion and provide replacement habitat.

##### Pollution

- 7.4.2. The pollution mitigation measures for designated sites detailed above will also sufficiently reduce the risk of pollution impacts for aquatic ecology.

##### Visual (Lighting) Disturbance

- 7.4.3. Lighting used for construction (if required) nearby to watercourses will be switched-off when not in use or where appropriate will be motion sensitive and, will be positioned to minimise light spill. Dark corridors will be maintained within the watercourses to allow fish passage.

#### Operation

##### Pollution

- 7.4.4. The proposed drainage strategy<sup>4</sup> will utilise SuDS components to manage the surface run-off entering the watercourses, ensuring that water quality treatment and pollution control requirements are met. Prior to discharging into watercourses, surface water run-off will be conveyed within a network of swales before discharging into attenuation ponds/basins. These ponds, which will support emergent and submerged vegetation along their shoreline and in shallow zones, provide both attenuation and enhance treatment processes.

- 7.4.5. Therefore, this embedded mitigation design will control the levels of suspended sediment and pollutants entering the watercourse, reducing impacts and effects on aquatic macroinvertebrates and fish.

##### Visual (Lighting) Disturbance

- 7.4.6. No lighting impacts during operation of the Scheme are predicted. No permanent lighting is proposed at Bin Brook and the park and ride location near to Callow Brook is unlikely to have light spill onto the brook due to the intervening distance and the buffer of woodland planting proposed around the perimeter of the area.

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<sup>4</sup> Drainage Strategy (Document reference: P11069-SMCE-ZZ-XX-RP-D-0001)

## MAMMALS

### Badger

#### Construction

##### Site and Vegetation Clearance and, Noise and Vibration

- 7.4.7. The information pertaining to Badgers is included within Confidential Badger Survey Report and has been provided to GCP as part of the TWAO submission; it is expected it will be provided to relevant stakeholders by GCP, as appropriate.
- 7.4.8. A pre-construction Badger survey will be carried out in advance of site clearance to ensure that any setts within and up to 30m from the Scheme construction boundary are identified. This will allow identification of any additional mitigation required.
- 7.4.9. Badger setts within the Scheme boundary or within adjacent land up to 30m from the Scheme boundary may be impacted during construction. Where possible, exclusion zones should be adhered to during construction to ensure that impacts are avoided. Depending on the type of impact, the exclusion zones will typically be between 10 and 30m of any active sett entrance. Any works within 30m of any active sett entrance will be assessed by an experienced and competent ecologist to determine whether the exclusion zone may be reduced, and whether additional mitigation and/or licensing from Natural England will be required.
- 7.4.10. Where impacts upon Badgers and their setts cannot be avoided, a Natural England Badger Mitigation licence may be required. This will enable Badgers to be excluded from active setts to enable construction works to proceed legally. Any setts that require exclusion of Badger will be monitored for up to 21 days to determine whether the sett is in current use. If a sett is determined to be in current use, a licence to close the sett will need to be applied for through Natural England. Natural England will generally only grant licences to close active Badger setts between July and November.
- 7.4.11. If piling works are required to construct any part of the Scheme, additional setts beyond 30m of the Scheme boundary may need to be temporarily closed under licence. It is anticipated that piling is required for the construction of the M11 overbridge, however it is not clear at this stage whether vibro-piling or percussive piling will be required. This will need to be determined at detailed design and suitable mitigation designed and implemented by the Principal Contractor. The distance at which disturbance effects on Badgers and their setts will occur will be heavily dependent on the duration and type of piling works necessary. Mitigation for these effects will therefore need to be determined once further construction methodology and information is available.
- 7.4.12. In addition, detailed measures will be included in the CoCP to prevent injury to Badgers during construction, which will include: all compounds and working areas will be checked for Badgers prior to construction; lighting to be directed away from setts and limited light spill in surrounding habitats, all excavations should be covered overnight or of an angled access/egress point installed to allow a means of escape.

#### Operation

##### Road Traffic Collision and Habitat Interruption and Fragmentation

- 7.4.13. Badger proof fencing will be installed where necessary within the Scheme to reduce the risk of vehicle collision during operation. Badger proof fencing will be installed following updated Badger

surveys to determine where this will be required. It is anticipated that Badger proof fencing will be required through sections of the Scheme where activity is most prevalent, particularly where the Scheme severs common commuting routes, foraging areas and near to setts.

- 7.4.14. Underpasses will be installed under the new road where well-used badger pathways are located (namely Coton Orchard) to allow Badger to pass safely under the Scheme and reduce the risk of traffic collisions. The location of these underpasses will be determined at detailed design stage and the design will adhere to relevant best practice. Badger proof fencing and underpasses will be designed in line with Design Manual for Roads and Bridges (DMRB) guidance (DMRB, 2001).

## **Bats**

### **Construction**

#### Site and Vegetation Clearance

- 7.4.15. No confirmed roosts are anticipated to be lost to the Scheme, however a total of 35 trees (five high suitability, 12 moderate suitability and 28 low suitability trees) with roost suitability will likely be removed or remediated (e.g. pruning or pollarding) for health and safety reasons.
- 7.4.16. Felling of these trees will be preceded by a suitable survey or inspection to ensure no roosts/bats are present, in line with BCT guidelines (Bat Conservation Trust, 2016). An updated ground level tree assessment will also be carried out to ensure any additional roost features are identified. Where trees cannot be inspected or surveyed sufficiently before felling, soft felling and dismantling techniques will be employed during the suitable time of year to ensure roost features can be safely brought to the ground and any bats are able to leave roost features overnight. If roosts are identified during pre-felling inspections and surveys, a mitigation licence from Natural England may be required in order to proceed with tree felling or remediation activities.
- 7.4.17. Replacement roost features will be incorporated in the form of bat boxes and veteranisation of retained trees where appropriate. These replacement roost features will compensate for any loss of roost resource and will also act as rescue bat boxes if required under Natural England mitigation licence. The location, number and type of replacement roost feature will be detailed within the Landscape and Ecological Management Plan.
- 7.4.18. Habitat features such as hedgerows, lines of trees and woodland will be interrupted by the Scheme where it intersects these habitats within the landscape. These habitats are typically used by bats to navigate the landscape and construction of the Scheme will permanently sever these habitats. Bat surveys across the Scheme have identified potentially important commuting routes and they have also identified that all of the habitat features that will be intersected are used by a variety of species. In order to maintain connectivity for bats throughout the Scheme, the landscaping proposals include planting of woodland, trees and hedgerows at all habitat features in order to minimise disruption of flight paths for bats through the landscape. Within the landscaping proposals, larger, more mature standard trees have been specified to minimise adverse impacts through habitat severance. Planting of mature standards will ensure that these reinstated habitat features are able to establish faster and reach similar maturity to habitats that are lost to the Scheme through construction. This has included planting of trees along the banks of the busway and as close to the service road as reasonably practicable in order to reduce the gap and interruption caused by the Scheme.
- 7.4.19. Extensive replacement woodland planting at Highfields roundabout (crossing point 9) and an increase in embankment height will ensure planting reduces light spill from the lit junction and to

encourage bats to fly through this area at height. This was an area that was determined to be a potentially important flight path for bats from the radio tracking from Bucket Hill Plantation. This area was also determined to be potentially important for Barbastelle Bats from static detector surveys.

- 7.4.20. Barbastelle Bats were detected in the northeast of the Bourn Airfield, at the entrance from Broadway during crossing point surveys (crossing point 10), although all were heard and not seen by surveyors. Barbastelle Bats were also detected on static detectors placed along a hedgerow north of the existing access which will form the access for the new Bourn Airfield development. The new entrance to the Bourn Airfield development will share the same existing access, with the Scheme also running parallel through this area, however this is outside of the Scheme design, as this area is designed and developed as part of the Bourn Airfield development. Operational impacts from lighting and bus movements will occur at this junction. A dark corridor will be maintained to the west (along the eastern side of Cambourne) and the C2C Scheme will incorporate a new drainage pond and habitat planting with woodland and trees to the north of the new junction layout to ensure dark corridor can be maintained through the C2C and Bourn Airfield development.
- 7.4.21. Barbastelle Bats were recorded at crossing point 19 (static location 13) during 2022 surveys. This is located within the arable field to the west of Long Road. The Scheme will also sever the hedgerow running south. Barbastelle Bats were recorded commuting along the east-west hedgerow and were not recorded commuting south towards the new bus gate junction. As such, mitigation within this area has focussed on enhancing the habitat connectivity in an east-west direction through the planting of new woodland around the north and east of the junction. This habitat planting will also provide a buffer to any lighting proposed at the new bus gate junction. Mature tree planting along the line of the existing hedgerow has been incorporated in the landscaping design to maintain connectivity in a north-south direction.
- 7.4.22. Barbastelle Bats were recorded along Long Road through static detector surveys between 2019 and 2020. They were subsequently recorded commuting north during crossing point surveys in 2022 (crossing point 18). A new traffic light junction is proposed at this location and as such, landscaping has been designed to maintain connectivity along Long Road and maintain flight height by creating bunds along the eastern side of the hedgerow along Long Road. Further mature tree planting has been incorporated in landscape proposals to encourage an increased flight height over the new busway and act as buffer planting to any new lighting at the traffic light junction. These features will be developed further at detailed design stage, however the focus of this mitigation will be to create a bund with mature tree planting on top that will be 4m above the made ground level. This is to encourage commuting bats to pass over of the height of buses running along the Scheme. The sensitive lighting strategy detailed below will also focus on this junction.
- 7.4.23. The following crossing point locations along the route were also considered to require additional landscape mitigation features as they were deemed to be potentially important landscape habitat features routes for bats during crossing point surveys, static detector surveys and activity transect surveys. These locations are identified as potentially important habitat features because Barbastelle Bats have been recorded commuting along them during crossing point surveys or because more than ten commuting bats have been observed during a single crossing point survey. These habitat features are described below.
- Crossing point 6 – The ditch line southwest of Madingley Wood;
  - Crossing point 16 and static point 10 - Hedgerow south of the American Cemetery and Madingley Wood;

- Crossing point 5 and activity transect 2, leg 3 – Hedgerow south of Madingley Windmill, north of Coton Primary School; and
- Crossing point 2 and activity transect 3, leg 4 – The eastern boundary of Coton Orchard.

