



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.

Wildlife Licensing
 Natural England
 Horizon House
 Deanery Road
 Bristol
 BS1 5AH.
 T. 020802 61089

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 at South Cubbington Wood Local Wildlife Site (LWS) and the 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 southern end of South Cubbington Wood LWS (Ordnance Survey (OS) central grid reference SP3518468641). The licence area is 158.7 ha in total, comprising of woodland extending through open countryside to the north-west and encompassing South Cubbington Wood at the north-west end. See Figure B2.1- Master Plan Overview and Figure C5a – Location Map.

Summary statistics are presented in Table A1 below.

Habitat	Area (ha)			Percentage affected (%)
	Total	Direct Impact Zone	Indirect Impact Zone	
Licence area	158.70	46.40	29.90	48
South Cubbington woodland only	32.79	3.57	4.76	25

The 'direct impact zone' is defined as the extent of the LLAU for the construction of the Scheme, where land within the LLAU is to be cleared for construction (some areas of the LLAU will not currently be used or are to be used for habitat creation). The 'indirect impact zone' is the land within which disturbance to bat roosts within trees may occur as a result of the construction of the Scheme. This zone comprises a 20m buffer around areas of the LLAU where disturbing construction works will occur..

Advanced licence bat surveys were undertaken in 2018 and 2019, along with visual inspections of trees within the LLAU at the woodland. 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.

Data from a small number of traditional emergence / re-entry surveys have been taken into account for any additional roosts found during surveys in 2019 between South Cubbington. Visual inspection survey data from

2016 and 2017 have also been utilised to gain information on the potential of trees in the intervening area to support bats, as these were not resurveyed in 2018 or 2019.

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 the individual woodland of South Cubbington to be assessed for their importance as a roosting resource for bats, as well as an assessment of the licence area overall.

The surveys have confirmed the presence of at least twelve species of bat using South Cubbington for foraging and/or roosting. Four species, soprano pipistrelle (day roosts), barbastelle (day roost), Bechstein's (day roost) and brown long-eared bat (maternity and day roosts) have been confirmed as roosting within South Cubbington or the adjacent LLAU.

Prior to mitigation, the predicted impacts of the Scheme on the bat assemblage at South Cubbington Wood comprise:

- **Direct loss** of 3.57 ha of ancient woodland with permanent loss of trees (through felling) identified as having Potential Roosting Features (PRFs): 150 of low, 74 of moderate and 30 of high potential
- **Direct impacts** to four known tree roosts, including one day roost for barbastelle along with a further two maternity roosts and one day roost used by brown long-eared bat;
- **Indirect impacts** comprising alterations of conditions to one day roost for Bechstein's bat, one day roost for soprano pipistrelle bats and one day and three maternity roosts for brown long-eared bat;
- **Indirect impacts** comprising alterations of conditions to trees identified as having PRFs: 90 of low, 61 of moderate and 25 of high 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 assemblage of bats within the licence area. For South Cubbington the impacts may be significant at the Local level for the non-rare (non-Annex 2) bat species concerned, and at up to the County level for the rare (Annex 2) species. No significant cumulative impacts have been identified with other works for the Scheme including at Ash Beds (adjacent).

The inherent design of the HS2 scheme has been refined to avoid effects on bats resulting from habitat fragmentation and other indirect impacts. For South Cubbington, this has included placement of the route within deep cutting where the route crosses South Cubbington Wood to screen noise, visual and wind pressure impacts. Construction access will be restricted to the western side of the Scheme, with the haul route running outside the wood, to reduce loss of woodland habitat.

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 138 replacement roost features (see Section E3.4) A temporo-spatial mitigation strategy taking a landscape approach 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 45 bat boxes to act as immediate roost replacements and as rescue boxes during tree felling; 2) planting of 15.19ha of replacement woodland habitat with early senescent fruit trees and additional connective habitat both within and outside the licence area; 3) replacement of the 45 bat boxes after 20 years; 4) development of at least 14 veteran features on fruit trees from 30 years post-planting; and 5) creation of 84 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 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 and radio tracking 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).

