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The Cambourne to Cambridge Order

Cambridgeshire County Council

Transport and Works Act 1992

Transport and Works (Inquiries Procedure) Rules 2004

Inquiry into:

THE CAMBOURNE TO CAMBRIDGE ORDER

PROOF OF EVIDENCE

of

Paola Reason

of RSK Biocensus

On behalf of Cambridgeshire County Council

17 August 2025

Planning Inspectorate Reference: DPI/E0535/25/1

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1.0 INTRODUCTION

1.1 Qualifications and Experience

- 1.1.1 I am Paola Reason and I am a Director of RSK Biocensus, part of the RSK Group.
- 1.1.2 I hold a first-class honours Degree in Zoology and an MSc in Conservation. I have been a consultant for approaching 30 years, and I am a Fellow of the Chartered Institute of Ecology and Environmental Management (CIEEM), a Chartered Ecologist and a Chartered Environmentalist, and a full Member of the Institute of Environmental Management and Assessment (IEMA)¹. I have provided advice on hundreds of development projects, and my particular expertise concerns bats.
- 1.1.3 I have continuously held a Level 2 Natural England bat licence (or equivalent) for over 25 years and have held many licences for development projects. I am currently the named ecologist on the licence for the Bernwood section of High-speed 2, which covers Bechstein's bats (and the complex mitigation that has received much press recently). I was a member of the independent Bat Advisory Group for the Norwich Western Link (a new road; currently on pause) and prepared pre-consent assessments for the Sizewell nuclear new-build; both of which concerned breeding barbastelle.
- 1.1.4 I am the lead author of CIEEM's 2023 UK Bat Mitigation Guidelines [CD25-45]; on the Technical Review Board for The Bat Conservation Trust's national Bat Survey Guidelines [CD25-34]; and was a driver/author for their recent guidance on large-scale housing maintenance in England, driven by my own experience of multiple large-scale projects for the Ministry of Defence.
- 1.1.5 I am a member of Natural England's Bat Expert Panel "providing expert opinion on Natural England's approach to bat conservation and regulation" and currently co-supervising a PhD on the impacts of noise on bats.
- 1.1.6 I was engaged to represent Cambridge County Council in May 2025, and visited the Scheme in June/July 2025, driving/walking the Scheme in both daylight hours and in darkness.

1.2 Scope of evidence

- 1.2.1 My evidence outlines the overall approach and findings of the bat assessment as presented within the Environmental Statement (ES) for the Scheme [for Ecology: CD1-11.05], and Statement to Inform the Habitats Regulation Assessment (HRA) [CD1-11.05 TR5.11] for the Eversden and Wimpole Woods Special Area of Conservation (SAC). Following Natural England's lead and concerns, I make particular reference to barbastelle. I consider whether the impacts of the Scheme have been fully considered and adequately mitigated. This evidence addresses one aspect of Matter 4c identified in the Secretary of State's Statement of Matters.
- 1.2.2 In addition to covering the outcomes of the ES and HRA, my Proof of Evidence also responds to objections that have been made in relation to effects on bats and specifically barbastelle. This is covered in more detail in Section 9.0.

¹ Recently rebadged as The Institute of Sustainability and Environmental Professionals 2025 (formerly the Institute of Environmental Management and Assessment).

Table 1: Coverage of certain matters in Proofs of Evidence as set out in the Statement of Matters [CD25-01, pages 1 and 2]

Statement of Matters [CD25-01] Reference	Statement of Matters text	Coverage through my Proof of Evidence	Coverage through Proofs of Evidence of Others
3:	The main alternative options considered by CCC and the reasons for choosing the preferred option set out in the Order.		
3a	a. The rationale for the preferred option and the alternatives considered.	N/A	A description of the reasonable alternatives studied and the main reasons for selecting the preferred option is covered in the Proof of Evidence of Andy Saunders [CD26-01-APP-W3]. The rationale for the preferred option and the consideration of alternatives is covered in the Proof of Evidence of Jo Baker [CD26-01-APP-W1].
4:	The effect of the implementation, operation and maintenance of the Scheme.		
4c	The effect of the Scheme on the environment, including biodiversity, habitats, and wildlife, with particular reference to the Coton Orchard and Coton Orchard County Wildlife Site.	I will describe how the ES has reported the effect of the Scheme on bats, notably barbastelle and the Eversden and Wimpole Woods SAC	How the ES has reported the effect of the Scheme on the environment including biodiversity is covered in the Proof of Evidence of Andy Saunders [CD26-01-APP-W3]. Specific details in relation to biodiversity, habitats and wildlife are covered in the Proof of Evidence of Ian Ellis [CD26-01-APP-W13] in relation to ecology with the exception of veteran trees at Coton Orchard, which is covered in the Proof of Evidence of Chris Alder [CD26-01-APP-W4].

1.3 Summary of Evidence

- 1.3.1 In Section 2.0 of my Proof of Evidence, I outline background information relevant to the Scheme, namely: signposting documents that informed and set out the impact assessment; legislation and standards that underpinned the work. I also outline the assessment methodology used.
- 1.3.2 Section 3.0 outlines the process of engagement with Natural England as a statutory consultee.
- 1.3.3 Detailed information about effects on bats, notably barbastelle, associated with the Scheme and a description of the likely significant effects of the proposals is provided in ES Technical Report 5: Ecological Impact Assessment [CD1-11.05]. The information on which the assessment is based is summarised in Section 4.0, supported by a Technical Note appended to my evidence (Appendix 3.3, Technical Note 1). This section outlines the surveys undertaken and the context, with particular attention to Coton Orchard as this was the focus of Natural England's concerns. Section 5.0 summarises the importance of different areas to bats, with particular attention to barbastelle, as this species was a further matter of concern for Natural England.
- 1.3.4 Section 6.0 sets out the potential impacts and effects on bats and explores the likelihood of these given the nature of the Scheme. These are separated into construction and operation.

- 1.3.5 Section 7.0 outlines the mitigation measures that will be adopted and which have been assumed within the design and construction methods for our assessment that will ensure that significant effects are avoided as far as practicable. Areas to be confirmed at detailed-design stage are listed. Section 8.0 examines residual impacts.
- 1.3.6 Section 9.0 deals with objections and representations made relevant to my Proof of Evidence. I address specific matters raised with respect to both statutory and non-statutory parties.
- 1.3.7 Section 10.0 presents my conclusions followed by my statement of truth (Section 11.0).

2.0 BACKGROUND

2.1 Legislation and standards

- 2.1.1 Legislation associated with the protection of British bat species is detailed below.

The Environment Act 2021

- 2.1.2 The Environment Act 2021 [CD5-14] legislates the enhancing of the environment in the UK by introducing measures and targets (Chapter 1) for improving (amongst other measures) and / or preventing species decline. This Act introduces a new legally binding target on increasing British species abundance by 2030 (Section 3). The Act also sets out the framework for Biodiversity Net Gain (s.98).

Conservation of Habitats and Species Regulations 2017 (as amended)

- 2.1.3 The Habitats Directive (92/43/EEC), which came into force in the EU in 1992, is transposed into domestic law in England and Wales by means of the Conservation of Habitats and Species Regulations 2017 (as amended) [CD5-21]. The 'Habitats Regulations' provide for the designation and protection of 'European Sites' in England (now the 'national site network') (regulation 12), the protection of 'European Protected Species' or EPS (reg. 42; as listed on its Schedules 1 and 2, which currently mirror the relevant Habitats Directive annexes), and the adaptation of planning and other controls for the protection of the national site network (Part 6).
- 2.1.4 In terms of the protection of EPS: all species of British bats are protected under reg. 43, making it illegal to:
- deliberately capture, injure, or kill any such animal (reg. 43(1)(a));
 - deliberately disturb wild animals of any such species (reg. 43(1)(b)); and / or
 - damage or destroy a breeding site or resting place of such an animal (reg. 43(1)(d)).
- 2.1.5 Under the Habitats Regulations [CD5-21], disturbance of protected animals includes, in particular, any disturbance which is likely to: (i) impair their ability to survive, breed or reproduce, or to rear or nurture their young or to hibernate or migrate; (ii) significantly affect the local distribution or abundance of the species in question (reg. 43(2)).
- 2.1.6 Due to the high level of protection afforded to bats and their habitat, mitigation is governed by a strict licensing procedure (reg. 55) administered by Natural England (as the relevant licensing body). Licensing is subject to three tests: these must be applied before granting permission for activities affecting bats. For permission to be granted, the following criteria must be satisfied:
- the proposal is necessary for 'preserving public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment' (reg. 55(2)(e));
 - there is no satisfactory alternative' (reg. 55(9)(a)); and

- the proposals 'will not be detrimental to the maintenance of the population of the concerned at a favourable conservation status in their natural range' (reg. 55(9)(b)).

Wildlife and Countryside Act 1981 (As Amended)

- 2.1.7 The Wildlife and Countryside Act 1981 (as amended; hereafter referred to as the 'WCA') [CD5-06] 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 are implemented in the UK. The WCA includes provisions, amongst others, for the identification and designation of protected species (s. 9).
- 2.1.8 All bats in England are included in the list (Schedule 5 of the WCA) of animals which are protected. Bats receive partial protection under the WCA, which for animals makes it illegal (subject to certain exceptions) to:
- intentionally or recklessly disturb such animals while they occupy a place used for shelter or protection (s. 9(4)(b));
 - intentionally or recklessly obstruct access to any structure or place which any such animal uses for shelter or protection (s. 9(4)(c));
 - sell, offer, or expose for sale, or has in his possession or transports for the purpose of sale, any live or dead wild animal included in Schedule 5, or any part of, or anything derived from, such an animal (s. 9(5)(a); or
 - publish or cause to be published any advertisement likely to be understood as conveying that he buys or sells, or intends to buy or sell, any of those things (s. (9)(5)(b).

The Natural Environment and Rural Communities (NERC) Act 2006

- 2.1.9 The Natural Environment and Rural Communities Act (NERC Act; s. 40) [CD5-28] 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. The Environment Act 2021 (referenced above) extended that duty to not only conserve (as previously) but also enhance biodiversity. Public authorities are also expected to produce reports on the action they have taken under this duty when designated by the Secretary of State.

2.2 Standards

- 2.2.1 Survey methods were guided by good practice standards for bat assessments [Collins, 2023 (currently), but previously 2016: CD25-34].

2.3 Assessment methodology

- 2.3.1 The EcIA carried out the impact assessment in accordance with the following guidance documents:
- Guidelines on Ecological Impact Assessment (CIEEM, 2018) [CD25-33];
 - Advice Note on Lifespan of Ecological Reports and Surveys (CIEEM, 2019) [CD25-35]; and
 - Guidelines for Accessing, Sharing and Using Biodiversity Data in the UK (CIEEM, 2020) [CD25-36].
- 2.3.2 In accordance with the CIEEM EcIA Guidelines [CD25-33; Chapter 3; PDF pp26-28], the assessment used relevant baseline information to predict the effects of the Scheme on

Important Ecological Features. In terms of the bat assessment, this included desk study and survey data (as summarised in Section 4.1 below), information on statutory and non-statutory designated sites, and data on habitats as well as the landscape context of the Scheme.

- 2.3.3 A **significant effect** was defined as an effect that could have an impact upon the structure, form, function and conservation status of a designated site, or species population where these are defined as Important Ecological Features. In line with CIEEM [CD25-33] v1.3; PDF p31 para 4.7], the relative importance of ecological features was assessed against a geographic frame of reference. This is standard practice for ecological assessment and explained further in the Environmental Statement [CD1-11.05 s4.2; PDF p15].
- 2.3.4 Where effects require mitigation; the mitigation hierarchy was adopted. That is: 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 considered.