- 7.4.24. At each of these locations, landscape mitigation features will be incorporated to encourage flight heights to be maintained at a height above 4m. This will include bunds where necessary with mature tree planting over them that will be a minimum height of 4m above the made level of the new road. Willow fencing or similar will be used as a temporary measure if tree planting cannot establish this height initially. It is anticipated that these will be a temporary measure until tree planting has become established and mature. Where the scheme is in cutting, the same principle of a 4m level above the new road height will be designed. It is anticipated that crossing point 5 will be in cutting and no bund creation is necessary, however this will be determined at detailed design stage. As a general rule, the gap between the canopy heights either side of the new road should be less than 20m to encourage bats to maintain their flight height over the road.
- 7.4.25. Barbastelle Bats and a range of other bat species were recorded at crossing point 1, located in the east of the Scheme at the intersection between the Scheme and existing hedgerows south of the University Sports Ground. Bats were generally recorded flying east to west, evidencing foraging and commuting behaviour. This area of the Scheme had particularly high levels of activity, with a large number of heard and not seen bats. It is considered likely that this area is of particular interest as foraging habitat due to the presence of plantation woodland in a north-south aspect and a large, mature hedgerow in an east-west aspect that likely creates a large wind break and in turn used by a high abundance of invertebrate prey. As the majority of commuting activity was considered to be in an east-west direction, additional planting has been incorporated in the landscape proposals that will maintain connectivity to the east and west, as well as north and south.
- 7.4.26. The landscaping strategy has been designed to replace existing bat foraging and commuting habitat to be lost to the Scheme (i.e., hedgerows, tree lines and grassland), and to provide habitat enhancement.
- 7.4.27. The newly created habitat will provide potentially greater access and foraging habitats around and within the Scheme for bats, particularly when compared to the existing arable land. The landscape strategy will also provide some mitigation / buffering for increased levels of lighting. The landscaping proposals will be reassessed by an ecologist at detailed design to ensure no adverse effects on the FCS of the local bat population.

#### Visual (Lighting) Disturbance

- 7.4.28. Lighting during construction may affect bat foraging and commuting routes and the permeability of the landscape for bats, both within and surrounding the site, resulting in temporary fragmentation of significant flight commuting routes linked to important roosts in the wider area. This will be most prevalent where compounds are located and may require lighting beyond typical working hours for security. It is considered that the majority of the works will take place during standard working hours and therefore will limit the disturbance to bats foraging / commuting bats from general construction activities. Lighting and position of compounds will be detailed within the CEMP which will determine the appropriate set up of compounds in order to limit light spill onto important bat habitat.
- 7.4.29. Lighting during the construction phase would be designed to satisfy the requirements of the Institute of Lighting Professional's Guidance Note 01/21 'The Reduction of Obtrusive Light' (Institute of



Lighting Professionals, 2021), which would limit potential disturbance effects. Construction would also be carried out primarily during daylight hours (during periods where bats are largely inactive).

- 7.4.30. Any such lighting required will be restricted to, and directed towards, the working areas to prevent any light spill and disturbance /displacement of roosting, foraging and commuting bats in adjacent habitat. Habitats of importance for commuting and foraging bats are considered to be ditches and other water bodies, broadleaved woodland, scattered trees, , lines of trees, hedgerows, orchard, scrub and grassland. Night working outside may be permitted following development of the lighting strategy and under supervision of the ECoW. The CEMP and lighting strategy will be conditioned/provided as part of detailed design and will ensure that a 10 m dark corridor will be maintained along all potentially important habitats.
- 7.4.31. The maintenance and monitoring of the required dark corridors during construction will allow bats to continue to forage and commute. Appropriate additional or remedial measures will be employed if necessary following results of monitoring. This is required to maintain the Favourable Conservation Status of the local bat population.

## **Operation**

### Road Traffic Collision

- 7.4.32. The landscape mitigation features to mitigate impacts of habitat loss and fragmentation on bats have been designed to incorporate measures to reduce collision risk during operation of the Scheme.

### Visual (Lighting) Disturbance

- 7.4.33. In addition to the landscaping measures detailed above which will reduce lighting impacts in the long term, a Lighting Strategy will need to be developed and conditioned at detailed design to ensure all road lighting and in particular any road lighting introduced near and at junctions, in proximity to likely significant bat flight paths will be assessed and approved suitable experienced ecologist. The potential effects of lighting will be mitigated in accordance with standard guidelines (BCT and ILP, 2018). The assessment will first attempt to avoid impacts of lighting by ensuring that lighting is necessary in the first instance and whether timers can be installed to minimise the duration that lighting is switched on. Any lighting installations will use warm colour lighting that emits minimal ultra-violet, and will attract relatively few insects, and will not attract bats to enter the road corridor. In addition, the use of hoods/cowls, louvres or other luminaire design features will be used to reduce light spill within vicinity of the road junctions and light spill will be reduced to <1 lux at 10m from the road.

## **Otter**

### **Construction**

### Noise and Visual Disturbance

- 7.4.34. Construction compounds near to Bin Brook will be surrounded by hoardings to reduce visual effects due to the presence of construction traffic, plant and equipment. These will be in place for the duration of the relevant construction activities in this area. Solid hoardings will be provided on the eastern and southern boundaries.
- 7.4.35. There are no anticipated night-time works for the construction of the bridge over Bin Brook. However, a Lighting Strategy ( WSP, 2022) document reference 70086660-WSP-C2C-XX-RP-LI-0001) has been produced which includes measures to ensure that operational lighting design will

minimise impacts from lighting habitats that are currently unlit during construction. These measures are outlined within the CoCP.

## **Water Vole**

### **Construction**

#### Site and Vegetation Clearance

- 7.4.36. General precautionary mitigation is detailed within the CoCP to avoid impacts upon Water Voles during construction. No works will be permitted within 5m of Bin Brook or Callow Brook until suitable update surveys and mitigation have been undertaken.
- 7.4.37. An updated water vole survey will be undertaken prior to construction to establish whether Water Voles are present within the affected areas will be carried out. This pre-construction survey will map the extent of any water vole burrows and field signs to ensure that field survey data is relevant at the time of construction works. This survey will need to be undertaken during the active season. If Water Vole burrows and field signs are located in proximity to the outfall location, the placement of the outflow into Callow Brook will be reassessed to determine whether impacts upon burrows can be avoided. If this is not possible, a Natural England Mitigation licence may be required to displace water voles temporarily to avoid impacts during construction. In the event that Water Vole burrows are identified within the locality of the new Bin Brook overbridge, a licence may be required to facilitate the construction in this area.
- 7.4.38. During construction, any Water Voles present will be displaced from affected ditches into retained, unaffected and connected habitat. Where the update survey determines Water Vole presence, displacement will be required to be carried out under a Natural England licence. Where presence is not confirmed, displacement will be completed under an Ecological Method Statement. These survey and mitigation measures will be specified in the CEMP. The displacement methodology will follow the guidelines set out in the Water Vole Mitigation Handbook (Dean, Strachan, Gow, & Andrews, 2016), which includes for the gradual and directional removal of vegetation (where <50 m is lost), under the supervision of an appropriately qualified ecologist. It is not anticipated that habitat loss will occur beyond this length of watercourse.

## **BIRDS**

### **Breeding and Wintering Birds**

#### **Construction**

#### Site and Vegetation Clearance

- 7.4.39. If carried out during the breeding season, vegetation and site clearance could cause the destruction or damage of active nests and any eggs or live young present. The following measures will therefore be implemented:
- Any vegetation or trees that do not require clearance to facilitate the Scheme will be retained and protected during construction with appropriate construction fencing;
  - Vegetation and site clearance will take place between September and February inclusive, i.e., outside the main bird breeding season, wherever practicable. Should it be necessary to remove habitats suitable for breeding birds during the nesting season, these will be subject to a pre-clearance check by an ornithologist (or Ecological Clerk of Works); and

- In the event any active nests are found, clearance works will be halted within a minimum distance of 5 m from the nest. This buffer distance will be varied on the advice of the ecologist, dependent on the nature of affected habitats and the species of bird involved. Clearance works will not recommence until any young have fledged and left the nest, with a re-inspection by an ecologist to confirm the absence of active nests.

7.4.40. The proposals for reinstatement and compensatory habitat as set out in the landscape proposals will provide replacement habitat for breeding and wintering birds. The following compensation planting will be provided:

- New woodland planting throughout the Scheme;
- New and enhanced hedgerows within the Scheme boundary ; and
- Provision of scrub, traditional orchard, grassland and new wet ponds within the Scheme boundary.

7.4.41. The management of new landscaped areas within the Scheme will be detailed within a Landscape and Ecological Management Plan.

7.4.42. The habitat that will be secured to achieve BNG would provide additional habitat for breeding and wintering birds that would be over and above the compensation included within this assessment. This will likely result in a net gain in breeding and foraging habitat for a range of birds species.

## REPTILES

### Construction

#### Site and Vegetation Clearance

- 7.4.43. Vegetation clearance in areas that may support reptiles will be carried out under an Ecological Method Statement, to minimise the risk of individual reptiles being killed or injured during site and habitat clearance.
- 7.4.44. During construction, vegetation clearance will be carried out in a manner that will ensure the protection of reptiles. A two-stage cut of vegetation will be used to remove suitable habitat within the reptile active period (c. March – September inclusive, weather dependent) to allow reptiles to move out of the area of their own accord. Any hibernacula within the construction footprint will be dismantled during the active period and will be reconstructed outside of the construction footprint to provide safe refuge for reptiles.
- 7.4.45. The proposals for reinstatement, enhancement and compensatory habitat as set out in the landscape proposals, will provide replacement habitat for local reptile populations which will include additional wet pond and grassland creation adjacent to the Cambridge University Sports Ground, and grassland and scrub creation throughout the Scheme alignment. The management of landscaped areas will be incorporated into a Landscape and Ecological Management Plan.

