

## Bats – Method Statement template to support a licence application

The Method Statement will be used to determine the impact of the proposal on the favourable conservation status (FCS) of the species concerned (Regulation 55(9)(b)).

You are strongly advised to refer to the Bat Mitigation Guidelines.

Please use recent photographs to support your application.

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### Important advice:

The format below must be used. Please enter text below each heading keeping information as concise as possible.

All maps / figures that will become part of any annexed licence granted must be submitted as separate documents (with the site name and date included on the map / figure. See section I for list – all others may be included within the Method Statement document (e.g. survey maps / figures) if preferred).

A separate work schedule must also be submitted on form WML-A13a-E5a&b to accompany the Method Statement.

### A Executive summary

Provide an overview (no more than 1 side of A4) of what works are proposed and how the impacts identified will be addressed in order to ensure no detriment to the maintenance of the population at a favourable conservation status.

This application relates to the data, surveys, assessment, predicted impacts, licensing requirements, proposed mitigation and predicted residual effects on the conservation status of the bat assemblage, individual bats and bat roosts in trees at Ash Beds (Ordnance Survey (OS) central grid reference SP3657066496) and its immediate surrounds resultant from the construction of the Offchurch and Cubbington Community Forum Area (CFA) section 17 of the wider High Speed 2 (HS2) rail infrastructure Scheme ('the Scheme'). The proposed HS2 route in section CFA17 is 7.3 km in length and runs through the central section of Ash Beds to the east of Cubbington. Summary statistics are presented in Table A1 below.

**Table A1:** Licence area statistics

Habitat	Area (ha)			Percentage affected (%)
	Total	Direct Impact Zone	Indirect Impact Zone	
Licence area	67.50	35.70	8.67	66
Ash Beds woodland only	2.84	0.77	0.85	57
All woodland in licence area	3.25	0.77	0.85	50

The 'direct impact zone' has been informed by current works schedules and clearance areas at the time of writing, and comprises the land that will be cleared and used for construction of the Scheme. The 'indirect impact zone' comprises a 20 m buffer around areas where disturbing construction works will occur.

[See Figure B2.1- Master Plan Overview and Figure C5a – Location Map]

Advanced licence bat surveys were undertaken in 2018 and 2019, along with visual inspections of trees within the Limits of Land to be Acquired or Used (LLAU) (typically comprising the direct and indirect impact zones plus a small buffer). The purpose of the surveys was to confirm the assemblage of tree roosting bat species using the woodland during the survey period and to identify any roosts. The data have been used to formulate a risk assessment of bats likely to be present during tree felling works, to allow a licence to be sought and appropriate mitigation and safeguarding measures prescribed. Given the highly mobile behaviour of tree roosting bats, any of the bat species found during the surveys could be roosting at the site at other times of the year. The data also allows Ash Beds to be assessed for its importance as a roosting resource for bats.

The surveys have confirmed the presence of nine species of bat using the site. Two species, soprano pipistrelle and noctule bat have been identified as day roosting within Ash Beds. Common pipistrelle and barbastelle bat

were found roosting in trees outside the woodland within the licence area. Other tree roosting species are also considered likely to use the site for day roosting / transitional roosting at other times of the year, however there is no evidence to suggest maternity or mating roosts (high conservation roosts) of any species occur at Ash Beds.

Prior to mitigation, the predicted impacts of the Scheme on the bat assemblage at Ash Beds comprise:

- **Permanent loss** of 0.77 ha of broad-leaved woodland and 85 trees identified as having PRFs: 19 of high, 44 of moderate and 22 of low potential to support roosting bats;
- **Direct impacts** to six known roosts for barbastelle, noctule, soprano pipistrelle and common pipistrelle bats; and
- **Indirect impacts** comprising the alteration of conditions around 0.85 ha of woodland and 83 trees with PRFs: 8 of high, 15 of moderate and 60 of low potential to support roosting bats.

In the absence of mitigation, it is anticipated that the combination of these impacts will lead to an adverse effect on the conservation status of the general assemblage of bat species at Ash Beds that may be significant at up to the District level. No significant cumulative impacts have been identified with other works for the Scheme including at South Cubbington adjacent.

The inherent design of the Scheme has been refined to avoid effects on bats resulting from habitat fragmentation and other indirect impacts, including a 20m cutting where the route passes through Ash Beds itself (to screen noise, visual and wind pressure impacts), planting of hedgerows along the top of raised embankments (where present in the surrounds) and woodland/scrub planting along the Scheme to link up habitats, restoring and improving connectivity. Embedded mitigation for the loss of woodland includes creation of 0.52 ha of broad-leaved woodland at the western end of Ash Beds.

To address the remaining impacts of tree and vegetation clearance in this location on bats, the following will be implemented:

- All climbing surveys / works will be undertaken by suitably qualified ecologists with Level 2 Class licences that are accredited agents approved by the Named Ecologist for the Mitigation Licence. All activities will be supervised by an Ecological Clerk of Works (ECoW Site Supervisor) approved by the Named Ecologist, and all works, actions and bats encountered will be fully documented;
- In accordance with the detailed methodologies in Section E and Appendix B of this Method Statement, moderate and high potential trees will be climbed, PRFs inspected and then the trees will be felled. Low potential trees will also be climbed and inspected at the discretion of the ECoW site supervisor / accredited agents where this is deemed to be required. Outside the hibernation season only, any roosting bats will be removed (in line with process E.2.2 (NE capture and release procedures a-h)) or one-way valves fitted to allow exit but not re-entry. Trees are anticipated to be felled within 24 hours of climbing inspection. Trees with PRFs will be prioritised for felling first.
- The minimum mitigation requirements are for provision of 57 replacement roost features (see Section E3.4). A temporo-spatial mitigation strategy has been formulated to address impacts to bats, providing a range of potential roost features and habitats for bats both immediately and over the short-, medium- and long-term. This will comprise 1) erection of 35 bat boxes to act as immediate roost replacements and as rescue boxes during tree felling; 2) planting of replacement woodland habitat and additional connective habitat both within and outside the licence area in between South Cubbington and Ash Beds to enhance connectivity, foraging habitats and roosting provision within range of all bats potentially impacted through works at Ash Beds; 3) replacement of the initial bat boxes (where possible) after 20 years; 4) planting of rapidly veteranizing fruit trees in the vicinity of South Cubbington, at least 14 veteran features will develop from 30 years post-planting; and 5) creation of 82 veteranised features on newly planted trees once mature (in 30 years' time).
- All bat boxes will be erected under supervision of the ECoW Site Supervisor approved by the Named Ecologist. The loss of any additional confirmed roosts discovered during bat rescue inspections will be compensated for at a ratio of 2:1 for non-Annex 2 species day roosts, at a ratio of 4:1 for non-Annex 2 species maternity and hibernation roosts, and at a ratio of 4:1 for Annex 2 species;
- Post-mitigation monitoring is set out in Section E3.4 and will comprise bat box inspections and further trapping surveys to assess mitigation effectiveness against the bat assemblage baseline established prior to clearance. Emergence and re-entry surveys will be undertaken for occupied bat boxes, and a site walkover will be undertaken to verify the successful establishment of new habitat creation and its likely suitability for bats long-term).

Ash Beds is relatively isolated in the landscape. The species roosting within and adjacent to this woodland are tolerant of open space habitats and are known for their wide ranging behaviour, with noctule and *Pipistrellus* spp. bats utilising a broad range of habitats. As such, the loss of foraging habitat at Ash Beds represents only a small amount of the wider available resource to these bats. Following implementation of the above measures, it is considered that any adverse impacts on bats resulting from the clearance of vegetation and trees in this specific area of the Scheme will be reduced to a level at which they will not result in any significant effect on the

favourable conservation status of the species concerned. There will be medium-term adverse effects whilst the new woodland planting becomes established and mature, which could be over a period of 30 - 50 years.

## B Introduction

### B1 Background to activity / development:

Include a brief summary of:

- Why the activity and a licence are necessary (*e.g. bridge structure repairs are required and will affect a known maternity roost of Daubenton's bats, which will be temporarily lost whilst works are being undertaken; renovation works to an office building will result in the permanent loss of three day roosts of common pipistrelle bats; demolition of an existing hospital to be replaced with flats will result in the loss of a brown-long eared bat maternity roost*).

In order to facilitate the construction of the HS2 Scheme, extensive clearance of ground and vegetation, ground investigation works and associated construction works are necessary throughout the extent of the LLAU of the Scheme. The LLAU comprises the route of the railway, its associated access tracks, construction areas (including those associated with planned mitigation schemes and structures) and compounds. The LLAU runs through habitats which will be affected by the construction and / or operation of the Scheme. This is the case with Ash Beds, which will require partial clearance of areas of lowland mixed deciduous woodland to facilitate the Scheme.

These clearance works are anticipated to result in the loss of known and assumed bat roosts as well as the loss of a number of potential roost features. There is also a risk to individual bats during felling works. Removal of surrounding habitat will cause the alteration of conditions around existing bat roosts up to 20 m from the clearance works (20 m being the agreed buffer for the Scheme, see Section D1 for further details). Without mitigation and licensing, the construction phase of the Scheme could not proceed should bats be found during the clearance process.

The operational phase of the Scheme represents a risk of disturbance (alteration in the immediate environment due to noise, light and vibration associated with the running of trains) to any retained roosts within 20 m of the operational boundary of the Scheme, and to individual bats during the operational phase of the scheme through severance of commuting routes and / or direct mortality through collision of bats with trains.

Species known to be present in Ash Beds (through surveys in 2018/19) and its immediate vicinity (the species at risk of disturbance and mortality) are common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*P. pygmaeus*), brown long-eared bat (*Plecotus auritus*), noctule (*Nyctalus noctula*), Daubenton's bat (*Myotis daubentonii*), Brandt's bat (*M. brandtii*), whiskered bat (*M. mystacinus*), Natterer's bat (*M. nattereri*) and Barbastelle bat (*Barbastella barbastellus*). Other bats not trapped or recorded at Ash Beds but potentially present in the area (as flagged through desk study and ALBST surveys in other licence areas) are Bechstein's bat (*M. bechsteinii*), Nathusius's pipistrelle (*P. nathusii*) and Leisler's bat (*N. leisleri*).

As such, a robust mitigation scheme is required comprising replanting, screening, roost replacement and general mitigation measures for the timing and methodology of tree felling.

- Include current status of planning permission (if applicable) *e.g. full planning permission with all relevant wildlife conditions discharged; permitted development; demolition with prior notification of demolition issues resolved*. If the proposal is for demolition only of a structure supporting a bat roost / s, please confirm whether there are plans to develop the site in the future and if so when.

N/A

### B2 Relationship with other nearby development and cumulative impacts

**B2.1** Is the current application part of a larger development project? For example, is it part of a phased or multi-plot housing development that will require more than one bat licence? Enter Yes, No or N/A in the text box below. If yes, note a separate **master plan** document will be required.

The license area forms part of the HS2 Scheme. See 2013 HS2 Environmental Statement, which refers to the HS2 development as a whole, and the CFA17 report and map book which refer to the specific area to which this method statement pertains. Whilst this is a phased development in the construction sense, it is not in a licensing sense, as the majority of licensable activities on the bat populations occur in the same year.

With regard to works for HS2, there are five Bat Low Impact Class Licence (BLICL) areas in the vicinity although only two are registered or in submission. These are detailed below. The licenses cover three bat day roosts that occur on individual tree lines and hedgerows which are in ecological connectivity with habitats within the Ash Beds licence area. These bats are likely to use the woodlands onsite for foraging and roosting and are considered likely to form part of the bat population using the licence area. As such, given the low numbers of bats concerned and the presence of other retained woodlands and trees in the area providing alternative foraging and roosting options, the cumulative impacts are not considered to exceed those detailed within the licence.

Bat Licence	Species on Licence	Date of Licence Start	Date of Licence End	Licence for?	Case reference	Closest distance from licence area	Status
BLICL04	NA	NA	NA	NA	NA	Within	Retired
BLICL08	<i>Pipistrellus pipistrellus</i> , <i>P. pygmaeus</i> , <i>Plecotus auritus</i>	Oct-19	Oct-24	Destruction of 1 day roost	B40RC011-12A	1.7 km SE	Registered by Natural England
BLICL031	NA	NA	NA	NA	NA	Adjacent (NW)	Retired
BLICL21	NA	NA	NA	NA	NA	300m (NW)	Retired
BLICL18	<i>M. nattereri</i>	TBC	TBC	Destruction of 2 day roosts	TBC	2600m (SE)	Amendment with NE awaiting approval

South Cubbington (located adjacent to the north of the Ash Beds license area and with the two woodlands approximately 1.7 km apart at their closest points), and Stoneleigh Park (located beyond South Cubbington approximately 4.9 km to the north-west of Ash Beds), are both subject to EPSL applications as a result of HS2 Early Works vegetation clearance and building demolition. Open countryside lies between Ash Beds, South Cubbington and Stoneleigh, with habitat connectivity provided between all three areas in the form of linear trees and hedgerows. Alternative roosting and foraging provision is available in the immediate vicinity of all three licence areas for bats impacted by works. Stoneleigh Park has significant areas of woodland, trees and hedgerows in its surrounds along with retained park buildings and historic settlements (affording various roosting opportunities). South Cubbington itself forms the southern part of a larger woodland complex, with settlements to the west, south and east. Ash Beds lies within open countryside connected with hedgerows, tree lines and the River Leam corridor adjacent, and Offchurch settlement nearby. It is considered that bat populations for each area have ample available alternative habitat nearby if and when displaced by the licensable works, that bats will use rather than migrating into other affected areas.

Stoneleigh lies significantly further north beyond South Cubbington Wood, and other significant woodlands (North Cubbington Wood as well as the Weston and Waverley Woods) are present in the intervening area. Therefore no significant cumulative impacts arising from the development of the Scheme are anticipated with Stoneleigh Park for South Cubbington or Ash Beds (either separately or together).

The study undertaken for this licence application was focussed on finding roosts, and therefore tagged bats were not tracked exhaustively and an assessment of the core sustenance zone (CSZ) for the tagged bats was not made. However, a review of the available literature shows that of the nine species known to be present in the licence area, CSZs range between 1 to 6 km (BCT, 2016), whiskered / Brandt's having the lowest of 1 km, while all others had a CSZ of 2 km or more. The table below provides a summary of the CSZ and also indicates a maximum range (where available from the literature).

Species	Core Sustenance Zone (all from BCT, 2016)	Maximum Range (km)	Reference for maximum range
<i>Barbastella barbastellus</i>	6	20.4	Zeale, Davidson-Watts and Jones, 2012
<i>Myotis bechsteinii</i>	3		
<i>Myotis daubentonii</i>	2	1.8	Parsons and Jones, 2003
<i>Myotis mystacinus</i> / <i>brandtii</i>	1	2.3	Berge, 2006
<i>Myotis nattereri</i>	4	3 – 5	Smith and Racey, 2008
<i>Nyctalus leisleri</i>	3		
<i>Pipistrellus nathusii</i>	3		
<i>Nyctalus noctula</i>	4	6.3	Makie and Racey, 2007

<i>Pipistrellus pygmaeus</i>	3	1.9	Davidson-Watts and Jones, 2006
<i>Pipistrellus pipistrellus</i>	2	1.9	Davidson-Watts and Jones, 2006
<i>Plecotus auritus</i>	3	2.8	Entwistle, Racey and Speakman, 1996

Given the good connectivity and relatively small distance between the two woodlands, most bat species will be able to traverse this distance without issue on a nightly basis. Therefore bats in the vicinity of either woodland may potentially make use of any and all suitable habitat in between and within the two areas. For instance, despite having the smallest CSZ, this study found evidence that whiskered/Brandt's bats regularly travel from a maternity colony in Offchurch adjacent to the Ash Beds licence area to South Cubbington Wood. The limitations of the study (focussed on finding roosts) meant that the types of use of the Cubbington woodland complex by these bats was not determined. Bats travel for a variety of reasons and these bats may travel to South Cubbington for socialising for example.

Overall, the evidence suggests that the bat assemblages using Ash Beds and South Cubbington are largely roosting within or in the vicinity of the woodland where they were trapped. Given the limited linear footprint of the works associated with the Scheme and the presence of alternative foraging and roosting resources surrounding each locality, the potential for significant cumulative adverse impacts has been considered and dismissed.

BCT (2016) Core Sustenance Zones: Determining zone size. Available online:

[https://cdn.bats.org.uk/pdf/Resources/Core\\_Sustenance\\_Zones\\_Explained\\_04.02.16.pdf?mtime=20190219173135&focal=none](https://cdn.bats.org.uk/pdf/Resources/Core_Sustenance_Zones_Explained_04.02.16.pdf?mtime=20190219173135&focal=none)

**Important Advice: If yes to the above,** please note that sections in this Method Statement on impact assessment and mitigation measures must explicitly relate *only* to impacts from the works currently proposed.

**A project-wide master plan must detail the overall impact assessment and mitigation and explain where, and why, each of the bat licences will be required. The master plan must be included as a separate document to this application: see [http://www.naturalengland.org.uk/Images/WML-G11\\_tcm6-9930.pdf](http://www.naturalengland.org.uk/Images/WML-G11_tcm6-9930.pdf) for details that are to be included in this separate document.** The separate master plan is expected to take due regard of the overall project to ensure that in-combination effects are considered, and mitigation and compensation measures are both sufficient and coherent.

If the current development is part of a larger development project, summarise very briefly here how the current application relates to the larger project and how the in-combination effects are considered and mitigation / compensation is sufficient.

The Scheme is part of the wider HS2 project. A full assessment of the cumulative impacts for committed and proposed developments in the vicinity of the full length of the Scheme (including the area of Ash Beds) was undertaken as part of the HS2 Environmental Statement in 2013, which (along with its technical appendices) lays out detailed assessment of cumulative / in-combination effects, provides plans for mitigation and assesses the residual effects on a taxon-specific / habitat-specific basis.

As part of drafting this method statement, key facts have been taken from the HS2 ES which outlined the ecological baseline at the time, and from subsequent updates / publications (where they exist relevant to the site). There are no significant changes to report regarding the ecological baseline in this location relative to that reported in the ES. The ES has been consented and the associated mitigation and compensation therefore assessed as being proportionate and appropriate.

The design of the Scheme and associated construction and logistics planning has continued to be developed since the original ES. In due course there will be a Schedule 17 application (with Written Statement) for the detailed final design of the Scheme through Ash Beds Wood including such details as earthworks and fencing with a master plan. This work is undertaken at the Main Works Stage of the Scheme and therefore has not yet been produced. The controls contained in the Environmental Minimum Requirements (EMR), along with powers contained in the High Speed Rail (London - West Midlands) Act ('the Act') and the Undertakings and Assurances given by the Secretary of State, will ensure that impacts which have been assessed in the ES (as amended) will not be exceeded. EMR compliance is ensured through the EMR compliance review process, which is an integral part of the design process. The outcome of this process is the production of EMR compliance reports which provide in the context of the Phase One EMRs, the outcomes of a review of whether the developed design or changes to the associated construction and logistics activities, is likely to result in environmental impacts which exceed those reported in the ES (as amended). An EMR compliance report will be produced with the results of this review which will be updated at the end of the Scheme Design process and again during Detailed Design. Any additional impacts on bats will identified during this process.

At this stage any outstanding Environmental Site Management Plans (ESMP) will be produced (those for the initial compensatory habitats have already been produced at the Early Works Stage which is the stage of works at the time of writing of this licence application, however others relating to the Main Works remain outstanding). Any ESMPs for the Main Works will ensure the long-term management of compensatory habitats and mitigation measures required as a result of the detailed design, including such features as cuttings and viaducts whereby impacts on the Favourable Conservation Status (FCS) of bats (if identified) may be required to be monitored. As such, it is considered that monitoring of construction impacts of the Scheme beyond the tree clearance does not form part of this Licence Application.

**Important Advice: to accompany this Method Statement also include Figure. B2.1 for a Master plan overview - and see section I "Map checklist" at the end of this document.**

**B2.2** Apart from any mention in B2.1, please inform us of any past or future development or other projects (in the last 5 years or next 5 years) in the vicinity which may have significantly impacted or are likely to significantly impact on the same population / s of bats as this application (e.g. loss of maternity or hibernation roosts). You must make reasonable efforts to establish this, including discussions with your client and the Local Planning Authority – stating below what you undertook. A brief summary of the project / s should be provided including the site name and location, dates and if known the licence reference number(s).