3.0 Key stakeholder engagement

3.1 Engagement to date with Natural England

- 3.1.1 WSP submitted a Technical Note [CD25-41] to Natural England on 08/04/2022, through their Discretionary Advice Service (DAS), detailing the proposed bat survey methodology and approach. This Note included reference to an agreement with East West Rail (EWR) on the data-sharing of radio-tracking information undertaken to identify foraging areas. In the DAS response received from Natural England (DAS 14298_391617) [CD25-42; PDF p3] in July 2022, it is stated '*Natural England has no objection to the proposed approach to barbastelle bat survey and data gathering set out in Technical Note...*'
- 3.1.2 In January 2025, Natural England responded to the Scheme with a detailed representation [CD2-REP-11] covering six areas:
1. Habitats Regulations Assessment
 2. Lighting plans – Pre-Construction, Construction, and Operation phases
 3. Crossing-point mitigation
 4. Foraging areas
 5. Coton Orchard County Wildlife Site (CWS)
 6. Further surveys and analysis relating to bats
- 3.1.3 Detailed responses to the points raised under each of these areas are set out in Section 9.0 Table 4. Importantly, this representation did not take into account the EWR data-sharing agreement referenced in para 3.1.1. This data, alongside data collected specifically for the scheme, together has informed avoidance and mitigation measures relating to and other species, though with elements reserved for the detailed design stage, taking stakeholder feedback into account.
- 3.1.4 Between January and the time of writing, Natural England have been engaged in a series of meetings to ensure a full understanding of the data collected and how that data has informed the scheme design.
- 3.1.5 The first meeting, principally to discuss survey effort, was held on 02 April 2025 (the 'April meeting'). The minutes and associated presentation were issued on 25 June 2025, and a technical note was issued on 03 August 2025. All three documents are appended to this document as Appendix 3. Natural England responded to that meeting on 16 April 2025.
- 3.1.6 The second meeting was held on 09 June 2025 (the 'June meeting'); principally to discuss collision risk and landscape treatments. The minutes, associated presentation and technical note were issued on 25 June 2025, (and are appended to this document as Appendix 4). The June minutes included a detailed response to Natural England's response of 16 April 2025.

3.1.7 The third meeting was held on 16 July 2025 (the 'July meeting'), principally to discuss lighting. The minutes and associated presentation were issued on 1st August 2025 (and are appended to this document as Appendix 5).

3.1.8 Following the July meeting, Version 1 of a Statement of Common Ground (SoCG) was issued to Natural England on 25 July 2025 for consideration, and initial discussions took place on 29 July 2025. These have continued and, prior to the point of exchange of Proofs (third meeting held 13 August 2025) have resulted in all items being either resolved, either fully, or subject to further discussion at detailed design stage, as indicated below. The Applicant and Natural England are in the process of finalising this SoCG.

4.0 BASELINE

4.1 Studies undertaken

4.1.1 A number of studies were relied upon to undertake the bat assessment within the ES. These are set out in the attached Technical Note (Appendix 3.3; see Technical Note 1; Table 1) and included:

- Desk study
- Crossing Point surveys
- Winter Static Detector surveys
- Summer Static Detector surveys
- Tree preliminary surveys, aerial inspections and dusk emergence and dawn -re-entry surveys
- Structure preliminary surveys, hibernation surveys and summer assessments including dusk emergence and dawn re-entry surveys

4.1.2 These more recent studies built iteratively on to an earlier suite of surveys, also set out in Appendix 3.3, Technical Note 1; Table 1.

4.1.3 In addition to the Study Areas detailed above, and as outlined in para 3.1.1, a data-sharing agreement with EWR allowed the use of data collected for that scheme over a wide area, which included woodlands local to this Scheme [CD25-53/CD25-54].

4.1.4 A number of other radio-tracking surveys and assessments were taken into consideration, which were reviewed to provide a desk-based assessment of available data for the ES [CD1-11.05] and Statement to Inform the HRA [CD1-11.05 TR5.11].

4.1.5 As a whole, I believe that the whole data set, including the wide-ranging EWR and other publicly-available radio-tracking studies, is a sufficient baseline on which to undertake an impact assessment and to determine the location, extent and design of mitigation.

4.1.6 Although Natural England raised concerns in their initial representation [CD2-REP-11], this item is now considered provisionally resolved in the latest draft SoCG.

4.2 Context

Landscape context

4.2.1 The busway joins Cambourne and new housing development to the west with Cambridge. Most of the open land crossed by the Scheme is arable farmland, including the footprint of the travel hub. There are a number of major roads which are of relevance to local barbastelle populations; notably the A1303 and the A428. Both are crossed by barbastelle, as I describe in para 6.2.9 and para 6.2.13 *inter alia*.

- 4.2.2 West Cambridge is interspersed with green open spaces and waterbodies largely managed for people and wildlife, and barbastelle have been recorded in these areas. The roads running (broadly) east-west are lined along much of their lengths with substantial tree lines and hedgerows. The eastern end of the Scheme includes scrubland and young woods on the east side of the M11 (designated as a City Wildlife Site), and the narrow and overgrown Bin Brook (also a City Wildlife Site). These more open areas are less well-connected.
- 4.2.3 From a 'bat perspective', the night-time landscape is largely dark (other than at a limited number of junctions) and therefore permeable to bats along much of its length.
- 4.2.4 Of note are also Madingley Wood, 800 Wood, and Coton Orchard, described below.

Madingley Wood and 800 Wood

- 4.2.5 Madingley Wood is an ancient woodland Site of Special Scientific Interest (SSSI) that supports a breeding population of barbastelle. This SSSI lies directly alongside the A1303 which carries a significant amount of traffic. The wood is part of the 500+ ha University-owned Madingley Estate.
- 4.2.6 Adjacent to Madingley Wood (to its north), and also part of the Madingley Estate, is 800 Wood, a developing woodland planted in 2007-8 with over 15,000 trees and shrubs. This area was linked to Madingley Wood by the incorporation of a continuous 20m natural colonisation zone along the length of the shared boundary. The planting design also incorporated glades and rides, making it good for foraging bats, though some areas are still densely planted.

Coton Orchard

- 4.2.7 The 100-year-old Coton Orchard, recently designated a County Wildlife Site, is considered to be of County importance for terrestrial invertebrates, as well as providing a refuge for a range of animals and birds. Its importance was recognised in the ES.
- 4.2.8 As summarised in ES Technical Report 5 [CD1-11.05 para 5.3.19; PDF p31], 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, including densely-planted dwarf fruit trees. Formerly covering an area of some 23 ha, the original orchard footprint now supports a garden centre of 2 ha.
- 4.2.9 Of the remainder, much of the Coton Orchard is managed through a relatively intensive mowing regime. The grassland ground flora is therefore classified as other neutral grassland though, in some areas, appears to be progressing towards modified grassland.
- 4.2.10 Part of the traditional orchard in the east has been left unmanaged, with the majority of this area succeeding to woodland dominated by a closed canopy of Common Ash (*Fraxinus excelsior*), with lines of Apple (*Malus domestica*) trees still present. This area was mapped as traditional orchard. In the far east of Coton Orchard, the former orchard is dominated by dense Damson (*Prunus domestica*) scrub.
- 4.2.11 The terrestrial invertebrate survey report [CD1-11.05 TR5.14 para 4.2.51; PDF p27] describes a predominantly traditional orchard habitat with abundant flower-rich resources in the form of Apple, Pear and Plum trees, along with Blackthorn and Hawthorn scrub, but with dense patches of Bramble. The report concludes that the diversity of flowering vegetation is likely to be of importance for its invertebrate assemblage.
- 4.2.12 Of the target groups recorded during the surveys, Lepidoptera was the dominant order: 132 species across 30 orders/families were recorded and, of these, ten orders/families were recorded as being part of a barbastelle diet in another study (Carr *et al.*, 2020; Appendix 2). As summarised in the favourable conservation status (FCS) definition for barbastelle (Zeale and Natural England, 2024) [CD25-43; PDF p11], this species specialises in hunting moths and often forages predominantly in habitats where moth biomass is high – rather than targeting

habitats supporting particular moth species. As a result, common and abundant moth species are consumed most frequently.

- 4.2.13 Barbastelles have been shown to hunt predominantly where dense vegetation borders open ground, such as woodland edge, treelines, hedgerows, woodland rides, and above woodland canopy; predominantly linked to areas where moth density may be high (Zeale & Natural England, 2024 [CD25-43; PDF p11]).
- 4.2.14 The mix of hedgerows, lines of trees and edge habitat of dense scrub within the east of the orchard all have suitability to support not only foraging and commuting barbastelle, but other bat species also. However, areas of dense cluttered scrub are less suitable for a species such as barbastelle that hunts along edge habitats. Functional groups of European bat species are set out in Elmeros *et al.* (2016; pp4-5, Appendix 2). Barbastelle are described as: “*Bats with medium manoeuvrability with a more straight flight pattern than bats in Category C [a category which includes pipistrelles]. They hunt and commute both in the away from vegetation and structures in a variety of flight heights. May occasionally fly but never hunt within vegetation. Commuting over open stretches tend to occur at medium heights (2 – 10 m) with no clear tendency to lower flight.*” Serotine are similarly categorised.
- 4.2.15 A number of trees date back to the original orchard that was planted at Coton Orchard around 1922. These trees contain various veteran features including rot sites, holes and water pockets, dead branches, hollow limbs and trunks, and fungal fruiting bodies [CD1-11.05 para 5.2.34 p32] and therefore have the potential to support roosts. Technical Report 5.6 [CD1-11.05 TR5.06 Section 4.2, p16], summarises the assessment of the tree roost resource across and within a 50m buffer of the centre line of the Scheme, extended to 120m of proposed illuminated junctions. Of the trees surveyed within the orchard's ownership boundary, 3 trees supported high, 23 moderate and 4 low roosting suitability [CD1-11.05 TR5.06 Figure 5.6.2-6; p32]. Potential roosting suitability was noted in apple, alder and poplar trees and the most common roosting features noted were rot holes, with woodpecker holes, knot holes, open cavities and dead trees/ limbs also noted. However, no confirmed roosts were identified within the Order Limits when surveyed by aerial inspection or dusk/dawn surveys.
- 4.2.16 Although Natural England raised concerns about the assessment of Coton Orchard in their initial representation [CD2-REP-11], these items are now considered provisionally resolved or agreed in the latest draft SoCG.
- 4.2.17 Note that any consideration of the cultural/heritage or biodiversity value of the orchard to species other than bats is outside the scope of this document (see Table 1).

5.0 BASELINE SURVEY DATA

5.1 Use of woodlands

- 5.1.1 Extensive radio-tracking surveys of barbastelle throughout the wider landscape² have identified the use of multiple woodland sites for foraging and roosting, including for maternity roosts.
- 5.1.2 Publicly available radio-tracking data (Bourne Airfield and A428 Black Cat to Caxton Gibbett Road Improvement Scheme (described in the HRA [CD1-11.05 TR5.11 paras 6.1.6 and 6.1.9 ; PDF p53/54] provide a robust and rounded data set for the barbastelle baseline throughout the wider landscape, which is important to set the context of the Scheme against the wider barbastelle population. The EWR radio-tracking data [described in CD1-11.05 TR5.11 paras 6.1.7/8; PDF p54] then provides Scheme-level context. As summarised within para 3.1.1, Natural England had no objection to the proposed approach to barbastelle bat survey and data-

² Bourn Airfield: data summarised within Paragraphs 6.1.13 to 6.1.15 of CD1-11.05 TR5.11; PDF p54-55; East West Rail (EWR): data summarised within Paragraphs 6.1.16 to 6.1.20 of CD1-11.05 TR5.11; PDF p55; and the A428 Black Cat to Caxton Gibbett Road Improvement Scheme: data summarised within Paragraphs 6.1.21 to 6.1.22 of CD1-11.05 TR5.11; PDF p56.

gathering given the data-sharing agreement, which allowed the use of EWR radio-tracking and home-range analysis to inform the Scheme.