## TERRESTRIAL INVERTEBRATES

### Construction

#### Site and Vegetation Clearance

- 7.4.46. Key areas for terrestrial invertebrates will be lost to the Scheme. The following measures will be implemented to mitigate impacts on terrestrial invertebrates and will focus on habitat compensation. These measures will be documented in full within a Landscape and Ecological Management Plan.

- Habitat creation throughout the Scheme includes suitable habitats for a range of terrestrial invertebrate species, including those recorded during the terrestrial invertebrate surveys of the Coton Orchard and other key invertebrate sites; and
- Dead wood features such as log piles will be created from orchard trees and other trees that will be lost to the Scheme. Although this will be of limited benefit to species that are associated with standing deadwood, they will provide habitat for a range of other species.

7.4.47. Darkling Beetle, Clown Beetles, Checkered Beetle, Click Beetle and False Click Beetle are species associated with standing and fallen dead wood, a resource that is abundant within Coton Orchard. Provision of deadwood derived from the orchard trees lost to the scheme will provide some compensation for the loss of deadwood resource. Fruit tree planting adjacent to the Scheme through Coton Orchard will also provide some compensation in the long term for these habitat resources, as well as other invertebrates species.

7.4.48. The Large Fruit Bark Beetle are a species that is associated with orchards and decaying trees. Therefore, the loss of this habitat resource cannot be compensated through the provision of log piles or fallen deadwood or tree planting, at least in the short term. This Nationally Scarce species (category B) will be impacted by the Scheme through habitat loss. Given the abundance of this resource throughout Coton Orchard, this species will likely persist within the areas of the orchard outside of the Scheme limits.

The mitigation measures for terrestrial invertebrates will be secured through the provision of a Landscape and Ecological Management Plan.

## 8 ASSESSMENT OF SIGNIFICANT EFFECTS

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- 8.1.1. This section details the assessment of significant effects taking account of the mitigation detailed in Section 7: mitigation measures above.

### DESIGNATED SITES

#### Statutory Designated Sites of International and National Importance

- 8.1.2. Following implementation of the embedded and additional mitigation measures for Barbastelle Bats, impacts during construction and operation of the Scheme on Eversden and Wimpole Woods SAC are not predicted to be significant.

#### Non-Statutory Designated Sites

- 8.1.3. Following implementation of the mitigation and habitat compensation measures, effects on non-statutory designated sites are not predicted to be significant.

### HABITATS AND BOTANICAL

#### Habitats

- 8.1.4. On the basis of embedded mitigation measures, there will be a likely significant effect upon HPI as a result of construction of the Scheme. There will be an increase in the area of lowland mixed deciduous woodland through the habitat creation within the Scheme, however it is recognised that this habitat will take time to reach maturity and establish into HPI habitat. The area of lowland mixed deciduous woodland within the Scheme prior to development is 1.82ha and the area of this HPI in the long term (10 years), post development (including retaining and created habitat) will be 7.53ha.
- 8.1.5. The area of traditional orchard (0.42ha) within Coton Orchard will be lost to the Scheme and compensatory habitat has not been proposed within the Scheme boundary. There are 4.87km of hedgerows that qualify as HPI within the Scheme boundary prior to development and 3.58km post-development (including retained and created hedgerow priority habitat). Overall, there remains a net loss of hedgerows as a result of construction of the Scheme.
- 8.1.6. Due to the net loss of traditional orchard and hedgerow HPI there remains a residual likely significant effect. As the traditional orchard habitat within the Scheme boundary was assessed as being of County importance it is considered that the impacts upon habitats will lead to permanent adverse effects that are significant at a County scale.
- 8.1.7. Offsite compensation measures are proposed as mitigation, the provision of which will be secured by pre-commencement planning condition. Offsite compensation has been proposed rather than extending the Scheme boundary to accommodate additional habitat creation. This is largely due to the type of management required as small areas of traditional orchard and hedgerow created adjacent to the busway would likely be of less wide benefit than if they were created as part of an offsite habitat creation scheme. In addition, hedgerow planting parallel to the Scheme could have adverse implications for landscape and visual impacts.
- 8.1.8. Two offsite habitat creation sites have been identified to provide compensatory measures as well as BNG. These sites will be investigated further at detailed design stage. Both sites fall within the South Cambridgeshire District area.

- 8.1.9. The Biodiversity Metric will be used to ensure that the area and type of habitat to be created will be sufficient to compensate for those HPI that are lost to the Scheme. Due to the difficulty of creating certain habitat types and the time that it will take for certain habitat to become established, habitats are replaced at a higher ratio that is relative to this difficulty and time.
- 8.1.10. It is recognised that traditional orchard largely comprises trees of approximately 50-60 years old, and a number of apple trees will be over 100 years old at the time of construction. The compensation ratio of traditional orchard will be approximately 2:1 in area. Traditional orchards are important due to a range of factors included their fruit and nut trees, which are just one component part of the habitat. The created habitat can include a range of fruit and nut varieties that will provide fruit and nectar resources. Appropriate management can also provide a range of swards heights, with the grassland understorey managed in a low intensity way. The compensatory habitat, although not equivalent in age, can provide the same habitat type and ecological importance.
- 8.1.11. Offsite habitat creation that is secured to achieve the aspiration for 20% BNG would also provide additional habitat beyond that required to compensate for likely significant effects of the Scheme. Although the habitat created to achieve 20% BNG may not include HPI.
- 8.1.12. The additional habitat required to achieve 20% BNG will be created solely to achieve the BNG target. This will ensure that the additionality principles of the Good Practice Principles for Development (CIEEM, IEMA & CIRIA, 2016) are met. This principle ensures that net gains are achieved that demonstrably exceed existing obligations (i.e., do not deliver something that would occur anyway).

### **Invasive Non-Native Species**

- 8.1.13. Following implementation of mitigation measures it is considered that the spread of invasive non-native plants can be avoided.

## **PROTECTED AND NOTABLE SPECIES**

### **Aquatic Ecology**

- 8.1.14. Following implementation of the mitigation measures, impacts on fish, aquatic macroinvertebrates and macrophytes are not predicted to be significant.

### **Mammals**

#### **Badger**

- 8.1.15. Following implementation of the mitigation measures effects on Badgers can be avoided or suitably mitigated throughout construction and operation of the Scheme.

#### **Bats**

- 8.1.16. Following implementation of the mitigation measures, impacts on all bat species are not considered to be significant.

#### **Otter**

- 8.1.17. Following implementation of the mitigation measures, effects on Otters are not predicted to be significant.

### **Water Vole**

- 8.1.18. Following implementation of mitigation measures, impacts on Water Vole during construction of the Scheme are not predicted to be significant.

### **Birds**

#### **Barn Owl**

- 8.1.19. Following implementation of the additional mitigation measures, effects on Barn Owl are not predicted to be significant.

#### **Breeding and Wintering Birds**

- 8.1.20. It is anticipated that impacts from construction on nesting birds can be avoided through the proposed mitigation measures. Given the clearance of habitats during construction, there will be a loss in suitable nesting habitat for breeding birds including foraging and roosting habitat for wintering birds. Impacts from habitat loss are therefore predicted to remain with effects predicted to be significant adverse at a Local scale in the short term until compensation measures have been implemented through landscape proposals and within offsite compensation areas. Once these habitats have been created, it is anticipated that the effect of habitat loss on breeding and wintering birds will not be significant.
- 8.1.21. Areas of arable land will be permanently lost to the Scheme. The largest areas of this habitat loss are at the park and ride location, between that land west of Long Road (5750m) to Cambridge Road, Coton (8550m), and the land west of the University Sports Ground (10350m to 11000m). A total of 102 records of Skylark were recorded throughout arable land during the breeding bird surveys. Twenty-four territories were mapped and of these, seven were located either wholly or partially within the Scheme limits. Limited ground nesting habitat suitable for Skylark will be created through the development. However, given the low number of territories within the Scheme limits and that many of the territories are only partially within these limits, it is considered that the loss of these habitats is not significant.

### **Reptiles**

- 8.1.22. Following implementation of the mitigation measures effects on reptiles are not predicted to be significant.

### **Terrestrial Invertebrates**

- 8.1.23. Following implementation of mitigation and compensation measures, impacts on terrestrial invertebrates are predicted to be minor adverse with effects predicted to be significant adverse at a Local scale in the short term prior to compensation measures reaching their target habitat type and maturity. In the long term, once compensatory habitats have established it is not considered that the effects of habitat loss will not be significant.

## 9 CUMULATIVE EFFECTS

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- 9.1.1. The Proposed Development is in an area with several other plans and projects which have either come forward or are expected to come forward in the near future. There is therefore potential for non-significant effects arising from the Scheme alone to combine with those from other plans and projects. This may result in cumulative effects to Important Ecological Features which could be significant.
- 9.1.2. The outcome of the Biodiversity element of the EIA for the Scheme alone is that impacts will be non-significant or temporary Local scale adverse impacts during construction only. Chapter 11: Cumulative Effects has scoped in a 11 commercial and residential development projects for the assessment of cumulative impacts which are described below.
- 9.1.3. Additional plans and projects within the vicinity of the Scheme have been considered for inclusion in this cumulative assessment. The potential impacts and effects of each plan and project considered within this assessment have been refined specifically in relation to the Important Ecological Features that are predicted to be affected by the Scheme. They therefore differ from those included in Chapter 11: Cumulative Effects.