At South Cubbington, due to the large areas over which bats forage, the loss of, or displacement of bats from, suitable foraging habitat will amount to only a small proportion of the wider available foraging resource given the adjacent extensive woodlands in the vicinity. Consequently, it is not considered that the loss of foraging habitat associated with tree and vegetation clearance at South Cubbington will result in any significant adverse effect on the local bat assemblage.

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..

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 (GI) works and associated construction works are necessary throughout the extent of 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 route of the railway and the surrounding LLAU runs through habitats which will be affected by the construction and / or operation of the Scheme. South Cubbington Wood LWS will require partial clearance of areas of Ancient Semi-natural Woodland (ASNW) to facilitate the Scheme. Figure Da Impacts Plan shows the areas that will be cleared within the licence area.

These clearance works will result in the loss of known and assumed bat roosts of both high and low conservation value, as well as the loss of trees with 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.

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 through severance of commuting routes and / or direct mortality through collision of bats with trains.

Species known to be present in the licence area (the species at risk of disturbance and mortality) are common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*P. pygmaeus*), Nathusius's pipistrelle (*P. nathusii*), brown long-eared bat (*Plecotus auritus*), noctule (*Nyctalus noctula*), Leisler's bat (*N. leisleri*), Daubenton's bat (*Myotis daubentonii*), Natterer's bat (*M. nattereri*), whiskered bat (*M. mystacinus*), Brandt's bat (*M. brandtii*), Barbastelle bat (*Barbastella barbastellus*) and Bechstein's bat (*M. bechsteini*).

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 licence 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 day roosts within 5km of the South Cubbington licence area. These bats may use the woodlands onsite for foraging and roosting and as such may form part of the bat population using the licence area. However, 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 (Km)	Status
BLICL04	NA	NA	NA	NA	NA	Adjacent (SE)	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	2.9 km SE	Registered by Natural England
BLICL031	NA	NA	NA	NA	NA	Adjacent (NW)	Retired
BLICL21	NA	NA	NA	NA	NA	300 m (NW)	Retired
BLICL18	<i>M. nattereri</i>	TBC	TBC	Destruction of 2 day roosts	TBC	4.85 km (SE)	Amendment with NE awaiting approval

Ash Beds (located beyond South Cubbington approximately 1.7 km to the south-east) and Stoneleigh Park, (located 2.1 km to the north-west) 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.

South Cubbington forms the southern part of a larger woodland complex, with settlements to the west, south and east (North Cubbington Wood as well as the Weston and Waverley Woods). Stoneleigh lies further north beyond South Cubbington Wood, and has significant areas of woodland, trees and hedgerows in its surrounds along with retained park buildings and historic settlements (affording various roosting opportunities). 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. 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 12 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.

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 / 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

It is considered that given the good connectivity and relatively small distances between the South Cubbington and Ash Bed in particular that most bat species will be able to traverse without issue on a nightly basis, 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 of the twelve species, 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. Although, given the limitations of the study (focussed on finding roosts), the types of use of the Cubbington woodland complex by these bats was not determined. Bats travel for a variety of reasons and they 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 Sustainance Zones: Determining zone size. Available online: https://cdn.bats.org.uk/pdf/Resources/Core_Sustainance_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 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 South Cubbington licence area) 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.

The ecological baseline assessed within the 2013 ES and the predicted impacts were reviewed for this licence application. There has been no change in the significance of the adverse effect from the Scheme on South Cubbington woodland resulting from construction activities and the loss of woodland habitats. This significance remains at county / metropolitan level. However as a result of changes in construction methods (to 'open cut') since the ES and the requirement to now remove 3.57 ha of ancient woodland rather than 2.0 ha as reported in the ES and 2017 Ancient Woodland Strategy (High Speed Two Phase One: London-West Midlands Ancient Woodland Strategy dated August 2017), there is an associated change in the magnitude of the effect (not affecting the significance). The prescribed mitigation and compensation also remains largely unchanged, although now incorporating a woodland edge management area to minimise the area of woodland required to be felled at the fringe of the construction area.