- 5.1.3 Breeding colonies have been identified at a number of woodlands within the wider landscape; woodlands in which barbastelle have been located are detailed within Table 2.

Table 2: Woodlands with barbastelle colonies identified.

Woodland Name	Designation	Data collected to date	Distance From Scheme
Madingley Wood	SSSI	Peak count of 28 bats	Approximately 250m north
Hardwick Wood	SSSI	Peak counts of 28 and 27 bats	Approximately 1.7km south
Eversden and Wimpole ³	SAC	Designated for its breeding colony of barbastelle of 11-54 bats	Approximately 6km south
Waresley and Gransden	SSSI	Peak count of 10 bats	Approximately 7.6km south west
Hauxton Gravel Pits	None	No roost counts available	Approximately 5.9km south
Kingston Wood	SSSI	Peak count of 1 bat (no roost identified)	Approximately 4.9km south

- 5.1.4 The home range and core foraging areas for barbastelle within Madingley Wood lie 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 into the Scheme boundary. The report in which this is detailed is not in the public domain, but the results were discussed in the HRA [CD1-11.05 TR5.11 para 6.1.2; PDF p55] and maps showing this colony's home range and core areas were shared with Natural England in the April meeting.
- 5.1.5 The home range and core foraging areas for barbastelle from the Hardwick Wood colony primarily extend north of the woodland east of Highfield Caldecote and Bourn Airfield, and extend beyond St Neots Road and the A428, as well as within the Scheme boundary. The report in which this is detailed is not in the public domain, but the results were discussed in the HRA [CD1-11.05 TR5.11 para 6.1.2; PDF p55] and maps showing this colony's home range and core areas were shared with Natural England in the April meeting.
- 5.1.6 These findings correspond with static detector data collected in 2022 [CD1-11.05 TR5.05, summarised in Appendix 3.3, Technical Note 1], where the highest levels of barbastelle 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).
- 5.1.7 Barbastelle 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 [CD1-11.05 TR5.05 para 6.1.13-15; PDF p55].
- 5.1.8 To date, the radio-tracking surveys undertaken for EWR have not established that the breeding colonies at Madingley Wood SSSI, Hardwick Wood SSSI or Waresley and Gransden Wood SSSI 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.

³ There are seven SACs where this Annex II species is a primary reason for site selection, and two further SACs where this species is a qualifying feature. Only one other SAC is in East Anglia (Paston Great Barn, the only known example of a maternity roost of barbastelles in a building). This is, in large part, a reflection of historical survey effort and no new SACs have been designated. More details are provided for each in Appendix 1.

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 [CD1-11.05 TR5.11 para 6.1.9 p56].

- 5.1.9 The data has shown that barbastelle use landscape features such as woodland edge, 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 (described in more detail in para 6.2.9 below).
- 5.1.10 No barbastelle roosts were recorded within the Order limits. The closest identified barbastelle roost was within Madingley Wood SSSI, the woodland resource approximately 250m north of the Scheme.

5.2 Commuting routes and foraging areas

- 5.2.1 The radio-tracking data highlighted above have demonstrated where barbastelle colony home ranges and core areas are located, to the best of our knowledge. It is recognised that not all individuals of a colony will have been radio-tracked; notably, licences for radio-tracking allow no more than the assumed 20% of a colony to be tagged.
- 5.2.2 Nonetheless, radio-tracking is only one part of the data collected and therefore, in combination with the other techniques used, it is possible to have reasonable confidence in the areas which are of greater importance to barbastelle in particular.
- 5.2.3 Multiple criteria were used to determine which were the more important areas (summarised in para 7.3.3 below), taking into account survey and other contextual information Technical Note 1 (Appendix 3.3, paras 7.1.1-7.1.6 (PDF p80-81) and Table 6 (PDF pp 82-87) shows how the iterative approach to data collection has been used to determine such areas. The highest levels of activity recorded for all species bar two were recorded at a static detector located ~1.5km west of Madingley (rather than east of Madingley, in the direction of Coton Orchard).

5.3 Temporal data

- 5.3.1 During the series of stakeholder meetings, Natural England requested additional information on the timing of barbastelle activity recorded. Further assessment of every barbastelle registration from the Scheme's time-stamped static detector surveys (those collected by WSP) has therefore been undertaken. These registration timings have been assessed against sunset, to quantify the instances of early barbastelle movements and where these were located.
- 5.3.2 Further details are provided in Appendix 3.3, Technical Note 1 Section 3.0; PDF pp 73-76. A total of 80% of all barbastelle registrations were recorded over more than 1.5 hours following sunset (see Table 2 of Technical Note 1; PDF p73). Only 5.6% were within 60 minutes of sunset. Of the 1151 barbastelle registrations recorded across all summer static detector locations and months surveyed, only 6% of those registrations were recorded within Coton Orchard CWS (Locations 5, 6, 7 and 8). Of this 6%, 3 registrations (0.26% of all registrations) were recorded within an hour post-sunset.
- 5.3.3 Of the WSP crossing point surveys undertaken within Coton Orchard CWS (CP2, CP3, CP4 and CP13), post-QA, no barbastelle registrations were recorded. During the Thomson surveys of CP2, a total of 55 barbastelle registrations were noted along the tree line during a single survey visit. No flightlines were recorded for these registrations, with the only timing registration noted being 49 minutes following sunset.
- 5.3.4 A considerable amount of time has been spent in and around Coton Orchard undertaking emergence surveys from dusk: within the orchard (50 hours); on its northern boundary (30 hours); and southern boundary (40 hours). These recorded very little barbastelle (two faint calls) from within the orchard. This also reinforces that there is very low barbastelle activity in the period after sunset.

6.0 IMPACTS AND EFFECTS

6.1.1 Potential impacts are described below, separated into the impacts relating to construction and those of operation. For each potential impact, the likelihood of that impact occurring is then assessed.

6.1.2 Potential construction impacts comprise:

- loss of roosts through removal (direct impact, with the potential for mortality) or disturbance from construction activities;
- fragmentation of the landscape through loss of commuting routes; and
- loss of foraging habitat

6.1.3 Potential operational impacts comprise:

- indirect loss of roosts through disturbance/abandonment;
- indirect loss/degradation of foraging habitat through disturbance change in management, prey availability;
- fragmentation of the landscape through the barrier effect of the new busway; and
- mortality from collision with buses.

6.2 Construction impacts

Roost loss (direct/indirect) and mortality

6.2.1 Although no confirmed roosts are anticipated to be lost to construction, a total of five trees with 'high' suitability, 12 with 'moderate' suitability and 28 with 'low' suitability to support roosts are anticipated to be lost to the Scheme (and a small number of veteran trees translocated), which could affect the local roost resource. Even though no roosts have yet been identified within the Scheme, trees that have or are developing suitable roost features could form part of the overall roost resource.

6.2.2 According to Zeale & Natural England (2024) [CD25-43; PDF p3] barbastelles are "closely associated with broadleaved woodland containing large numbers of veteran and dead trees ...[they] switch roosts frequently and require large numbers of roost trees [which] can be spread over a large area, typically 100-200 ha. Roost-switching means that individual roosts are used for short periods of time; thus, even if retained trees are used as roosts on occasion, the likelihood of any individual tree being occupied at the time of construction is low. Even if occupied, the temporary effect of construction disturbance on individual trees is unlikely to cause long-term abandonment (see para 6.3.1 for operational disturbance).

6.2.3 Other tree-roosting bat species also tend to switch roosts frequently (Collins, 2023) [CD25-34 Box 6.1, p59]. Roost-switching does mean that a large number of trees are needed to sustain a colony. Collins (2023) estimates between 27 and 60 for different species. The trees used in any year will change, particularly for those which roost behind fragile features such as loose bark (notably barbastelle).

6.2.4 The removal of roost trees (a sub-set of those trees with suitability for bats), should bats be in occupation at the time of removal (a subset of those trees that actually are used as roosts) has a small potential for bats to be injured or killed, but only if best practice is not followed. If best practice is adopted (as outlined in Reason & Wray, 2023 [CD25-45 Section 6.5; PDF pp87-90], such impacts would be unlikely.

- 6.2.5 In summary, direct (potential) roost loss is limited to a small proportion of the roost resource; and the indirect impacts of roost loss, and mortality through tree removal are very unlikely. Nonetheless, mitigation for any potential impacts is set out in Section 7.1.

Fragmentation of the landscape through severance

- 6.2.6 Fragmentation of the landscape could occur through loss of commuting routes (removal of linear habitat features across the proposed busway) if bats are unable or unwilling to follow their traditional routes to reach existing productive foraging areas.
- 6.2.7 Lighting can be a barrier to light-averse species (and even urban pipistrelles will seek to cross in darker areas (Hale *et al.*, 2015; Appendix 2) if these are available, despite regularly foraging around street-lamps). Barbastelles are reported to be 'light-shy' (Zeale & Natural England, 2024) [CD25-43; PDF p21]; they too have been reported foraging around street-lamps⁴, though less commonly.
- 6.2.8 The effects of fragmentation will affect bat species differently, but in my opinion, it is unlikely that barbastelle would be significantly affected by the loss of such commuting routes, for the following reasons. Firstly, although the existing landscape is already partially fragmented owing to severance and lighting from the presence of several major linear infrastructures (described in para 4.2.1), it remains sufficiently dark, connected and permeable to bats (para 4.2.3).
- 6.2.9 In the specific location of the Scheme, CD1-11.05 TR5.11, para 6.1.11 p54 describes the extensive radio-tracking of barbastelle throughout the wider landscape. During the radio-tracking associated with Bourne Airfield, key barbastelle flight-lines were identified, two of which crossed the A428. At these locations, the flight-line gaps (canopy-to-canopy) include gaps of 37 and 28m at the western location, and a further gap of 50m at the eastern location⁵. This demonstrates that barbastelle populations within the wider landscape are already crossing gaps much larger than 20m (despite Natural England '*strongly*' advising that '*20m is much too wide for an effective crossing point*').
- 6.2.10 In consulting a peer with considerable barbastelle experience (G. Harris, pers. comm.), he referenced a barbastelle radio-tracking project undertaken for the A303 Stonehenge Tunnel Project (2016-17). As the landscape here is very open, it was considered unusual/surprising for barbastelle even to be present (perhaps as a result of previous barbastelle studies being heavily-focused in much more wooded areas of Sussex [e.g. CD25-50]). The mature female barbastelles Harris tracked were regularly crossing gaps in degraded hedgerows; some gaps 100m long. Without wishing to speculate too far, it seems probable that these flight-paths previously contained fewer gaps, but they continue to be used because these individuals could access good foraging by following them.
- 6.2.11 In addition, barbastelle fly at high speed (capable of 50kph⁶) and can travel up to 20 km from roost sites to preferred foraging areas (Zeale & Natural England, 2024 [CD25-43; PDF p3], thus covering very large distances each night. Small diversions are unlikely to result in increased energetic expenditure sufficient to affect fitness as is sometimes suggested.
- 6.2.12 In relation to lighting, barbastelle are often observed foraging within their 'home' woodland (i.e. close to their roosts) before venturing further afield ((Zeale & Natural England, 2024 [CD25-43; PDF p21]; also G. Harris, pers. comm; M. Zeale, pers. comm); and it is assumed that they do so to avoid emerging from the wood before it is fully dark. This behaviour may be why the

⁴ Gareth Harris (pers. comm.) observed barbastelle flying around/foraging around street lights in an urban park in Trowbridge (2019); and also flying across the open areas of Salisbury Plain during military exercises when the sky was heavily lit.

⁵ Measurements made using the locations identified in Figure 3 of Thomson Ecology (20218). Bourn Airfield. ES Volume 3: Ecology Survey Technical Reports BCOU110/001 10.1. Distance measurements were then taken using aerial imagery assessment.