### COMMERCIAL AND RESIDENTIAL DEVELOPMENT

- 9.1.4. There are 11 residential and commercial developments listed below which have either been granted planning permission, are under construction or are awaiting decision. These developments have been considered as potentially having a cumulative effect with the Scheme and other projects.
- Cambourne West (under construction);
  - Bourn Airfield New Village (outline consent granted);
  - Land at Highfields (under construction);
  - Inspired Villages at Comberton: Integrated retirement community (pre-application);
  - West Cambridge Development Site (under construction);
  - Clerk Maxwell Road Scheme (under construction);
  - Northwest Cambridge Development (under construction);
  - Land Between 21 And 29 Barton Road (under construction);
  - Darwin Green. (outline consent granted);
  - New Development at St Chad's (consented); and
  - Grange Lane College Accommodation (under construction).
- 9.1.5. The majority of these development schemes are small to medium sized developments that are generally isolated from the C2C Scheme and the Important Ecological Features that are included in this assessment. It is considered that for the majority of the developments, there are no plausible impact pathways that could combine to result in significant effects.
- 9.1.6. Cambourne West is a large-scale mixed development of up to 2350 residential units, commercial, community and leisure facilities. The development is to the west of Cambourne, approximately 1.6km from the C2C Scheme. The development will impact almost exclusively upon arable land, with a number of field boundaries also affected. Due to the distance of the Scheme and that it largely impacts upon habitats of low importance, there are no anticipated cumulative effects.
- 9.1.7. The C2C Scheme will extend through the Bourn Airfield development, with part of the busway being developed as part of these proposals, where the C2C Scheme extends from Bourn Airfield, across



Broadway and into Cambourne. The Bourn Airfield development is a mixed-use village providing approximately 3500 residential units, commercial, leisure and community facilities. There is potential for cumulative impacts to occur between these two projects, given the scale of the Bourn Airfield development and the spatial overlaps between the two projects. A potential cumulative impact during construction and operation phases is considered with regards to the Bourn Airfield development and, but the only likely features that this may affect are bats and habitats.

- 9.1.8. The Bourn Airfield development is subject to the EIA process and mitigation for bats is incorporated within the Scheme. This includes retention and incorporation of green/dark corridors and important habitat features for bats such as woodland and boundary hedgerows. These features are included within the Scheme design and mitigation proposals. Bourn Airfield is dominated by habitats of low ecological importance, including arable and green space provision extensive. It is likely that the two projects will impact some of the same ecological features during operation and construction, but the combined impacts are unlikely to lead to significant effects.

### **A428 BLACK CAT TO CAXTON GIBBET ROAD IMPROVEMENT SCHEME**

- 9.1.9. Planning permission (via a Development Consent Order (DCO)) was granted for the A428 Black Cat to Caxton Gibbet Road Improvement Scheme by the Secretary of State in August 2022.
- 9.1.10. The scheme was subject to an EIA and HRA includes measures to mitigate impacts upon biodiversity. Accounting for the mitigation measure, the scheme will have effects which vary between negligible adverse and slight beneficial. The scheme will also achieve net gain in biodiversity. As such, no significant cumulative effects are predicted.

### **SUMMARY OF CUMULATIVE EFFECTS ASSESSMENT**

- 9.1.11. In consideration of relevant plans and projects in relation to the developments noted above, it is generally concluded that other developments will have no significant effects on any Important Ecological Features that are affected (non-significantly) by the Scheme.

## 10 MONITORING

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- 10.1.1. A post-construction monitoring programme should be carried out during the first five years after construction. This will focus on the establishment of the ecological mitigation measures, including offsite compensation areas, help inform future management and, if necessary, allow for the implementation of remedial measures.
- 10.1.2. Ecological monitoring surveys should be required to assess the efficacy of the mitigation for significant effects stated in Section 7 and confirm the findings of this impact assessment. The monitoring would be secured by planning condition and through the provision of a Landscape and Ecological Management Plan.
- 10.1.3. An aftercare plan will be included as part of the Landscape and Biodiversity Mitigation Strategy. The Strategy would provide an auditable record of the mitigation commitments identified and the requirements for regular maintenance. It is anticipated that the following monitoring activities will be required to ensure implemented mitigation is successful.

### **Habitats**

- 10.1.4. Surveys of landscape and habitat creation and mitigation areas should be completed following completions of the construction phase. This would assess the success of habitat mitigation measures and ensure that any remedial management and planting is identified and completed.

### **Bats**

- 10.1.5. Walkover surveys of reinstated, created and enhanced habitats on and off-site to assess suitability for foraging and commuting bats should be completed. In addition, crossing point surveys should be completed to assess the success of landscape mitigation features. Surveys should be completed between May and September in years 1, 3 and 5 following completions of the construction phase.

### **Badger**

- 10.1.6. Monitoring of underpasses and fencing will be carried out in years 1, 3, 5 and 10 to ensure that fencing and underpasses remain effective. This monitoring will use a combination of site visits to check fencing and underpasses for signs of use and condition, as well as camera traps where required to monitor for longer periods of time.
- 10.1.7. Should any ecological mitigation measures be identified as failing by the monitoring exercises, the Ecology Management Plan will be reviewed and remedial works to ensure that the objectives are achieved may be necessary.

## 11 SUMMARY

11.1.1. A summary of the impact assessment upon Important Ecological Features during construction and operation of the Scheme is summarised in **Table TR5-11-1** and **Table TR5-11-2** below.

**Table TR5-11-1 - Assessment of potential effects, mitigation and residual effects during construction**

Sensitive Receptor	Potential Effects/Additional Mitigation/Residual Effects		
<b>Non-statutory Designated Sites – Coton Path Hedgerow CWS, Bin Brook CiWS and Scrubland east of the M11 CiWS</b>	<b>Potential Effects</b>	Potential to be affected by direct habitat loss from site and vegetation clearance, as well as water bourn pollution from sediment load or accidental pollutant release.	
	<b>Effect Nature</b>	Adverse	
	<b>Effect Type and duration</b>	Temporary (disturbance) and permanent (habitat loss and pollution)	
	<b>Significance of Effect</b>	Significant at a Local Scale	
	<b>Mitigation</b>	All necessary measures to minimise habitat loss and to minimise the risk and effects of pollution are detailed within the CoCP and will be secured through a CEMP. Replacement scrub and woodland planting is included in the design proposals and once matured, will compensate for habitat loss.	
	<b>Residual Effects</b>	On the basis of embedded mitigation measures, <b>no significant effects</b> on non-statutory designated sites during construction are predicted.	
	<b>Optional (additional) Mitigation</b>	Offsite habitat creation is proposed to compensate for the loss of HPI habitats (traditional orchard and hedgerows).	
<b>Habitats</b>	<b>Potential Effects</b>	Will be affected by direct habitat loss from site and vegetation clearance.	
	<b>Effect Nature</b>	Adverse	
	<b>Effect Type</b>	Permanent	
	<b>Significance of Effect</b>	Significant at a County Scale	
	<b>Mitigation</b>	All necessary measures to minimise habitat loss through construction are detailed within the CoCP and will be secured through a CEMP. Measures to reduce habitat loss are embedded in the Scheme design alongside habitat compensation within the landscape proposals the long-term maintenance of these habitats will need to be detailed within a Landscape Ecological Management Plan.	
	<b>Residual Effects</b>	On the basis of embedded mitigation measures, a <b>likely significant effect</b> upon habitats during construction is	

		predicted at a County scale due to the loss of habitat that is considered to be of County importance.
	<b>Optional Mitigation</b>	Offsite habitat creation is proposed to compensate for the loss of HPI habitats (traditional orchard and hedgerows).
<b>Invasive Non-Native Species</b>	<b>Potential Effects</b>	There is potential for spread of Himalayan Balsam from Bin Brook during construction of the Scheme.
	<b>Effect Nature</b>	Adverse
	<b>Effect Type</b>	Permanent
	<b>Significance of Effect</b>	N/A
	<b>Mitigation</b>	Mitigation to avoid spread of INNS are detailed within the CoCP and will be secured via a CEMP.
	<b>Residual Effects</b>	On the basis of embedded mitigation measures, it is likely that the spread of Himalayan Balsam can be avoided entirely during construction.
<b>Aquatic Ecology – Macroinvertebrates, Fish and Macrophytes</b>	<b>Potential Effects</b>	Site and vegetation clearance leading to habitat loss. Potential for increased sediment load, as well accidental spillage or pollution events.
	<b>Impact Nature</b>	Adverse
	<b>Impact Type</b>	Permanent
	<b>Significance of Effect</b>	Local scale
	<b>Mitigation</b>	Mitigation to reduce habitat loss and pollution during construction are detailed within the CoCP and will be secured via a CEMP.
	<b>Residual Effects</b>	On the basis of embedded and mitigation measures, <b>no significant effects</b> upon aquatic ecology during construction are predicted.
<b>Badger</b>	<b>Potential Effects</b>	Site and vegetation clearance along with noise and vibration during construction are likely to lead to destruction/damage to setts and/or death/injury/disturbance to Badgers.
	<b>Effect Nature</b>	Adverse
	<b>Effect Type</b>	Permanent
	<b>Significance of Effect</b>	N/A
	<b>Mitigation</b>	Measures to avoid and mitigate impacts upon Badgers and their setts are detailed within the CoCP and will be secured via a CEMP and Natural England mitigation licence, where necessary, to temporarily or permanently close setts prior to construction.