*Please note we are not expecting details of every licence / planning permission issued within the vicinity of the site – we are only concerned with projects that have the potential to significantly impact or have impacted on same population of bats (maternity and hibernation roosts). Note: Natural England is aiming to make available licensing records from the last 5 years publicly available.*

A data search was undertaken for developments in the surrounds which might cumulatively impact bat populations in conjunction with the HS2 scheme. A search of the MAGIC website (<https://magic.defra.gov.uk> on 04/02/2020) found eight licences issued during the last ten years to damage a breeding site or destroy a resting site within 5 km of the licence area. No licences were found that related directly to the licensable area. The closest is 2.8 km and the most recent licence is from 2017. These are detailed below. The majority of impacts from these licences will have occurred before the survey works undertaken to inform this licence application, and the only licence with an end dates beyond 2020 is located more than 4km from the Ash Beds licence area. As such, no further impacts from these licences are anticipated that might exacerbate impacts from the woodland clearance works at Ash Beds.

Species	Licence Start	Licence End	Parish	Licence for	Case Reference	Distance From Licensable Area (km)
Common pip, and Brown Long Eared	28/08/2014	30/10/2019	Wappenbury	Damage to resting places	2014-2492-EPS-MIT	2.8
Common pipistrelle brown long-eared, whiskered	30/03/2017	31/12/2017	Long Itchington CP	Destruction of a resting place	2017-28431-EPS-MIT	3.7
C. Pipistrelle	04/04/2013	30/09/2017	Princethorpe	Impacts and destruction to breeding sites and resting places	EPSM2012-4129	3.9
Common Pipistrelle	06/07/2011	01/12/2012	Warwickshire CP	Destruction of a resting place	EPSM2010-2608	4.4
C. Pipistrelle S. Pipistrelle Brown Long-eared Natterers	01/02/2016	31/01/2023	Bubbenhall	Impacts and destruction to resting places	2015-7557-EPS-MIT-1	4.7
Brown long-eared	06/11/2013	31/08/2015	Long Itchington CP	Destruction of a resting place	EPSM2013-6649	4.9
Common Pip	11/09/2014	02/09/2019	Royal Leamington Spa CP	Destruction of a resting place	2014-2713-EPS-MIT-1	4.9

C. Pipistrelle	19/12/2012	31/08/2014	Princethorpe	Destruction of resting place no impact on breeding site	EPSM2012-5239	5.0
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A search of Warwick District Council planning records (search updated 04/02/2020) found no relevant planning application within a 5 km radius of the licence area where bats would be affected.

Cumulatively and in conjunction with the impacts from the development of the HS2 scheme, it is considered that the existing licensed development and planning applications will not have an adverse impact on the local bat populations.

**Important Advice: locations of other bat mitigation sites that may have significantly impacted or are likely to significantly impact on the same population / s of bats as this application must be shown on Figure B2.2.**

## C Survey and site assessment (also see section 5 of the Bat Mitigation Guidelines)

### C1 Pre-existing information on the bat species at the survey site:

Please undertake a historical data search within a 2km search radius and provide a summary of the results of this search. For example, records from local environmental records centres, local bat groups and previous survey work undertaken at the site is all relevant. Please briefly comment on the results in relation to your project / site

- Should no historical records be found from your search please state this – and specify what searches you undertook.
- Note that you must not include records from National Biodiversity Network (NBN) without first obtaining written permission from the relevant Data Provider.

### **Baseline / Historical Data:**

The following Baseline / Historical Data was provided from the HS2 Environmental Statement (ES) and was used to inform further survey work.

#### **Records Search**

In 2012, a desk study was undertaken to inform the HS2 ES. It is not possible to provide the source data for the desk study as this was not published along with the ES, however a summary of the data was provided in the ES which has been reproduced here. Information from Warwickshire Biological Records Centre (WBRC) identified the presence of a minimum of nine species of bat within 10 km of the route of the Proposed Scheme within the Offchurch and Cubbington area, giving an indication of the likely species assemblage at Ash Beds. There were no desk study records of roosts located within 100 m of the land required for the construction of the Scheme. There are no statutory or non-statutory designated sites within 10 km of the Proposed Scheme in the Offchurch and Cubbington area which mention bats within their citations.

Through consultation with Natural England (Rebecca Lee and Katherine Walsh, 4<sup>th</sup> April 2019) it has been agreed that further desk study data are not required for the purpose of this application.

#### **Roosts and Trees**

During initial tree assessments, 183 trees were recorded within the LLAU of the Offchurch and Cubbington (CFA17) section of HS2. Of those, 29 trees were found to contain features with a high potential to support roosting bats and 30 trees found to contain features with a moderate potential to support roosting bats. No confirmed roosts were identified.

[See Figure EC-05-045 from HS2 London-West Midlands Environmental Statement Volume 5 Map Books: CFA17 Offchurch and Cubbington (Ecology) [Bat Roosts]

#### **Field Surveys**

The following species were confirmed during field surveys associated with the HS2 ES in section CFA17: common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*P. pygmaeus*), Nathusius's pipistrelle (*P. nathusii*), brown long-eared bat (*Plecotus auritus*), Leisler's bat (*Nyctalus leisleri*), noctule (*N. noctula*) and Daubenton's bat (*Myotis daubentonii*). Of those, Nathusius's pipistrelle was not represented by any records in the 10 km search.



Nine transect surveys (29/4/2013 to 7/6/2013) were undertaken at land associated with Field Farm including Ash Beds recording common and soprano pipistrelle, Daubenton's, brown long-eared, noctule and a *Myotis* species.

In addition, 15 static detector surveys (25/4/2013 to 3/5/2013, 25/4/2013 to 2/5/2013, 21/5/2013 to 29/5/2013, 31/5/2013 to 7/6/2013) were undertaken at land associated with Field Farm including Ash Beds recording common pipistrelle, soprano pipistrelle, Leisler's bat, noctule and a *Myotis* species.

### **Likely Species Assemblage**

In addition to the species reported above, three species require further consideration.

A male Bechstein's bat was discovered roosting in a tree outside woodland in the South Cubbington licence area 1.7 km north from Ash Beds. This is the northern-most record for this extremely rare species in the UK. Male Bechstein's bats use a variety of tree roosts and travel widely. The woodland complex that South Cubbington belongs to is extensive and offers better quality foraging habitat than the Ash Beds licence area. However it is considered that given the good connectivity and relatively small distance between the two woodlands, up to one individual male bat (likely the same bat) may also be encountered at Ash Beds.

A small population of barbastelle bat is known to be present at Long Itchington and an individual barbastelle bat was trapped at South Cubbington in 2019; a barbastelle roost was also discovered in a treeline to the north of Ash Beds woodland (as reported in this Method Statement).

Nathusius's pipistrelle has been included in the likely species assemblage for Ash Beds. This species was found at South Cubbington 1.7km away from Ash Beds which is well within the range of this species. Although rare, Nathusius pipistrelle is widespread and has the longest of migrate on distances. The record of this species at South Cubbington increases the risk of this species being present at Ash Beds.

Overall this gives an indicative baseline species list of the wider area of potentially 12 species:

1. common pipistrelle (*Pipistrellus pipistrellus*);
2. soprano pipistrelle (*P. pygmaeus*);
3. Nathusius's pipistrelle (*P. nathusii*);
4. brown long-eared bat (*Plecotus auritus*);
5. Daubenton's bat (*M. daubentonii*);
6. Natterer's bat (*Myotis nattereri*);
7. Brandt's bat (*M. brandtii*);
8. whiskered bat (*M. mystacinus*);
9. Barbastelle bat (*Barbastella barbastellus*);
10. noctule (*Nyctalus noctula*);
11. Leisler's bat (*N. leisleri*); and
12. Bechstein's bat (*M. bechsteini*).

**C2 Status of the bat species:** Detail conservation status at the local, county and regional levels. Please complete the following table, justifying your assessment, and add additional lines where necessary. If the status is unknown then please enter 'unknown'.

Species	Conservation status assessment		
	Local	County	Regional
<i>Barbastella barbastellus</i>	Local; rare	Local; rare; southern	Widespread; rare
<i>Myotis bechsteini</i>	Never before recorded locally; extremely rare and at the northern limit of distribution	Never before recorded in the county of Warwickshire; extremely rare and at the northern limit of distribution	Localised / scattered; rare. Records exist in the region (West Midlands) including day and maternity roosts in Worcestershire. Few records in the adjacent region (South-east England) in Oxfordshire
<i>Myotis brandtii</i>	Local; uncommon	Local; rare	Local; rare
<i>Myotis daubentonii</i>	Widespread; common	Widespread; common	Widespread; common
<i>Myotis nattereri</i>	Widespread; uncommon	Widespread; uncommon	Widespread; uncommon
<i>Myotis mystacinus</i>	Widespread; uncommon	Widespread; uncommon	Widespread; uncommon



<i>Nyctalus leisleri</i>	Local; uncommon	Local; rare; southern	Local; rare
<i>Nyctalus noctula</i>	Widespread; common	Widespread; common	Widespread; common
<i>Pipistrellus nathusii</i>	Unknown	Unknown	Unknown
<i>Pipistrellus pipistrellus</i>	Widespread; common	Widespread; common	Widespread; common
<i>Pipistrellus pygmaeus</i>	Widespread; common	Widespread; common	Widespread; common
<i>Plecotus auritus</i>	Widespread; common	Widespread; common	Widespread; common

\* **Please note** that you can add more rows to the table: right click in any cell choose Insert > Insert rows below.

**C3 Objectives of the survey to inform this proposal:** Please complete the following table, entering 'Yes', 'No' or N/A to indicate the objective of your survey and provide comments / explanation where necessary:

Survey objective	Yes / No / N-A	Comments
<b>Determine presence / absence of bats</b>	Yes	The aim of providing a species assemblage for the site.
<b>Determine bat usage of site (e.g. maternity, hibernation, night roosts in various structures (specify)).</b>	Yes	Assessment of role of Ash Beds as a bat roosting resource and determine status of any tree roosts found and affected by HS2
<b>Identify foraging, commuting or swarming sites (explain)</b>	N/A	Foraging and commuting routes have been noted where the survey effort allowed, however the focus of the surveys (as detailed above) was to characterise the species assemblage and to identify roosts. Traps were sited in locations where experienced surveyors felt that trapping rates would be higher but a comprehensive assessment of the licence area for the best locations (with the most foraging / commuting) was not undertaken.
<b>Other (explain)</b>	Yes	Roost Identification

**C4 Site / habitat description:** Please provide:

- Brief descriptions of the site, including total size of the development site (ha) (most often within the red line planning boundary) and areas of the site with potential value to bats (ha).

Ash Beds is a narrow parcel of woodland lying less than 1 km to the east of Cubbington and flanking a tributary of the River Leam. The surrounds are characterised by open fields, hedgerows and small scattered settlements in the surrounds, the closest being Offchurch 700m to the south-west.

The secondary broad-leaved woodland at Ash Beds shows a slow transition from scrub to woodland and is a close match with both the ash woodland community W8 (*Fraxinus excelsior* - *Acer campestre* - *Mercurialis perennis*) and the hawthorn scrub community W21 (*Crataegus monogyna* - *Hedera helix*). The woodland is lowland mixed deciduous woodland, a Habitat of Principal Importance (HPI). This habitat is of district / borough value. The unnamed tributary of the River Leam associated with Ash Beds woodland is heavily shaded with no in-channel aquatic vegetation, but the watercourse retains natural features, a sinuous nature and a diverse range of habitats. Such a watercourse is a HPI and is of district / borough value.

All trees within the licence area have potential value to support roosting bats.

- Brief descriptions of the structures on site, differentiating between **those surveyed** and **not surveyed**, with an explanation why. Ensure structures are referenced and consistently indicated on relevant figures and tables.

One building lies within the licensable area, but as this will not be affected by the tree felling for which this licence relates, any impacts on the wider HS2 scheme on those structures will be assessed through traditional survey methods and subsequent appropriate licensing and mitigation.

- A description of adjacent areas / offsite habitats, specifying any relevance to bats, including descriptions of habitat / s relevant to bat commuting / foraging behaviour.

The landscape within the Offchurch and Cubbington section of HS2 is dominated by large, arable fields with associated hedgerows and trees. There are small historic scattered settlements in the surrounds, the closest being Offchurch 700m to the south-west. The bat interest within the area is enhanced by a number of habitat features with potential to support roosting, commuting and foraging bats, including watercourses which represent linear features that facilitate the navigation of commuting bats through the landscape.

- Please also include annotated (cross reference the structures) and dated photographs (showing both internal and external survey areas) as these are very useful as an assessment aid. These can be inserted below or submitted as a separate (referenced) document.

N/A

## C5 Field survey(s):

**Surveys must be up to date and have been conducted within the current or most recent optimal season. Surveys must be undertaken in accordance with the most up to date edition of the Bat Conservation Trust (BCT) *Bat Surveys for Professional Ecologists – Good Practice Guidelines* and the *Bat Mitigation Guidelines*.**

**C5a Justification for surveys that deviate from the best practice guidelines:** Please provide full justification below if your surveys deviate from the aforementioned best practice guidelines, confirming how you have obtained a full appreciation of the bat species roosting at the site, and of the type and status of roosts they use on site and in the context of the immediate surrounding area. **Please note that inadequate survey information is likely to cause delays to your licence application and may result in a Further Information Request.**

Advanced Licensed Bat Survey Techniques (ALBSTs) were employed to undertake the necessary information-gathering of bats roosting in trees potentially affected by the construction and operation of the Scheme.

Tree-roosting bats are particularly challenging to survey, being small, nocturnal, highly mobile and often do not emit echolocation when emerging, all of which limit the effectiveness of conventional survey methods (e.g. acoustic surveys). Unlike bats that use buildings, tree-roosting bats may only occupy a tree for a period of as little as a few days. As such, the main constraint to surveying bat tree roosts relates to the very low encounter rates due to the resultant frequent movement of bats. As a result, traditional emergence/re-entry surveys are unlikely to effectively determine the presence of bats, and even tree climbing will only encounter evidence of bats using trees approximately 7% of the time (Andrews and Gardner, 2015).

The Bat Conservation Trust (BCT) guidelines (Collins, 2016) recognises these issues and whilst surveys for bats in trees using traditional emergence/re-entry surveys are generally recommended, the guidelines acknowledge these methods as being unlikely to provide confidence in negative results for trees: *“Where there are large numbers of trees, the efficiency and efficacy of PRF inspection and other techniques should be evaluated and alternative methods considered. In situations where there are a lot of trees to survey, such as in woodland, it may be more effective to consider advanced licence bat survey techniques (ALBSTs)”* (Collins, 2016: 6.3.6)

And: *“More detailed information gained from ALBST is likely on projects with greater impacts on ‘difficult to survey’ bat species such as tree-roosting or quiet-calling species... or in particular habitats such as woodland.*

*Non-invasive survey methods are generally unable to confirm the sex, age class or breeding status of individual bats, especially away from the roost. Projects of developments that are likely to have high direct or indirect impacts on bats ... will be required to have much more detailed data sets, potentially justifying the use of ALBST. Radio telemetry can provide valuable data on roost use [and] can locate roosts of challenging species (especially in trees).”* (Collins, 2016: 9.1)

The guidelines do suggest alternative methods such as radio-tracking bats as being more effective at finding roosts in trees, particularly where larger numbers of trees or woodland areas are being affected by projects such as infrastructure schemes. Although Fulfen is a relatively small ancient woodland, these techniques are still considered to be proportionate and more appropriate than traditional techniques.

Therefore, in order to gather the required data in a way that allows the surveyors to locate key, high conservation value roosts (maternity and roosts of Annex 2 species), establish a species assemblage for the woodland, gain a higher level of confidence in assessment of the number and locations of roosts of lower

conservation value, and avoid harm to individual bats during the initial clearance process, the following two-step approach has been adopted:

**Stage 1** comprises a series of bat trapping, tracking and subsequent roost characterisation assessment surveys. Initial surveys were undertaken in autumn of 2018 and have been subsequently followed by spring and summer surveys in 2019 to complete the assessment. These surveys target bats of specific breeding status to enable surveyors to identify key roosts. Tree inspections (ground level and climbing surveys) were also undertaken to assess the potential for trees to support roosting bats.

**Stage 2** comprises a methodology aimed at avoiding impacts to individual bats during the clearance phase: the undertaking of endoscope surveys of potential roost features (PRFs) which are to be lost to construction, and relocation of any bats found (Rescue Surveys). Bats, if found, will be located to pre-installed bat boxes on Site or released at dusk, away from works areas at the same site. The numbers and species of bats found during this stage may trigger the provision of additional bat boxes. Any PRFs with unexpected maternity roosts present are to be retained with a 10 m operational buffer until the bats have left the roost.

Following this approach, a higher number of roosts present within the woodland are likely to be identified, with an overarching mitigation strategy that is rooted in a thorough understanding of the assemblage, number, usage and roost diversity determined by the trapping and tracking surveys (and associated emergence surveys).

This methodology employed is considered to be in line with best practice guidelines and is not considered to be a deviation of those guidelines. Methods were presented to Natural England and HS2 on 24th July 2018. This method relies on a two-step approach to meet requirements for maintaining the Favourable Conservation Status (FCS) of the populations concerned. All trapping, tagging and tracking was undertaken according to the conditions of the licence(s) as issued.

The woodland as a whole is considered to provide a roosting resource throughout the year including supporting hibernation roosts. This has been assessed and confirmed as part of this licence. Suitable working measures have been incorporated for all roost types.

*[See Figure C5b – Survey Area]*

**C5b Please complete the following tables and add additional lines where necessary** (*right click in any cell outside the grey box area. Choose Insert > Insert rows below*). Please enter 'N/A' if the table is not applicable to your survey. Please ensure the information is consistent with Figure **C5b** (showing all buildings, structures and habitats that are within the survey area and distinguishing those that were surveyor and those that were not; indicate where surveyors were located):

### Visual inspection

Date of each survey visit	Summary (Trees and potential to support roosting bats)	Surveyors and Equipment used	Appendix reference
<b>Ash Beds:</b> Surveys undertaken on dates between 17/10/18 – 29/10/18 and on 22/4/19, 30/4/19 and 8/7/19	Whole woodland surveyed	(Ground level assessments) 2x Surveyors with Binoculars	See map C6a (pink hatched area). Full results provided within an excel spreadsheet in the appendices.
<b>Trees lying outside woodland:</b> Surveys undertaken in 2016, 2018 and 2019.	In total: 80 trees with PRFs	(Ground level assessments) 2x Surveyors with Binoculars	See map C6a See also excel spreadsheet of full survey results within appendix
<b>October 2019</b>	<i>Retained woodland inspected for suitable locations to place rescue and longer term mitigation bat boxes</i>	<i>(Ground level assessments) 2x Surveyors with Binoculars</i>	NA
Visual inspections of trees within the licence area have been undertaken within the direct impact zone and a 20m buffer. Including woodland (3.25 ha) and discrete scattered trees, the surveyed area covers approximately 5.2 ha.			

Please provide surveyors names (including Class Licence registration number if applicable) and ensure the above table states the number of surveyors used for each survey visit undertaken.

**Survey Leads:** [REDACTED] 2015-13901-CLS-CLS, [REDACTED] 2019-39334-CLS-CLS, [REDACTED] 2015-10167-CLS-CLS & 2015-10176-CLS-CLS, [REDACTED] 2016-14236-CLS-CLS, [REDACTED] 2015-15664-CLS-CLS, [REDACTED] 2015-14702-CLS-CLS, [REDACTED] 2015-11170-CLS-CLS, [REDACTED] 2018-34342-CLS-CLS, [REDACTED] 2015-15080-CLS-CLS, [REDACTED] 2016-19409-CLS-CLS, [REDACTED] 2015-13919-CLS-CLS, [REDACTED] 2015-13354-CLS-CLS, [REDACTED] 2015-10591-CLS-CLS, [REDACTED] 2015-15477-CLS-CLS, [REDACTED] 2017-31111-CLS-CLS, [REDACTED] 2016-16645-CLS-CLS

2016 and 2018 surveyor names not supplied.