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 South Cubbington 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 be identified during this process.

At this stage any outstanding Environmental Site Management Plans (ESMP) will be produced. Those ESMPs 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.

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 publically 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 04/04/2020) found 12 licences issued during the last ten years to damage a breeding site or destroy a resting site within 5km of the South Cubbington licence area. No licences were found that related directly to the licensable area. The closest is 2.3 km and the most recent licence is from 2016. 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 licences with end dates beyond 2020 are located more than 3 km from the licence area (3.1 and 4.4 km respectively). 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)
Brown long-eared	07/10/2009	01/01/2011	Wappenbury CP	Impact and destruction of breeding and resting sites	EPSM2009-1190	2.3
Common pip Brown Long Eared	28/08/2014	30/10/2019	Wappenbury	Damage to resting places	2014-2492-EPS-MIT	2.5
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	3.1
C. Pipistrelle, Brown long-eared	04/04/2013	30/09/2017	Princethorpe	Impacts and destruction to breeding sites and resting places	EPSM2012-4129	3.2

Common Pipistrelle	06/07/2011	01/12/2012	Warwickshire CP	Destruction of a resting place	EPSM2010-2608	3.5
Common Pipistrelle Brown long-eared	01/08/2011	01/07/2012	Warwickshire CP	Destruction of a resting place	EPSM2011-3252	3.5
Brown Long-eared	27/10/2015	01/11/2020	Stretton-on-Dunsmore	Impacts and destruction to breeding sites	2015-7598-EPS-MIT-1	4.4
C. Pipistrelle	19/12/2012	31/08/2014	Princethorpe	Destruction of resting place no impact on breeding site	EPSM2012-5239	4.4
Common Pipistrelle	25/01/2010	30/09/2011	West Midlands CP	Destruction of a resting place	EPSM2009-1597	4.6
Common Pip	11/09/2014	02/09/2019	Royal Leamington Spa CP	Destruction of a resting place	2014-2713-EPS-MIT-1	4.7
Common pipistrelle brown long-eared, whiskered	30/03/2017	31/12/2017	Long Itchington CP	Destruction of a resting place	2017-28431-EPS-MIT	4.9
Common pipistrelle, Soprano pipistrelle, Daubenton's	25/10/2012	31/07/2015	Royal Leamington Spa CP	Destruction of a resting place	EPSM2012-5054	5.0

A search of planning records (search updated 20/05/2020) found no relevant planning applications within a 5 km radius of the South Cubbington licence area where bats would be affected (a previously reported relevant application has been withdrawn on 18/05/2020).

Cumulatively and in conjunction with the impacts from the development of the HS2 scheme, it is considered that these existing licensed developments 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 (to 2012):

The following Baseline / Historical Data was provided from the 2013 HS2 Environmental Statement (ES) and was used to support subsequent further survey work:

Records Search

In 2012, a desk study was undertaken to inform the HS2 ES. Information from Warwickshire Biological Records Centre (WBRC) identified the presence of a minimum of nine species of bat within 10km of the route of the

Scheme within the Offchurch and Cubbington area, giving an indication of the likely species assemblage within the licence area. WBRC provided 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 ([REDACTED], 4th 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 moderate potential to support roosting bats. No confirmed roosts were identified. Within the northern section of South Cubbington Wood LWS, two trees were identified to support features with high potential to support roosting bats and a further 11 were confirmed with moderate potential. However, no access was available to assess the roosting potential of trees within the southern section of South Cubbington Wood LWS.

[See Figure EC-05-046 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 bat activity 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. Static detector monitoring took place for five consecutive nights commencing on 28th June 2012 at the land associated with South Cubbington Wood, adjacent to the south side of the B4453 Rugby Road.