⁶ A tagged and tracked barbastelle located 10km from its roost (Lincolnshire, 2015) was located back at its roost after 12 minutes (I. Davidson-Watts, pers. comm.).

further assessment of WSP static data recorded, on average, 'first' barbastelle registrations across the Scheme 1.79 hours after sunset⁷ and at Coton Orchard 1.88 hours after sunset) (Appendix 3.3, Technical Note 1 Section 3); that behaviour would not be affected by the proposed busway. Specifically, only three early (between sunset and 1 hours post-sunset) barbastelle registrations were picked up within Coton Orchard CWS over 90 nights of survey (Section 5.3).

- 6.2.13 in addition, at the time of writing, additional surveys are in progress to respond to Natural England's request to 'better understand local crossing behaviour'. These surveys are being undertaken at locations where barbastelles have either previously been recorded crossing existing roads or at likely crossing locations. At Madingley, where the breeding barbastelle closest to the Scheme are located, the observations made using thermal imagery confirm that bats are crossing the A1303 in darkness; the earliest registrations 70, 83 and 85 minutes after sunset (Appendix 3.3, Technical Note 1 Section 3, para 3.1.5). This is in line with, and supports, the observations made (and data collected) at Coton Orchard and elsewhere.
- 6.2.14 In summary, construction activities which result in gaps in commuting routes are unlikely to cause fragmentation of the landscape to the extent that would impact barbastelle. Nonetheless, in order to provide safe and connected commuting routes at safe height across the busway for barbastelle and other species, mitigation is set out in Section 7.2.

Loss/degradation of foraging habitat

- 6.2.15 Collins (2023) [CD25-34; PDF p39] defined a Core Sustainance Zone (CSZ) as the area surrounding a communal bat roost within which habitat availability and quality will have a significant influence on the resilience and conservation status of the colony using the roost. For barbastelle, the CSZ is 6km radius (>100km²); for brown long-eared bat, half that (3km radius or ~28km²). The Scheme runs for 13.6 km, but over a narrow width for most of its length. Of the habitats lost, ditches and other waterbodies, broadleaved woodland, scattered trees, lines of trees, hedgerows, orchard, scrub and grassland represent the majority of highly suitable habitat for commuting and foraging bats. Construction of the busway will result in the loss a small proportion of the potential foraging habitat within the core foraging area of the bat species that could be affected, and a very small proportion of the habitat within 10km of the Eversden and Wimpole SAC (>300km²). Moreover, these habitats are widely represented in the wider local landscape.
- 6.2.16 The Scheme proposals have committed to delivering a minimum of 10% biodiversity net gain (BNG), with the aim of achieving 20% (the former is a planning condition). To reduce the effect on the natural environment, the route has been adjusted to avoid trees and other vegetation where possible. At the 'April meeting', Natural England were shown pre- and post-construction barbastelle foraging availability (Appendix 3.2; April presentation Slide 12; PDF p21), based on UK Habs categories assigned for the BNG assessment), and that there would be no net loss of bat foraging habitat as a result of the Scheme following implementation of BNG.
- 6.2.17 In relation to Coton Orchard specifically, Natural England suggested that this area, located ~250m from Madingley Wood, could be used by early foraging barbastelle seeking cover before full darkness. Concerns were raised that the level of survey effort (with respect to bats) would not have been sufficient to determine this. As discussed in the April meeting, and outlined further in Appendix 3.3, Technical Note 1, the orchard has been surveyed using static detectors as well as subjected to crossing-point and emergence surveys. Static detectors were placed on four linear features: three towards the western end, and one on the eastern boundary, which comprised a tall line of poplars. Crossing-point surveys were also undertaken along these features. I consider this a reasonable survey effort for a small land parcel. As set out in para 4.2.14, much of the habitat within the orchard is sub-optimal for barbastelle, being either closely-mown (para 4.2.9) or very cluttered (4.2.10). Static detectors were not placed within the dense scrub, as such cluttered vegetation is not typically used for foraging by

⁷ Crossing-point surveys undertaken for EWR, following standard methods, continued for 60 minutes and did not pick up barbastelle. Surveys undertaken for this Scheme were extended to 120 minutes to ensure late-emerging species such as barbastelle would be recorded if present later in the evening.

barbastelle (4.2.13 - 4.2.14) and bats were observed flying over not within this area (early August survey at a height of 8m). Importantly, with rare exceptions (as set out in Section 5.3 and Appendix 3.3, Technical Note 1, Section 3.0; PDF p73-76), barbastelle were not recorded within the orchard within an hour of sunset (and generally much later).

- 6.2.18 To the south-east of the orchard, between the proposed busway, Coton Nature Reserve and the M11, is a further small area of woodland that is less cluttered than the eastern end of the orchard (there is also a large basin planted with marginal aquatic plants). This area linked to the orchard on one side by the line of poplars described above and a parallel tree-line bordering the M11 [CD1-11.05 TR5.06 Figure 5.6.2-6; PDF p32]. A further crossing-point survey was undertaken here (on each tree-line); again, the data did not suggest early evening activity of this habitat linked to (and likely more suitable for) barbastelle seeking early cover (Section 5.3 and Appendix 3.3, Technical Note 1, Section 3.0), with a single exception, as detailed above.
- 6.2.19 A small amount of habitat would be removed within the orchard. While the creation of the busway could create additional edge habitat close to traffic, its value to foraging bats (and thus the likelihood of bats remaining in the vicinity of the busway) would depend on how it is planted and managed (para 7.4.4).
- 6.2.20 Lighting during the construction phase could deter bats from using areas of habitat that have previously been unlit, including commuting and foraging habitat for bats as well as potential roost sites in buildings outside of the Scheme boundary. However, construction activities are planned to take place between 0800 and 1800 Monday to Friday (0800 and 1300 on Saturday; with no working on Sundays or bank holidays). There may be some start-up and shut-down activities either side of these ranges, and occasional out-of-hours working (by separate agreement). There will therefore be very limited overlap with the hours of darkness during the seasons in which bats are active, limiting the potential for any indirect impacts. In addition, construction compounds will be sited within the red line boundary, and security will be provided by patrols rather than lighting.
- 6.2.21 In summary, only a very small proportion of a 'typical' barbastelle CSZ would be directly affected, i.e. removed, or indirectly affected on a temporary basis by lighting, noise or increased human presence (and the same applies even to species with smaller CSZs). Much of the habitat to be removed is sub-optimal, both for barbastelle and other bat species. Nonetheless, in recognition of the proximity to woodlands including Madingley Wood and the potential for other species to be affected, mitigation for potential impacts to foraging habitat is described in Section 7.4.

6.3 Operational impacts

Indirect loss of roosts

- 6.3.1 Trees that have the potential to support bats of all species, whether or not they have been used as roosts to date, are part of the long-term roost resource where they are in suitable locations. Such trees may be lost from the roost resource indirectly through abandonment as a result of disturbance. Such disturbance could include increases in noise, human presence and, in a small number of cases, lighting; potentially also a change in micro-environment through the removal of adjoining vegetation. However, bats would be habituated to existing levels of disturbance (particularly on the online sections), so the trees affected would be limited to a small number of trees that are exposed to increased disturbance. This would affect only a small proportion of the overall roost resource, and the likely overall impact would be negligible.

Indirect loss/degradation of foraging habitat

- 6.3.2 The indirect loss of foraging habitat could arise through disturbance (noise, lighting, additional human presence) or reduction in prey (through unfavourable changes in management, including hydrological change, and lighting). As for direct habitat loss, only a very small proportion of a 'typical' barbastelle CSZ could be indirectly affected. Nonetheless, in recognition

of the proximity to woodlands including Madingley Wood and the potential for other species to be affected, mitigation for potential impacts to foraging habitat is considered in Section 7.4.

Barrier effect of the new busway

- 6.3.3 This is an extension of the point in para 6.2.6, but over a longer term, i.e. barbastelle (and other species) could, in theory, be reluctant to cross the busway due not only to the removal of linear features but to noise, lighting, and potentially additional human presence from traffic and street lighting.
- 6.3.4 As a worst-case scenario, continued access to roosts for mating, breeding and hibernating which are spread across the wider landscape could (in theory) be disturbed. This could impact how the bats meet their energetic requirements for breeding and rearing young and thus impacting breeding success. If barrier impacts persist, again in an unmitigated worst-case scenario, fragmentation may affect the population, resulting in a reduction in genetic exchange and eventually population collapse. Whilst this is theoretically possible, it is unlikely, as set out in para 6.2.8 *et seq.*
- 6.3.5 In fact, Natural England's own report on the status of barbastelle [CD25-43] notes that 'roads, motorways, and other clearings in natural vegetation do not appear to be a major barrier to movement or dispersal in the landscape and so probably do not restrict habitat accessibility to a significant extent' (with the caveat that the barrier effect may be substantially stronger where roads and motorways are lit).
- 6.3.6 In any case, additional impact is considered unlikely to occur where street lighting and traffic are already present. This includes the lit 'Madingley Mulch' roundabout, which is within core foraging area within the home range of the Madingley bat population. Likewise the St Neots roundabout, is within the core foraging area and home range of the Hardwick bat population. This clearly shows a degree of habituation/accommodation.
- 6.3.7 Details of the existing and proposed lighting, showing the limited extent of new lighting and the rationale for that lighting, was presented to Natural England on 16 July 2025 (see Appendix 5). The presentation outlined the work that had been done to ascertain existing (pre-construction) night-time lux level plans. As already outlined, West of Cambridge is predominantly a dark landscape (the A428/A1303/M11 are predominantly unlit) with localised significant lighting within the Hardwick and Madingley barbastelle home ranges. However, these localised areas of lighting are at junctions/roundabouts which have significant mature and dense trees/shrubs lining roads. This likely acts as screening, providing dark areas (confirmed by lux readings) behind, allowing movements for more sensitive to light bat species.
- 6.3.8 New lighting is limited to areas required to meet H&S standards, this is particularly important following the HSE ruling that unlit areas were, in part, the cause of fatalities on another bus route in Cambridge, notably where pedestrians/cyclists could be in proximity to the busway. Mitigation to further limit the impacts of the lighting (beyond avoidance wherever possible) is set out in Section 7.2.

Mortality

- 6.3.9 Should barbastelle (and other bats) cross the Scheme, they could cross unsafely i.e. at traffic height and be at risk of colliding with bus traffic. The risk is potentially increased at points where linear features identified as commuting routes have been severed. Areas of the Scheme that do not contain existing roadways will also introduce traffic into areas where there are no roads at present.
- 6.3.10 The Scheme will run single-decker buses that have a typical body height of 3.1m. Collision risk is therefore higher for those species that typically fly below this height. Elmeros *et al.* (2016; pp4-5; Appendix 2) categorises species according to flight characteristics; those typically flying below 5m, notably over open gaps, are those which would be most at risk (in Cambridgeshire, the *Myotis* and long-eared bats).