#### Dusk survey

Date of each survey visit (e.g. format 01 / 06 / 13)	Start and end times and time of sunset	Structure reference / location	Equipment used (include make of bat detectors and logging equipment)	Weather – (Include start and end temps, precipitation, Beaufort wind scale etc)
17/09/2019	Start time: 19:04, end time: 21:19. Sunset 19:19	AB-F003 and AB-F004	Echo meter touch	Wind 1 - 1, Temp 14 - 10 Rain 0 - 0, cloud 0 - 0.
16/10/2019	Start time: 17:55, end time: 20:10. Sunset 18:10	AB-F002	Echo meter touch	Wind 0 - 0 Temp 11 - 9, Rain 0 - 0 Cloud 1 - 1 Calm, sunny
<b>Comments (to include # of surveyors used for each visit):</b> 2 surveyors used on each dusk survey.				

Please provide surveyors names (including Class Licence registration number if applicable) and ensure the above table states the number of surveyors used for each survey visit undertaken.

170919 - [REDACTED] (unlicensed, fourteen years' relevant professional ecological experience), [REDACTED] (unlicensed, one season of field ecology experience)  
161019 - [REDACTED] (as above), [REDACTED] (unlicensed, two seasons of field ecology experience)

The traditional emergence surveys were undertaken in 2019 by a third party contractor. Only the positive roost data has been reported (i.e. surveys where roosts were recorded). Surveys which did not identify roosts have not been reported and would add little value or context overall to this assessment, given that the trees have also been surveyed through ALBST as part of the licence area. These traditional surveys are in date and within the relevant area, and therefore have been included on the precautionary and conservative basis that such additional records add context, value and increase the mitigation provision overall for roosts at the site. However they are not strictly required to gain a licence for tree felling.

The robust 'umbrella' approach provided within this licence ensures that appropriate data will be captured prior to tree felling, impacts to bats will be avoided and reduced as far as possible, and sufficient mitigation and compensation will be implemented.

#### Dawn survey

Date of each survey visit (e.g. format 01 / 06 / 13).	Start and end time and time of sunrise	Structure reference / location	Equipment used (include make of bat detectors and logging equipment)	Weather – (Include start and end temps, precipitation, Beaufort wind scale etc)
N/A				
<b>Comments (to include # of surveyors used for each visit):</b>				

Please provide surveyors names (including Class Licence registration number if applicable) and ensure the above table states the number of surveyors used for each survey visit undertaken.

N/A

‘Other’ survey (please specify e.g. trapping, remote, etc)

#### C5B ‘Other’ – Bat trapping and tracking surveys (ALBST).

The following tables comprise the survey effort for bat trapping and tracking, and report what surveys were undertaken where and when. **Table A** details the bat trapping surveys and the bats caught. **Table B** provides the detail of survey effort for day tracking and roost characterisation or night tracking, with a summary of the survey effort per bat tagged in **Table C**. The survey results are presented in Section C6. For the purposes of clarity, bats trapped have been fully detailed here, as this explains / contextualises the follow-on survey effort. The purpose of the surveys is to identify a) the assemblage of bats using the site and b) roosts within the licence area. Other data may also be collected where possible (tagged bat behaviour and location permitting) including flight lines and foraging areas. Trap locations and the dates they were deployed are shown (and detailed in a table) within **Figure C6b – Trap Locations**.

The data for two bats caught at South Cubbington but found roosting near Ash Beds (239423 *M. mystacinus* / *brandtii*; 238366 *M. mystacinus* / *brandtii*) has been included in this section as relevant to the impact assessment and mitigation provision for Ash Beds.

C5b ‘Other’ – Table A Bat trapping surveys (dates and results)				
Date of each survey visit	Start and end times	Location	Bat Details	Weather Start - End
25/09/2018 Trapping Survey	19:00 - 01:46	Ash Beds	000350 <i>P. pygmaeus</i> adult male; 000619 <i>P. auritus</i> adult nulliparous female; 1x <i>M. mystacinus</i> / <i>brandtii</i> immature male.	Wind 1 – 1 Air temp 16 – 15 Rain 0 – 0 Cloud 0 – 0
3x Surveyors; Harp Traps x3 Acoustic Lures x3. 3x bats caught comprising 3x species ( <i>P. auritus</i> , <i>P. pygmaeus</i> , <i>M. mystacinus</i> / <i>brandtii</i> )				
15/05/2019 Trapping Survey	20:15 - 01:45	Ash Beds	237058 <i>P. auritus</i> adult parous female; 2x <i>M. mystacinus</i> adult parous female; 1x <i>M. mystacinus</i> adult male; 2x <i>P. auritus</i> adult parous female; 2x <i>P. auritus</i> adult male; 1x <i>P. pipistrellus</i> adult nulliparous female.	Wind 1 – 2 Air temp 15 – 8 Rain 0 – 0 Cloud 1 – 0
3x Surveyors; Harp Traps x3 Acoustic Lures x3. 9x bats caught comprising 3x species ( <i>M. mystacinus</i> , <i>P. auritus</i> , <i>P. pipistrellus</i> )				
24/06/2019 Trapping Survey	21:15 - 02:15	Ash Beds	239048 <i>M. brandtii</i> adult male; 239049 <i>P. pygmaeus</i> adult male; 1x <i>M. mystacinus</i> adult male.	Wind 0 – 0 Air temp 19 – 18 Rain 0 – 1 Cloud 2 – 7
4x Surveyors; Harp Traps x2 Mist Nets x1 Acoustic Lures x2. 3x bats caught comprising 3x species ( <i>M. brandtii</i> , <i>M. mystacinus</i> , <i>P. pygmaeus</i> )				
09/07/2019 Trapping Survey	20:15 - 02:44	Ash Beds	239051 <i>N. noctula</i> adult lactating female; 239052 <i>N. noctula</i> adult male; 1x <i>P. pygmaeus</i> adult male.	Wind 0 – 1 Air temp 20 – 18 Rain 0 – 0 Cloud 7 – 8
4x Surveyors; Harp Traps x2 Mist Nets x1 Acoustic Lures x3. 3x bats caught comprising 2x species ( <i>N. noctula</i> , <i>P. pygmaeus</i> )				
07/07/2019 Trapping Survey	21:15 - 02:20	South Cubbington Wood	239423 <i>M. mystacinus</i> / <i>brandtii</i> adult lactating female	Wind 0 – 2 Air temp 16 – 12 Rain 0 – 0 Cloud 3 – 3
2x Surveyors; Harp Traps x3 Acoustic Lures x3. 6x bats caught comprising 4x species ( <i>M. brandtii</i> , <i>M. daubentonii</i> , <i>M. mystacinus</i> , <i>P. pygmaeus</i> )				

31/07/2019 Trapping Survey	19:30 - 01:00	Ash Beds	240302 <i>M. daubentonii</i> adult nulliparous female; 240304 <i>M. nattereri</i> juvenile nulliparous female; 1x <i>M. mystacinus</i> juvenile male; 1x <i>M. nattereri</i> adult male; 1x <i>N. noctula</i> adult parous female; 1x <i>P. pipistrellus</i> adult nulliparous female; 1x <i>P. pygmaeus</i> juvenile nulliparous female.	Wind 5 – 3 Air temp 18 – 16 Rain 0 – 0 Cloud 8 – 7
4x Surveyors; Harp Traps x3 Acoustic Lures x3. 7x bats caught comprising 6x species ( <i>M. daubentonii</i> , <i>M. mystacinus</i> , <i>M. nattereri</i> , <i>N. noctula</i> , <i>P. pipistrellus</i> , <i>P. pygmaeus</i> )				
05/08/2019 Trapping Survey	20:05 - 02:50	South Cubbington Wood	238366 <i>M. mystacinus</i> / <i>brandtii</i> adult parous female	Wind 3 – 1 Air temp 16 – 15 Rain 0 – 0 Cloud 2 – 1
4x Surveyors; Harp Traps x3 Acoustic Lures x3. 12x bats caught comprising 4-5x species ( <i>M. daubentonii</i> , <i>M. mystacinus</i> , <i>P. auritus</i> , <i>P. pygmaeus</i> , <i>M. mystacinus</i> / <i>brandtii</i> )				

<b>C5b 'Other' – Table B Daytime tracking and roost characterisation surveys – survey effort</b>				
<b>Date of each survey visit</b>	<b>Start and end times</b>	<b>Location</b>	<b>Bat Details</b>	<b>Weather</b>
27/09/2018 Daytime Tracking Survey	09:15 – 13:15	Ash Beds	000350 <i>P. pygmaeus</i> ; 000619 <i>P. auritus</i> .	N/A
3x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
27/09/2018 Emergence / Tracking Survey	18:05 – 21:30	Ash Beds	000350 <i>P. pygmaeus</i> .	Wind 1 – 1 Air temp 18 – 12 Rain 0 – 0 Cloud 1 – 0
3x Surveyors using Radio telemetry equipment (Biotrack Sika + 3 element Yagi), infra-red camera and bat detectors.				
27/09/2018 Emergence / Tracking Survey	18:50 – 20:05	Ash Beds	000350 <i>P. pygmaeus</i> .	Wind 1 – 1 Air temp 18 – 18 Rain 0 – 0 Cloud 5 – 5
3x Surveyors using Radio telemetry equipment (Biotrack Sika + 3 element Yagi), infra-red camera and bat detectors.				
28/09/2018 Daytime Tracking Survey	09:15 – 13:00	Ash Beds	000350 <i>P. pygmaeus</i> ; 000619 <i>P. auritus</i> .	N/A
3x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
28/09/2018 Emergence / Tracking Survey	18:04 – 20:00	Ash Beds	000350 <i>P. pygmaeus</i> .	Wind 1 – 1 Air temp 15 – 15 Rain 0 – 0 Cloud 2 – 2
3x Surveyors using Radio telemetry equipment (Biotrack Sika + 3 element Yagi), infra-red camera and bat detectors.				
28/09/2018 Emergence / Tracking Survey	18:55 – 21:45	Ash Beds	000350 <i>P. pygmaeus</i> ; 000619 <i>P. auritus</i> .	Wind 1 – 1 Air temp 14 – 8 Rain 0 – 0 Cloud 1 – 2
3x Surveyors using Radio telemetry equipment (Biotrack Sika + 3 element Yagi), infra-red camera and bat detectors.				
01/10/2018 Daytime Tracking Survey	15:00 – 16:00	Ash Beds	000350 <i>P. pygmaeus</i> .	N/A
3x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
16/05/2019 Daytime Tracking Survey	16:00 – 17:00	Ash Beds	237058 <i>P. auritus</i> .	N/A
2x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
17/05/2019 Daytime Tracking Survey	10:30 – 11:20	Ash Beds	237058 <i>P. auritus</i> .	N/A
2x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				

<b>C5b 'Other' – Table B Daytime tracking and roost characterisation surveys – survey effort</b>				
<b>Date of each survey visit</b>	<b>Start and end times</b>	<b>Location</b>	<b>Bat Details</b>	<b>Weather</b>
25/06/2019 Daytime Tracking Survey	15:30 – 20:00	Ash Beds	239048 M. brandtii; 239049 P. pygmaeus.	N/A
2x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
25/06/2019 Emergence / Tracking Survey	21:00 – 23:30	Ash Beds	239049 P. pygmaeus.	Wind 1 – 2 Air temp 16 – 15 Rain 0 – 0 Cloud 8 – 8
2x Surveyors using Radio telemetry equipment (Biotrack Sika + 3 element Yagi), infra-red camera and bat detectors.				
26/06/2019 Daytime Tracking Survey	18:00 – 18:30	Ash Beds	239049 P. pygmaeus.	N/A
2x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
26/06/2019 Daytime Tracking Survey	18:30 – 20:00	Ash Beds	239048 M. brandtii.	N/A
2x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
09/07/2019 Daytime Tracking Survey	16:00 – 20:00	South Cubbington Wood	239423 M. mystacinus / brandtii	N/A
2x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
09/07/2019 Emergence / Tracking Survey	21:00 – 23:30	South Cubbington Wood	239423 M. mystacinus / brandtii	Wind 0 – 2 Air temp 20 – 18 Rain 0 – 0 Cloud 8 – 7
2x Surveyors using Radio telemetry equipment (Biotrack Sika + 3 element Yagi), infra-red camera and bat detectors.				
10/07/2019 Daytime Tracking Survey	16:00 – 21:00	Ash Beds	239051 N. noctula; 239052 N. noctula.	N/A
2x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
10/07/2019 Daytime Tracking Survey	16:00 – 21:00	South Cubbington Wood	239423 M. mystacinus / brandtii	N/A
2x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
11/07/2019 Daytime Tracking Survey	17:00 – 20:30	South Cubbington Wood	239423 M. mystacinus / brandtii	N/A
2x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
11/07/2019 Daytime Tracking Survey	17:00 – 20:30	Ash Beds	239051 N. noctula; 239052 N. noctula.	N/A
2x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
14/07/2019 Daytime Tracking Survey	15:10 – 19:36	Ash Beds	239051 N. noctula; 239052 N. noctula.	N/A
2x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
14/07/2019 Daytime Tracking Survey	16:30 – 21:00	Ash Beds	239051 N. noctula; 239052 N. noctula.	N/A
2x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
14/07/2019 Daytime Tracking Survey	15:10 – 19:36	South Cubbington Wood	239423 M. mystacinus / brandtii	N/A
2x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
16/07/2019 Daytime Tracking Survey	17:00 – 19:00	South Cubbington Wood	239423 M. mystacinus / brandtii;	N/A
2x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
01/08/2019 Daytime Tracking Survey	15:45 – 19:04	Ash Beds	240302 M. daubentonii; 240304 M. nattereri.	N/A
2x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
01/08/2019 Daytime Tracking Survey	16:00 – 21:00	Ash Beds	240302 M. daubentonii.	N/A
2x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				





## 2019 Surveyors

**BR5 Trapping & Tagging Survey Leads** (all named persons under project licence 2019-40508-SCI-SCI-1):

2015-10461-CLS-CLS, (2015-10167-CLS-CLS; 2015-10176-CLS-CLS; 2017-30660-CLS-CLS), 2016-22696-CLS-CLS; 2016-23453-CLS-CLS, 2015-17357-CLS-CLS; 2017-32644-CLS-CLS, 2015-13794-CLS-CLS and 2015-11383-CLS-CLS; 2015-11384-CLS-CLS.

**BR4 Daytime Tracking & BR1 Roost Characterisation Survey Leads:**

(2018-34342-CLS-CLS; 71238:OTH:CSAB:2016),

**Survey Assistants:**

**Please explain any constraints on the survey / s undertaken** (time of year, cold weather, refused access, safety issues preventing access etc – justify as necessary and include evidence where required). If access was refused please provide evidence (letter / email) to demonstrate this.

Weather conditions were appropriate on all trapping sessions. In cooler months, some trapping surveys were curtailed due to temperatures falling below 9°C as per licence conditions.

Radio transmitters can fail for a variety of reasons, including adverse weather and damage from the bats grooming. During some surveys, tags were scratched off after two to three days, limiting tracking data capture.

Bats are mobile species and may use a variety of roosts, commuting routes and foraging areas during their yearly life cycle, which is influenced by a range of factors such as breeding status, energetic requirements and the availability of prey. These surveys are considered suitable for providing a sufficient sampling effort (without disturbing the population adversely) to obtain information to assist in the location of key roosts potentially affected by the Scheme, and to thereby inform licensing requirements and the development of appropriate mitigation.

Access to some roost sites found through radio-tracking was not possible due to the roosts being located on land where access permission had not been possible to obtain. In these cases, bat movements could still be followed via radio-tracking from public roads. A limitation of radio-tracking studies relates to accuracy of positional fixes. Accuracy of fixes can be a common problem in studies of bats, particularly those species that have relatively large home ranges (Holland and Wilelski, 2009). Whilst methods such as bi-angulation / triangulation can provide relatively rapid and systematic location data for bats, studies have shown that due to variability of surveyor skill, especially at distance, positional fixes might only be accurate to >220 m<sup>2</sup> (Bontanida et al, 2002).

Also complete the following:

- If DNA analysis of droppings has been undertaken, please indicate below (Yes, No, N/A) and ensure that **Figure C5b** (if applicable – see below) details the locations where the samples were taken. Where long-eared bats are detected but cannot be identified to species level visually, DNA analysis of any droppings will be needed where grey long-eared bats may be present.

N/A – No droppings collected

- Please confirm that a walk over survey / check has been carried out within 3 months *prior* to application submission by a suitably experienced ecologist to ensure that conditions have not changed since the most

recent survey was undertaken. Provide details of any changes to conditions and habitats and / or structures on site since the surveys were undertaken.

<b>Date of walkover survey / check</b>	18 <sup>th</sup> March 2020
<b>Details of any changes to conditions and habitats and / or structures, if there are no changes please insert 'None'</b>	None

**C6 Survey results:** Summarise your findings in the tables below and cross reference to **Figure C6** (which must also include flight lines, access points, dimensions of existing roosts etc). If you did not undertake a specific survey type please add N/A to the relevant table / s. Raw data is to be appended to the Method Statement (including sonograms, DNA analysis results etc).

**Roost types to be referenced as:** *Day, Night, Feeding Perch, Transitional, Satellite, Maternity, Hibernation confirmed, Foraging Area, Commuting Route, Swarming Site, Other.* See end of document for "Definitions" of these roosts.

When completing "**Notes / observations**" include reference to *direct observations, extent and age of droppings, presence of field signs, emergence or re-entry, echolocation analysis.* Also include DNA results if applicable and include nil results)

#### Visual inspection results

Ash Beds PRF assessment (visual inspection of trees within the LLAU and 20m buffer)	Numbers of trees		
	Direct impact area (LLAU)	Indirect Impact Area (20 m buffer)	Total within licence area
High potential	19	8	39
Moderate potential	44	15	85
Low potential	22	60	135
<b>Total</b>	<b>85</b>	<b>83</b>	

Date (e.g. format 01 / 06 / 13)	Species and numbers	Roost type (to be consistent with the above listed types)	Structure reference (consistent with relevant figures and other text)	Roost location	Access points (include # of them)	Dimensions of existing roosts or explanation of where the roost is (as appropriate)
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N/A						
<b>Notes / observations:</b>						

#### Provide further (brief) comments / explanation if required:

N/A – No roosts recorded but tree potential assessed [See Figure C6a – Bat Roost Potential]
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#### Dusk survey results

Date (e.g. format 01 / 06 / 13)	Start and end times	Species and numbers	Roost type (to be consistent)	Structure reference (consistent)	Roost location	Access points (include)	Dimensions of existing roosts or
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			<i>with the above listed types)</i>	<i>with relevant figures and other text)</i>		# of them)	explanation of where the roost is (as appropriate)
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17/09/2019	Start time: 19:04, end time: 21:19.	Barbastelle x 1 emergence confirmed.	Day	AB-F003	Easting: [REDACTED] Northing [REDACTED]	Unknown	Unknown
17/09/2019	Start time: 19:04, end time: 21:19.	P. pip x 1 emergence confirmed	Day	AB-F004	Easting: [REDACTED] Northing [REDACTED]	Unknown	Unknown
16/10/2019	Start time: 17:55, end time: 20:10.	P. pip x 1 emergence confirmed	Day	AB-F002	Easting: [REDACTED] Northing [REDACTED]	Unknown	Unknown

**Notes/observations:**

**Provide further (brief) comments / explanation if required:**

N/A

#### Dawn Survey results

Date (e.g. format 01 / 06 / 13)	Start and end times	Species and numbers	Roost type (to be consistent with the above listed types)	Structure reference (consistent with relevant figures and other text)	Roost location	Access points (include # of them)	Dimensions of existing roosts or explanation of where the roost is (as appropriate)
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N/A

**Notes / observations:**

**Provide further (brief) comments / explanation if required:**

N/A

#### 'Other' results – please specify.

##### Table C6 'Other' Day tracking and roost characterisation survey results.

This Survey Results table (within Section C6) comprises the results of the tracking and roost characterisation surveys (as per the Survey Effort table in C5 above). The key information includes the bat tracked, whether the bat was found or not, and the location of any PRFs identified. Further details of any roosts (including the tree species and feature specifics) have been detailed in the Roost table in Section C7 below.