Nine transect surveys (29/4/2013 to 7/6/2013) were undertaken at land associated with Field Farm including, 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 recording common pipistrelle, soprano pipistrelle, Leisler's bat, noctule and a *Myotis* species.

Likely Species Assemblage

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

A male Bechstein's bat was discovered roosting in a tree outside woodland in the South Cubbington licence area. 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.

A small population of Barbastelle bat is known to be present at Long Itchington; a barbastelle roost was found approximately 1.5km south in the Ash beds licence area, and an individual barbastelle bat was trapped at South Cubbington in 2019.

Overall this gives an indicative baseline species list for the wider area of the following 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 (*Myotis daubentonii*),
6. Natterer's bat (*M. nattereri*),
7. Whiskered bat (*M. mystacinus*)
8. Brandt's bat (*M. brandtii*),
9. noctule (*Nyctalus noctula*),
10. Leisler's bat *N. leisleri*).
11. Barbastelle bat (*Barbastella barbastellus*);
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 http://heritage.warwickshire.gov.uk/files/2012/05/Bats.pdf/ with reference to the National Bat Monitoring Report 2018 (BCT, 2018) as well as detailed assessment within HS2 2012 ES Volume 5 (ref: http://webarchive.nationalarchives.gov.uk/20140806173545/http://assets.dft.gov.uk/hs2-environmental-statement/volume-5/ecology/EC-003-003.pdf).		
	Local	County	Regional

<i>Barbastella barbastellus</i>	Local; rare	Local; rare	Local; rare
<i>Myotis bechsteinii</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
Determine presence / absence of bats	Yes	The aim of providing a species assemblage for the site
Determine bat usage of site (e.g. maternity, hibernation, night roosts in various structures (specify)).	Yes	Assessment of role of the licence area as a bat roosting resource and determine status of any tree roosts found affected by HS2
Identify foraging, commuting or swarming sites (explain)	NA	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.
Other (explain)	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).

Key statistics relevant to the South Cubbington licence area are presented in the table below:

Habitat	Area (ha)	

	Total	Direct Impact Zone	Indirect Impact Zone	Percentage affected (%)
Licence area	158.70	46.40	29.90	48
South Cubbington woodland only	32.79	3.57	4.76	25

Please refer to the figures appended to this report for further context with regard to the licence area.

South Cubbington Wood was identified on the ancient woodland inventory in 2012 as PAWS (ancient replanted woodland) and is a Local Wildlife Site (LWS) in Warwickshire. South Cubbington Wood is recognised as lowland deciduous woodland on the Natural England inventory of Habitats of Principal Importance in England identified in Section 41 of the Natural Environment and Rural Communities (NERC) Act (2006). South Cubbington Wood is of county value.

The Warwick District Local Plan Additional Site Options Ecological Assessment (2015) provides the following habitat description for South Cubbington Wood LWS:

“This ancient semi-natural woodland lies less than 500 m from the southern development parcel, 1 km to the East of Cubbington. North Cubbington wood is adjacent to the North across the B4453. These woods are an outlying part of the Princethorpe Woods Complex, the largest concentration of semi natural woodland in Warwickshire. South Cubbington wood is an excellent example of traditional Warwickshire woodland. It is surrounded by an intact boundary ditch and ridge and contains old coppice stools of Ash (*Fraxinus excelsior*) and Wild Service Tree (*Sorbus torminalis*). In the North East of the wood there is a high density of vigorous Hazel (*Corylus avellana*) stools, coppicing appears to have been practiced here relatively recently.