	<b>Residual Effects</b>	On the basis of embedded mitigation measures, impacts upon Badgers and their setts can be sufficiently mitigated to ensure legal compliance. As such there are no significant effects predicted upon Badgers.
<b>Bats</b>	<b>Potential Effects</b>	Site and vegetation clearance is likely to lead to foraging and commuting habitat loss and interruption of commuting corridors. Lighting during construction may also lead to further disturbance to foraging, commuting and roosting habitat.
	<b>Effect Nature</b>	Adverse
	<b>Effect Type</b>	Permanent (habitat loss/fragmentation)
	<b>Significance of Effect</b>	National (Barbastelle Bats) and Local (all other species)
	<b>Mitigation</b>	Mitigation measures for habitat loss and lighting impacts during construction are detailed within the CoCP and will be secured via a CEMP. Measures to mitigation the impacts of habitat loss and interruption of commuting routes have been embedded in the Scheme design and long-term management and maintenance will be secured via Landscape and Ecological Management Plan.
	<b>Residual Effects</b>	On the basis of embedded mitigation measures, <b>no significant effects</b> upon all bat species during construction are predicted.
<b>Otter</b>	<b>Potential Effects</b>	Noise and visual disturbance could deter Otters from the suitable habitat along Bin Brook.
	<b>Effect Nature</b>	Adverse
	<b>Effect Type</b>	Temporary
	<b>Significance of Effect</b>	Local scale
	<b>Mitigation</b>	Measures to avoid and mitigate impacts upon Otters are detailed within the CoCP and will be secured via a CEMP
	<b>Residual Effects</b>	On the basis of embedded mitigation measures, <b>no significant effects</b> upon Otter during construction are predicted.
<b>Water Vole</b>	<b>Potential Effects</b>	Site and vegetation clearance and any construction activities within 5m of Bin Brook and Callow Brook could lead to damage/destruction of Water Vole Burrows if presence within the construction area. This could also lead to

		death/injury/disturbance to individuals.
	<b>Effect Nature</b>	Adverse
	<b>Effect Type</b>	Permanent
	<b>Significance of Effect</b>	Local scale
	<b>Mitigation</b>	Measures to avoid and mitigate impacts upon Water Voles and their burrows are detailed within the CoCP and will be secured via a CEMP and Natural England mitigation licence, where necessary, to temporarily displace or translocated during construction of the Scheme.
	<b>Residual Effects</b>	On the basis of embedded mitigation measures, <b>no significant effects</b> upon Water Vole during construction are predicted.
<b>Breeding and Wintering Birds</b>	<b>Potential Effects</b>	Site and vegetation clearance has the potential to kill/injure wild birds and damage/destroy active nests. These activities will also lead to habitat loss for breeding and wintering species.
	<b>Effect Nature</b>	Adverse
	<b>Effect Type</b>	Permanent
	<b>Significance of Effect</b>	Local scale
	<b>Mitigation</b>	Mitigation measures to avoid impacts upon breeding birds are detailed within the CoCP and will be secured via a CEMP. Habitat compensation is embedded within the Scheme design and long-term management and maintenance of these habitats included within a Landscape and Ecological Management Plan.
	<b>Residual Effects</b>	On the basis of embedded mitigation measures, <b>no significant effects</b> upon breeding and wintering birds during construction are predicted.
<b>Reptiles</b>	<b>Potential Effects</b>	Site and vegetation clearance has the potential to kill/injure Common Lizard and Grass Snake if present within suitable habitat within the Scheme.
	<b>Effect Nature</b>	Adverse
	<b>Effect Type</b>	Permanent
	<b>Significance of Effect</b>	Local scale
	<b>Mitigation</b>	Measures to avoid impacts upon reptiles are included within the CoCP and will be secured via a CEMP.
	<b>Residual Effects</b>	On the basis of embedded mitigation measures, <b>no significant effects</b> upon reptiles during construction are predicted.

Terrestrial Invertebrates	<b>Potential Effects</b>		Site and vegetation clearance leading to habitat loss within the construction boundary.
	<b>Effect Nature</b>		Adverse
	<b>Effect Type</b>		Permanent
	<b>Significance of Effect</b>		Local scale
	<b>Mitigation</b>	Measures to compensate for habitat loss are embedded in the Scheme design where possible. Long term management and maintenance of these habitat will be detailed within a Landscape and Ecological Management Plan.	
	<b>Residual Effects</b>	On the basis of embedded I mitigation measures, <b>no significant effects</b> upon terrestrial invertebrates during construction are predicted.	

**Table TR5-11-2 - Assessment of potential effects, additional mitigation and residual effects during operation**

Sensitive Receptor	Potential Effects/Additional Mitigation/Residual Effects		
Internationally Designated Sites – Eversden and Wimpole Woods SAC	<b>Potential Effects</b>		Potential for increased risk of traffic collision and road mortality at key commuting and foraging areas for Barbastelle which are the qualifying species at the SAC
	<b>Effect Nature</b>		Adverse
	<b>Effect Type</b>		Permanent
	<b>Significance of Effect</b>		National scale
	<b>Mitigation</b>	Measures to mitigate collision risk along key commuting routes are embedded within the Scheme design and landscape design. A Landscape Ecological Management Plan will be required to ensure long term management and maintenance of these mitigation features. A sensitive lighting strategy will also need to be designed for the Scheme at key commuting/foraging routes at road junctions as detailed within this assessment.	
	<b>Residual Effects</b>	Following implementation of embedded and additional mitigation measures, <b>no significant effects</b> upon Barbastelle during operation are predicted.	
Aquatic Ecology – Macroinvertebrates, Fish and Macrophytes	<b>Potential Effects</b>		Potential for increase water runoff from road entering watercourses containing pollutants.
	<b>Effect Nature</b>		Adverse
	<b>Effect Type</b>		Permanent
	<b>Significance of Effect</b>		Local scale

	<b>Mitigation</b>	Embedded mitigation to ensure polluted water from SuDS ponds that outflows into Callow Brook and Bin Brook are sufficiently filtered to avoid pollutants entering watercourses.
	<b>Residual Effects</b>	Following implementation of embedded mitigation measures, <b>no significant effects</b> upon macroinvertebrates, fish and macrophytes during operation are predicted.
<b>Badger</b>	<b>Potential Effects</b>	Potential for increase traffic collision and road mortality.
	<b>Effect Nature</b>	Adverse
	<b>Effect Type</b>	Permanent
	<b>Significance of Effect</b>	N/A
	<b>Mitigation</b>	Provision of underpasses and suitable exclusion fencing to be determined at detailed design stage.
	<b>Residual Effects</b>	Following implementation of embedded mitigation measures, <b>no significant effects</b> upon Badger during operation are predicted.
<b>Bats</b>	<b>Potential Effects</b>	Potential for increased risk of traffic collision and road mortality at key commuting and foraging areas for Barbastelle and other at-risk bat species.
	<b>Effect Nature</b>	Adverse
	<b>Effect Type</b>	Permanent
	<b>Significance of Effect</b>	National scale (Barbastelle) and Local Scale for all other at-risk species.
	<b>Potential Effects</b>	Potential for increased risk of traffic collision and road mortality at key commuting and foraging areas for Barbastelle and other at-risk bat species.
	<b>Mitigation</b>	Measures to mitigate collision risk along key commuting routes are embedded within the Scheme design and landscape design. A Landscape Ecological Management Plan will be required to ensure long term management and maintenance of these mitigation features. A sensitive lighting strategy will also need to be designed for the Scheme at key commuting/foraging routes at road junctions as detailed within this assessment.
	<b>Residual Effects</b>	On the basis of embedded mitigation measures, <b>no significant effects</b> upon bats during operation are predicted.

11.1.2. There are no predicted cumulative effects upon Important Ecological Features in combination with other plans and projects in the surrounding area. Monitoring will be required for all planted habitats to ensure that they meet the condition and habitat type to adequately compensate for the loss of HPI. In addition, monitoring of the landscape mitigation features embedded in the design for bats will be required. Monitoring of fencing and underpasses for Badger will also be undertaken. These monitoring measures are required to ensure compliance with best practice guidelines.





- 11.1.3. Optional offsite mitigation has been proposed to compensate for the loss of HPI habitats, namely traditional orchard and hedgerows. They can be secured by planning condition.
- 11.1.4. The Scheme will achieve 20% net gain in biodiversity from the combination of onsite habitat creation and enhancement which has been embedded in the mitigation and landscape design, and offsite habitat creation. This net gain will be over and above the habitat creation required to mitigate significant effects of the Scheme.

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# Appendix A


## FIGURES





THIS DRAWING MAY BE USED ONLY FOR THE PURPOSE INTENDED AND ONLY WRITTEN DIMENSIONS SHALL BE USED.