Date	Survey Type	Bat Details	Result	Roost Ref	Roost Location
27/09/18	Daytime tracking	000350 P. pygmaeus adult male from Ash Beds	PRF identified	350a	Ash Beds [REDACTED]
27/09/18	Daytime tracking	000619 P. auritus adult nulliparous female from Ash Beds	PRF identified	619a	Hunningham [REDACTED]
27/09/18	Night tracking	000350 P. pygmaeus adult male from Ash Beds	Activity recorded.		
27/09/18	Roost characterisation	000350 P. pygmaeus adult male from Ash Beds	Emerged at 19:15	350a	Ash Beds [REDACTED]

Date	Survey Type	Bat Details	Result	Roost Ref	Roost Location
28/09/18	Daytime tracking	000350 P. pygmaeus adult male from Ash Beds	PRF identified	350b	Ash Beds [REDACTED]
28/09/18	Daytime tracking	000619 P. auritus adult nulliparous female from Ash Beds	PRF identified	619a	Hunningham [REDACTED]
28/09/18	Night tracking	000350 P. pygmaeus adult male from Ash Beds	Activity recorded.		
28/09/18	Night tracking	000619 P. auritus adult nulliparous female from Ash Beds	Activity recorded.		
28/09/18	Roost characterisation	000350 P. pygmaeus adult male from Ash Beds	Emerged at 18:55	350b	Ash Beds [REDACTED]
01/10/18	Daytime tracking	000350 P. pygmaeus adult male from Ash Beds	PRF identified	350b	Ash Beds [REDACTED]
16/05/19	Daytime tracking	237058 P. auritus adult parous female from Ash Beds	PRF identified	237058b	Offchurch - Manor Farm [REDACTED]
17/05/19	Daytime tracking	237058 P. auritus adult parous female from Ash Beds	PRF identified	237058a	Offchurch - Manor Farm [REDACTED]
25/06/19	Daytime tracking	239048 M. brandtii adult male from Ash Beds	Not found		
25/06/19	Daytime tracking	239049 P. pygmaeus adult male from Ash Beds	PRF identified	239049a	Offchurch - Osier Cottages [REDACTED]
25/06/19	Roost characterisation	239049 P. pygmaeus adult male from Ash Beds	Emerged at 21:50	239049a	Offchurch - Osier Cottages [REDACTED]
26/06/19	Daytime tracking	239048 M. brandtii adult male from Ash Beds	Not found		
26/06/19	Daytime tracking	239049 P. pygmaeus adult male from Ash Beds	PRF identified	239049b	Offchurch - Osier Cottages [REDACTED]
09/07/19	Daytime tracking	239423 M. mystacinus / brandtii adult lactating female from South Cubbington Wood	PRF identified	239423a	Offchurch - School Hill [REDACTED]
09/07/19	Roost characterisation	239423 M. mystacinus / brandtii adult lactating female from South Cubbington Wood	Did not emerge		
10/07/19	Daytime tracking	239051 N. noctula adult lactating female from Ash Beds	Not found		
10/07/19	Daytime tracking	239052 N. noctula adult male from Ash Beds	PRF identified	239052a	Ash Beds [REDACTED]
10/07/19	Daytime tracking	239423 M. mystacinus / brandtii adult lactating female from South Cubbington Wood	PRF identified	239423a	Offchurch - School Hill [REDACTED]

Date	Survey Type	Bat Details	Result	Roost Ref	Roost Location
11/07/19	Daytime tracking	239051 N. noctula adult lactating female from Ash Beds	Not found		
11/07/19	Daytime tracking	239052 N. noctula adult male from Ash Beds	Not found		
11/07/19	Daytime tracking	239423 M. mystacinus / brandtii adult lactating female from South Cubbington Wood	PRF identified	239423a	Offchurch - School Hill [REDACTED]
14/07/19	Daytime tracking	239051 N. noctula adult lactating female from Ash Beds	Not found		
14/07/19	Daytime tracking	239052 N. noctula adult male from Ash Beds	Not found		
14/07/19	Daytime tracking	239423 M. mystacinus / brandtii adult lactating female from South Cubbington Wood	PRF identified	239423a	Offchurch - School Hill [REDACTED]
14/07/19	Roost characterisation	239423 M. mystacinus / brandtii adult lactating female from South Cubbington Wood	Did not emerge		
16/07/19	Daytime tracking	239052 N. noctula adult male from Ash Beds	Not found		
16/07/19	Daytime tracking	239423 M. mystacinus / brandtii adult lactating female from South Cubbington Wood	PRF identified	239423a	Offchurch - School Hill [REDACTED]
01/08/19	Daytime tracking	240302 M. daubentonii adult nulliparous female from Ash Beds	Not found		
01/08/19	Daytime tracking	240304 M. nattereri juvenile nulliparous female from Ash Beds	PRF identified	240304a	Eathorpe - Eathorpe Hall [REDACTED]
02/08/19	Daytime tracking	240302 M. daubentonii adult nulliparous female from Ash Beds	Not found		
02/08/19	Daytime tracking	240304 M. nattereri juvenile nulliparous female from Ash Beds	PRF identified	240304b	Eathorpe - Eathorpe Hall [REDACTED]
05/08/19	Daytime tracking	240302 M. daubentonii adult nulliparous female from Ash Beds	PRF identified	240302a	Print Wood [REDACTED]
05/08/19	Daytime tracking	240304 M. nattereri juvenile nulliparous female from Ash Beds	PRF identified	240304a	Eathorpe - Eathorpe Hall [REDACTED]
07/08/19	Daytime tracking	238366 M. mystacinus / brandtii adult parous female	PRF identified	238366a	Offchurch - Village Street [REDACTED]

Date	Survey Type	Bat Details	Result	Roost Ref	Roost Location
		from South Cubbington Wood			
08/08/19	Daytime tracking	238366 M. mystacinus / brandtii adult parous female from South Cubbington Wood	PRF identified	238366a	Offchurch - Village Street [REDACTED]

**Provide further (brief) comments / explanation if required:**

[See Figure C6b – Trapping Locations]

See Figure C6c – Roost Locations]

The results table above is a summary (basic) record of the results for each survey undertaken. These results detail all PRFs and roosts found to date within the licence area (and up to 3 km distant) through trapping and tracking. The results table above also reports on null survey results. In some cases where multiple surveys have tracked bats to the same roost, multiple grid references have been provided for the same roost. This is due to triangulation error during the survey being reported. The best grid reference (or alternatively an average of those provided from several surveys) has been determined during a review of all the identified roosts (using all survey data collected plus photos) and reported in the collated list of the roosts provided below in C7.

Significantly more data has been collected than is reported here, and each PRF (when found during daytime tracking) has also been photographed to assist with specific tree identification/along with tree marking.

Where dimensions or explanation of roost location above is listed as 'Unknown', the exact roost location or feature could not be observed. An approximate height and orientation have been provided using radio telemetry data, but this was not confirmed by direct observation.

**C7 Interpretation / evaluation of survey results** (also see the Bat Mitigation Guidelines section 5.8 and Figure 4 for conservation significance of roost type): Please complete the following table:

Table C7 Table of Roosts Identified					
Roost ID	Bats identified	No. of bats	Location	Roost Type	Conservation Status
<i>N.B - A number of bats is provided if the roost is a confirmed roost and the bat was positively identified as roosting there. A * denotes a roost where the PRF was identified from daytime tracking but not confirmed through observation of emergence. A † denotes a roost found outside the licence area.</i>					
239052a	N. noctula adult male.	*	Split in common ash [REDACTED] In woodland <b>Within direct impact area</b>	Unknown (likely day)	Unknown
350a	P. pygmaeus adult male.	1	Multiple features in common ash [REDACTED] In woodland <b>Within direct impact area</b>	Day (Summer)	Low
350b	P. pygmaeus adult male.	1	Tear-out in hybrid / uncertain oak [REDACTED] In woodland <b>Within direct impact area</b>	Day (Summer)	Low
AB-F002	P. pipistrellus bat.	1	Common ash [REDACTED] In Field north of Ash Beds <b>Within direct impact area</b>	Day (Summer)	Low
AB-F003	B. barbastellus bat.	1	Common ash [REDACTED] In Field north of Ash Beds <b>Within direct impact area</b>	Day (Summer)	High
AB-F004	P. pipistrellus bat.	1	Common ash [REDACTED] In Field north of Ash Beds <b>Within direct impact area</b>	Day (Summer)	Low
239049a †	P. pygmaeus adult male.	1	Common ash [REDACTED] In Offchurch - Osier Cottage	Unknown	Unknown



			Outside impact area		
239049b †	P. pygmaeus adult male.	*	Tree not on accessible land in unknown species [REDACTED] In Offchurch - Osier Cottages Outside impact area	Unknown	Unknown
237058a †	P. auritus adult parous female.	*	Residential building [REDACTED] [REDACTED] In Offchurch - Manor Farm Outside impact area	Likely maternity	High
237058b †	P. auritus adult parous female.	*	Residential building [REDACTED], [REDACTED] In Offchurch - Manor Farm Outside impact area	Likely maternity	High
239423a †	M. mystacinus / brandtii adult lactating female (South Cublington bat)	*	Residential building [REDACTED] [REDACTED] In Offchurch - School Hill Outside impact area	Maternity	High
238366a †	M. mystacinus / brandtii adult parous female (South Cublington bat)	*	Residential building [REDACTED], [REDACTED] In Offchurch - Village Street Outside impact area	Maternity	High
240304a †	M. nattereri juvenile nulliparous female.	*	Sessile oak [REDACTED], [REDACTED] In Eathorpe - Eathorpe Hall Outside impact area	Likely maternity	High
240304b †	M. nattereri juvenile nulliparous female.	*	Residential building [REDACTED] [REDACTED] In Eathorpe - Eathorpe Hall Outside impact area	Likely maternity	High
240302a †	M. daubentonii adult nulliparous female.	*	Unknown species [REDACTED] In Print Wood Outside impact area	Unknown	Unknown
619a †	P. auritus adult nulliparous female.	*	Hybrid / uncertain oak [REDACTED] [REDACTED] In Hunningham Outside impact area	Day (Summer)	Low

**Provide further (brief) comments / explanation if required:**

With reference to Table C7 above - as per Bat Mitigation Guidelines, for the purposes of impact assessment and mitigation design, all roosts containing subadult bats of any sex, or pregnant, lactating or post-lactating female bats (with no evidence to the contrary such as those proven to share a roost with other subadults or females through radio tracking) were assumed to be from a unique maternity roost within the woodland, regardless of whether they were tagged and/or tracked back to a roost.

**Approach to evaluation and interpretation of results**

Both capture and known roost data collected during the surveys is used to formulate a risk assessment of bats likely to be present during tree felling / clearance works. The survey data is able to confirm what bats are known to roost in the woodland as well as other tree roosting bats visiting the site at the time of the surveys, as these bats could also be roosting at the site at other times of the year, given the highly mobile behaviour of tree roosting bats. Given this risk factor, a licence will be sought and mitigation provided for the entire tree roosting species assemblage using the site to ensure that all species likely to be roosting can be appropriately considered and safeguarded during the tree felling operations (i.e. suitable mitigation and bat rescue procedures).

In addition, Ash Beds as a whole will also be considered as a roosting resource for bats based primarily on the results of tracking data to provide a level of importance of the site at a landscape scale.

**Summary of 2018/19 Initial Tree Assessment Results**

[See Figure C6a – Bat Roost Potential]

Impact Area	Total Trees	High	Low	Moderate	Negligible	Confirmed
Direct Impact Area	228	19	22	44	143	NA
Indirect Impact Area	319	8	60	15	236	NA
Outside Impact Area	354	12	53	26	263	NA

The Ash Beds licence area was subject to ground level tree assessments and tree climbing inspection surveys to assess the potential of trees for their potential to support bats, as detailed in the table above. No bat roosts were identified as part of these surveys.

### **Summary of 2018 / 2019 Traditional / ABLST Results**

[See Figure C6b – Trapping Locations]

In 2018 and 2019, ALBSTs were employed to determine the assemblage of bats within the woodland, locate late summer roosts of bats using the woodland, and inform licensing and mitigation requirements. In addition a number of traditional emergence and re-entry surveys were undertaken by third party contractors on trees located outside woodland areas.

Eight species of bats were confirmed to be using Ash Beds using ALBST. The numbers and species of bats trapped at Ash Beds are reported in the table below.

Bat Species	No of bats trapped
<i>P. auritus</i>	6
<i>M. mystacinus</i>	5
<i>P. pygmaeus</i>	4
<i>N. noctula</i>	3
<i>M. nattereri</i>	2
<i>P. pipistrellus</i>	2
<i>M. daubentonii</i>	1
<i>M. mystacinus / brandtii</i>	1
<i>M. brandtii</i>	1

In addition, a Barbastelle was found to be roosting within a tree outside Ash Beds woodland, and is also presumed to be utilising the woodland habitat onsite for foraging (see below for further discussion).

See Figure C6c Roost Locations and Figure C6d Bat connectivity showing connection of off-site roosts to Ash Beds.

All 16 roosts identified by location relative to the licence area are presented below (14 from surveys at Ash beds and two from surveys focussed on South Cubbington). Six roosts are within the direct impact zone of the Scheme and will be lost. The other eight roosts found are not within the licence area or impact zones.

<b>Roosts by Bat Species by area relative to the licence area</b>					
Bat Species	Total roosts identified	Direct Impact High	Direct Low	Unlicensed High	Unlicensed Low
<i>B. barbastellus</i>	1	1	0	0	0
<i>M. daubentonii</i>	1	0	0	1	0
<i>M. nattereri</i>	2	0	0	2	0
<i>N. noctula</i>	1	1	0	0	0
<i>P. auritus</i>	3	0	0	2	1
<i>P. pipistrellus</i>	2	0	2	0	0
<i>P. pygmaeus</i>	4	0	2	2	0
<i>M. mystacinus / brandtii</i>	2	0	0	2 (tagged at South Cubbington)	0
<b>Total</b>	16	2	4	9	1
Direct / Indirect = impact zone					
Outside = outside impact area, within licence area					

Unlicensed = outside licence area  
High / Low = conservation status of roost

**Bat roosts directly impacted within the Ash Beds licence area**

Location	Bat Species	Conservation Status	Roost Name	X	Y	Ecology Type
Field north of Ash Beds	<i>B. barbastellus</i>	High	AB-F003	██████	██████	Day (Summer)
Field north of Ash Beds	<i>P. pipistrellus</i>	Low	AB-F004	██████	██████	Day (Summer)
Field north of Ash Beds	<i>P. pipistrellus</i>	Low	AB-F002	██████	██████	Day (Summer)
Ash Beds	<i>N. noctula</i>	Unknown	239052a	██████	██████	Unknown (likely day)
Ash Beds	<i>P. pygmaeus</i>	Low	350b	██████	██████	Day (Summer)
Ash Beds	<i>P. pygmaeus</i>	Low	350a	██████	██████	Day (Summer)

**Summary of Known Assemblage and Roosts:**

As a bat roosting habitat Ash Beds is relatively small and located 1.5-2 km away from other woodlands. Ash Beds woodland supports two confirmed day tree roosts for soprano pipistrelle male bats, and one unknown type tree roost for a noctule male (likely a day roost but listed as unknown on a precautionary basis as a roost characterisation survey was not undertaken). Roosts outside the woodland comprised barbastelle and common pipistrelle day roosts. The remaining assemblage of bats using the site for foraging, social activity and potential day roosting at other times of the year include Natterer's, Daubenton's, Brandt's, whiskered and brown long-eared bat. It is considered to be of District importance for tree roosting bats.

With reference to the indicative species list from the baseline data reported in Section C1, Bechstein's bat, Nathusius' bat and Leisler's bat were not found to be using the Ash Beds licence area. At South Cubbington Wood (approximately 1.8 km to the north-west of Ash Beds), Leisler's bat was not found, but a single Nathusius' pipistrelle immature male bat and a single male adult Bechstein's bat were trapped. On a highly precautionary basis, it may be assumed that rarer bat species found in South Cubbington may make occasional use of Ash Beds given the good connectivity and relatively short distance between the woodlands. However no roosts for these species have been found to date at Ash Beds.

Based on the ALBST data, the use of Ash Beds by other bat species is likely to be as day or transient roosts only during the maternity season. It is considered that significant maternity or breeding roosts are unlikely to be present. However, the site could also support small numbers of day roosting / hibernating bats during the winter period (of the species encountered during the summer / autumn surveys). Therefore it is considered that hibernating bats could occur within the impacted trees. Data obtained through ALBST surveys at woodland blocks / complexes (including ancient woodlands) across the EWC North area of the Scheme found that larger woodlands or smaller woods in connected complexes appear to support a more diverse range of bat species and roost types (e.g. maternity / mating roosts) compared with more isolated woods such as Ash Beds. As such, rarer bats found at South Cubbington are not likely to be roosting at Ash Beds.

**Outside the licence area**

A number of roosts were identified outside the licence area, five within trees and five within buildings. All roosts identified by ALBST found outside the licence areas are formally notified to HS2. This information is then supplied to the team (WP54) writing the other licences (HS2 low / moderate impact class licences or traditional licences) for inclusion in their licence submissions. This process ensures that all impacted roosts are addressed under a suitable licence.

**Important Advice:**

**Survey maps that must be included in this section of the Method Statement, or as separate documents if preferred, are listed in section I "Map checklist" at the end of this document.**

**Insert survey figures, photographs etc below here if not submitting them as separate documents:**

**D: Impact assessment in absence of mitigation or compensation for each species / roost type**

(also see section 6 of the Bat Mitigation Guidelines). Where appropriate you must take into consideration cumulative impacts of your proposals on the bat species and populations identified in your survey in each section.

**Guidance on quantifying roosts for the purpose of licensing:** To be considered the same roost, the locations need to have the same **functional** and **qualitative** (e.g. physical) characteristics, be used by the **same species** for the **same purpose** (e.g. day roosting) and be within the **same building / structure**. If the physical characteristics are different (e.g. one roost is in external crevices in the wall and the other is in the roof void against internal timbers) then they should be considered different roosts - because they offer bats different roosting opportunities. If the physical characteristics are similar and provide the same functional characteristics, used by the same species for the same purpose (e.g. transitional roost) but with different individual roosting locations within the overall building / structure, that could be considered one transitional roost. If two species are using an area which provides the same characteristics, for the same function, it is still two roosts - as there are two species.

**D1 Initial impacts:** The impact / s of activities undertaken on site pre-development and during works must be considered and explained. **Consider disturbance** (such as human presence, noise, vibration, dust, lighting, access obstruction due to scaffolding and plastic sheeting etc), **temporary damage and temporary loss of roosts and injuring / killing**.

*E.g. Unsupervised contractor removing roof tiles has the potential to crush 3 common pipistrelle bats using the roof tiles as day roosts. Major negative impact at a site level; Demolition of an extension to a building will take place adjacent to a maternity roost of common pipistrelle bats situated under the soffit board of the retained building. Potential for significant disturbance if demolition works are undertaken during the maternity period through vibration, noise and dust. Medium negative impact on a local level.*

#### **Direct and Indirect Impacts – definition of assessment zones**

The LLAU broadly defines the direct impact zone, and covers all potential land required during the construction phase of the Scheme, including the LOD, other construction works such as site compounds and new access or haul roads. It also covers areas where no destructive works will occur such as use of existing roads required for access, and areas for beneficial works comprising woodland enhancement and habitat creation. The LLAU is effectively a worst-case scenario for assessing direct impacts and is applied in the absence of further site-specific knowledge and requisite detail of planned works. The impact zone assessed is shown clearly in Figure Da.

For this assessment, the indirect impact zone is defined as a 20 m buffer on the direct impact zone. The 20 m buffer has been agreed through consultation with HS2, our client LM's ecologists (DJV) and Aecom ecologists. It represents professional judgement and consensus agreement. Retained woodland will buffer impacts from the Scheme significantly over other habitat types, as the mature trees and shrubs present will filter air turbulence, noise, dust and light pollution, reducing the area of the impacted zone significantly.