English Oak (*Quercus robur*) is the dominant standard tree in the North with some Ash and Birch (*Betula*) invading since the cessation of coppicing. The canopy is dense as is the shrub layer of Hazel stools. The ground layer is shaded to exclusion in the densest parts, elsewhere Bluebell (*Hyacinthoides non-scripta*) is the vernal dominant. The vegetation here is W10 *Quercus robur*-*Pteridium aquilinum*-*Rubus fruticosus* woodland (English Oak-Bracken-Bramble woodland). Moving South and West through the wood Oak decreases as a standard and Ash and Field Maple (*Acer campestre*) increase. In the Southern half of the wood the dominance of Bluebells decreases and is replaced by Wood anemone (*Anemone nemorosa*) as the vernal dominant. Here the vegetation is W8b *Fraxinus excelsior*-*Acer campestre*-*Mercurialis perennis* woodland, *Anemone nemorosa* subcommunity (Ash-Field Maple-Dogs Mercury woodland, Wood Anemone sub community), this vegetation occurs on heavy clay soils of impeded drainage. Notably some veteran Midland Hawthorn (*Crataegus laevigata*) trees contribute to the canopy and Wild Service Tree and Small Leaved Lime (*Tilia cordata*) are present. In this area of the wood there are several small shaded pools. Fallen dead stems of Ash and Birch are scattered throughout. Regeneration of Ash saplings is taking place sporadically, over most of the wood. Invasive non-native trees and shrubs are not a major problem, though Cherry Plum (*Prunus cerasifera*), Snowberry (*Symphoricarpos rivularis*) and Sycamore (*Acer pseudoplatanus*) are present. The wood is threatened by underplanting of cypress trees. There is a good diversity of woodland indicator species including Moschatel (*Adoxa moschatellina*), Wood anemone, Wood Sedge (*Carex sylvatica*), Enchanters Nightshade (*Circaea lutetiana*), Ground Ivy (*Glechoma hederacea*), Bluebell, Wood Sorrel (*Oxalis acetosella*), Wild Service Tree, Yellow Archangel (*Lamium galeobdolon*) Small Leaved Lime and the Butterfly, White Admiral (*Ladoga camilla*).”

The northern portion of South Cubbington Wood (from chainage 135+225 northwards) was subject to NVC survey in 2012 (Main ES Volume 5 Appendix EC-001-003). Following land access NVC surveys were carried out on the central and southern portions of the woodland in 2015 (SES and AP2 ES Volume 5 Appendix EC-001-002). The results of the NVC survey describe South Cubbington Wood as an area of broadleaved native woodland with ash and pedunculate oak as canopy constants. Sessile oak and the non-native Monterey cypress (*Cupressus macrocarpa*) are also canopy constants in the central and southern portions of the woodland respectively. Occasional canopy species include: silver birch, sycamore, aspen, rowan and hornbeam in the northern portion of the woodland; silver birch and field maple in the central portion; and aspen and wild service tree (*Sorbus torminalis*) in the southern portion. In the northern portion of South Cubbington Wood, hazel coppice is abundant throughout, but hazel growth has been affected by the shaded conditions caused by the closed canopy such that the coppice stools are not densely spaced, and it is easy to walk between them. Other shrubs include common hawthorn, field maple, holly (*Ilex aquifolium*), wild apple (*Malus species*) and blackthorn. The ground flora is dominated by bluebell throughout, which had receded at the time of the survey. Wood millet is frequent throughout and wood anemone occasional. Yellow archangelis occasional in the northern portion. Bramble, cleavers, ivy and male fern are also occasionally present. Variegated yellow archangel was recorded within the ground flora in South Cubbington Wood during a Phase 1 survey in May 2012 although this was not noted during the NVC surveys as it is an early growing species. This is a non-native species in Britain listed on Schedule 9 of the Wildlife & Countryside Act 1981 (as amended) and grows in areas of dense shade and in dry conditions. In the central and southern portions of South Cubbington Wood, the shrub layer is well developed