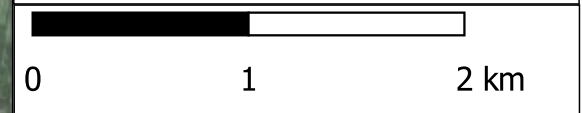
**Legend:**

 Scheme Boundary



STATUS: **FINAL**

Copyright  
Map data: Google ©2023



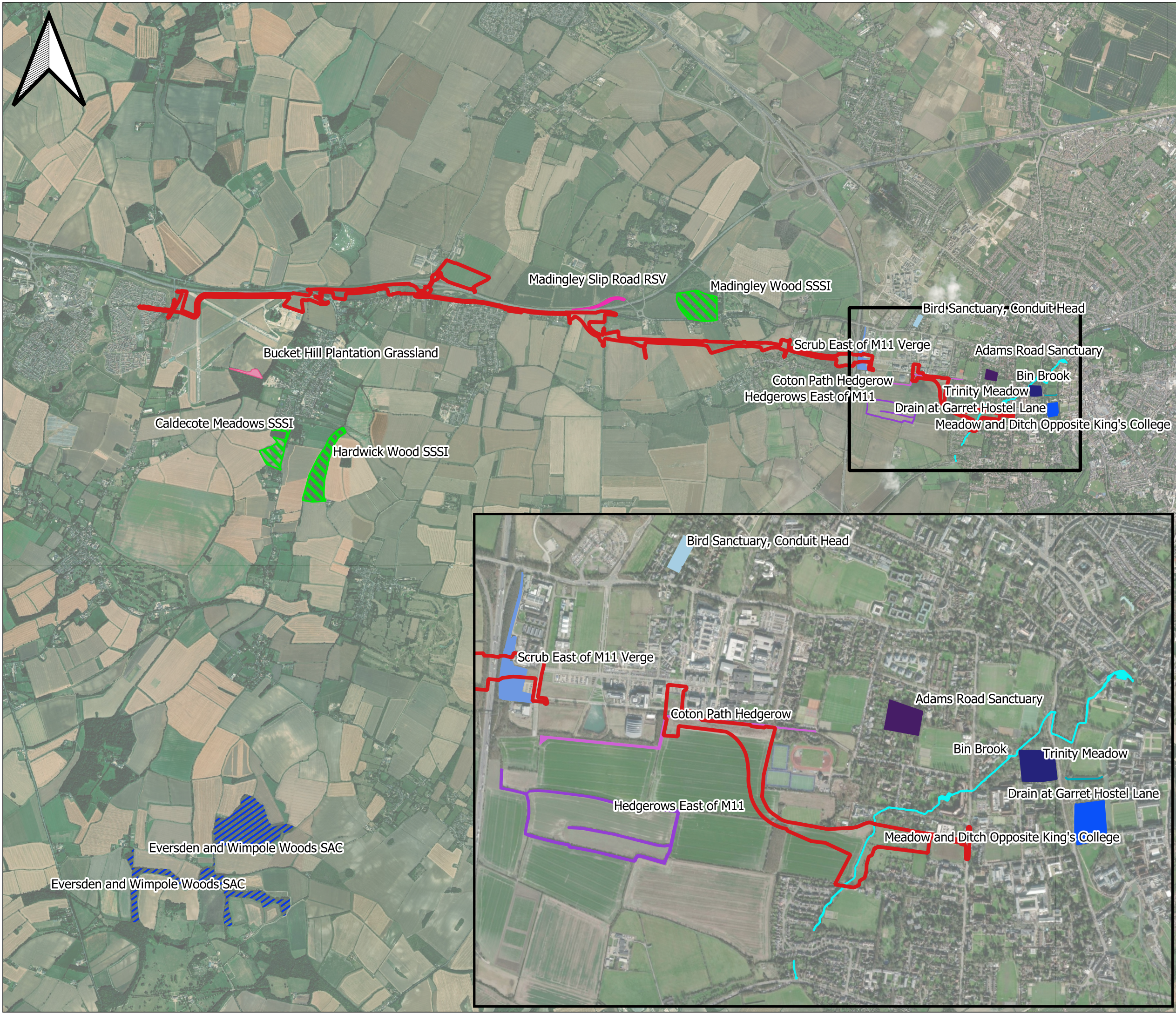
CLIENT: **Greater Cambridge Partnership**

PROJECT: **Cambourne to Cambridge**

TITLE: **Figure 5.1 C2C Scheme**

SCALE @A3:	CHECKED: <b>MP</b>	APPROVED: <b>AH</b>
QGIS FILE:	DRAWN: <b>24/01/2023</b>	DATE: <b>24/01/23</b>
PROJECT No: <b>70086660</b>	DRAWING No: <b>70086660_EIA_4.1</b>	REV: <b>0.1</b>



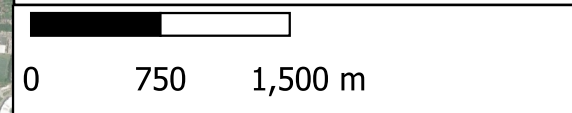


THIS DRAWING MAY BE USED ONLY FOR THE PURPOSE INTENDED AND ONLY WRITTEN DIMENSIONS SHALL BE USED.

- Legend:**
- Construction Boundary
  - Eversden and Wimpole Wood SAC
  - SSSI
  - County Wildlife Site (CWS)
  - Adams Road Sanctuary
  - Bucket Hill Plantation Grassland
  - Cotton Path Hedgerow
  - Hedgerows East of M11
  - Madingley Slip Road RSV
  - City Wildlife Site (CiWS)
  - Bin Brook
  - Bird Sanctuary, Conduit Head
  - Drain at Garret Hostel Lane
  - Meadow and Ditch Opposite King's College
  - Scrub East of M11 Verge
  - Trinity Meadow

STATUS: **FINAL**

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CLIENT: **Greater Cambridge Partnership**

PROJECT: **Cambourne to Cambridge**

TITLE: **Figure 5.2. C2C Designated Sites**

SCALE @A3:	CHECKED: <b>MP</b>	APPROVED: <b>IE</b>
QGIS FILE:	DRAWN: <b>23/01/2023</b>	DATE: <b>23/01/23</b>
PROJECT No: <b>70086660</b>	DRAWING No: <b>70086660-EIA_4.2</b>	REV: <b>0.1</b>

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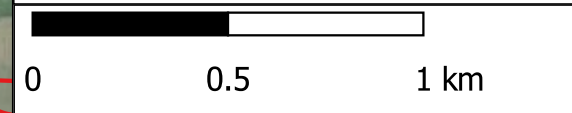
**Legend:**

- Scheme Boundary
- Habitats**
- Mixed deciduous woodland
- Other woodland; broadleaved
- Traditional orchard
- Hedgerows
- Childerley Gate Area A



STATUS: **FINAL**

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CLIENT: **Greater Cambridge Partnership**

PROJECT: **Cambourne to Cambridge**

TITLE: **Figure 5.3 C2C Important Ecological Features - West**

SCALE @A3:	CHECKED: <b>MP</b>	APPROVED: <b>AH</b>
QGIS FILE:	DRAWN: <b>24/01/2023</b>	DATE: <b>24/01/23</b>
PROJECT No: <b>70086660</b>	DRAWING No: <b>70086660- EIA_4.3_West</b>	REV: <b>0.1</b>



THIS DRAWING MAY BE USED ONLY FOR THE PURPOSE INTENDED AND ONLY WRITTEN DIMENSIONS SHALL BE USED.

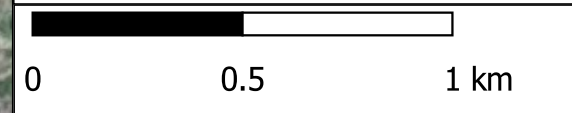
**Legend:**

- Scheme Boundary
- Habitats**
- Mixed deciduous woodland
- Other woodland; broadleaved
- Traditional orchard
- Hedgerows
- Childerley Gate Area A



STATUS: **FINAL**

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CLIENT: **Greater Cambridge Partnership**

PROJECT: **Cambourne to Cambridge**

TITLE: **Figure 5.3 C2C Important Ecological Features - East**



SCALE @A3:	CHECKED: <b>MP</b>	APPROVED: <b>AH</b>
QGIS FILE:	DRAWN: <b>24/01/2023</b>	DATE: <b>24/01/23</b>
PROJECT No: <b>70086660</b>	DRAWING No: <b>70086660- EIA_4.3_East</b>	REV: <b>0.1</b>



THIS DRAWING MAY BE USED ONLY FOR THE PURPOSE INTENDED AND ONLY WRITTEN DIMENSIONS SHALL BE USED.



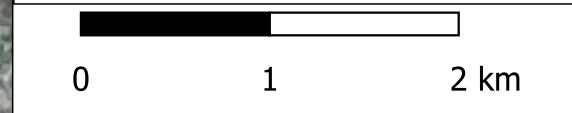
**Legend:**

-  Scheme Boundary
-  Summer Automated Detector Locations



STATUS: **FINAL**

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CLIENT: **Greater Cambridge Partnership**

PROJECT: **Cambourne to Cambridge**

TITLE: **Figure 5.4 Automated Detector Locations**

SCALE @A3:	CHECKED: <b>MP</b>	APPROVED: <b>AH</b>
QGIS FILE:	DRAWN: <b>24/01/2023</b>	DATE: <b>16/10/23</b>
PROJECT No: <b>70086660</b>	DRAWING No: <b>70086660-EIA_4.4</b>	REV: <b>0.1</b>



THIS DRAWING MAY BE USED ONLY FOR THE PURPOSE INTENDED AND ONLY WRITTEN DIMENSIONS SHALL BE USED.



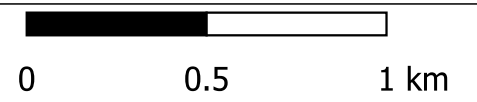
**Legend:**

- Construction\_boundary\_2023
- Crossing Point Locations
- Linear Crossing Point Features
- Summer Crossing Point Locations



STATUS: **FINAL**

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CLIENT: **Greater Cambridge Partnership**

PROJECT:  
**Cambourne to Cambridge**

TITLE:  
**Figure 5.5. Summer Bat Crossing Point Survey Locations Map (West)**

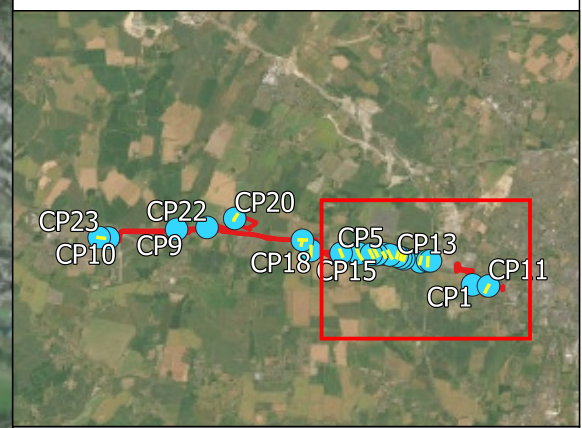
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QGIS FILE:	DRAWN: <b>26/04/23</b>	DATE: <b>16/10/23</b>	
PROJECT No: <b>70086660</b>	DRAWING No: <b>Figure 5.5</b>	REV: <b>0.1</b>	

THIS DRAWING MAY BE USED ONLY FOR THE PURPOSE INTENDED AND ONLY WRITTEN DIMENSIONS SHALL BE USED.