#### **Initial impacts**

Initial impacts relate to the clearance of trees and vegetation, required to facilitate construction works. Direct impacts comprise the loss of roosts, potential roost features and foraging and commuting bat habitat. Indirect impacts may arise from disturbance from felling activities. These will be fairly short-term in nature and relatively localised – the disturbance will comprise noise, dust, and potentially some limited lighting. No night-time vegetation clearance work is proposed during the active bat season. No tree felling will be done in darkness. Where other clearance work is undertaken during the darker winter months, all lighting will be limited to 1-2 hours after dusk and prior to dawn, and flood lights will be angled away from tree line/woodland edges. The noise (chainsaws and other machinery) resulting from felling of trees will be relatively short term in nature, and undertaken in conjunction with other ecologically supervised works associated with PRF inspections. Unnecessary noise by contractors will be managed through toolbox talks and direct supervision by qualified ecologists approved by the named ecologist for the Mitigation Licence.

The bat assemblage within the Ash Beds licence area and the woodland itself has been assessed of District importance. Prior to mitigation, the predicted initial impacts of the Scheme on the bat assemblage at Ash Beds comprise:

- The **direct permanent loss** of approximately 0.77 ha (27%) of lowland mixed deciduous woodland from the central section of Ash Beds. Remnants to the east of the woodland will be severed from linear woodlands to the west of the route. This loss is considered to be a **major adverse impact at the Local level**;
- The **direct permanent loss** of 85 trees with PRFs (19 of low, 44 of moderate and 22 of high suitability to support roosting bats) which represents a **major adverse impact at the Local level**;
- The **direct loss** of five known roosts for three common bat species (noctule, common and soprano pipistrelle) considered a **major adverse impact at the Site to Local level**;
- The **direct loss** of a day roost for Barbastelle bat, considered a **major adverse impact at the District level**;
- **Loss of a section of treeline / hedgerow** that links Ash Beds with brown long-eared roost 237058a (possible maternity roost) which would be a **minor adverse impact at the Local level**; and

- **Indirect impacts** (disturbance from tree felling) on 0.85 ha of lowland mixed deciduous woodland from the retained parts of Ash Beds (41% of the retained woodland), affecting 83 trees with PRFs (60 of low, 15 of moderate and 8 of high suitability to support roosting bats). This represents a **moderate adverse impact at the Local level**.

#### **Consideration of construction impacts beyond vegetation clearance**

Other impacts will occur over the medium-term once construction of the Scheme commences (excavation of cuttings and tunnels, building of viaducts and bridges, construction of embankments, installation of the track and relevant infrastructure etc). The construction phase is expected to last approximately five to seven years although works at individual locations will be of much shorter duration during this time period. Disturbance from the construction works in the absence of mitigation will comprise noise, vibration and possibly lighting, and will affect approximately 0.85 ha of woodland retained (41% of the remainder) outside the works area but falling within the 20m indirect impact zone. These impacts are dealt with outside this licence application at the Detailed Design stage through Schedule 17 applications (see B2.1) to relevant planning authorities which are informed by the Environmental Minimum Requirements (EMR) documents published by HS2 and with reference to the HS2 Code of Construction Practice (CoCP). In the Written Statement for the Sch 17 application, the final detailed design is set out. The changes to design since the ES are detailed and all potential impacts are reassessed. Mitigation measures are also reviewed and amended if required. Although the exact location and detail of impactful works cannot be known as the detailed assessment has not been undertaken, it is considered that in the absence of mitigation, under a worst case scenario the potential indirect construction impacts may represent a **moderate to major adverse effect, that may be significant at up to the Local level**.

[See Figure Da – Impacts / Fragmentation Plan]

#### **Confirm number of roosts to be damaged:**

N/A – All roost damage is considered a loss and is detailed in the Roost Loss section below. Given the highly transient nature of bat populations that use trees, the roosts identified below are those which were confirmed as in use by bats at the time of the survey. The bats within Ash Beds are likely to use significantly more tree PRFs within the same woodland habitat than just those roosts listed in this application. Therefore, the potential roosts detailed above may also support the same populations detailed below and have been fully factored into the overall assessment of the Scheme's predicted impact and residual effects on the bat populations relevant to the whole woodland.

**D2 Long-term impacts:** Consider and explain the impacts of the proposed works on the different species populations at a site, local, regional, and national level.

**D2.1. Roost modification:** e.g. changes to roosts / access points, new entrances (including human access e.g. for servicing / maintenance etc), change in size of roost space, changes in air flow, temperature and humidity, light etc. Please detail the access points into each roost and the type / s of roosts which will be modified.

*E.g. Non-mitigated changes to the roof structure, which requires replacing, will lead to the modification of 3 access points into a common pipistrelle maternity roost which will result in bats being unable to enter or exit the roost. Moderate negative impact on a local level.*

#### **Confirm number of roosts to be modified:**

- No known roosts are to be indirectly affected within the licence area.
- Alteration of conditions (comprising disturbance or alteration of ambient conditions such as light, noise, exposure or airflow) affecting 0.85 ha of lowland mixed deciduous woodland from the retained parts of Ash Beds (41% of the retained woodland) incorporating 83 trees with PRFs (60 of low, 15 of moderate and 8 of high suitability to support roosting bats). This represents a **moderate adverse impact at a local level**.

**D2.2. Roost loss:** Loss or deterioration of roosting sites, access points, habitat, etc must be considered. Please detail the access points into each roost and types of roost / s which will be lost.

*E.g. Demolition of building reference X in June will lead to the loss of a night roost in the porch used by 1 lesser horseshoe bat and the loss of a maternity brown-long eared bat roost in the loft space. This will lead to the death and / or injury of bats including dependent young and permanent destruction (loss) of both*

roosts. Moderate negative impact at a site level for lesser horseshoe bats and moderate negative impact at a local level for brown-long eared bats.

#### Confirm number of roosts to be destroyed:

Bat roosts directly impacted within the Ash Beds licence area						
Location	Bat Species	Conservation Status	Roost Name	X	Y	Ecology Type
Field north of Ash Beds	<i>B. barbastellus</i>	High	AB-F003	██████	██████	Day (Summer)
Field north of Ash Beds	<i>P. pipistrellus</i>	Low	AB-F004	██████	██████	Day (Summer)
Field north of Ash Beds	<i>P. pipistrellus</i>	Low	AB-F002	██████	██████	Day (Summer)
Ash Beds	<i>N. noctula</i>	Unknown	239052a	██████	██████	Unknown (likely day)
Ash Beds	<i>P. pygmaeus</i>	Low	350b	██████	██████	Day (Summer)
Ash Beds	<i>P. pygmaeus</i>	Low	350a	██████	██████	Day (Summer)

- The **direct loss** of five known roosts for three common bat species (noctule, common and soprano pipistrelle) considered a **major adverse impact at the site to Local level**;
- The **direct loss** of a day roost for barbastelle bat, considered a **major adverse impact at the District level**;

Overall the direct impacts are considered to comprise a major adverse impact at up to the District level.

A key factor in predicting roost loss is the acknowledgement of the loss of potential roost features. Woodland bats habitually use multiple tree roosts, moving between them regularly and utilising different roosts for different purposes and parts of their life cycle. The Scheme will also destroy 85 trees with PRFs (22 of low, 44 of moderate and 19 of high potential to support roosting bats) which should be regarded as an integral part of the roost resource represented by the woodland as a whole. This is a **major adverse impact at the Local level**.

[See Figure Da – Impacts/Fragmentation Plan]

[See Figure Db – Impacted Trees with Roosting Potential Plan]

**D2.3. Fragmentation and isolation:** Will the proposed works results in these impacts? E.g. loss of linear features such as hedges, tree lines, increased lighting, severance of flight lines by roads / rail lines, separation of breeding / hibernation sites from feeding grounds, etc.

*E.g. In addition to the removal of common pipistrelle day roosts in trees along the proposed road, removal of hedgerows, shown on Figure D, and the construction of the new road will fragment a significant commuting and foraging route for a lesser horseshoe maternity roost. This may cause a reduction in the long term success of the breeding colony of lesser horseshoes by restricting existing foraging range or killing bats on the road. Potentially major negative impact at a site and local level.*

#### **D2.3 Predicted fragmentation and isolation impacts prior to any mitigation**

Fragmentation impacts are anticipated within the central section of Ash Beds wood as the area to be cleared is 0.77 ha (27%), as detailed in Figure Da. Loss of hedgerows to the north connecting to Ash Beds (where the barbastelle and common pipistrelle roosts have been identified) will partially sever commuting routes from the east to Ash Beds and the river corridor to the west. This will potentially affect any bats roosting at farm buildings near the barbastelle roost, although connectivity with Ash Beds for this location is maintained through tree lined roads to the east. There will also be fragmentation impacts due to the loss of part of the hedge / tree line connecting Ash Beds with the probable brown long-eared bat maternity roost (237058a) to the south of the site. However connectivity will be maintained to the retained section of Ash Beds via the River Leam corridor to the north-west of the roost, and connectivity is retained to the main area of suitable bat habitat which lies predominantly to the south-west of the roost. Overall the fragmentation of Ash Beds is likely to result in a **major adverse impact at the local level**.

Loss of part of the woodland area comprises a small reduction in foraging habitat for bats using the site for foraging but roosting elsewhere. The ALBST surveys identified eight roosts (Natterer's, brown long-eared bat, Daubenton's, and soprano pipistrelle) outside the licence area, five within trees and three within buildings. These are detailed in the table below (and shown on Figure C6c). The roost locations are to the north-east or to the south-west, with one bat to the south-east at Print Wood. All location have good foraging and roosting opportunities nearby, and are in connectivity with both Ash Beds and South Cubbington. Two *M. mystacinus* / *brandtii* lactating female bats tagged at South Cubbington were also found roosting in Offchurch near to Ash

Beds. This shows good connectivity between the two woodlands and confirms that bats within the area may be using any woodlands within range. As such, loss of foraging resource at Ash Beds as a result of the Scheme for the wider bat assemblage is considered to comprise a **moderate adverse impact at up to the local level**.

Trapping location	Location	Bat Species	Conservation Status	Physical Type	Roost Name	Ecology Type	Approximate distance to licence area (km)
Ash Beds	Eathorpe - Eathorpe Hall	M. nattereri	High	structure	240304b	Likely maternity	3.26 NE
Ash Beds	Eathorpe - Eathorpe Hall	M. nattereri	High	Tree	240304a	Likely maternity	3.26 NE
Ash Beds	Hunningham	P. auritus	Low	Tree	619a	Day (Summer)	1.54 NE
Ash Beds	Offchurch - Manor Farm	P. auritus	High	structure	237058a	Likely maternity	0.16 SW
Ash Beds	Offchurch - Manor Farm	P. auritus	High	structure	237058b	Likely maternity	0.16 SW
Ash Beds	Offchurch - Osier Cottage	P. pygmaeus	Unknown	Tree	239049a	Unknown	0.45 SW
Ash Beds	Print Wood	M. daubentonii	Unknown	Tree	240302a	Unknown	2.34 SE
Ash Beds	Ash Beds	P. pygmaeus	Unknown	Tree	239049b	Unknown	0.45 SW
South Cubbington	Offchurch - School Hill	M. mystacinus / brandtii	High	structure	239423a	Maternity	0.75 SW
South Cubbington	Offchurch - Village Street	M. mystacinus / brandtii	High	structure	238366a	Maternity	0.56 SW

**D3 Post-development interference impacts:** e.g. extra street lighting or other external lighting, use of loft space as storage, increased noise. Please also consider other direct or indirect post development impacts which may include disturbance / injuring / killing.

*E.g. Security lighting being installed will shine on the brown-long eared bat maternity roost access points which may affect emergence patterns and lead to a reduction in foraging times. This may cause a reduction in the long term success of the breeding colony or cause the roost to be abandoned. Moderate to high negative impact at a site and local level.*

Anticipated post-development (operational) long-term impacts of the Scheme on bats relate to bats using or crossing the rail corridor. These are anticipated to persist for the operational phase of the Scheme and as such are considered to be effectively permanent.

Predicted indirect impacts comprise mainly noise and vibration (disturbance) for the operational hours and days of the railway line. Trains are anticipated to take approximately four seconds to pass any one point, with 14 trains per hour at peak travel times during the day and with approximately 75 trains per day (with a reduced frequency and limited operating hours at night). The only anticipated night-time lighting impacts of the Scheme are those associated with the passing trains themselves, and as such are intermittent, low-level and short-duration.

During the active bat flight season (April to October inclusive), direct mortality of individual bats through collision with trains is also a potential impact (where not mitigated by embedded design such as tunnels or cuttings) between the hours of dusk and dawn. Impacts to bats from collision risk within the Ash Beds licence area are avoided through the design features including raised 1 m high embankments to either side of the Scheme through much of this licence area to lift the flight path of bats up over the route away from trains, and through placement of the route within a 20 m long cutting where it passes through Ash Beds (designed to reduce wind pressure impacts). Together these design features will drop the route below the level of the surrounding landscape and therefore below the typical commuting / foraging level of the bats using the area, facilitating the passage of bats across the route at a higher level and reducing collision risk.

Overall it is considered that in the absence of mitigation, operational impacts may comprise a **minor negative impact at the local level**.

In the event that monitoring (prescribed in Section E4.2b) identifies an impact on the favourable conservation status (FCS) of bats within the licence area at the pre-operational stage, further monitoring will be designed and implemented to determine what is causing the impacts, including consideration of collision and severance impacts.

Operational impacts will be reassessed at the Detailed Design stage within a Written Statement (see Section D1 for further details).



**D4 Predicted scale of impact of this development / activity on species status (also see section 6.5 of the Bat Mitigation Guidelines and the BCT's Bat Survey Good Practice Guidelines):** Please complete the following table to explain what this is likely to be at the site, local / county and regional levels for each roost type and species. Add additional lines when necessary

*Roost types to be referenced as: Day, Night, Feeding Perch, Transitional, Satellite, Maternity, Hibernation confirmed, Foraging Area, Commuting Route, Swarming Site, Other.*

Species and Numbers (which will be affected at the time works will be undertaken)	Roost type	Predicted scale of impact (place X in relevant column)			Notes (include impact on roost – damage / destruction / modification etc)
		Site	Local / Parish / District/ County	Regional	

2 x Soprano pipistrelle	Day	X			Direct loss (site level impact)
1 x Noctule	Unknown (likely day)		X		Direct loss (local level impact)
2 x Common pipistrelle	Day	X			Direct loss (site level impact)
1 x Barbastelle	Day		X		Direct loss (district level impact)
Brown long-eared	Possible Maternity		X		Minor fragmentation (local level)

**\* \*\*Please note** that you can add more rows to the table: right click in any cell outside the grey box area. Choose Insert > Insert rows below.

Provide further comments / explanation as required (this helps understand how the impacts will be mitigated or compensated for when assessing section E):

As per Bat Mitigation Guidelines, for the purposes of impact assessment and mitigation design, all roosts containing sub-adult bats of any sex, or pregnant, lactating or post-lactating female bats (with no evidence to the contrary such as those proven to share a roost with other subadults or females through radio tracking) were assumed to be from a unique maternity roost within the woodland, regardless of whether they were tagged and / or tracked back to a roost.

This is to ensure no underestimation of potential impacts and subsequent residual effects takes place and ensures adequate mitigation plans based on a worst-case scenario.

#### Important Advice:

Please ensure that a separate 'Impact map' is provided (Figure D) which must show all structures or habitats (clearly referenced) that will be disturbed, damaged or destroyed, detailing where the roosts and access points are etc. Also see section I "Map checklist" at the end of this document.

## E Mitigation and Compensation (please also see section 7 and 8 of the Bat Mitigation Guidelines)

**E1 Please explain why this design was chosen over other potential solutions - set out what other designs were considered and why they were not feasible** (e.g. if the proposal is to construct a new stand-alone roost, explain why it is not possible to retain the roost in the existing structure etc). The mitigation solution being proposed in the method statement should be the one that delivers the 'need' with the least impact on the bat population.

It is considered appropriate to adapt plans to replace roosts based on the species, numbers and nature of the roosts found within the woodland, taking account of recorded activity levels and other data obtained during bat trapping, radio tracking and emergence surveys undertaken in 2018 and 2019. This will ensure the most recent and accurate baseline data is used to inform mitigation. The layout of the route has been refined to minimise impacts on the woodland habitats and bat roosts therein, but the scheme design still impacts approximately 1.62 ha of broad-leaved woodland habitat in spite of design measures to minimise those impacts (such as the use of

existing access roads etc). Therefore, the following roost replacement, connectivity and habitat replacement measures were selected as the best option for mitigating impacts on bats and the habitats and resources that they are dependent on within the area of Ash Beds.

The Early Works mitigation sites have already been through Detailed Design, with ESMPs drafted to detail the habitat creation and management of these sites. The design was informed by the impact assessment from the ES and designed to be appropriate to ecological receptors and environmental impacts within the immediate area while taking into account the mitigation provision across the wider area. Therefore some mitigation sites are targeted at great crested newts and reptiles, with only incidental benefits for bats, while others are designed to mitigate for impacts to ancient woodland, or for bats. Some sites are simply to be managed to enhance their biodiversity value (e.g. by removal of invasive species). Other areas of planting which will be planted at a later stage of works (e.g. embankments) fall under the Main Works and have not yet been fully designed. Where this licence applications has identified specific impacts to bats, the mitigation sites that have already been designed (EWC sites) and the future indicative areas available for planting (for Main Works sites) have been assessed and considered for overall benefits to bats. If it is felt that additional specific benefits to bats may be achieved without compromising the planting or mitigation site's intention and benefits for other species, such design amendments have been prescribed in this licence application, and will be added to the ESMPs. Where it is felt that it is not possible to amend the planting or that recommended changes cannot be guaranteed to be implemented, no prescriptions or amendments have been recommended. The existing mitigation sites (where intended for other species or other habitat benefits) are already extremely well designed for their purpose and are ecologically sound, and to enhance them further to benefit bats has not always been possible. Where ancient woodland soils are to be translocated to preserve the seedbed and allow future ancient woodland to develop, no amendments to planting can be made without compromising the end result of the translocation. The recommendations below are considered to fit well with the other goals for mitigation sites, and to provide clear net benefits for bats – effectively these enhance a site that is already beneficial to bats still further, to make it clear that impacts to bats identified in this licence application are addressed.

At Ash Beds, only very small areas of land are available within the Hybrid Bill limits for mitigation purposes at the initial stages of the Scheme. Only a small number of suitable trees within retained woodland are available on which to mount bat boxes. Other trees are either not large enough or in good enough condition to either mount bat boxes on or on which to create veteranised features. The woodland creation site at the west of Ash Beds has been designed to incorporate immediate benefits to great crested newts and reptiles, and benefits to bats through open water habitat and woodland creation. However there is no room for any additional benefits to bats such as including the planting of early senescent fruit trees. Other planting areas within the licence area will be created at a later date and proximity to the Scheme in many cases reduces the value to bats so these areas have not been specifically considered to be enhanced for bats (above the benefits provided through the basic principles of the Scheme design). Mitigation opportunities outside the licence area has also been explored. Small new woodland creation areas in between Ash Beds and South Cubbington Wood are similar to Ash Beds in size, location and composition and offer opportunities to create veteran features on trees once planting matures sufficiently, although no opportunities at the initial stage of works have been identified. The mitigation provision at neighbouring South Cubbington is extensive and varied. It was considered to allocate some of the benefits to Ash Beds. However the benefits already provided by the strategy discussed above and outlined below are considered to adequately mitigate for impacts to bats at Ash Beds.

The mitigation measures detailed below will be implemented alongside those committed to in the HS2 Phase 1 Environmental Statement, the HS2 Code of Construction Practice (CoCP), and the relevant Landscape & Environmental Management Plan (LEMP). Collectively, these measures will ensure impacts on the assemblage of bats at Ash Beds Wood will be reduced to the lowest level practicable whilst progressing construction and operation of the Scheme.

*[See Figures E3A Roost Mitigation Features, E3B Mitigation Planting and E4 Monitoring.]*

## **E2.2 Capture and release (if applicable):**

Please confirm that you agree to undertake the following procedures for the capture and exclusion of bats, where these are applicable:

- a. The use of endoscopes, artificial light from torches, destructive search by soft demolition (see Definitions), temporary obstruction of roost access, temporary or permanent exclusion methods (including installation) and use of static hand held nets must only be undertaken or directly supervised by the Named Ecologist, or an Accredited Agent.