- 6.3.11 In addition, bus operation is limited to between approximately 6.00am and midnight, ceasing operations overnight. The periods of risk therefore differ between species that emerge early and those that emerge late. For all species, there is a limited period of overlap where bats are flying and the buses are operational, and the risk would be further reduced during the summer months when sunset is later.
- 6.3.12 The bus service will also run at a low frequency relative to a trunk or motorway (for which mortalities are well documented), with approximately ten services an hour in each direction, totalling 20 movements (service frequency will vary at different times of the day)⁸.
- 6.3.13 Wang *et al.*, (2023; Appendix 2) noted the majority of studies indicate that wildlife/vehicle collisions are positively correlated with road width, number of lanes, road class, traffic volume, and speed limit (though bats were not referenced specifically). A specific study of bat road mortality (Figueiredo Ramalho *et al.*, 2021; ; Appendix 2) concluded road width, speed and volume were contributing factors to increased bat road mortality. Here, buses will be limited to a speed of 50mph, slowing to 30mph or less at junctions and stopping at various points, which minimises the risk of injury/mortality from a collision.
- 6.3.14 Barbastelles were recorded returning to roosts up to around four and a quarter hours before sunrise, and on average about 3 hours 40 minutes before [CD1-11.05 TR5.11, para 7.1.17 p62]. Buses are operational from 06:00am, meaning there is a very low likelihood of overlap with the buses operation when the bats return to the roost from foraging, due to sunrise being between approximately 05:00am at the beginning of August and 07:00am by the end of September.
- 6.3.15 A meta-analysis of road collision data (Fensome and Mathews, 2016; Appendix 2) found that low-flying species are more prone to collisions than high-flying species, and that juveniles (which fly from three or so weeks of age in summer) are more vulnerable to collisions than adults. This period of potentially higher risk (which should be considered against the parameters of bus operation in paras 6.3.11/6.3.12) extends from emergence (barbastelle emerge between 12 and 36 minutes after sunset, with a mean average of 24 minutes after sunset (Zeale *et al.*, 2012; Appendix 2) until the end of bus operations at midnight. Sunset in August and September, when young bats are flying, is between 20:50 at the beginning of August and around 18:40 at the end of September i.e. up to 5 hours per night, when there will be a maximum of 20 slower-speed bus movements per hour. The risk is, as previously noted, much lower compared to a fully operational road⁸.
- 6.3.16 Barbastelles are fast-flying bats which are less likely to be subject to road collisions than slower-flying individuals of species such as horseshoe bats. However, it is notable that, despite an increase in the number of roads (and traffic volumes) over recent decades, horseshoe bat populations are increasing (Mathews *et al.*, 2018; BCT, 2025; Appendix 2).
- 6.3.17 The proliferation of roads is undoubtedly a threat to wildlife. However, given that the available evidence and literature shows the risk of bat mortality due to roads is proportionate to the width of the road (and the gap that bats have to cross), and the speed and volume of traffic (para 6.3.13), I consider that, with the single-decker buses' low height, low frequency, volume and speed, and the narrow width of the busway, the risk of road traffic mortality from collisions is very low when compared to the existing 24-hour operational road network that bats are already navigating.
- 6.3.18 It is possible to calculate the likelihood of bats and buses being in a position to collide given the *number and speed of buses, the times at which barbastelle have been recorded, and the*

⁸ We know bats emerge from Madingley Wood once it is dark and cross the A1303 which runs alongside (para 6.2.13). From the available traffic data, I have made a rough approximation regarding the addition of a parallel busway. Traffic flows between 20:00 and 00:00 on the adjoining A428 were 6% of the 24-hour total in Mar 2019. Applying this percentage to a 24-hour count on the A1303 just to the east of this location (all two-way traffic; data from 2024) shows that vehicles on the busway would likely be less than a tenth of the existing night-time traffic on the A1303. Source of raw data: DfT.

numbers of registrations recorded. A comprehensive collision-risk assessment for Coton Orchard has been undertaken and was presented to Natural England on 09 June 2025 (reproduced in Appendix 4.2), and in a subsequent Technical Note issued on 23 July 2025 (reproduced in Appendix 4.3). This examines the risk not just for barbastelle but all species other than those which fly at height.

- 6.3.19 Although Natural England raised concerns around levels of mortality in their initial representation [CD2-REP-11], this item is now considered provisionally resolved in the latest draft SoCG.
- 6.3.20 Notwithstanding the very low risk of collision, mitigation to reduce that risk further is presented together in Section 7.3.

6.4 Designated sites: Eversden and Wimpole SAC

- 6.4.1 The Eversden and Wimpole SAC, designated for its maternity colony of barbastelle, lies 6km south of the Scheme [CD1-11.05 TR5.11; PDF p70].
- 6.4.2 The SAC is close to several roads within similar distances (or less) to the Scheme.

Table 3. Major roads close to Eversden and Wimpole SAC

Major infrastructure	Distance to SAC
A1198	0.63km
A603	1.64km
A486	6.21km
M11	7.42km
A1301	7.65km

- 6.4.3 Six km is the outer radius of the Core Sustenance Zone for barbastelle (Collins, 2023; CD25-34, p38 Table 3.5), and no 'roost swapping' has yet been recorded between the SAC and other known woodland breeding populations during radio-tracking. However, given the distances barbastelle can fly on a nightly basis (up to 20km, but more often within 7km (Zeale & Natural England, 2024); [CD-43; PDF p12]), there is the *potential* for land within the Scheme footprint to be functionally linked to the SAC (i.e. used by one or more barbastelle that also use the SAC).
- 6.4.4 Potential impacts of construction and operation on the barbastelle using the SAC have therefore been fully considered. A detailed assessment is set out in the Habitats Regulation Assessment for the Scheme [CD1-11.05 TR5.11], and the conservation objectives are discussed below. This is in alignment with the Greater Cambridge Biodiversity Supplementary Planning Document [CD7-12, para 5.6.13; PDF p52] whereby smaller woods in the wider landscape of the SAC and the connecting linear features are considered functionally linked supporting habitat, until data suggests otherwise.
- 6.4.5 The Supplementary Advice on Conservation Objectives (SACO) states that the population and abundance of the breeding barbastelle population of Eversden and Wimpole SAC should be maintained at a level of between 11 to 54 bats or more, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.
- 6.4.6 It is worth noting that population estimates are notoriously difficult and tend to be based on peak counts from identified roost trees. However, it is impossible to be sure that all roost trees

are identified as part of any simultaneous count; indeed, due to roost-switching and the large number of trees used by a colony (para 6.2.3), they never will be. When radio-tracking bats at Sizewell (also in East Anglia), the 16-18 tracked bats used several roost trees on any one night⁹. Accurate counts are also hampered by the difficulties of counting bats emerging from features which may be up to 20m high and out of sight from the ground. That means that simultaneous counts are more likely than not to be minimum counts.

- 6.4.7 Barbastelle is rarer than many bat species, but our understanding of their distribution has improved in recent years by more extensive survey effort and technological advances, as set out in Appendix 1. East Anglia is sometimes described as a 'stronghold' for this species, in a marked departure from earlier assumptions of habitat use based on work carried out in the woodlands of East Sussex.
- 6.4.8 This SACO population estimate (and associated objective) does not take into consideration breeding populations recently identified in multiple woodlands in the wider landscape through extensive radio-tracking at Hardwick Woods SSSI (1.5km from the scheme) and Madingley Woodlands SSSI (within 250m of the scheme) [see paragraph 6.1.11 of CD1-11.05 TR5.11; PDF p54]. There are peak counts for bats emerging from a single tree at these breeding populations of 27 and 28 barbastelles, respectively, which has doubled the current population estimate, and there could be as-yet unidentified populations in the wider area. Count data was shared with Natural England at the June meeting (Appendix 4.2; Slides 19-20; PDF p122-123) for a number of local woodlands.

7.0 SCHEME DESIGN, MITIGATION AND COMPENSATION

7.1 Addressing roost loss (direct/indirect) and roost-linked mortality

- 7.1.1 Replacement roost features will be incorporated in the form of bat boxes and veteranisation of retained trees, to ensure no net loss of roost resource. The location, number and type of replacement roost feature will be detailed within the Landscape and Ecological Management Plan.
- 7.1.2 Mortality and injury when trees are removed will be avoided by following good practice as set out in the Bat Mitigation Guidelines (Reason and Wray, 2023 [CD25-45 Section 6.5; PDF p87]).
- 7.1.3 Construction disturbance is considered to be insignificant and confined to the site boundary, with limits on night-time working, as set out in para 6.2.20.

7.2 Addressing fragmentation of the landscape through severance and the barrier effect

- 7.2.1 Notwithstanding the ability of barbastelle to travel long distances at speed and cross significant gaps, as set out in para 6.2.11, mitigation in the form of landscape treatments will be implemented in offline locations where barbastelle and other species have been recorded commuting across the proposed Scheme. The justification for the locations of landscape treatments is provided in Appendix 3.3, Technical Note 1, Section 7.0 and Table 6 PDF pp80-87, which sets out the rationale for all landscape mitigation measures.
- 7.2.2 At eight locations, landscape mitigation features will be incorporated to encourage flight heights of all bats 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 busway. Willow fencing or similar will be used as a temporary measure if tree planting cannot establish this height initially, and may need to be permanent to avoid fly-through by clutter-feeding bats (also, to meet landowner requirements). Where the Scheme is in cutting, the same principle (4m above the new busway) will apply. Once mature, the gap

⁹ From personal involvement in the radio-tracking undertaken for Sizewell C, 18 tagged bats in 2014 were distributed between a number of day roosts on any one night (most commonly five or six), and each used between one and four roost sites during the study, although not all day-roost locations were confirmed each day for each bat. A similar picture was seen in 2011; 16 tagged bats were distributed between slightly fewer roosts (three or four) on any day, but each used between one and five roosts sites during the period they were tracked.

between the canopy heights either side of the new road will be less than 20m to encourage all bats species to maintain their flight height over the road. Design principles and options were presented to Natural England in the meeting of 09 June 2025 (presentation reproduced in Appendix 4.2) and will be finalised at detailed-design stage.

- 7.2.3 Whilst barbastelle and other bats could cross elsewhere along the busway, i.e. outside of the landscape treatments designed to maintain their flight above the buses, there is some (albeit limited) evidence that even barbastelle would seek to use the features that minimise gaps. In a study of the Northern Distributor Road (NDR) reported by the Wensum Valley Barbastelle Project [CD25-44; PDF p45], barbastelle travelled parallel to the NDR before crossing at a limited number of specific points, where habitat corridors/shelter were present on both sides and the unvegetated 'gap' over the road was reduced.
- 7.2.4 It is also important to note that, generally, very low registrations of barbastelle were recorded across the Scheme, emphasising the low risk for which mitigation is proposed. Although severance impacts are considered unlikely, even in the absence of mitigation, these landscape treatments provide assurance that risks to barbastelle can be further minimised, and they will also address impacts to other species.
- 7.2.5 Landscape treatments will be unlit or protected from lighting. Outside of the landscape treatments that mitigate for severed linear features across the offline busway, the driving principle has also been to avoid lighting other than in areas where safety issues have been identified, as set out in the July meeting (see Appendix 5). Thus, as is the case now, the limited additional lighting provision, localised to junctions (driven/pedestrian and cycling) and travel hubs (situated outside of ecologically sensitive areas), maintains wide ranging dark areas, avoids fragmentation and ensures landscape permeability to the bat populations within local woodlands (including individuals from the SAC). The new lighting provision will be subject to a Planning Condition.
- 7.2.6 For online sections, the existing road may already constitute a barrier to some species, but the addition of the narrow busway is unlikely to result in a barrier to those individuals already crossing at those locations (such as barbastelle and high-flying species such as *Nyctalus*). Online mitigation will be to retain habitat *in situ* (as far as is practicable) during construction and, where this is not possible, such planting will be replaced at a similar height and density to maintain the function previously provided (again, as far as is practicable).
- 7.2.7 Although Natural England raised concerns around lighting in their initial representation [CD2-REP-11], these items are now considered resolvable at detailed design in the latest draft SoCG.