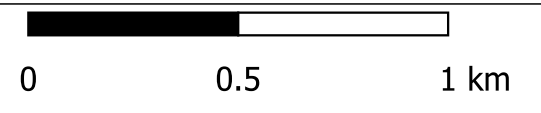
**Legend:**

- Scheme Boundary
- Crossing Point Locations
- Linear Crossing Point Features
- Summer Crossing Point Locations



STATUS: **FINAL**

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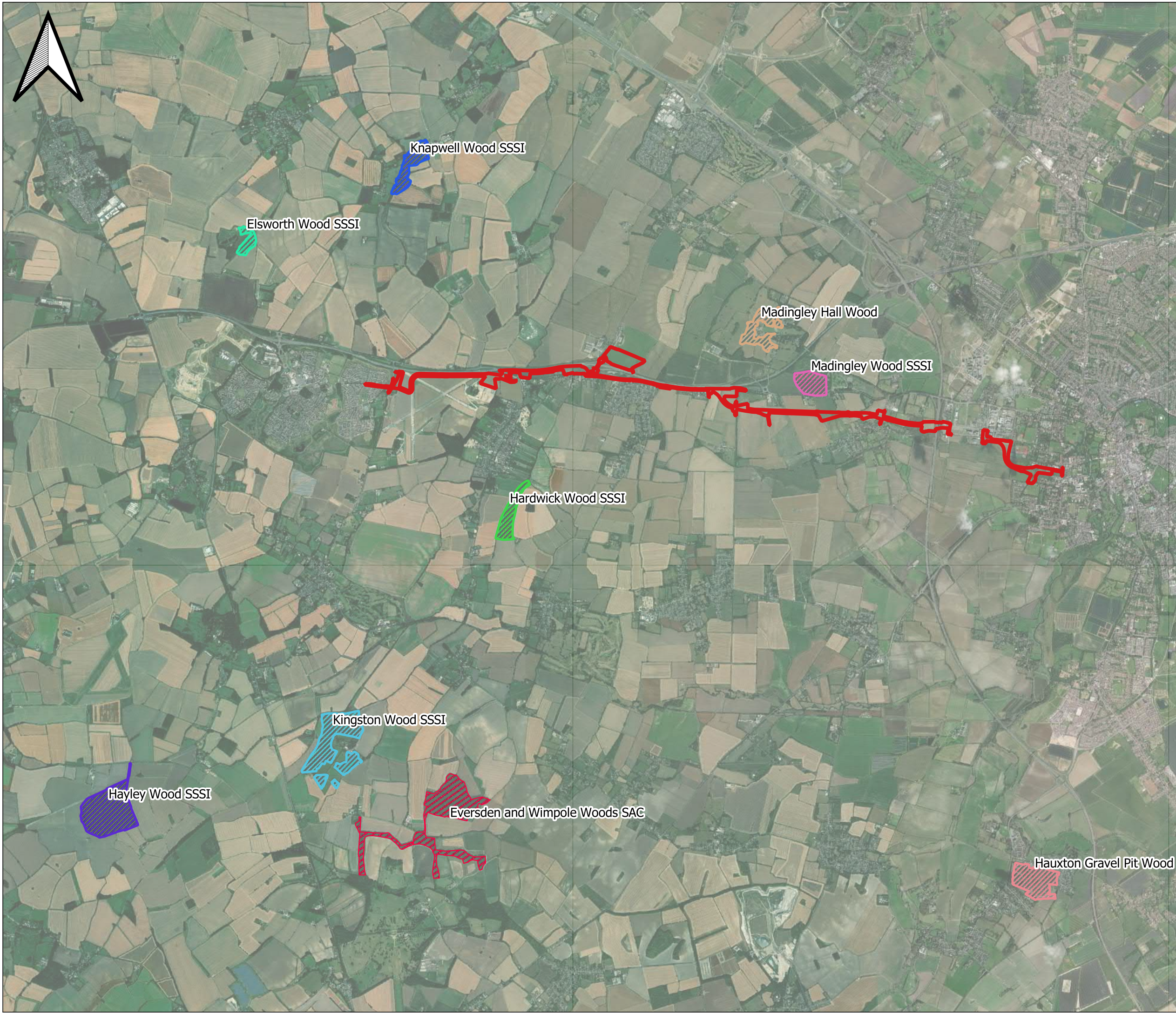


CLIENT: **Greater Cambridge Partnership**

PROJECT: **Cambourne to Cambridge**

TITLE: **Figure 5.5. Summer Bat Crossing Point Survey Locations Map (East)**

SCALE @A3:	CHECKED: <b>MP</b>	APPROVED: <b>AH</b>	
QGIS FILE:	DRAWN: <b>24/01/2023</b>	DATE: <b>16/10/23</b>	
PROJECT No: <b>70086660</b>	DRAWING No: <b>Figure 5.5</b>	REV: <b>0.1</b>	



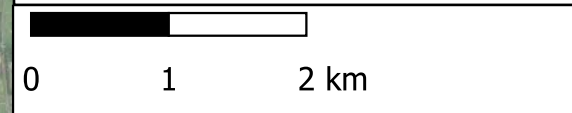
THIS DRAWING MAY BE USED ONLY FOR THE PURPOSE INTENDED AND ONLY WRITTEN DIMENSIONS SHALL BE USED.

**Legend:**

- Construction boundary
- Bat trapping locations**
- Elsworth Wood SSSI
- Hardwick Wood SSSI
- Hauxton Gravel Pit Wood
- Hayley Wood SSSI
- Kingston Wood SSSI
- Kingston Woods SSSI
- Knapwell Wood SSSI
- Madingley Hall Wood
- Madingley Wood SSSI
- Waresley and Gransden Wood SSSI
- Eversden and Wimpole Wood SAC

STATUS: **FINAL**

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PROJECT: **Cambourne to Cambridge**

TITLE: **Figure 5.6. EWR bat trapping locations in relation to C2C**

SCALE @A3:	CHECKED: <b>MP</b>	APPROVED: <b>IE</b>	
QGIS FILE:	DRAWN: <b>23/01/2023</b>	DATE: <b>23/01/23</b>	
PROJECT No: <b>70086660</b>	DRAWING No: <b>70086660-EIA_4.6</b>	REV: <b>0.1</b>	



THIS DRAWING MAY BE USED ONLY FOR THE PURPOSE INTENDED AND ONLY WRITTEN DIMENSIONS SHALL BE USED.

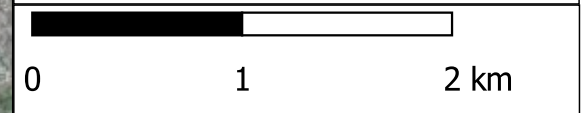
**Legend:**

- Scheme Boundary
- Watercourses



STATUS: **FINAL**

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PROJECT: **Cambourne to Cambridge**

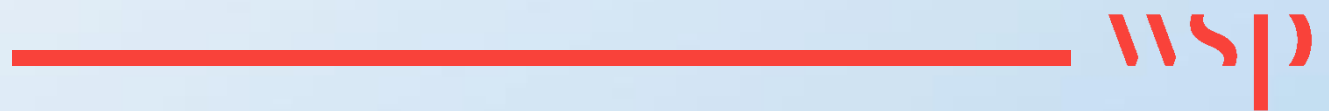
TITLE: **Figure 5.7 C2C Water Vole Survey Watercourse Locations**

SCALE @A3:	CHECKED: <b>MP</b>	APPROVED: <b>AH</b>
QGIS FILE:	DRAWN: <b>24/01/2023</b>	DATE: <b>24/01/23</b>
PROJECT No: <b>70086660</b>	DRAWING No: <b>70086660_EIA_4.7</b>	REV: <b>0.1</b>



# Appendix B

## **SURVEY DATA SUMMARY TABLES**



**Table TR5-B-1 - Bird Breeding Status Summary**

Common Name	Scientific Name	WCA Schedule 1	NERC Act SPI	BoCC Status	Breeding Status	WSP 2022	CE 2021	Bourn Airfield 2018
<b>Blackbird</b>	<i>Turdus merula</i>				Breeding	CB	CB	CB
<b>Blackcap</b>	<i>Sylvia atricapilla</i>				Breeding	CB	CB	CB
<b>Black-headed gull</b>	<i>Chroicocephalus ridibundus</i>			Amber	Non-breeding	NB		
<b>Bluetit</b>	<i>Cyanistes caeruleus</i>				Breeding	CB	CB	CB
<b>Bullfinch</b>	<i>Pyrrhula pyrrhula</i>		Yes		Breeding	PoB	CB	CB
<b>Buzzard</b>	<i>Buteo buteo</i>				Breeding	PrB	CB	
<b>Carrion crow</b>	<i>Corvus corone</i>				Breeding	CB	CB	
<b>Chaffinch</b>	<i>Fringilla coelebs</i>				Breeding	PrB	CB	CB
<b>Chiffchaff</b>	<i>Phylloscopus collybita</i>				Breeding	PrB	CB	
<b>Coal tit</b>	<i>Periparus ater</i>				Probable breeding	PrB	PoB	
<b>Collared dove</b>	<i>Streptopelia decaocto</i>				Breeding	PrB	CB	
<b>Corn bunting</b>	<i>Emberiza calandra</i>		Yes	Amber	Breeding	-	PoB	CB
<b>Cormorant</b>	<i>Phalacrocorax carbo</i>				Non-breeding	NB		
<b>Cuckoo</b>	<i>Cuculus canorus</i>		Yes	Red	Possible	PoB		
<b>Dunnock</b>	<i>Prunella modularis</i>		Yes	Amber	Breeding	PrB	CB	CB
<b>Feral Pigeon</b>	<i>Columba livia (domest.)</i>				Probable breeding	PrB		
<b>Garden warbler</b>	<i>Sylvia borin</i>				Possible	PoB		
<b>Goldcrest</b>	<i>Regulus regulus</i>				Breeding	CB		
<b>Goldfinch</b>	<i>Carduelis carduelis</i>				Breeding	CB	CB	CB
<b>Grasshopper warbler</b>	<i>Locustella naevia</i>		Yes	Red	Possible	PoB		
<b>Great spotted woodpecker</b>	<i>Dendrocopus major</i>				Breeding	PrB	CB	
<b>Great tit</b>	<i>Parus major</i>				Breeding	CB	CB	
<b>Green woodpecker</b>	<i>Picus viridis</i>				Breeding	PrB	CB	