- b. Where capture and / or handling of bats are necessary, only the Named Ecologist, Accredited Agent, or an Assistant directly supervised by the Named Ecologist may do so. Capture / handling / exclusion of bats must only be undertaken in conditions suitable for bats to be active.
- c. Where bats are discovered and taken (excluding unexpected discoveries during adverse weather conditions) they must either be relocated to an alternative roost (see Definitions) suitable for the species, or where bats are held this must be done safely and bats released on site at dusk in, or adjacent to, suitable foraging / commuting habitat in safe areas within or directly adjacent to the pre-works habitat.
- d. Endoscopes and hand held nets are only to be used to assist with the locating and capture of bats.
- e. Temporary and permanent exclusion must be carried out using techniques specified in the most up to date edition of the '*Bat Workers Manual*'. If one-way exclusion devices are to be used, each device must remain in position for a period of at least 5 consecutive days / nights throughout a spell of suitable weather conditions, or remain longer until these conditions prevail.
- f. Prior to destructive works, an inspection using torches and / or an endoscope must be performed internally to search for the presence of bats. If any licensed vesper bat species is found and is accessible, each will be captured by gloved hand or hand-held net, given a health check and then each placed carefully inside a draw-string, calico cloth holding bag or similar for transport. If any licensed horseshoe bat species is found, the capture methods outlined in (h) will only be used after it has been shown that overnight dispersal or exclusion are no longer practicable methods.
- g. Following inspection and exclusion operations, the removal of any feature with bat roost potential, will be only performed by hand in suitable weather conditions and under direct ecological supervision. Where applicable, materials will be removed carefully away and not rolled or sprung to avoid potential harm to bats. The undersides of materials will be checked by the Named Ecologist or Accredited Agent for bats that may be clung to them before removal.
- h. For sites where the presence of horseshoe species has been confirmed, the following exclusion method will be used: prior to work commencing, the Named Ecologist or Accredited Agent will conduct a thorough internal inspection for the presence of horseshoe bats. Only after the void is shown to be unoccupied will the destructive search commence, or all apertures into that void be closed and sealed (windows, doors, etc) by use of boarding, sealed tarpaulin or similar.

If a horseshoe bat is encountered, it will be left undisturbed during daylight. After all bats have dispersed overnight, the void will be sealed as described above. If all bats have not emerged, the Named Ecologist will either use torchlight and non-tactile human presence to disturb the bat to encourage it to emerge and disperse, during night only, or through use of a hand held net. Only after all bats have emerged from the building or void will it be sealed.

<b>Yes, I agree / No, I don't agree</b>
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Yes I agree
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**If NO, please provide justification below.** Please use this text box to describe any additional information on protocols to be employed if bats are found during works. Non-standard capture and exclusion apparatus must be shown on **Figure E2**.

#### **Additional conditions / protocols**

The indicative timing of planned works is provided within Appendix A and within the Works Schedule.

Tree clearance works have been proposed for May. A peak number of bats (9) were caught in May 2019 compared to the following months. This supports the fact that the site is less important during the maternity season. May is a flexible month for breeding bats. The May survey was done in mid-May when bats are in mid-pregnancy and the numbers of bats trapped then tailed off in June and July. With June to mid-July being critical for rearing young, this is the most energy demanding period for bats, when the lactating females will use very close-by foraging grounds to conserve their energy. As less bats were trapped in June and July, this suggests the bats will be breeding elsewhere and using other foraging grounds, therefore there is no likelihood of maternity roosts present. By the end of July, the trapping survey showed an increase in bats again as juveniles start to visit the site which is typical exploratory behaviour.

All bat related tree works will be undertaken by the Named Ecologist and / or the 'accredited agents'. Accredited agents will be suitably experienced ecologists with Natural England Level 2 Class (CL18) licences who have been approved by and will be working under the direction of the Named Ecologist.

All activities will be supervised by an Ecological Clerk of Works (hereafter the ECoW Site Supervisor) approved by the Named Ecologist, and all works, actions and bats encountered will be fully documented

A pre-fell decision tree has been developed (as shown in Appendix B) to ensure consistency in decisions made by accredited agents and the Named Ecologist. Guidance with examples on suitable one-way exclusion devices is provided in Appendix C in addition to guidance detailed in the Bat Workers Manual (see section 'E2.2 e' above).

Re-grading of the potential of trees (high / moderate / low) to support bats will be undertaken at the discretion of the accredited agents or the Named Ecologist. The loss of obscuring vegetation in winter allows for a clearer assessment of trees and Potential Roost Features (PRFs) from the ground in early spring. Any re-survey via ground-based inspection (BT1) or tree climbing inspection (BT2) will be documented and reported to Natural England as part of a preliminary/interim licence return. The following protocol therefore applies to all trees subject to felling that are considered by the accredited agents or Named Ecologist to have PRFs suitable to support roosting bats.

All trees declared clear of bats and approved for felling by the accredited agents or Named Ecologist will be marked and recorded.

**Additional non-standard protocols not covered by Natural England conditions a-h:**

1. **For trees that are safe to climb and with Potential Roost Features (PRFs) that can be reached / accessed**, pre-felling climbing inspections will be undertaken on the same day as the planned tree felling. All climbing surveys will be undertaken by accredited agents equipped with an endoscope (with 1m minimum length cable);
2. **Where a PRF contains bats** they will be removed in line with Natural England capture and release procedures (see sections a-h above). The tree roost will be declared clear for felling by the Named Ecologist or accredited agent. In the unlikely event a maternity roost is discovered, then works will cease and the Named Ecologist will be informed. Felling will take place on the same day as the climbing inspection or the roost will be made permanently unsuitable for bats, via destruction, soft felling or exclusion of bats. The action undertaken will be recorded.
  - a. **In the unlikely event a maternity roost is discovered**, the bats will not be removed from the roost. The Named Ecologist will be informed. A bespoke buffer of vegetation will be created around the roost that is specific to the conditions onsite, and left in place until the bat(s) have moved of their own accord and felling can take place. The minimum buffer will be 10m diameter but in practice the buffer may need to be 20m or even more depending on the location and thickness of surrounding vegetation, in order to be effective at preventing impacts (disturbance and change of environmental conditions) to the roost.
3. **Where a PRF contains no bats** the tree will be felled following confirmation by an accredited agent or the Named Ecologist that no bats are present. Should there be delays to felling, the PRF will be made unusable for roosting bats via removal of the PRF (destruction, soft felling or exclusion of bats). In the event that exclusion of bats is not possible or is reported to be ineffective the PRF will be re-inspected prior to felling.
4. **Where bats within a roost cannot be captured or excluded using one-way exclusion devices** consideration will be given to the range of options available to the Named Ecologist or accredited agents to establish whether bats are present or absent and how best to fell the tree. The options include undertaking additional emergence / re-entry surveys, repeat climbing inspections, or soft felling as detailed in point 6 below. A decision on the approach to be taken will be based on the nature of the PRF, associated safety considerations, the anticipated effectiveness of emergence / re-entry surveys given the time of year, and the ability to soft-fell safely.

Where emergence / re-entry surveys are undertaken, these will make use of thermal imaging (TI) or Infra-Red (IR) cameras in-line with BCT Guidelines (Collins, 2016).
5. **Where a tree cannot be climbed or inspected due to safety** the considerations and measures outlined in point 4 above will be followed.
6. **Where soft felling is required as the presence of bats within a PRF cannot be determined**, the feature will be soft felled in conjunction with an experienced arborist. This will PRF sections to be cut away and lowered to the ground (anchored from MEWP or adjacent trees) and inspected by an accredited ecologist or the Named Ecologist. Any bats found will be moved in line with Natural England capture and release procedures (see sections a-h above) with consideration given to anchoring the section felled PRF into a nearby suitable tree. PRFs will be left in-situ on the ground within a 10m exclusion zone for 24 hours; and,
7. **Following successful bat capture** by an accredited agent or the Named Ecologist, a health check of the bat will be undertaken (see NE capture and release procedures a-h above). The bat will then either

be transported immediately to a pre-installed bat box / roost mitigation feature in the same woodland parcel where access is possible, or kept in a suitable container until dusk and released near the site of capture. Bats kept in captivity and released at dusk will be cared for in line with the Bat Care Guidelines (Miller 2016).

8. All licensable works, bats captured and subsequent actions will be recorded and documented by the accredited agents approved by the Named Ecologist.

Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London

Miller, H. (ed.) (2016) Bat Care Guidelines (2nd edn). The Bat Conservation Trust, London.

Should your proposals include capture (taking) please specify numbers of each species that will be affected at the time the works are to be undertaken:

Species	Expected number of bats to be captured at the time works will be undertaken. <i>Note: this may be different to the number of bats using the roost at its optimum time as timings for works will be at a time when bats are least likely to be present.</i>
<i>Barbastella barbastellus</i>	2 – during rescue inspections / soft fell
<i>Pipistrellus pipistrellus</i>	2 – during rescue inspections / soft fell
<i>Pipistrellus pygmaeus</i>	5 – during rescue inspections / soft fell
<i>Pipistrellus nathusii</i>	2 - during rescue inspections / soft fell
<i>Nyctalus noctula</i>	5 – during rescue inspections / soft fell
<i>Nyctalus leisleri</i>	2 – during rescue inspections / soft fell
<i>Plecotus auritus</i>	5 – during rescue inspections / soft fell
<i>Myotis nattereri</i>	2 – during rescue inspections / soft fell
<i>Myotis daubentonii</i>	2 - during rescue inspections / soft fell
<i>Myotis mystacinus</i>	2 – during rescue inspections / soft fell
<i>Myotis brandtii</i>	2 – during rescue inspections / soft fell
<i>The captured bat numbers provided above are an educated estimate based on the results of the desk study, ALBST surveys, the time of year for the planned works (autumn / spring) and the broad proportions of bats found utilising the licence area.</i>	

*\*\* Please note that you can add more rows to the table: right click in any cell outside the grey box area. Choose Insert > Insert rows below.*

**E3 Bat roost and access point retention, modification and creation:** Please detail how all impacts to each species (as identified in sections C and D) will be mitigated. If not applicable to your proposals please state 'N/A' in the relevant text boxes.

Please note that breathable roofing membranes must not be installed into a roof used by bats. If the use of roof membranes is necessary, only Bitumen type 1F felt with a hessian matrix will be permitted under licence:

N/A

**E3.1 Retention of existing roost(s) –** *Works may include, for example, maintenance works that result in no material changes to the roost but may cause disturbance or temporary damage e.g. temporary exclusion of a roost to allow investigative and repair works to a bridge.* Provide details of all works including:

- Number and description of roosts to be retained, with an explanation of how they will be retained. Confirm dimensions to be retained.

No known roosts are being indirectly affected – all **known** roosts within the impacted woodland are being lost.

- Number of access / entrance points to be retained and how this will be achieved. If enhancements to the roosts will be provided, such as through crevice provision, please detail.

N/A

- Mitigation for any other impacts e.g. new lighting at the site.

There will be no new lighting at the site post construction. No night time vegetation clearance work is proposed during the active bat season. No tree felling will be done in darkness. Where other clearance work is undertaken during the darker winter months, all lighting will be limited to 1-2 hours after dusk and prior to dawn, and flood lights will be angled away from tree line / woodland edges.

The noise (chainsaws and other machinery) resulting from clearance / felling of trees will be in daylight hours and may indirectly affect other roost sites in Ash Beds. Such noise will be relatively short term in nature and undertaken in conjunction with other ecologically supervised works associated with PRF inspections.

Unnecessary noise by contractors will be managed through toolbox talks and direct supervision by qualified ecologists approved by the named ecologist for the Mitigation licence.

**E3.2 Modification of existing roost(s)** - *Works may include, for example, reduction in roof void height, change of tiles and roof lining (stating the type of membrane that will be used), alteration of access point through replacement of soffits etc.* Please provide the following:

- Dimension details of modified roosts: clearly state what the original roost dimensions were and what the dimensions of the modified roost will be.

N/A

- Dimension details of modified access points: clearly state how the access points are being modified.

N/A

- Details of any other modifications to be made to roosts.

N/A

- Mitigation for any impacts of lighting on the modified roost / s if appropriate.

N/A

**E3.3 New roost creation (including bat houses, cotes and bat boxes etc).**

*Note – creation of compensation for high impact cases (e.g. loss of a maternity roost) must be protected in the long term. Any bat boxes or roost structures that are part of a licence proposal which do not show signs of bats must be retained for a minimum of 5 years from date of completion of the development / works. Typically this will be around 5 years for low conservation status roost compensation (e.g. bat boxes) and longer for other significant roosts (e.g. bat houses, lofts etc). The exact time period will be specified in any licence issued. For high conservation status roost loss, the compensation roost / s must still be protected in the long term by another means (such as a s106 agreement), which is particularly important if the structure is likely to change ownership.*

**E3.3a Please complete the table below for the species and roost types listed.** For all other species and roost types please provide information under **E3.3b**.

<b>Species &amp; Roost type for which new roost creation will be provided</b>  Select 'yes' for those species impacted or 'N/A' if not applicable to this application	<b>New roost creation</b>		
	Compensation should be in line with the <i>Bat Mitigation Guidelines</i> . Where compensation is being provided, there should be at least <b>one compensation feature, suitable for the species concerned, per roost and per species to be impacted</b> , OR If a proposal impacts more than one bat species and / or roost type then cumulative impacts must be considered when designing the compensation; this should always be in line with the species and / or roost type which will be subject to the greatest impact and ensure that the requirements of all species impacted are met.		
	<b>Compensation Feature</b>	<b>Quantity</b>	<b>Location of Compensation Feature</b> (as shown on Figure E3)
<b>Common pipistrelle</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> N/A  <i>Day roost</i> <i>Night roost</i> <i>Feeding</i> <i>Transitional/Occasional</i>	<input type="checkbox"/> Bat box <input type="checkbox"/> Integrated bat box/ bat brick/ bat tube <input type="checkbox"/> Bat tile (including ridge tile) <input type="checkbox"/> Other (specify): <input type="checkbox"/> None		<input type="checkbox"/> In same building <input type="checkbox"/> In other existing building on site <input type="checkbox"/> In new building <input checked="" type="checkbox"/> Other (specify):
<b>Soprano pipistrelle</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> N/A  <i>Day roost</i> <i>Night roost</i> <i>Feeding</i> <i>Transitional/Occasional</i>	<input type="checkbox"/> Bat box <input type="checkbox"/> Integrated bat box/ bat brick/ bat tube <input type="checkbox"/> Bat tile (including ridge tile) <input type="checkbox"/> Other (specify): <input type="checkbox"/> None		<input type="checkbox"/> In same building <input type="checkbox"/> In other existing building on site <input type="checkbox"/> In new building <input checked="" type="checkbox"/> Other (specify):
<b>Whiskered</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> N/A  <i>Day roost</i> <i>Night roost</i> <i>Feeding</i> <i>Transitional/Occasional</i>	<input type="checkbox"/> Bat box <input type="checkbox"/> Integrated bat box/ bat brick/ bat tube <input type="checkbox"/> Bat tile (including ridge tile) <input type="checkbox"/> Other (specify): <input type="checkbox"/> None		<input type="checkbox"/> In same building <input type="checkbox"/> In other existing building on site <input type="checkbox"/> In new building <input type="checkbox"/> Other (specify):
<b>Brandt's</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> N/A  <i>Day roost</i> <i>Night roost</i> <i>Feeding</i> <i>Transitional/Occasional</i>	<input type="checkbox"/> Bat box <input type="checkbox"/> Integrated bat box/ bat brick/ bat tube <input type="checkbox"/> Bat tile (including ridge tile) <input type="checkbox"/> Other (specify): <input type="checkbox"/> None		<input type="checkbox"/> In same building <input type="checkbox"/> In other existing building on site <input type="checkbox"/> In new building <input type="checkbox"/> Other (specify):
<b>Daubenton's</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> N/A  <i>Day roost</i> <i>Night roost</i> <i>Feeding</i> <i>Transitional/Occasional</i>	<input type="checkbox"/> Bat box <input type="checkbox"/> Integrated bat box/ bat brick/ bat tube <input type="checkbox"/> Bat tile (including ridge tile) <input type="checkbox"/> Other (specify): <input type="checkbox"/> None		<input type="checkbox"/> In same building <input type="checkbox"/> In other existing building on site <input type="checkbox"/> In new building <input type="checkbox"/> Other (specify):
<b>Natterer's</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> N/A  <i>Day roost</i> <i>Night roost</i> <i>Feeding</i> <i>Transitional/Occasional</i>	<input type="checkbox"/> Bat box <input type="checkbox"/> Integrated bat box/ bat brick/ bat tube <input type="checkbox"/> Bat tile (including ridge tile) <input type="checkbox"/> Other (specify): <input type="checkbox"/> None		<input type="checkbox"/> In same building <input type="checkbox"/> In other existing building on site <input type="checkbox"/> In new building <input type="checkbox"/> Other (specify):



<b>Brown long-eared</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> N/A  <i>Day roost</i> <i>Night roost</i> <i>Feeding</i> <i>Transitional/Occasional</i>	Note: boxes for this species will only be acceptable in certain circumstances, where this is justified on an ecological basis  <input type="checkbox"/> Bat box, justification <input type="checkbox"/> Other (specify): <input type="checkbox"/> None		<input type="checkbox"/> In same building <input type="checkbox"/> In other existing building on site <input type="checkbox"/> In new building <input checked="" type="checkbox"/> Other (specify):
<b>Serotine</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> N/A  <i>Day roost</i> <i>Night roost</i> <i>Feeding</i> <i>Transitional/Occasional</i>	Note: bat boxes are not suitable for this species. Compensation should replicate, as closely as possible, the existing roost:  <input type="checkbox"/> Bat tile <input type="checkbox"/> Bat brick <input type="checkbox"/> Other (specify):		<input type="checkbox"/> In same building <input type="checkbox"/> In other existing building on site <input type="checkbox"/> In new building <input type="checkbox"/> Other (specify):
<b>Lesser Horseshoe</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> N/A  <i>Day roost</i> <i>Transitional/Occasional</i>	A proportionate number of bat features suitable for the species. The provision of one feature, suitable for the species concerned (eg void) per roost to be impacted will be considered appropriate:  Specify:		<input type="checkbox"/> In same building <input type="checkbox"/> In other existing building on site <input type="checkbox"/> In new building <input type="checkbox"/> Other (specify):

**E3.3b For all species and roost types not covered in the above table please provide the following:**

- New roost dimension details or features (to include bat tiles / boxes as applicable).

A Roost Mitigation Feature (RMF) may comprise:

- a suitable bat box (remaining useful for bats for 15 years);
- a new 'veteranised' feature created either within a healthy retained tree (in the initial 30-year period) or on newly planted woodland once mature enough (from 30+ years old). 10 trees per hectare will be veteranised with two features per tree targeted. Features are assumed to take five years to come into use and remain useful for 15-20 years;
- fruit trees planted for rapid creation of natural features (assuming one roost mitigation feature will form per tree once the tree is 30+ years old);
- an existing PRF on a felled tree which has been relocated to an adjacent enhancement area ('monolith' if laid on the ground or 'totem' if stood upright within a pit); and
- a new 'veteranised' feature created on monoliths / totems.

All roost mitigation features will be erected or created in woodlands adjacent to the impacted areas under the direct supervision of the named ecologist / accredited agents. Provision of bat roost mitigation features will be as per the ratios set out in Table 1 below:

<b>E3.3b Table 1– Provision of bat roost mitigation features</b>	
<b>Roost feature type</b> (existing confirmed roost or PRF)	<b>Minimum replacement ratio</b> (roost or tree lost : roost mitigation feature)
Annex 2 species (any roost type)	4:1
Maternity / hibernation roost (any species)	4:1
Non-Annex 2 species (any roost other than maternity or hibernation)	2:1
Trees with PRFs (moderate potential only)	1:1
Trees with PRFs (high potential only)	1:1

The roosts and potential roost features to be impacted (directly or indirectly) at Ash Beds and the number of roost mitigation features required are detailed in Table 2 below.