7.3 Assessing and addressing mortality during operation

- 7.3.1 The current bus service relies on double-decker buses which pass along the edge of Madingley Wood SSSI. The new bus service would employ single-decker vehicles (typical body height of 3.1m) using a single lane in each direction, located 250 m away from Madingley Wood at its closest point, and therefore further from bats as they emerge and forage close to their roosts.
- 7.3.2 The low risk of collision for barbastelle and other species is set out in a detailed Technical Note (Appendix 4.3, Technical Note 2) and summarised in Section 6.3. Given the low risk of collision, it is not considered that mortality represents an existential threat or could compromise FCS by materially adding to existing levels of natural and anthropogenic mortality. Nonetheless, for offline sections of the Scheme, landscape mitigation features will be located at the crossing features identified and listed in Appendix 3.3, Technical Note 1, Section 7.0. These landscape treatments further reduce the likelihood of road mortality.
- 7.3.3 The rationale for scoping in a location for mitigation was:
- previously recorded as a crossing location for barbastelle through radio-tracking; and/or
 - at least one barbastelle registration during CP surveys; and/or

- at least ten bat registrations of other (more common) species were recorded during CP surveys; and/or
 - barbastelle or 'at risk' species recorded during static detector surveys.
 - In addition, contextual information was also taken into consideration, including whether the feature was within or near to a barbastelle maternity colony's home range, core foraging area or juvenile sustenance zone.
- 7.3.4 Although Natural England raised concerns around the design of crossing-points in their initial representation [CD2-REP-11], these items are now considered resolvable at detailed design in the latest draft SoCG.

7.4 Addressing loss/degradation of foraging habitat

- 7.4.1 Even in the absence of mitigation, sufficient existing and accessible habitat is available within and beyond the Scheme to maintain the favourable conservation status of the bat population given the small extent of habitat loss.
- 7.4.2 The landscaping strategy, which will be the subject of a planning condition, will be designed to replace existing bat foraging and commuting habitats to be lost to the Scheme (i.e., hedgerows, tree lines and grassland), and to provide habitat enhancement. Appendix ES1 of the ES contains a Mitigation Register [CD1-10.02] which includes the locations of measures such as the retention of certain habitats including woodland; native woodland/tree planting and specific measures in relation to Coton Orchard.
- 7.4.3 The newly created habitat will provide potentially greater access to foraging habitats around and within the Scheme for bats, particularly when compared to the existing arable land to be lost.
- 7.4.4 As noted in para 4.2.12/4.2.13, barbastelle forage in edge habitats that provide high moth biomass, and a moth larval food plant analysis, based on the results of the moth surveys completed in Coton Orchard, has been undertaken. These moth larval foodplants will be incorporated into the landscaping specification (at detailed design stage) within the Scheme footprint away from collision risk areas and this requirement will be part of a planning condition.
- 7.4.5 Although Natural England raised concerns around the loss of foraging habitat, and moth larval food plants in particular in their initial representation [CD2-REP-11], their concerns are now considered resolved in the latest draft SoCG.
- 7.4.6 The landscape strategy will also provide some mitigation / buffering for increased levels of lighting where this is considered essential for safety reasons (see also para 7.2.5). Such areas will be subject to further consideration at detailed design stage.

7.5 Implementation

- 7.5.1 Embedded mitigation measures are those that have been incorporated in the design of the Scheme to design-out impacts and significant effects where possible.
- 7.5.2 Where elements of detailed design remain unconfirmed (this may include, at the time of writing, details of landscape strategy include vegetation removal plans, landscape treatments for severed linear features, fencing, lighting design and operational speed restrictions), the process for confirming the design that will be taken forward will be secured via planning conditions.
- 7.5.3 In addition, a Code of Construction Practice (COCP; CD1-26) has been produced for the Scheme which provides an overview of the mitigation actions and commitments during construction and how they are secured. The measures described here and in the ES are included in the CoCP and will be secured via a planning condition requiring a Construction Environmental Management Plan (CEMP).

8.0 RESIDUAL IMPACTS

- 8.1.1 Given the measures outlined in Section 7.0, no significant effects on bats during construction or operation are predicted.
- 8.1.2 A monitoring strategy that sets defined objectives, test against those objectives, and potential remedial measures will be produced and implemented, in line with Reason and Wray, 2023 [CD25-45, Ch 9, p122], and subject to a planning condition.

9.0 REPRESENTATIONS RELEVANT TO MY EVIDENCE

- 9.1.1 The objections are outlined in Table 4, categorised by the nature of each objector (statutory/non-statutory), and limited to those that relate, or could relate, to the impact on the Scheme on barbastelle and Eversden and Wimpole SAC. Table 4 does not present each objection in full, only relevant elements.
- 9.1.2 For each point raised, my responses reference the parts of the text above that address the objection and/or provide additional information.
- 9.1.3 Of the representations raised by Natural England [CD2-REP-11], as of 13 August 2025, all are considered resolved, provisionally or fully, subject to further discussion at detailed design stage, as indicated in the sections above.

Table 4: Representations relevant to my Evidence

Objector / Reference Category of Objector	Nature of objection	Reference to paragraphs above where this concern is addressed and/or response where required.
CD2-REP-11 – Natural England Statutory	HRA – DAS Agreement: <i>The Statement to Inform Habitats Regulations Assessment [TR5.11] quotes Natural England's most recent advice in paragraph 4.2.8, provided under our Discretionary Advice Service (DAS) in July 2022 [CD25-42]. We believe that our comments in the following sections align with this previous advice.</i>	See row below. We acknowledge that Natural England's response in July 2022 ' <i>Natural England has no objection to the proposed approach to barbastelle bat survey and data gathering set out in Technical Note...</i> ' continues ' <i>subject to this being progressed in accordance with our advice above</i> ', and would note that the advice within [CD25-42] was followed.
	HRA: Insufficient Evidence base: <i>Natural England advises that TR5.11 is not robust enough to provide sufficient certainty of no adverse effect on the integrity of Eversden and Wimpole Woods SAC. Paragraph 7.2.5, for example, relating to the loss of foraging habitat, is too simplistic and lacks evidence to support the statement that 'the loss of these foraging areas are highly unlikely to have a significant effect on Barbastelle Bats given the availability of habitat in the wider landscape.'</i> For clarity: the specific paragraph quoted from TR5.11 states that 'The existing habitats within the scheme boundary provide a small proportion of the potential foraging habitat within their core foraging areas and the loss of these foraging areas are highly unlikely to have a significant effect on Barbastelle Bats given the availability of habitat in the wider landscape.'	At the time of writing this objection [CD2-REP-11], Natural England appeared unaware of the EWR data-sharing agreement, despite indicating that their comments aligned with previous DAS response which relied on that agreement [CD25-42]. However, it may be that Natural England were not aware of the extent of data that this agreement provided, nor of all of the data collected since 2017. This has now been corrected through engagement meetings, notably in April (see Appendix 3 for meeting outputs). Given the additional information set out in Appendix 3, Technical Note 1, I conclude there is sufficient information to determine impacts on the integrity of Eversden and Wimpole Woods SAC and barbastelle more widely. See also para 6.2.15 <i>et seq.</i> and Section 7.4 (above) regarding foraging areas (importance and mitigation).
	<i>The submitted Bat Activity Report [TR5.5] does not give enough consideration to foraging habitat, and the potentially most valuable foraging habitat impacted by the scheme (Coton Orchard) was not surveyed.</i>	Coton Orchard and its likely value to barbastelle is described in Section 4.2 <i>et seq.</i> Although access to the orchard has not been available recently, sufficient survey has been undertaken to ascertain the use of the orchard over time (as set out in para 6.2.17 and Section 5.3). The contention raised by Natural England was that Coton Orchard could be of value in providing early shade; however, thermal imaging (initial results) has now confirmed that bats

		<p>are leaving Madingley Wood in darkness (para 6.2.13). See Section 5.3 for further temporal analysis.</p> <p>See also the description of 800 Wood (paras 4.2.5/4.2.6), which provides supporting habitat adjacent to Madingley Wood.</p> <p>Furthermore, regardless of survey effort, the ES already considered Coton as ‘potentially important’ and committed to mitigation within its boundaries.</p>
	<p>HRA: Mortality From Collisions:</p> <p>Natural England ‘...disagree with the conclusion of paragraph 7.2.37 that there will be no adverse effects as a result of mortality from collisions. Given the low number of bats per colony, it may only take a handful of collisions to significantly reduce the population size of a colony. As stated above, the genetic health of one barbastelle colony is dependent on the genetic health of the colonies around it.</p>	<p>The risk of mortality from collisions is assessed in para 6.3.17. Detailed calculations are presented in para 6.3.18; see also the presentation to Natural England from 09 June 2025 and the subsequent Appendix 4.3, Technical Note 2. Our understanding of barbastelle distribution and population size (national and regional) is outlined in Appendix 1; local populations are described in Table 2 of that appendix.</p> <p>Given the low risk of collision, and the likely more extensive nature of the population of barbastelles in the landscape, it is not considered that mortality represents an existential threat or could compromise FCS by materially adding to existing levels of natural and anthropogenic mortality.</p>
	<p>HRA and - Barrier Effect</p> <p>Natural England ‘...believe that paragraphs 7.2.31 and 7.2.34 are misleading our advice is that, as barbastelles are one of the most light-averse bats, they should only be considered an ‘open flying’ species when full darkness is reached. In locations close to roost sites, as is likely to be the case at various points here, barbastelles require continuous shaded routes in order to begin commuting before full darkness, therefore a 20m gap is likely to be a barrier until later in the evening, or result in lower flying behaviour, putting the bats at greater risk.</p>	<p>This is covered in paras 6.3.3 <i>et seq.</i></p> <p>In addition, Natural England's own report on the status of barbastelle [CD-43, p21] notes that ‘roads, motorways, and other clearings in natural vegetation do not appear to be a major barrier to movement or dispersal in the landscape and so probably do not restrict habitat accessibility to a significant extent’.</p>
	<p>Lighting: Lighting Plans and Strategies</p> <p>Natural England ‘...requests that we see and approve detailed lighting plans and strategies for both the Construction and Operation phases before agreeing to this scheme. This should include details of the current Pre-Construction lux levels in areas of ecological sensitivity, in addition to the modelled lux level changes for the subsequent phases.’</p>	<p>As per para 6.3.7, details of the existing and proposed lighting, showing the limited extent of new lighting and the rationale for that lighting, were presented to Natural England on 16 July 2025 (Appendix 5).</p> <p>See also para 7.1.3 and para 7.2.5 above.</p> <p>In respect of the width of dark corridors, 10m dark corridors are accepted within Local Authority planning guidance issued in</p>

	<p>Lighting: Lighting Mitigation Measures</p> <p>Natural England requests <i>'There should not be just 'some' mitigation /buffering for increased levels of lighting, as is stated in paragraph 7.4.27 of the Technical Report 5 – Ecology [C2C-11-TR05-00] – the increased lighting should be completely mitigated for where it needs to be.'</i></p> <p>Lighting: Ecology Site Management Plan</p> <p>Natural England <i>'...requests to see the Ecology Site Management Plan to make sure lighting and illuminated compounds are sensibly located.'</i></p> <p>As part of the plan Natural England requested that there is <i>'a strict 'no night working allowed' commitment, secured through an appropriate planning mechanism.'</i> that there <i>'...should be no light spill at all onto important bat habitat.'</i> that <i>'a '10m dark corridor', as specified in paragraph 7.4.30 is not wide enough, particularly if there are strong light sources nearby.'</i> and that <i>'More information is needed to back up paragraph 7.4.31, i.e. an explanation of how the dark corridors will be maintained and monitored, and exactly what the 'appropriate additional or remedial measures' would be.'</i></p>	<p>Devon. However, for this scheme, it is important to reiterate that the Scheme is predominantly unlit within a predominantly dark landscape tying in with west Cambridge. Thus, it is not correct to consider the landscape treatments as providing dark corridors within a predominantly-lit landscape.</p>
	<p>Crossing Point Mitigation: Width of Mitigation</p> <p>Natural England <i>'...strongly advise that 20m is much too wide for an effective crossing point, and request that the exact specifications and width of each crossing point be provided at this stage within a definitive plan. The gap between canopies should not be any wider than a standard two-lane road, preferably less – we believe this would be narrower than 7m, depending on the bus width.'</i> and that <i>'...canopies should ideally be touching.'</i></p> <p>This subject was also referenced against the HRA, where a concern was raised regarding the width of the gap and barbastelle use prior to darkness.</p> <p>They noted: <i>Barbastelles would not cross a 20m gap at height before complete darkness, they would instead cross close to the ground where it is more shaded – this therefore would encourage collisions with traffic rather than preventing it, particularly in locations close to roost sites.</i></p>	<p>The likelihood of a 20m gaps deterring barbastelle from crossing the busway is not supported by evidence of current barbastelle behaviour or from several other projects/research. This is discussed in para 6.2.9 <i>et seq.</i></p> <p>As noted above, Natural England's own report on the status of barbastelle [CD-43, p21] notes that <i>'roads, motorways, and other clearings in natural vegetation do not appear to be a major barrier to movement or dispersal in the landscape and so probably do not restrict habitat accessibility to a significant extent'</i>.</p> <p>With respect to low flight before full darkness, work undertaken in Sussex [CD-49, PDF p8] does suggest that if bats can remain in dark, shaded woodland and within a metre or two of the ground, predation risk would be lowered. However, it's not clear that this was derived from observations, and I have not been able to find evidence that barbastelle regularly cross gaps close to the ground when light levels are higher. It may be a conflation of the behaviour of <i>commuting</i> horseshoe bats</p>