Common Name	Scientific Name	WCA Schedule 1	NERC Act SPI	BoCC Status	Breeding Status	WSP 2022	CE 2021	Bourn Airfield 2018
Greenfinch	<i>Chloris chloris</i>			Red	Breeding	PrB	CB	
Grey heron	<i>Ardea cinerea</i>				Non-breeding	NB	NB	
Grey Partridge	<i>Perdix perdix</i>		Yes	Red	Probable breeding	-	PoB	
Herring gull	<i>Larus argentatus</i>		Yes	Red	Non-breeding	NB		
House martin	<i>Delichon urbicum</i>			Red	Breeding	CB		
House sparrow	<i>Passer domesticus</i>		Yes	Red	Breeding	CB	CB	
Jackdaw	<i>Corvus monedula</i>				Breeding	CB	CB	
Jay	<i>Garrulus glandarius</i>				Breeding	CB		
Kestrel	<i>Falco tinnunculus</i>			Amber	Breeding	CB	CB	
Kingfisher	<i>Alcedo atthis</i>	Yes			Breeding		NB	
Lapwing	<i>Vanellus vanellus</i>		Yes	Red	Non-breeding	NB		
Lesser black-backed gull	<i>Larus fuscus</i>			Amber	Non-breeding	NB		
Lesser whitethroat	<i>Sylvia curruca</i>				Possible	PoB		
Linnet	<i>Carduelis cannabina</i>		Yes	Red	Breeding	PoB	CB	CB
Little Grebe	<i>Tachybaptus ruficollis</i>				Possible	PoB	PoB	
Long-tailed tit	<i>Aegithalos caudatus</i>				Breeding	CB	CB	
Magpie	<i>Pica pica</i>				Breeding	CB	CB	
Mallard	<i>Anas platyrhynchos</i>			Amber	Breeding	PrB	CB	
Marsh tit	<i>Poecile palustris</i>		Yes	Red	Possible	PoB		
Mistle thrush	<i>Turdus viscivorus</i>			Red	Breeding	PrB	CB	
Moorhen	<i>Gallinula chloropus</i>			Amber	Breeding	CB	CB	
Mute Swan	<i>Cygnus olor</i>				Non-breeding	-	NB	

Common Name	Scientific Name	WCA Schedule 1	NERC Act SPI	BoCC Status	Breeding Status	WSP 2022	CE 2021	Bourn Airfield 2018
Peregrine	<i>Falco peregrinus</i>	Yes			Non-breeding	NB		
Pied wagtail	<i>Motacilla alba</i>				Breeding	CB	CB	
Red kite	<i>Milvus milvus</i>	Yes			Non-breeding	NB		
Reed bunting	<i>Emberiza schoeniclus</i>		Yes	Amber	Breeding	PoB	CB	
Reed warbler	<i>Acrocephalus scirpaceus</i>				Breeding	PrB	CB	
Robin	<i>Erithacus rubecula</i>				Breeding	CB	CB	CB
Rook	<i>Corvus frugilegus</i>			Amber	Breeding	PoB	CB	
Sedge Warbler	<i>Acrocephalus schoenobaenus</i>			Amber	Non-breeding	-	NB	
Skylark	<i>Alauda arvensis</i>		Yes	Red	Breeding	PrB	CB	CB
Song thrush	<i>Turdus philomelos</i>		Yes	Amber	Breeding	CB	CB	CB
Sparrowhawk	<i>Accipiter nisus</i>			Amber	Non-breeding	NB		
Starling	<i>Sturnus vulgaris</i>		Yes	Red	Breeding	CB	CB	
Stock dove	<i>Columba oenas</i>			Amber	Breeding	PrB	CB	
Swallow	<i>Hirundo rustica</i>				Breeding	NB	CB	
Swift	<i>Apus apus</i>			Red	Non-breeding	NB		
Teal	<i>Anas crecca</i>			Amber	Non-breeding	-	NB	
Whitethroat	<i>Sylvia communis</i>				Breeding	PrB	CB	
Willow warbler	<i>Phylloscopus trochilus</i>			Amber	Breeding	PrB	CB	
Woodpigeon	<i>Columba palumbus</i>			Amber	Breeding	PrB	CB	
Wren	<i>Troglodytes troglodytes</i>			Amber	Breeding	CB	CB	CB
Yellowhammer	<i>Emberiza citrinella</i>		Yes	Red	Breeding	PrB	CB	CB

**Table TR5-B-2 - Winter Bird Survey Summary**

Common Name	Scientific Name	WCA Schedule 1	NERC Act	BoCC Status	No. of Flyovers	No. recorded on Site
<b>Bullfinch</b>	<i>Pyrrhula pyrrhula</i>		Yes			1
<b>Common gull</b>	<i>Larus canus</i>			Amber	1	
<b>Corn bunting</b>	<i>Emberiza calandra</i>		Yes	Red	2	1
<b>Dunnock</b>	<i>Prunella modularis</i>		Yes	Amber		3
<b>Fieldfare</b>	<i>Turdus pilaris</i>	Yes		Red	34	80
<b>Gadwall</b>	<i>Anas strepera</i>			Amber		3
<b>Greenfinch</b>	<i>Chloris chloris</i>			Red	3	30
<b>Grey partridge</b>	<i>Perdix perdix</i>		Yes	Red	2	10
<b>Herring gull</b>	<i>Larus argentatus</i>		Yes	Red	4	1
<b>House sparrow</b>	<i>Passer domesticus</i>		Yes	Red		30
<b>Kestrel</b>	<i>Falco tinnunculus</i>			Amber	2	1
<b>Lapwing</b>	<i>Vanellus vanellus</i>		Yes	Red	47	
<b>Lesser black-backed gull</b>	<i>Larus fuscus</i>			Amber	5	
<b>Linnet</b>	<i>Carduelis cannabina</i>		Yes	Red	25	8
<b>Mallard</b>	<i>Anas platyrhynchos</i>			Amber	3	30
<b>Marsh tit</b>	<i>Poecile palustris</i>		Yes	Red		1
<b>Meadow pipit</b>	<i>Anthus pratensis</i>			Amber	10	5
<b>Mistle thrush</b>	<i>Turdus viscivorus</i>			Red	1	1
<b>Moorhen</b>	<i>Gallinula chloropus</i>			Amber		3
<b>Red kite</b>	<i>Milvus milvus</i>	Yes			2	
<b>Redwing</b>	<i>Turdus iliacus</i>	Yes		Amber	47	30
<b>Reed bunting</b>	<i>Emberiza schoeniclus</i>		Yes	Amber		1
<b>Rook</b>	<i>Corvus frugilegus</i>			Amber	100	25
<b>Skylark</b>	<i>Alauda arvensis</i>		Yes	Red	2	6
<b>Snipe</b>	<i>Gallinago gallinago</i>			Amber	1	
<b>Song thrush</b>	<i>Turdus philomelos</i>		Yes	Amber	1	2
<b>Sparrowhawk</b>	<i>Accipiter nisus</i>			Amber	1	

Common Name	Scientific Name	WCA Schedule 1	NERC Act	BoCC Status	No. of Flyovers	No. recorded on Site
Starling	<i>Sturnus vulgaris</i>		Yes	Red	20	30
Stock dove	<i>Columba oenas</i>			Amber	8	21
Tawny owl	<i>Strix aluco</i>			Amber		1
Teal	<i>Anas crecca</i>			Amber		6
Woodcock	<i>Scolopax rusticola</i>			Red	1	
Woodpigeon	<i>Columba palumbus</i>			Amber	400	400
Wren	<i>Troglodytes troglodytes</i>			Amber	1	2
Yellowhammer	<i>Emberiza citrinella</i>		Yes	Red	1	6
Black-headed gull	<i>Chroicocephalus ridibundus</i>			Amber	20	100

**Table TR5-B-3 - Great Crested Newt Survey Summary**

Water Body Ref.	Survey Results					Evaluation Presence/Likely Absence
	2017	2018	2019	2021	2022	
1	Scoped out - unsuitable					Likely Absent
2	No previous surveys completed					Negative
3	N/A	Negative	N/A	N/A	Dry	Likely Absent
4	N/A	Negative	N/A	N/A	Negative	Likely Absent
5	Negative	N/A	Negative	Negative		Likely Absent
6	Positive	Negative	Negative	Negative		Likely Absent
7	Negative	N/A	Negative	Negative		Likely Absent
8	Negative	N/A	Negative	Negative		Likely Absent
9	N/A	N/A	N/A	Negative		Likely Absent
10	Negative	N/A	Negative	Inconclusive	Negative	Likely Absent
11	Negative	N/A	Negative	Negative		Likely Absent
12	No previous surveys completed					Negative
13	Pond geographically isolated, no survey required.					Likely Absent
14	No surveys – swimming pool/roof					Likely Absent
15	N/A	Negative	N/A	N/A	Dry	Likely Absent
16	N/A	N/A	N/A	N/A	N/A – no access	No data

Water Body Ref.	Survey Results					Evaluation
	2017	2018	2019	2021	2022	Presence/Likely Absence
17	No surveys – swimming pool/roof					Likely Absent
18	N/A	Negative	N/A	N/A	Outside 250 buffer	Likely Absent
19	No previous surveys completed				No access	No data
20	N/A	Negative	Negative	Dry	Dry	Likely Absent
21	N/A	Negative	Negative	Inconclusive	Dry	Likely Absent
22	Negative	N/A	Negative	Inconclusive	Negative	Likely Absent
23	No previous surveys completed				Negative	Likely Absent
24	No previous surveys completed				Negative	Likely Absent
25	Negative	N/A	Negative	Negative	-	Likely Absent
26	No Access					No Data
27	No Access					No data
28	N/A	N/A	Dry	Dry	Dry	Likely Absent
29	Scoped out - unsuitable					Likely Absent
30	HSI below average no surveys undertaken					Likely Absent
31	Pond surveyed as part of the Bourn Airfield development- negative					Likely Absent
32	N/A	N/A	Positive	Negative	-	Likely Absent
33	N/A	N/A	N/A	Negative	-	Likely Absent
34	Pond not identified in previous surveys				Desk study – positive record	Likely present
35	Pond not identified in previous surveys				Presence assumed due to proximity of Pond 34	Likely present
36	Pond not identified in previous surveys					Likely present





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