**E3.3b Table 2 – Details of roosts and PRFs to be lost and number of replacement features required**

Species	Roost type	Number affected directly	Number affected indirectly	Compensation ratio	Number of compensatory roost mitigation features required
<i>Pipistrellus pygmaeus</i>	Day	2	0	2:1	4
<i>Nyctalus noctula</i>	Unknown (likely day)	1	0	4:1	4
<i>Pipistrellus pipistrellus</i>	Day	2	0	2:1	4
<i>Barbastella barbastellus</i>	Day	1	0	4:1	4
NA	Trees with Potential Roost Features – moderate potential	44	NA	1:1	44
NA	Trees with Potential Roost Features – high potential	19	NA	1:1	19
<b>Total</b>					<b>79</b>

Overall, 79 roost mitigation features (RMFs) are required as the minimum mitigation for impacts at Ash Beds. A spatio-temporal strategy to achieve and exceed this number has been adopted and is set out below. It is not possible to provide all the mitigation features required in Year 0 and therefore only those compensating for directly impacted roosts and high potential trees will be provided initially (35 features required). To provide the remaining mitigation features (44) for the loss of moderate potential trees, a greater density of created and naturally occurring PRFs over a long timescale (5-70 years) is targeted, creating 143 RMFs over 30 years. This is considered more beneficial than all PRF mitigation provision comprising bat boxes within the first 15 years only.

Three small woodland creation sites that lie in between Ash Beds and South Cubbington have been allocated as mitigation for impacts to Ash Beds (although these sites fall within the licence area for South Cubbington). Like Ash Beds, these woodlands are isolated and are anticipated to create 'stepping stones' through the landscape towards South Cubbington. This will enhance the connectivity between these two licence areas that has been demonstrated by the whiskered / Brandt's maternity colony in Offchurch.

Mitigation comprising rapidly veteranizing fruit trees to be planted at South Cubbington has also been assessed as providing benefits to the bat populations in both licence areas given the use of South Cubbington by bats from Ash Beds (and well within the range of the Ash Beds bat assemblage). This has been detailed below as part of the mitigation provision for Ash Beds.

#### Targeted RMFs:

Year post-felling	Number of RMFs
0	35
20	12 (+23 if possible)
30	96
<b>Total</b>	<b>143 (+23 if possible)</b>

#### Initial / short-term provision 0-15 years: 35 bat boxes

- Two barbastelle bat boxes to be mounted either on a pole ('rocket' box) or retained suitable tree within either the same hedgerow as the impacted barbastelle roost or within a retained connecting hedgerow;
- Ten suitable trees are accessible within Hybrid Bill land on which bat boxes may be mounted (located between 60m and 98m from the centre line of the Scheme and at least 15m back from the clearance zone). Ten bat boxes will be mounted in total on trees ideally on those located furthest away from the Scheme; and
- 23 further bat boxes to be provided on suitable trees within retained areas of Ash Beds away from the Scheme outside the Hybrid Bill\*.

The bat boxes will be erected prior to works commencing. This will provide sufficient bat boxes to act as rescue bat boxes, allowing at least one bat box for every two individual bats likely to be encountered within roosts during tree felling (as per Table E2.2) (total 31 bats of up to ten species predicted). This number of bat boxes also ensures that all roosts lost are adequately mitigated for immediately.

More bat boxes could be erected on the trees within the Hybrid Bill; however their relative proximity to the Scheme reduces their value to bats and therefore compensation further away from the Scheme in other locations has been prioritised.

\*A land access agreement will be pursued in order to allow inspection of the bat boxes outside the Hybrid Bill over the long-term. However as this is not currently in place, it must be assumed these bat boxes will not be accessible for ongoing monitoring as part of this licence.

#### **Medium-term provision 20-35 years: 12 bat boxes within the Hybrid Bill**

- Replacement of all bat boxes within the Hybrid Bill land at 20 years – two rocket boxes and ten crevice / cavity boxes;

(If accessible and subject to landowner agreement at the time, replacement of the 23 bat boxes outside the Hybrid Bill will also be made).

#### **Medium / long-term provision 30-70 years: 96 RMFs**

- Veteranisation of newly planted woodland in 30 years' time when trees are mature enough (based on 10 trees per hectare having 2 features created or being present already):
  - o 0.52 ha at Ash Beds = 10 features;
  - o 3.64 ha in fields in between South Cubbington and Ash Beds woodlands = 72 features;
- Formation of at least 14 veteran features on 0.7 ha of rapidly veteranizing fruit trees (early senescent varieties including domestic apple, plum and cherry) in the vicinity of South Cubbington from 30 years post-planting. The trees will be planted on vigorous rooting stocks (with specification and management prescriptions as per the tables included within Appendix E). The trees will naturally self-veteranise from 30 years old (with management to assist the development of such features if required), creating features that may be used by bats until the trees degrade and rot beyond use (>70 years). Once these fruit trees die, the woodland planting around them will develop further resulting in the correct woodland species mix at 100 years old.

#### **Very long-term provision 70+ years:**

- Maturation of broadleaf woodland planting with natural development of PRFs from 70+ years.

All roost mitigation features will be erected or created in suitable habitats within or adjacent to the licence area. Rescue bat boxes will be erected adjacent to the impacted area under the direct supervision of the named ecologist / accredited agents. Due to restrictions on box locations, if required the capture and release method outlined in E2.2 point c may be utilised.

Any additional confirmed roosts discovered during bat rescue procedures will be compensated by additional bat boxes or similar mitigation features as per the ratios detailed in Table 2 above. All boxes will remain in place and suitable for bats for at least 15 years.

Table 3 below details the habitat areas included as mitigation and compensation for bats and indicates those areas of planting where trees will be veteranised. The areas are labelled on the Figures E3A Roost Mitigation Features and E3B Mitigation Planting.

<b>E3.3b Table 3: Habitat mitigation and areas (shown in Figure E3A and E3B)</b>			
<b>Area Number</b>	<b>Description of Woodland Habitat Creation</b>	<b>Mitigation type</b>	<b>Area (ha)</b>
1	Woodland Planting in field to the west of Ash Beds	Veteranisation of proposed planting	0.52
2	Ash Beds Existing Woodland - Enhanced Mitigation	12 bat boxes in existing woodland	0.49
NA	Ash Beds – retained woodland outside the Hybrid Bill	23 bat boxes only	1.22
F1	Woodland planting between the north of South Cubbington Wood & Weston Wood	Fruit tree planting	0.51

F2a	Woodland planting to the east of South Cubbington Wood	Fruit tree planting	0.08
F2b	Woodland planting to the east of South Cubbington Wood	Fruit tree planting	0.11
A	Woodland planting in field not connected to South Cubbington Wood	Veteranisation of proposed planting	2.3
B	Woodland planting in field not connected to South Cubbington Wood	Veteranisation of proposed planting	0.49
C	Woodland planting in field not connected to South Cubbington Wood	Veteranisation of proposed planting	0.85
Total	Mitigation habitat in Ash Beds Licence Area		1.01
	Mitigation habitat in South Cubbington licence area		4.34

Where bat boxes are the selected roost mitigation feature, Table 4 below lists suitable bat box types for the different bat species and roost types identified.

Any additional confirmed roosts discovered during bat rescue procedures will be compensated by additional bat boxes or similar mitigation features as per the ratios detailed in Table 1 above.

**E3.3b Table 4 – Suggested bat box types to mitigate for impacts to different species and roost types**

Species	Type preferred	2 F	1F F	2FN / 3FN	Kent	Eco Kent	Improve d Crevice bat box (ICRBB)	Improve d Cavity bat box (ICABB)	1FS / 1FW Maternity / hibernation
Soprano pipistrelle	Crevice	✓	✓		✓	✓	✓		✓
Common pipistrelle	Crevice	✓	✓		✓	✓	✓		
Barbastelle	Crevice		✓		✓	✓	✓		✓
Bechstein's	Cavity			✓				✓	
Natterer's	Cavity	✓		✓				✓	
Daubenton's	Cavity	✓		✓				✓	
Whiskered / Brandt's	Crevice/cavity	✓	✓			✓	✓	✓	
Brown long-eared	Cavity	✓	✓	✓				✓	✓
Noctule	Crevice/cavity	✓	✓	✓			✓	✓	✓
Leisler's	Crevice/cavity	✓	✓		✓	✓	✓	✓	

A number of manufacturers may produce bat boxes with essentially identical specifications, and these may be substituted for the listed types above.

Veteranisation of trees is explained in Bengtsson, V., Hedin, J. and Niklasson, M. 2012. Veteranisation of oak – managing trees to speed up habitat production. In 'Trees beyond the wood conference proceedings', September 2012. Veteranised features will be created using chainsaws and hand-held tools to mimic natural damage to trees, and speed up the development of rot holes, crevices, loose bark, hollows and splits on otherwise young healthy trees that would not normally develop these features until an advanced age. An additional method that may be used is the removal of limbs from trees via weakening of the branch to enable the safe removal via winch or rope to create a tear out on the stem. The onsite contractor will provide a document to the licencing ecologist, identifying:

- Numbers, species and ages of trees within woodland selected for veteranisation;
- Types of features to be created with indicative sketch to show final appearance; and
- Construction methodology of features to be created.

- Access points and size of access points.

N/A

- Location details (including an 8-figure grid reference for bat houses or bat lofts relating to the structure. 8-figure grid references are not required for positions of individual boxes, tiles etc).

At nearby sites within retained treelines and woodland areas of Ash Beds. See Figures E3A Mitigation features and E3B Mitigation planting and also E4 Monitoring Specification

- Aspect. Explain how the internal conditions of the roost will be created.

N/A

- Details of the materials to be used e.g. timber, sarking, felt etc.

N/A

- Justification for any variation from the original roost and / or deviations from recommendations in the Bat Mitigation Guidelines. (*Diagrams of widely available standard bat box designs are not required; just refer to bat box name and reference number, e.g. Schwegler 1FF*).

N/A

- Mitigation for any impacts of lighting if appropriate.

N/A

- Structures for access for monitoring / maintenance purposes (if applicable)

N/A

**E3.4 Other habitat re-instatement or creation** (e.g. retention of existing flight lines, retention or creation of appropriate vegetation around roost entrances where applicable) – please include details of:

- Habitat replacement (following works resulting in temporary impacts) or creation not covered by sections E2 to E3 such as hedgerow / woodland planting or enhancement. State the length of hedgerow planting and areas (ha) of other planting to be provided such as woodland and anticipated establishment period etc.

**E3.4 Table 1 Habitat creation / mitigation planting onsite and in the wider area considered to be relevant to Ash Beds, as shown on Figure E3B**

Area Number	Location of planting	Mitigation type	Area (ha)
1	Field to the west of Ash Beds	Woodland planting with veteranisation	0.52

3	Newly planted linear woodland to the east of the route	Woodland planting taken from Environmental Statement	0.78
4	Newly planted woodland in field to the south east of Ash Beds	Woodland planting taken from Environmental Statement	0.22
5	New woodland planting adjacent to Valley Fields farm house	Woodland planting taken from Environmental Statement	0.10
6	New planting to the south west of Fields Farm barns	Scrub/woodland planting taken from Environmental Statement	0.89
7	New planting adjacent to Ash Beds Enhancement Area	Scrub/woodland planting taken from Environmental Statement	0.60
8	New planting in fields to the south of Ash Beds	Scrub/woodland planting taken from Environmental Statement	0.70
9	New planting in field to the south of Ash Beds, adjacent to the route	Scrub/woodland planting taken from Environmental Statement	0.24
10	New planting alongside the Offchurch Road	Scrub/woodland planting taken from Environmental Statement	0.23
11	Planting in fields to the south of the Offchurch Road (west of the route)	Scrub/woodland planting taken from Environmental Statement	0.44
12	Planting in fields to the south of the Offchurch Road (east of the route)	Scrub/woodland planting taken from Environmental Statement	0.60
A	Woodland planting in field not connected to South Cubbington Wood	Woodland planting with veteranisation	2.3
B	Woodland planting in field not connected to South Cubbington Wood	Woodland planting with veteranisation	0.49
C	Woodland planting in field not connected to South Cubbington Wood	Woodland planting with veteranisation	0.85
F1	Woodland planting between the north of South Cubbington Wood & Weston Wood	Fruit tree planting	0.51
F2a	Woodland planting to the east of South Cubbington Wood	Fruit tree planting	0.08
F2b	Woodland planting to the east of South Cubbington Wood	Fruit tree planting	0.11
Total	Total planting in licence area		5.81
	Planting in South Cubbington licence area		4.34

Woodland will be created adjacent to retained parts of wet woodland at Ash Beds and along the unnamed tributary watercourse of the River Leam to its confluence (0.52 ha). The target habitat will be the habitat of principal importance, wet woodland. The woodland compensation planting near Ash Beds will extend the size of the retained woodland to the field east west of Ash Beds (east of the Scheme). The planting will also link woodland habitats between existing woodland pockets on the banks of the River Leam increasing woodland connectivity.

A total of 0.49 ha of retained woodland within the licence area will be managed to enhance this habitat for bats.

Outside the licence area, in fields in between Ash Beds and South Cubbington, three areas of woodland planting are planned to create 3.64 ha of woodland similar to Ash Beds itself. These areas will provide small 'stepping stone' areas of woodland across the landscape, and creating additional foraging, roosting and socialising habitat for bats.

Mitigation comprising 0.7 ha of rapidly veteranizing fruit trees to be planted at South Cubbington has also been assessed as providing benefits to the bat populations in both licence areas given the use of South Cubbington by bats from Ash Beds (and well within the range of the Ash Beds bat assemblage).

Other planting areas detailed include woodland and scrub creation along the route, improving connectivity through the landscape and generally mitigating for habitat impacts from the Scheme

- Creation of flight lines / routes of connectivity.

Planting on both sides of the rail line to provide visual screening, landscape integration and habitat connectivity, comprising hedgerows along the top of the raised embankments, and small blocks of broad-leaved woodland, including areas of woodland at the western end of Ash Beds. See Figure E3B.

- Foraging area enhancements, etc

N/A

- Mitigation for any impacts of lighting if appropriate.

N/A

### E3.5 Wider biodiversity gains:

Please indicate if enhancements, over and above what is necessary to mitigate the impact of the activity of the licence proposal, are being provided. Please indicate if enhancements are included to satisfy the requirement of a planning permission, and if so state the relevant planning condition, or other consents in your response below. Please also state if an applicant wishes to provide more than is typically required to mitigate for the impacts. Enter N/A if this is not applicable to your application.

**Note:** Any licence granted will only cover mitigation and compensation required to fulfill licensing requirements, but will acknowledge additional biodiversity enhancements.

N/A

### Important Advice:

**Scaled maps / plans** of mitigation / compensation must be provided as separate maps / figures (also **see section I "Map checklist" at the end of this document**):

- **Figure E2** if non-standard capture and exclusion apparatus is proposed please include diagrams / photographs.
- **Figure E3** to show specifications for mitigation / compensation to be provided and annotate where it will be provided. Should the scheme be large or complicated it may be necessary to submit more than one figure.

NOTE: It must be possible to compare these with the survey results plan (**Figure C6**) and 'Impacts' Figure (**D**).

**E4 Post-development site safeguard:** Further guidance and explanation on post-development monitoring requirements are included within our 'How to get a licence' document [http://www.naturalengland.org.uk/Images/wml-g12\\_tcm6-4116.pdf](http://www.naturalengland.org.uk/Images/wml-g12_tcm6-4116.pdf). Also see Section 8.7 of the Bat Mitigation Guidelines.

**E4.1 Habitat / site management and maintenance:** Is any specific post-development habitat management and site maintenance planned? If 'No'; state 'N/A'. If 'Yes' include the following:

- The period (years and months) for which habitat management and maintenance will take place. Ensure that this is consistent with the post development works detailed in section **E5b** of the **Work Schedule document, WML-A13-a-E5a&b**.

Yes - The HS2 ES makes provision for the preparation of Environmental Site Management Plans (ESMPs) to ensure the long-term management of compensatory habitats. In this area this includes the establishment of woodland edge management zones along the Offchurch Greenway and at South Cubbington Wood to enable retention of existing vegetation where possible and a more integrated transition between the Scheme and retained vegetation.

The ESMP relevant to Ash Beds Wood is referenced as WP 054 Environmental Mitigation Cluster 03: Ash Bed Wood – Enabling Works North Contract doc ref: 1EW04-LMJ-EV-PLN-NS01\_NL02-054038. There is an associated setting out plan showing the detailed design of the mitigation site (1EW04-LMJ-EV-DSO-NS01\_NL02-054001). Within the ESMP, management and maintenance is prescribed over 5 – 50 years depending on the habitat type. Maintenance is prescribed for bat boxes but not other roost mitigation feature types (as these are designed to replicate natural features which evolve over time in response to damage by fungus, birds and invertebrates). Three target age classes for woodland trees are prescribed (saplings seeds, young and mature trees, and standing or fallen deadwood of >20cm diameter) by the end of the 25 year management plan. Summary planting principles from the ESMP that inform the species for each habitat type are provided in Appendix E.

The ESMPs make reference to the HS2 Technical Standard - Ecological Monitoring Strategy (ECMS) which was not available to the authors at the time of writing the ESMP. The document reference is HS2-HS2-EV-STR-000-000029 and issue C01 of this document is dated October 2018. The ESMP specifies the monitoring to be undertaken for all compensatory and mitigation habitats. Where EPS licensing is required, this approach is then tailored on a site-specific basis subject to licencing requirements and recommendations of the professional ecologists involved in the licensing process, and in discussion and agreement with Natural England.

- Details of what will be undertaken in terms of site maintenance required to ensure long-term security of the affected population (e.g. maintain, repair or reinstate access points; maintain and repair heaters and / or data loggers; maintain, repair or restore bat feature / bat loft in good condition; repair or replace inspection hatches; management and maintenance of lighting regime, or bat boxes etc).

Maintenance of bat boxes and replacement roosts will be undertaken as required during the course of the monitoring scheme as specified in the ESMP.

- Details of what will be undertaken in terms of habitat management (e.g. planting cover around roost structure, hedgerow management regime, checking establishment of habitat creation; reduction of shade around roosts, woodland management to maintain species and structural diversity etc). Ensure this relates to the relevant map.

N/A

**Note** – for phased or multi-plot developments a separate habitat management and maintenance plan is required, which must be submitted with the master plan: see guidance on phased developments.

#### Important Advice:

Please include **Figure E4** as a separate figure to show which structures and habitats will be managed, maintained and monitored post development as part of your proposal – also see *section 1 "Map checklist" at the end of this document*).

**E4.2 Population monitoring, roost usage etc:** This should be in line with the monitoring requirements detailed in the Bat Mitigation Guidelines section 8.7 and Figure 4.

**E4.2a** Please complete the table below for the species and roost types listed. For all other species and roost types please provide information under E4.2b.

Species	Roost type	Post-development monitoring requirement
Common pipistrelle Soprano pipistrelle Whiskered Brandts Daubenton's Natterer's Brown long-eared Serotine	Day roost Night roost Feeding Transitional / Occasional	<input type="checkbox"/> None. There is no post-development requirement for proposals affecting bat roosts supporting up to any 3 species indicated, of the roost types listed, where they are used by low numbers of each species.  <input type="checkbox"/> A single presence / absence survey at an appropriate time of year is to be undertaken. This should not take place in the first year following completion of development. Timing (year):



		<input checked="" type="checkbox"/> Other (specify): Bat boxes provided as mitigation for roost losses will be subject to a robust monitoring scheme to gather data on compensatory roost uptake related to the Scheme as per the ESMP (and see below)
<b>Serotine</b>	<i>Day roost</i> <i>Night roost</i> <i>Feeding</i> <i>Transitional / Occasional</i>	<input type="checkbox"/> A single presence / absence survey at an appropriate time of year is to be undertaken. This should not take place in the first year following completion of development. Timing (year):  <input type="checkbox"/> Other (specify):
<b>Lesser Horseshoe</b>	<i>Day roost</i> <i>Transitional / Occasional</i>	<input type="checkbox"/> A single presence or absence survey at an appropriate time of year to be undertaken in year 2 post development plus a check of the condition and suitability of the roost.  <input type="checkbox"/> Other (specify):

**E4.2b For all species and roost types not covered in the above table please include details of:**

- Timing – state the years and months post development monitoring or other will be undertaken. Ensure that is consistent with the post development works detailed in section **E5b** of the **Work Schedule document WML-A13-a-E5a&b**.

[See Figure E4 – Monitoring Specification]

See below for full timing details within Monitoring Matrix.

The programme of monitoring will be informed by the Main Works programme – any changes to the Main Works will be used to inform the detailed programming of the post-tree clearance monitoring.