		<p>(which I have personally observed, as have many others), with that of barbastelles <i>foraging</i> over open spaces. Nick Downs (Natural England) described barbastelle flying low over sugar beet fields near Sizewell (Suffolk) before dark, and in the same location, barbastelles were exploiting open reedbed habitat within the first hour of sunset.</p> <p>In any case, at the locations monitored in relation to this Scheme (see Section 5.3), barbastelle do not appear to be leaving their home woodland before dark, even where the canopy gaps are short (i.e. adjacent to Madingley Wood).</p>
	<p>Crossing Point Mitigation: Timings of Barbastelle Movement</p> <p>Natural England requested '<i>...analysis of the timings of first and last bat pass registrations (relative to sunset and sunrise), particularly for barbastelles, should be carried out to inform which crossing points (and foraging areas, as discussed in parts 4 and 5, below) are currently being used outside of full darkness hours. This would therefore pinpoint the locations that should be prioritised for the highest quality mitigation measures to prevent barbastelle bats flying closer to the roadway at dusk and dawn (as they are more willing to fly higher and in more open areas once it is fully dark).</i>'</p>	<p>An analysis of the timing of barbastelle registrations is presented in Section 5.3, and in more detail in Appendix 3.3, Technical Note 1.</p> <p>In addition, at the time of writing, surveys are in progress to respond to Natural England's request to 'better understand local crossing behaviour'. At Madingley, where the breeding barbastelle closest to the Scheme are located, the observations made using thermal imagery confirm that bats are crossing the road in darkness.</p>
	<p>Crossing Point Mitigation: Local Barbastelle Population Behaviour</p> <p>Natural England noted '<i>The design of mitigation would also be aided by further investigation into the current road crossing behaviour of bats in the area, particularly where crossings are likely to be close to roost sites and therefore used before full darkness.</i>'</p> <p><i>It is further stated that 'Questions of both how local bats are crossing, and where they are crossing should seek to be answered, particularly close to Madingley Wood SSSI.' and that 'If it can be shown that bats from the local populations exhibit specific behaviours at existing roads, or are used to particular crossing features, it would give more confidence in the likely effectiveness of similar features incorporated into these proposals. It would also highlight where compensatory landscape enhancements could be most valuable, if they improve</i></p>	<p>In addition to the points made in the row above, the landscaping strategy is described in Section 7.4. See also the description of 800 Wood, planted directly adjacent (and linked to) Madingley Wood.</p>

	connectivity to or provide additional foraging habitat close to existing road crossings.	
	Foraging Areas: Insufficient Analysis Natural England stated " <i>Insufficient consideration has been given to impacts on areas which may be important bat foraging habitats where these are not the surveyed 'crossing point features</i> "	This was discussed in the April meeting (see Appendix 3); see also para 6.2.15 <i>et seq</i> and Section 7.4 regarding foraging areas (importance and mitigation).
	Foraging Areas: Prey Species Natural England considers that ' <i>There also appears to have been no consideration of impacts to bat prey species, their habitat and larval/food plants, which may impact the viability of existing foraging sites.</i> '	This was discussed in the April meeting (see Appendix 3); see also para 6.2.15 <i>et seq.</i> and Section 7.4 regarding foraging areas (importance and mitigation).
	Foraging Areas: Impact Level Natural England considers that ' <i>.... the territorial nature of barbastelles means that impacts to even one bat's foraging site or commuting route could have implications for the rest of the colony.</i> '	<p>This would appear to be an outdated understanding of barbastelle populations and their behaviour based on initial work carried out in Sussex.</p> <p>Studies from elsewhere, including work carried out for EWR, by myself in relation to Sizewell C in Suffolk, and work undertaken by WSP for the Norwich Western Link, as well as work carried out by Gareth Harris (pers. comm.) in Savernake Forest have shown overlapping foraging territories, even for separate maternity colonies.</p> <p>For this Scheme specifically, EWR data recorded overlapping foraging areas between the SAC population and both the Hardwick Wood and Madingley Wood populations</p> <p>Therefore, it is unlikely that an impact to <i>even one bat's foraging site or commuting route</i> could have measurable implications for its colony.</p> <p>It would be extremely surprising if that were the case, given that the CSZ for barbastelle is in excess of 100 km² and even breeding barbastelles have been shown to be capable of travelling many km in a night.</p> <p>The current best estimate (<i>sic</i>) for the size of the barbastelle population is stated as between 21,000 and 42,000 individuals in England (see Appendix 1) based on many assumptions and limited data, and subject to 'considerable uncertainty'. For example, there are large areas within the species' range where it has not been recorded (notably in central Wales and central</p>

		England), but this ‘gap’ may result from lower survey effort. In relation to this Scheme, as noted in para 6.4.7, East Anglia is considered a stronghold for barbastelle, and populations are likely to be robust.
	<p>Coton Orchard County Wildlife Site (CWS): Acknowledgement of the CWS Status</p> <p><i>As Coton Orchard has recently been designated as a County Wildlife Site (CWS) the map in Figure 5.2 of Appendix A of the Technical Report 5 – Ecology [C2C-11-TR05-00] should be updated to reflect this (along with any similar maps, or references to designated sites).'</i></p>	<p>It is accepted that Coton Orchard is designated a CWS, which has been acknowledged in technical appendices. The criterion for its selection is <i>1i- Traditional Orchard</i>.</p> <p>The presence of bats and barbastelle is noted within the supporting information; however, these species were not included within the assessment of criteria, confirming that the CWS was not designated due to the presence of bats in general or barbastelle specifically.</p>
	<p>Coton Orchard CWS: Dark Corridors</p> <p><i>‘Ordinarily, Natural England advises that existing treelines, hedgerows, and woodlands (including orchards) should be retained, enhanced, and maintained as dark corridors for commuting and foraging. This proposal, however, intends to cut straight through the middle of Coton Orchard, so this matter needs bespoke attention.’</i></p>	<p>It is important to understand the context of the Scheme, which will be primarily dark, as set out in para 6.3.7. The requirement is not to provide dark corridors within a primarily lit landscape, but to provide connectivity within a primarily dark landscape.</p> <p>Landscape treatments are described in para 7.2.2, and there are three within Coton Orchard. The justification for the locations of landscape treatments is provided in Appendix 3.3, Technical Note 1, Section 7.0 and Table 6.</p> <p>The mitigation planting proposed (Section 7.4) takes account of the specific needs of moth-feeding bat; details are set out in para 7.4.4.</p>
	<p>Coton Orchard CWS: Further Survey</p> <p><i>Natural England ‘request that bat activity surveys of the orchard and adjoining scrub/woodland be carried out.’</i></p> <p>In discussing further survey effort, Natural England agreed that one option would be to <i>acknowledge that the whole orchard is a valuable (or at least potentially valuable) foraging resource, and will therefore be given an appropriately high standard of mitigation (to be discussed at later meetings, likely including the 30mph speed limit extending through the orchard), then we will not insist on further surveys of the orchard itself to prove its significance.’</i></p>	<p>At the time of writing the Natural England response, the existence of the data-sharing agreement with EWR had not been appreciated (despite its acknowledgment in the earlier DAS response – CD25-42); thus, the full suite of available information was not appreciated.</p> <p>Coton Orchard and its likely value to barbastelle is described in paras 4.2.7 et seq. and in Appendix 3.3, Technical Note 1. As explained above, sufficient survey has been undertaken to ascertain the use of the orchard by barbastelle (as set out in para 6.2.17).</p> <p>Thermal imaging has also confirmed that bats are leaving Madingley Wood after dark (para 6.2.13).</p> <p>Nonetheless, as requested, Coton Orchard has been assumed to be potentially important to a small number of barbastelle</p>

		<p>(though it is unlikely to be performing the function of providing early shade).</p> <p>Mitigation measures that acknowledge the potential value of Coton Orchard include landscape treatments (see Section 7.2) and a landscaping strategy targeted to habitats supporting moth biomass (Section 7.4).</p> <p>A further potential mitigation measure would be to adopt a 30 mph speed restriction within the boundaries of Coton Orchard during periods when bats are active, though the need for this is uncertain given the short section over which this would apply and the already low collision risk (see para 6.3.18, the presentation to Natural England from 09 June 2025 and Appendix 4.3, Technical Note 2).</p>
	<p>Coton Orchard CWS: Micromoth Assessment</p> <p>Given barbastelles are specialist moth feeders, and indications that the orchard supports a number of invertebrates, Natural England requested <i>‘The potential impact of the scheme on these micromoths should therefore be taken into account in order to assess potential impacts on barbastelles.’</i> They also stated that <i>‘analysis of the larval and foodplants of the moths should be undertaken, compared to the plants that are to be removed should the scheme go ahead, and replacement plants and their associated habitats should be included in mitigation plans (preferably within the vicinity of the orchard, and/or near commuting routes between Madingley Wood and the orchard) to increase micromoth numbers.’</i></p>	<p>The likely value of Coton Orchard to foraging barbastelle is set out in para 4.2.13 <i>et seq.</i> and baseline data is set out in and in Appendix 3.3, Technical Note 1.</p> <p>The mitigation planting proposed (Section 7.4) takes account of the specific needs of moth-feeding bats and details are set out in para 7.4.4.</p>
	<p>Coton Orchard CWS: Foraging Opportunities</p> <p>Natural England acknowledge that their <i>‘remit does not extend to County Wildlife Sites’</i>; however, they also note that <i>‘There is evidence that this site [the CWS] could provide supporting habitat for barbastelle bats, particularly from the nearby Madingley Wood SSSI population, and our [Natural England’s] comments in relation to the orchard will therefore focus on this.’</i> They add, in relation to the CWS, that <i>‘some of the foraging habitats potentially impacted by the scheme have not been given due consideration.’</i></p> <p>They further suggest, given that Coton Orchard is relatively close to the Madingley Wood SSSI, that <i>‘the trees within the orchard offer more shelter and shade than most surrounding habitat,</i></p>	<p>The suggestion that <i>flightlines are abandoned if when too many foraging opportunities are lost along a flightline is derived</i> from a report of barbastelle studies carried out in West Sussex [CD25-49, Section 3.7 p15]. Its findings do not seem to be universally applicable, as the statement above is directly contradicted by work undertaken for the A303 – see para 6.2.10. Its statements on territoriality (Section 2.2 p9) are also contradicted by findings elsewhere (para 5.1.8).</p> <p>However, the low number of records of barbastelle registrations associated with/over Coton Orchard, and the fact that the Orchard lies outside of the home range of the Madeley barbastelle colony, do not, in any case, suggest that Coton</p>