with hawthorn and hazel as community constants with occasional field rose, bramble (central portion) and wych elm (southern portion). The ground flora is moderately diverse in the central portion, especially along the open rides and paths, which consists of the ancient woodland indicator species including bluebell, wood millet grass, wood anemone and primrose. The ground flora is very diverse in the southern portion, which consists of many ancient woodland indicator species including bluebell, wood millet grass and greater stitchwort. From observations made during the NVC surveys, the woodland community at South Cubbington Wood as a whole most closely resembles W8d *Fraxinus excelsior-Acer campestre Mercurialis perennis* woodland, *Hedera helix* sub-community (MATCH38 coefficients of similarity of ~50%). The W8d woodland community is typical of calcareous soils in the lowlands with a dense canopy of ash with pedunculate oak. It is more common on heavy base-rich soils in the south-east of Britain and less common in central Britain. Ivy is dominant in the ground flora due to shading from the canopy and more diverse ground flora is common in open areas along pathways and clearings.

- 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.

A total of 13 buildings lie within the licensable area (including three within the LLAU+20 m) but as they 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. No roosts were identified in these buildings as part of this assessment.

- 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 (CFA17) section of HS2 is dominated by large, arable fields with associated hedgerows and trees. The bat interest within the area is increased by a number of features with potential to support roosting, commuting and foraging bats, including watercourses which can provide commuting routes that enable the bats to navigate 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.**

Due to the predicted impacts on woodland habitats as a result of the Scheme, 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.

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 staged approach has been adopted:

Stage 1 comprises a series of bat trapping, tracking and subsequent roost characterisation assessment surveys undertaken in spring and summer in 2019. 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.

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 surveyed and those that were not; indicate where surveyors were located):

Visual inspection

Location and survey dates	Area surveyed	Surveyors and equipment	Further information
South Cubbington: Surveys undertaken on dates between 15 th October 2018 to 11 th August 2019	Assessment undertaken on 6.93 ha (0.81 ha not accessible due to refused land access)	(Ground level assessments) 2x Surveyors with Binoculars (Tree climbing surveys) 2x surveyors with endoscopes and tree climbing equipment	See map C6a See also excel spreadsheet of full survey results within appendix

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] t 2018-34342-CLS-CLS, [redacted] 2015-15080-CLS-CLS, [redacted] 2016-19409CLS-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, N [redacted] [redacted] 2016-16645-CLS-CLS
Surveyor names from 2016 and 2018 data 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)
NA				
Comments (to include # of surveyors used for each visit):				

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

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				
Comments (to include # of surveyors used for each visit):				

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** summarises the survey effort of the subsequent day tracking and roost characterisation surveys – fuller details of the survey effort are provided within Appendix D and 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**.

C5b 'Other' – Table A Bat trapping surveys (dates and results)