Currently clearance works are programmed for 2020-2021. There is then an approximately five to seven- year construction programme. Pre-operational testing will take 18 months to two years. Operation of the Scheme will then commence and this is now targeted for 2029 or 2030 depending on amendments to the construction programme over that period.

Given the long timescales involved for construction and subsequent operation of the Scheme, and given that the vast majority of the impacts will be incurred at the initial tree clearance phase due within the next 3 months at the start of the construction phase, it is proposed to undertake the first two rounds of monitoring prior to the operational phase of the Scheme. This will cover both basic monitoring of replacement roost features, and more complex non-standard monitoring proposed (bat trapping, see E4.3 below for details). The timing is set out in Table 1 below. Years 2 and 4 post-clearance have been proposed to align with the HS2 Ecological Monitoring Strategy (EcMS) : HS2-HS2-EV-STR-000-000029 (see Table 5b reproduced from the EcMS below which outlines the standard timings). The timing of the third round of monitoring will be scheduled to occur during operational testing, in order to capture and assess impacts from operation. Currently this is anticipated to occur in approximately 2028-2030.

The timing of bat trapping surveys is suggested for June, August and September in Year 2 (2022) following tree clearance.

A review of the monitoring strategy is proposed after the first two rounds of monitoring (year 5) to align with the recommendations in the EcMS. This is to incorporate any relevant changes, such as a better understanding in the use of the area by bats from the monitoring, changes to the Main Works programme, and advances in bat science and survey techniques. The techniques used and timing of subsequent rounds of monitoring may be varied as part of this review.

**E4.2b Table 1 – Timing of monitoring works (as understood in March 2020)**

<b>Tree felling = Year Zero</b>		<b>Ongoing construction / Pre-operation</b>									
		Post-tree felling – years 1 – 10 (+1, +2 etc) – to align with ECMS									
-1	0	1	2	3	4	5	6	7	8	9	10
2019	2020	2021	2022	2023	2024	2025	2026	2027	2028		2030
Survey works complete and mitigation planned	Felling of trees occurs – erection of bat boxes and first round of veteranisation		<b>First round of monitoring</b>	Reporting	<b>Second round of monitoring</b>	Reporting and review of monitoring strategy in consultation with NE			<b>Third round of monitoring</b> during operational testing. Timing may vary due		

	n of retained trees								to construction delays
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Timing of the post-development monitoring for replacement roost features will follow Table 5B of the ECMS (where relevant) reproduced below.

EcMS Table 5B. Monitoring frequency: bat roosts.

Objective	Years since replacement roost installation								
	1	2	3	4	5	6	8	10	11-15
Determine if roosts or replacement roost features are being used by bats	None		None		None			None	
Determine if conditions at replacement roosts are suitable for use by bats	None		None		None			None	
Key		All roosts or replacement roost features for which any kind of monitoring is identified by decision tree (including monitoring under Class Licences WMPL-CL39 and CL40)				Complex replacement roost structures and / or where required under licence			Selected roosts to be carried forward for long term monitoring. To be agreed with HS2 and reviewed following each monitoring year.

None = No monitoring under EcMS. The monitoring prescribed follows the route-wide bat licence that explicitly states monitoring should not occur in the first year.

N.B Complex roosts are defined as those roosts where more than one bat species is using the feature, or a single building / structure / tree that contains a variety of potential roosting features. Veteranised features are considered to be complex as this is an untested mitigation strategy.

- The type of monitoring which will be undertaken – include survey methods and equipment to be used. If it is expected any bats are to be taken or disturbed during this period please state anticipated numbers per species against each licensable activity.

#### **E4.2b Post Tree Clearance Monitoring**

##### **Aims**

The proposed licence monitoring at Ash Beds aims to establish whether the mitigation and compensation measures implemented, to address impacts on tree roosting bat species arising from tree clearance ahead of HS2 construction, are effective in maintaining the relevant bat species at favourable conservation status (FCS).

In summary, FCS relates to the long-term distribution and abundance of the populations of species in their natural range. At a local level this is best viewed as the contribution to wider FCS for the species concerned.

Currently the FCS of a species is measured and assessed with consideration given to the species' range, population size, and the condition and extent of relevant habitats, all of which inform likely future status of the populations concerned (see JNCC Joint Statement, 2018).

### Monitoring Objectives

The monitoring approach is determined by a range of factors to ensure it is proportionate to the predicted impacts on the conservation status of the species / assemblage concerned. The monitoring approach needs to provide the best method(s) of assessing (in a qualitative way) the effectiveness of the mitigation measures employed and whether the clearance works have been detrimental in the short, medium and longer term.

To assess whether the mitigation measures have been successful in maintaining FCS of the species concerned, the following questions will need to be answered:

1. For assessment of the impact on the *local occurrence/distribution* of the species concerned, has the **number / assemblage of bat species** occurring within the site changed or been reduced, despite the implementation of mitigation?
2. For assessment of the impact on the *local occurrence/distribution* of the species concerned, has the **breeding status** of the relevant bat species occurring on the site changed or been reduced?
3. For qualitative assessment of the impact on the *population and distribution* of the species concerned, has the **population type** (i.e. presence of maternity roosts) of key target species\*\* changed or been reduced, despite implementation of mitigation?
4. Has the area of **compensatory habitat** developed sufficiently to provide for the species concerned in the long term?
5. To what extent have the **roost mitigation features** been used by the species concerned?

Therefore the monitoring methods utilised must provide the data necessary to answer these questions.

\*\* The target species at Ash Beds will be soprano pipistrelle and noctule as these were the only roosting bats found in woodland at the site. If barbastelle bat is trapped this will also become a target species although this is much less likely to be trapped.

*Indicative trapping locations for future monitoring are shown on Figure E4 Monitoring. These largely align with the trapping locations used to establish the baseline for this licence application, although may have been moved to accommodate habitat loss from tree clearance for the Scheme. Trapping / monitoring locations are designed to generally monitor for impacts to FSC; should any impacts be identified the monitoring will be varied in future monitoring rounds to inform an investigation into the potential reasons for the impacts.*

### Ash Beds baseline and proportional monitoring

Eight species (in relatively low numbers) were confirmed using the woodland for foraging (this number excludes the whiskered /Brandt's bats tagged at South Cubbington which were not proven to use Ash Beds woodland). Roosts for common and soprano pipistrelle, noctule and Barbastelle were identified in 2019, three within woodland and three within trees outside the woodland but within the licence area. With South Cubbington Wood only 2km distant, and with demonstrable but limited interchange between the woodlands, there is also the potential for other bat species including Bechstein's bat to be using the woodland at Ash Beds.

The main bat interest at Ash Beds therefore lies in the assemblage and numbers of bats using the woodland for foraging. This is best assessed using trapping as many species are under-recorded using any other methods (due to ambiguities and variation in echolocation). This will provide data to allow an assessment of objective 1 above, that is comparable to the baseline data collected in 2019. As the licensable impacts will occur at the tree felling stage (loss of roosts and PRFs), the first round of monitoring is proposed in Year 2 (2022) following the felling works (in Year 0 or 2020) which should allow an assessment of the impacts of the tree felling to be made. Three rounds of monitoring are proposed in total. The second will be in Year 4, to continue to assess impacts from the tree clearance phase, and to provide an updated baseline for future monitoring. The third round will be during the pre-operational testing phase, to determine any impacts from collision and assess the likely success of designed avoidance and mitigation measures in ensuring FSC of the bat assemblage at the operational stage. If significant impacts are identified following any of the monitoring, further investigation and surveys may be recommended.

Inspections of bat boxes and other replacement roost features should allow a good assessment of the bat assemblage and numbers roosting at the site. This will provide data to allow an assessment of objectives 1,2,3 and 5 above.

Bat tracking (relevant to objectives 3 and 5 above) is not recommended for further survey as the low number of roosts identified (of low conservation status) during 2019 does not warrant this level of survey effort or disturbance to individual bats (through tagging the bats).

Objective 4 will be monitored indirectly in the long term through habitat surveys prescribed by the relevant ESMS (to be produced). The ESMS and EcMP will ensure that new habitat creation (wet woodland for Ash Beds) develops in accordance with its mitigation objectives. Retained woodland habitat will be inspected as part of a site walkover during the prescribed monitoring in Year 2. The ability of the woodland habitat to continue to support foraging and roosting bats will provide data for objective 4 and assist with the overall assessment of FCS.

Following the monitoring surveys in each year, a report will be provided assessing the data collected against the 2019 ALBST baseline. If significant issues are identified (e.g. impacts that potentially affect FCS, or inability of the survey method to provide sufficient information) then this review allows the monitoring strategy to be reassessed.

### Monitoring matrix

FCS value	Objective (with monitoring objective number)	Method	Timing	Location	Broad success indicators
Distribution	a. <b>Monitoring of mitigation feature uptake by bats (5)</b> and comparison of <b>species assemblage (1)</b> and <b>breeding status (2,3)</b> pre- and post- tree clearance works	2 x roost mitigation inspections confirming the presence of bat species and breeding status in June and September. Dropping collection for eDNA analysis to confirm species where possible	Year 2, 4 and 10 to align with pre-operational testing. Reporting and review following Years 4 and 10	Retained and new / planted mitigation woodland areas	Continued presence of the relevant bat species and associated breeding status post works.  Confirmation of use of mitigation roost features.
	b. Comparison of species <b>assemblage (1)</b> and <b>breeding status (2,3)</b> pre and post clearance works	Trapping surveys in June, August and September	Year 2, 4 and 10 to align with pre-operational testing. Reporting and review following completion of surveys	Retained and new/planted mitigation woodland areas	Continued presence of the relevant bat species and associated breeding status post works (comparing pre-clearance works trapping data e.g. assemblage, numbers present, species and breeding status).
Habitat	a. Comparison of new <b>habitat</b> creation in relation to habitat areas lost <b>(4)</b>	Assessment of woodland areas	As per EcMS and relevant ESMS (new habitat creation only)	-New woodland creation / planting areas Figure E3 -Site walkover during surveys in Year 2	Woodland creation in place and meeting creation targets  Retained habitat still fit for purpose for foraging bats (walkover)
Roost Mitigation Feature	a. Monitoring of bat boxes confirming the <b>presence of bat species (1,5)</b> and	2 x roost mitigation inspections in June and September. Dropping collection for eDNA analysis to confirm species where possible.	Year 2, 4 and 10 to align with pre-operational testing.	Retained and new / planted mitigation woodland areas	The baseline assemblage of bat species recorded using bat boxes and other mitigation features.

	<b>breeding status (2,3)</b>		Reporting and review following Years 4 and 10		
	b. (if relevant) Monitoring of other roost replacement features, e.g. monoliths salvaged from woodlands and 'veteranised' retained trees. Confirms the <b>presence of bat species (1,5) and breeding status (2,3)</b>	Ground-based, inspections (and tree climbing inspections where needed / safe); recommendations for replacement as necessary; supervision of replacement. If visual inspections cannot characterise roosts adequately, emergence / re-entry surveys will be undertaken to confirm use or otherwise inform requirement for re-siting / additional features.	Not currently applicable. If such features are installed in addition to prescribed mitigation, monitoring will occur in Years 2 and 4 post tree clearance as per the ECMS		

Target bat species are those which roosted consistently at the site from which a satisfactory baseline population assessment could be undertaken.

- Specify which compensation / mitigation measures will be subject to monitoring (as referenced on Figure E4).

1. Bat boxes erected to compensate for loss of confirmed roosts and loss of moderate and high potential roost features.
2. Retained woodland areas of Ash Beds.
3. Woodland creation and enhancement areas and areas of other new planting.
4. (if created) Monoliths and veteranised retained living trees, and any roost mitigation features created on these trees.

[See Figure E4 – Monitoring Specification]

Please note that it will be a requirement of the licence to undertake remedial action should monitoring identify that further management / maintenance is required of any compensation / mitigation provided, to ensure that mitigation / compensation measures are working effectively and are fit for purpose.

**Important advice:** Please always consider whether any *post development* monitoring effort should be staggered over alternate years in cases where use of the compensation measures may not occur in the same year of provision.

#### **E4.3 Mechanism for ensuring safeguard of mitigation / compensation and post-development management, maintenance and monitoring works:**

Please explain what mechanism is in place to ensure safeguard of mitigation / compensation provisions (e.g. Restrictive Covenant, clause to relinquish future development rights in S106 agreement, NERC Act agreement, explicit recognition of site in local planning documents, designation as County Wildlife Site or similar.) The need for this, and the type of mechanism, will vary with the scheme and impact. For substantial impact schemes (e.g. destruction of a significant maternity roost, or important hibernation site), some mechanism is always required. If you offer no specific mechanism, explain how you believe the population will be free of threats as far as can be reasonably determined (**the expectation of the granting of a licence should not be used for this purpose**).

HS2 publishes overarching technical documents which all its contractors are contractually required to adhere to (where relevant). These documents are kept up to date and are reissued periodically.

The Environmental Site Management Plan (ESMP) relevant to Ash Beds prescribes management and maintenance for the mitigation and compensatory habitats and features over 5 – 50 years depending on the habitat type.

The ESMPs all make reference to the HS2 Technical Standard - Ecological Monitoring Strategy (EcMS) (ref: HS2-HS2-EV-STR-000-000029 C01 dated October 2018) which specifies the monitoring to be undertaken for all compensatory and mitigation habitats.

The EcMS (and ESMP if required) will be amended and reissued by HS2 in line with any specific NE prescriptions related to this and other related licence applications where applicable.

Explain how all post-development works (management, maintenance (including remedial action) and monitoring, as appropriate) will be ensured? Include a commitment that the monitoring, habitat management and maintenance work will be undertaken. Mechanism / s for ensuring delivery must be in place before applying for a licence (also see Section F).

The ESMP and ECMS have been drawn up to ensure the long-term management of compensatory habitats. These cover a period of up to 50 years post-construction.

**E5 Timetable of works:** Please complete the **work schedule document WML-A13-a-E5a&b found on the 'bat' application form web page and append to your application pack.**

**Important Advice:** Please note that from end of March 2014 a separate work schedule is a mandatory requirement to support a new bat licence application when using this template.

## F Declarations

If the mitigation / compensation area / s is / are not owned by the applicant, you must have consent from the relevant land owner(s). You must have also secured details of how any measures to maintain the population in the long term will be achieved (e.g. a legal agreement).

**F1 Declaration Statement(s) – You must include the following declarations within your Method Statement and include the appropriate answer (Yes / No / Not applicable):**

**F1.1 Re: section E1** - I confirm that relevant landowner consent / s has / have been granted to accept bats into roosts or access into roosts on land outside the applicant's ownership:

Yes

**F2.2 Re: section E2** - I confirm that landownership consent / s has / have been granted to allow the creation of the proposed compensation on land outside the applicant's ownership

Yes

**F2.3 Re: section E3** - I confirm that consent / s has / have been granted by the relevant landowner / s for monitoring, management and maintenance purposes on land outside the applicant's ownership

Yes

Comments if applicable:

N/A

**Important Advice:**

Unsecured consents statement:

If you have been unable to secure consents for any of the three declarations please explain why and detail any plans you have in place to obtain the consent(s) or provide details of any right(s) or agreement(s) that will enable the lawful implementation of the proposed mitigation, compensation and monitoring. Failure to provide the appropriate landowner consents means that the Method Statement is unlikely to meet the requirements for the FCS test to be met. It is therefore in your interest to ensure that the appropriate consents have been secured *before* applying for a licence.

**G References:** List any references cited, and include credits for source information.

**H Annexes (supporting documents please append to your application pack)**

**H1** Pre-existing survey reports;

**H2** Raw survey data.

**I Check list of figures to be submitted with each Bat Method Statement**

**With your Method Statement and supporting documents please submit the following maps / figures – see table below.** Note that some can be included within the Method Statement itself (if preferred) and others must be submitted individually (i.e. separate documents). Maps / Figures must include the title, site name as referenced on your application form, date and figure reference. If a grid reference is more applicable (e.g. a bat house is being provided please include this). Include a scale bar (appropriate to the situation e.g. 100m on site maps, 1km on location maps) and direction of North etc.

Additional maps, photographs or diagrams should be included where necessary to adequately explain the scheme.

Figure reference	Mandatory as will be included in the annexed licence, if applicable	Mandatory for assessment purpose only, but will not be included in the annexed licence	What it must show (also see details above on site reference, dating and naming).
<b>Figure B2.1</b>	-	Yes, if the application is part of a phased or multi-plot development	<b>Master plan overview</b> - note – this is not the same as a master plan document, for which you should follow the guidance as stated in section B2.1.
<b>Figure B2.2</b>	-	Yes, if applicable	<b>Locations of other nearby bat licensed sites, or sites which will be impacted on by future development.</b>
<b>Figure C5a</b>	-	Yes	<b>Location map</b> at an appropriate scale for the application (often 1:50,000 or 1:25,000)
<b>Figure C5b</b>	-	Yes	<b>Survey area</b> showing all buildings, structures and habitats that are within the survey area and distinguishing those that were surveyed and those that were not. Indicate where surveyors were located. Aerial photographs should be provided where possible (ensure you have permission to use copy righted maps). If automated detectors were used or transect routes, ensure that these are indicated as appropriate.
<b>Figure C6</b>	-	Yes	<b>Survey results</b> - provide clear, annotated and cross-referenced maps / plans / photographs to show the survey results (access points, location of roosts, flight lines, results of activity surveys where

			DNA samples were taken etc).Ensure Figure is at a suitable scale to show the results.
<b>Figure D</b>	<b>Yes</b>	-	<b>Impacts plan</b> – map / figure which must show all structures or habitats (clearly referenced) that will be disturbed, damaged or destroyed, detailing where the roosts and access points are.
<b>Figure E2</b>	<b>Yes</b> – but only if applicable to the application	-	<b>Non-standard capture and exclusion apparatus.</b> If these are proposed please include diagrams / photographs.
<b>Figure E3</b>	<b>Yes</b>	-	<b>Specifications for mitigation / compensation</b> (including all dimensions for bat lofts / houses / stand-alone structures and materials to be used etc and 8-figure grid reference). Mitigation / compensation (must show all habitat creation, restoration, boxes). It may be necessary to submit more than 1 figure if the proposal is large or complicated.
<b>Figure E4</b>	<b>Yes</b> – when monitoring and maintenance will be included in the licence	-	<b>Monitoring, management and maintenance map.</b> Please indicate the specific structures and habitat that are to be managed, maintained and monitored as part of this licence proposal. Ensure that they are correctly referenced and are consistent with other parts of the Method Statement and figures.

**Definitions of roost types to be included in the application (further detail can also be found in the Bat Mitigation Guidelines and the BCT’s “Bat Surveys Good Practice Guidelines”):**

- a. **Day roost:** a place where individual bats, or small groups of males, rest or shelter in the day but are rarely found by night in the summer.
- b. **Night roost:** a place where bats rest or shelter in the night but are rarely found in the day. May be used by a single individual on occasion or it could be used regularly by the whole colony.
- c. **Feeding roost:** a place where individual bats or a few individuals rest or feed during the night but are rarely present by day.
- d. **Transitional / occasional roost:** used by a few individuals or occasionally small groups for generally short periods of time on waking from hibernation or in the period prior to hibernation.
- e. **Swarming site:** where large numbers of males and females gather during late summer to autumn. Appear to be important mating sites
- f. **Mating sites:** sites where mating takes place from later summer and can continue through winter.
- g. **Maternity roost:** where female bats give birth and raise their young to independence.
- h. **Hibernation roost:** where bats may be found individually or together during winter. They have a constant cool temperature and high humidity. Sites where hibernating bats have been confirmed by appropriate survey effort should be classed as ‘**hibernation confirmed**’.
- i. **Satellite roost:** an alternative roost found in close proximity to the main nursery colony used by a few individual breeding females to small groups of breeding females throughout the breeding season.
- j. **Other** – please explain what the roost type is if not one of the above (we recognise that roost types are interchangeable and not always easy to classify according to the nuances of certain species).
- k. An ‘**alternative roost**’ shall include: a purposely installed bat box; an existing roost which will not be impacted by the works; or other new / enhanced roosting opportunities. Any alternative



roost must be suitable for the species, within or close to the existing roost and free from additional disturbance or development pressure.