	<p><i>[which is therefore] likely to provide particularly useful foraging habitat during poor weather conditions, as well as at dusk and dawn en-route to other foraging areas.'</i></p> <p>They suggested that the effects of buses would add to the issue [of] the loss of foraging opportunities along established commuting routes, and stated that <i>'when too many foraging opportunities are lost along a flightline, the bats will cease to use it, even if its connectivity is maintained'.</i></p>	Orchard represents a critical resource, nor is it large enough to be so.
	<p>Coton Orchard CWS: Speed Limit</p> <p>Natural England request <i>'... that this is reduced to 30mph throughout the orchard and adjoining scrub/woodland, particularly during dusk/dawn and darkness hours. This would act as a mitigation measure for both bats and barn owls, allowing them more reaction time to reduce the risk of collisions and backdraught effects (which pull bats towards the buses).'</i></p>	A 30 mph speed restriction within the boundaries of Coton Orchard during periods when bats are active is being considered, though the need for this is uncertain given the short section over which this would apply and the already low collision risk (see para 6.3.18, the presentation to Natural England from 09 June 2025 and Appendix 4.3, Technical Note 2).
	<p>Further Surveys and Analysis</p> <p>Natural England disagree with the conclusions within TR5.16 regarding foraging and commuting bats and consider that the conclusion <i>'solely focuses on crossing point surveys and neglects to consider foraging habitat, specifically the absence of activity surveys within the orchard.'</i></p>	<p>At a meeting that post-dated the objection letter, Natural England accepted that further surveys of Coton Orchard (to which access has been withheld) would not be required if the orchard was assumed to be of importance.</p> <p>No further surveys of the orchard will therefore be undertaken in 2025.</p>
CD2-REP-09 South Cambridgeshire District (SCD) and Cambridge City Council (CCC) Statutory	<p>Barbastelle bats, associated with the Eversden and Wimpole Special Area of Conservation (SAC), are sensitive to habitat disruption. Proposed measures, including "hop overs" and a sensitive lighting strategy, are beneficial provided that temporary impacts during vegetation removal are addressed. Interim solutions, such as willow fencing during construction, should be integrated into the Code of Construction Practice to mitigate short-term effects and support bat commuting routes.</p> <p><i>[Further detail is provided in the Statements of Case - CCC CD23-16-2 para.s 10.4 to 10.10, and SCDC CD23-16-1 at paras 5.9-5.15.]</i></p>	The potential impacts of the Scheme, and the likelihood of such impacts occurring (including bats functionally linked to the SAC), are set out in Section 6.0. Mitigation (including landscape treatments to facilitate bats crossing the busway) is set out in Section 7.0, with a specific section setting out the role of the Code of Construction Practice [CD1-26] and associated Construction Environmental Management Plan (Section 7.5).
CD2-OBJ-46 The Wildlife Trust for Bedfordshire, Cambridgeshire & Northamptonshire (BCN) (Conservation Manager)	<p>The objection concludes that <i>the Scheme have failed to select the option that avoids significant adverse impacts on the natural environment. With respect to the evidence in this Proof, they note 'Barbastelle bats fly across the route from roost sites in Madingley Wood SSSI. There have also been six other bat species recorded. The EIA has suggested that the use of</i></p>	Alternative scheme options have been presented and discussed elsewhere, and their review is outside the scope of this Proof (see Table 1). However, the current assessment concludes that there will be no materially detrimental impact on bats, and that options that increase the amount of traffic passing close to Madingley Wood SSSI would be of greater

Non-statutory	<i>embankments and vegetation cover at key crossing points will ensure bats fly above the route of buses and thus prevent collisions. The accuracy of this conclusion and evidence supporting it needs to be reviewed and corroborated by an independent bat specialist.'</i>	<p>detriment. This is in line with Natural England's letter of 22 January 2022 that '<i>options / proposals should seek to reduce the amount of traffic passing close to the SSSI as far as possible</i>' [CD9-31, Appendix D, p69]. Such alternatives are therefore not considered in my evidence.</p> <p>The justification for the locations of landscape treatments is provided in Appendix 3.3, Technical Note 1, Section 7.0 and Table 6.</p> <p>I was engaged by WSP to provide independent scrutiny of the data presented for this Scheme and the conclusions reached.</p>
CD2-OBJ-52 Coton Orchard Limited (Director Coton Orchard Limited) Non-statutory	<p>The objection states that <i>the Scheme 'has failed to demonstrate a compelling case in the public interest to justify the scheme, including the compulsory acquisition of its [Houston Crest Properties Ltd (landowner)] land'. With respect to the evidence in this Proof, they note 'Coton Orchard's rich biodiversity is further evidenced by its role as a critical habitat for numerous protected and rare species: bats. A total of eleven bat species were recorded during the survey period. These comprised Nathusius' [pipistrelle], common and soprano pipistrelle bats, noctule, serotine, Leisler's [bat], barbastelle, brown long-eared [bat], whiskered/Brandt's, Natterer's and Daubenton's [bats].</i></p> <p><i>"The hedgerow with the most activity was hedgerow 10, along the eastern boundary of Coton Orchard" emphasising its importance as a habitat corridor and feeding ground."</i></p>	<p>The issue of public interest and compulsory acquisition are outwith the scope of this Proof (see Table 1).</p> <p>However, the presence of bats including barbastelle is acknowledged, and sufficient mitigation and compensation will be provided (Section 7.0).</p> <p>The description and likely value of Coton Orchard to foraging barbastelle and other bats is set out in para 4.2.8 <i>et seq</i> and baseline data is set out in Appendix 3.3, Technical Note 1.</p> <p>[For navigation across documents, Hedgerow 10, the eastern boundary of Coton Orchard is referenced as CP2 in Appendix 3,3 Technical Note 1.]</p>
CD2-OBJ-294 The Woodland Trust (Programme Lead - Woods Under Threat)	<i>The Wildlife Trust 'objects to the proposed busway on account of the loss and deterioration of a number of veteran apple trees within Coton Orchard.' and that 'As with ancient woodland, Government's 'Keepers of Time' policy stresses the importance of ancient and veteran trees: "Ancient and veteran trees are rich in biodiversity. They provide food, shelter and breeding sites to large numbers of species including birds, bats, fungi and insects, which are often restricted in their distribution. They can be found both inside and outside of woodlands."</i>	<p>The value of veteran trees in their own right is outwith the scope of this Proof (see Table 1).</p> <p>The value of Coton Orchard in respect of bats, particularly barbastelle, is presented in para 4.2.13 <i>et seq</i>.</p> <p>The presence of bats within the orchard is acknowledged and sufficient measures to mitigate for the impacts of the busway within the orchard have been provided, as set out in Section 7.0.</p>
CD2-OBJ-141 Mrs Julie Vine	<i>'I object to this new busway due to the environmental impact on the section between West Cambridge and Madingley Mulch. This section will cut through fields, hedges, scrub and would involve felling many mature trees. We cannot afford to lose this essential habitat for wildlife. This scheme will lay waste to large amounts of</i>	<p>The environmental impact of the scheme in its entirety, and the alternatives considered, are outwith the scope of this Proof (see Table 1).</p> <p>The conclusion of the ES is that the mitigation and compensation proposed are adequate to address the</p>

	<i>green belt and an ancient orchard when there is a viable alternative which is not anywhere near as damaging to the environment. Surveys have shown that 31 species of bird that are on at least one conservation priority list inhabit these areas, along with bats and hares, it is crucial that we protect them.'</i>	environmental impacts of the Scheme with respect to bats, notably barbastelle. Potential impacts on bats, notably barbastelle, are set out in Section 6.0, the mitigation proposed is set out in Section 7.0, and residual impacts within Section 8.0.
CD2-OBJ-150 Heather Sales	<i>'We were told that an alternative route along the current road would not be considered due to sites of scientific importance, although Coton orchard itself is an area of great scientific importance. Some of these large trees may well have roosting species, possibly bats.'</i>	The alternatives to the current Scheme are outwith the scope of this Proof (see Table 1). The conclusion of the ES is that the mitigation and compensation proposed are adequate to address the environmental impacts of the Scheme with respect to bats, notably barbastelle. Options that increase the amount of traffic passing close to Madingley Wood SSSI would be of greater detriment. This is in line with Natural England's letter of 22 January 2022 that ' <i>options / proposals should seek to reduce the amount of traffic passing close to the SSSI as far as possible</i> ' [CD9-31, Appendix D, p69]. Such alternatives are therefore not considered in my evidence. Potential impacts on bats, notably barbastelle, are set out in Section 6.0 and the mitigation proposed is set out in Section 7.0.
CD2-OBJ-290 Peter Godfrey Deere	<i>To my mind the most important if one can gauge above the natural bounty of the wonderful orchard is the presence of bats; serotine, barbastelle, Nathusius' [pipistrelle], pipistrelle [unspecified] and Leisler's, [bat] which in theory should stop construction due to status.'</i>	This is a misunderstanding of the legislative protection given to bats and other protected species. The value of Coton Orchard in respect of bats, particularly barbastelle, is presented in para 4.2.13 <i>et seq</i> . Potential impacts on bats, notably barbastelle, are set out in Section 6.0 and the mitigation proposed is set out in Section 7.0.
CD2-OBJ-296 Dr. Jennifer Bishop and Prof. Christopher Bishop	<i>The boundary of our property is one of the closest to the proposed busway route with several species of roosting bats, a large badger sett, and an occupied barn owl box (all documented with video/audio footage in 2024) barely more than 50 metres from the infrastructure's nearest edge. Habitual foraging routes and hunting grounds for all these species will become disturbed and dangerous on its construction....'</i> <i>The required decision-making hierarchy for the avoidance of these and other harms has not been followed by the Greater Cambridge Partnership. Mitigation and off-setting proposals</i>	Potential impacts on bats, notably barbastelle, are set out in Section 6.0 and the mitigation proposed is set out in Section 7.0. Residual impacts are considered unlikely (Section 8.0). Potential impacts on receptors other than bats are outwith the scope of this Proof (see Table 1). In relation to bats, the mitigation hierarchy has been followed, and avoidance has been fully considered. Alternative scheme options have been presented elsewhere and their review is outside the scope of this PoE. However, the current assessment concludes that there will be no materially

	<i>should only be considered where it is impossible to avoid such impacts.</i>	detrimental impact on bats, and that options that increase the amount of traffic passing close to Madingley Wood SSSI would be of greater detriment. This is in line with Natural England's letter of 22 January 2022 that ' <i>options / proposals should seek to reduce the amount of traffic passing close to the SSSI as far as possible</i> ' [CD9-31, Appendix D, p69].
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10.0 CONCLUSIONS

- The surveys were sufficient to provide a baseline against which the impacts could be assessed, and in line with good practice.
- The assessment was undertaken in line with relevant guidelines.
- The design followed the mitigation hierarchy.
- The mitigation and compensation measures adequately address the impacts, notably on barbastelle and Eversden and Wimpole SAC.
- The objections raised have been adequately considered and addressed as demonstrated in my evidence.
- Importantly, there is no evidence that the Scheme would materially alter the Favourable Conservation Status of barbastelle or other bat species, and there will be no adverse effect on integrity of the SAC.

11.0 Statement of Truth

- 11.1.1 The evidence which I have prepared and provide in this Proof of Evidence is true and is given in accordance with the guidance of my professional institution. I confirm that the opinions expressed are my true and professional opinions.

12.0 List of Appendices [separate PDF]

Appendix 1: Barbastelle in the UK

Appendix 2: Extracts of relevant papers

Appendix 3: Outputs from 'April meeting' (issued to Natural England)

3.1 Minutes

3.2 Presentation

3.3 Technical Note 1: Surveys Summary and Mitigation Justification

Appendix 4: Outputs from 'June meeting' (issued to Natural England)

4.1 Minutes

4.2 Presentation

4.3 Technical Note 2: Bats and Collision Exposure

Appendix 5: Outputs from 'July meeting' (issued to Natural England)

5.1 Minutes

5.2 Presentation