Date of each survey visit	Start and end times	Location	Bat Details	Weather
18/09/2018 Trapping Survey	19:10 - 01:16	South Cubbington Wood	000204 P. auritus immature nulliparous female; 000217 M. nattereri adult male; 2x M. nattereri adult male; 1x P. auritus adult n/a female; 1x P. auritus n/a n/a.	Wind 3 – 3 Air temp 19 – 15 Rain 0 – 0 Cloud 0 – 2
3x Surveyors; Harp Traps x3 Acoustic Lures x3. 6x bats caught comprising 2x species (M. nattereri, P. auritus)				
23/09/2018 Trapping Survey	19:00 - 00:52	South Cubbington Wood	000230 M. mystacinus / brandtii immature male; 000468 P. auritus adult male; 1x M. daubentonii immature male; 1x P. nathusii immature male.	Wind 3 – 3 Air temp 8 – 8 Rain 0 – 0 Cloud 0 – 3
3x Surveyors; Harp Traps x3 Acoustic Lures x3. 4x bats caught comprising 4x species (M. daubentonii, P. auritus, P. nathusii, M. mystacinus / brandtii)				
27/05/2019 Trapping Survey	20:50 - 00:50	South Cubbington Wood	1x M. mystacinus adult pregnant female; 1x M. mystacinus juvenile male.	Wind 1 – 0 Air temp 15 – 8 Rain 3 – 0 Cloud 4 – 2
4x Surveyors; Harp Traps x2 Mist Nets x1 Acoustic Lures x1. 2x bats caught comprising 1x species (M. mystacinus)				
27/05/2019 Trapping Survey	19:30 - 02:12	South Cubbington Wood	237063 B. barbastellus adult male; 1x P. pipistrellus adult parous female.	Wind 3 – 1 Air temp 13 – 8.2 Rain 3 – 0 Cloud 6 – 1
3x Surveyors; Harp Traps x3 Acoustic Lures x3. 2x bats caught comprising 2x species (B. barbastellus, P. pipistrellus)				
06/06/2019 Trapping Survey	21:22 - 00:30	South Cubbington Wood	238338 P. pygmaeus juvenile male; 1x P. auritus adult pregnant female; 1x P. auritus adult male; 1x P. pipistrellus adult pregnant female; 2x P. pipistrellus adult male.	Wind 1 – 1 Air temp 15 – 10 Rain 0 – 0 Cloud 1 – 2
4x Surveyors; Harp Traps x2 Mist Nets x1 Acoustic Lures x2. 6x bats caught comprising 3x species (P. auritus, P. pipistrellus, P. pygmaeus)				
13/06/2019 Trapping Survey	20:34 - 01:36	South Cubbington Wood	No bats caught.	Wind 0 – 0 Air temp 14 – 9.5 Rain 0 – 1 Cloud 7 – 8
4x Surveyors; Harp Traps x2 Mist Nets x1 Acoustic Lures x2				
30/06/2019 Trapping Survey	21:24 - 02:02	South Cubbington Wood	239422 M. brandtii adult male; 239432 P. auritus adult nulliparous female; 1x M. mystacinus adult male; 1x P. pygmaeus adult male.	Wind 1 – 3 Air temp 18 – 15 Rain 0 – 0 Cloud 0 – 0
3x Surveyors; Harp Traps x3 Acoustic Lures x3. 4x bats caught comprising 4x species (M. brandtii, M. mystacinus, P. auritus, P. pygmaeus)				

Date of each survey visit	Start and end times	Location	Bat Details	Weather
07/07/2019 Trapping Survey	21:15 - 02:20	South Cubbington Wood	239423 <i>M. mystacinus</i> / <i>brandtii</i> adult lactating female; 239424 <i>M. brandtii</i> adult male; 1x <i>M. daubentonii</i> adult lactating female; 1x <i>M. mystacinus</i> adult male; 1x <i>M. mystacinus</i> / <i>brandtii</i> juvenile nulliparous female; 1x <i>P. pygmaeus</i> adult male.	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>)				
08/07/2019 Trapping Survey	21:10 - 01:37	South Cubbington Wood	1x <i>M. mystacinus</i> / <i>brandtii</i> juvenile nulliparous female; 1x <i>P. pygmaeus</i> adult male.	Wind 1 – 0 Air temp 20 – 18 Rain 0 – 0 Cloud 6 – 6
2x Surveyors; Harp Traps x3 Acoustic Lures x3. 2x bats caught comprising 2x species (<i>P. pygmaeus</i> , <i>M. mystacinus</i> / <i>brandtii</i>)				
09/07/2019 Trapping Survey	21:15 - 02:20	South Cubbington Wood	239434 <i>P. auritus</i> adult lactating female; 239436 <i>M. bechsteinii</i> adult male; 239438 <i>N. noctula</i> adult lactating female; 2x <i>M. mystacinus</i> / <i>brandtii</i> adult lactating female; 3x <i>N. noctula</i> adult male; 1x <i>P. auritus</i> adult lactating female; 1x <i>P. pipistrellus</i> ad	Wind 0 – 0 Air temp 18 – 18 Rain 0 – 0 Cloud 6 – 6
4x Surveyors; Harp Traps x3 Acoustic Lures x3. 12x bats caught comprising 6-7x species (<i>M. bechsteinii</i> , <i>N. noctula</i> , <i>P. auritus</i> , <i>P. pipistrellus</i> , <i>P. pygmaeus</i> , <i>M. mystacinus</i> / <i>brandtii</i>)				
05/08/2019 Trapping Survey	20:05 - 02:50	South Cubbington Wood	238360 <i>P. auritus</i> juvenile male; 238366 <i>M. mystacinus</i> / <i>brandtii</i> adult parous female; 239872 <i>M. daubentonii</i> adult male; 239874 <i>M. daubentonii</i> adult parous female; 3x <i>M. daubentonii</i> adult parous female; 2x <i>M. mystacinus</i> adult male; 1x <i>M. mystacinus</i> / <i>brand</i>	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>)				

C5b 'Other' – Table B Daytime tracking and roost characterisation surveys – survey effort				
Date of each survey visit	Start and end times	Location	Bat Details	Weather
19/09/2018 Daytime Tracking Survey	13:00 – 15:30	South Cubbington Wood	000204 <i>P. auritus</i> .	N/A
3x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
19/09/2018 Emergence / Tracking Survey	19:00 – 20:35	South Cubbington Wood	000230 <i>M. mystacinus</i> / <i>brandtii</i> ; 000204 <i>P. auritus</i> .	Wind 4 – 4 Air temp 17 – 17 Rain 0 – 0 Cloud 4 – 4
2x Surveyors using Radio telemetry equipment (Biotrack Sika + 3 element Yagi), infra-red camera and bat detectors.				
19/09/2018 Emergence / Tracking Survey	19:10 – 23:00	South Cubbington Wood	000204 <i>P. auritus</i> .	Wind 4 – 1 Air temp 17 – 13 Rain 0 – 0 Cloud 4 – 3
2x Surveyors using Radio telemetry equipment (Biotrack Sika + 3 element Yagi), infra-red camera and bat detectors.				

Date of each survey visit	Start and end times	Location	Bat Details	Weather
20/09/2018 Daytime Tracking Survey	10:27 – 15:00	South Cubbington Wood		N/A
3x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
24/09/2018 Daytime Tracking Survey	13:00 – 17:00	South Cubbington Wood	000217 M. nattereri; 000468 P. auritus.	N/A
3x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
24/09/2018 Emergence / Tracking Survey	18:30 – 21:30	South Cubbington Wood	000468 P. auritus.	Wind 1 – 1 Air temp 14 – 14 Rain 0 – 0 Cloud 2 – 2
3x Surveyors using Radio telemetry equipment (Biotrack Sika + 3 element Yagi), infra-red camera and bat detectors.				
24/09/2018 Emergence / Tracking Survey	18:50 – 22:30	South Cubbington Wood	000217 M. nattereri.	Wind 1 – 1 Air temp 14 – 13 Rain 0 – 0 Cloud 3 – 3
3x Surveyors using Radio telemetry equipment (Biotrack Sika + 3 element Yagi), infra-red camera and bat detectors.				
25/09/2018 Daytime Tracking Survey	10:00 – 14:41	South Cubbington Wood	000230 M. mystacinus / brandtii; 000468 P. auritus.	N/A
3x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
25/09/2018 Emergence / Tracking Survey	18:45 – 20:30	South Cubbington Wood	000468 P. auritus.	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.				
25/09/2018 Emergence / Tracking Survey	18:45 – 21:45	South Cubbington Wood	000217 M. nattereri; 000468 P. auritus.	Wind 1 – 1 Air temp 15 – 16 Rain 0 – 0 Cloud 2 – 0
3x Surveyors using Radio telemetry equipment (Biotrack Sika + 3 element Yagi), infra-red camera and bat detectors.				
26/09/2018 Daytime Tracking Survey	12:00 – 14:50	South Cubbington Wood	000230 M. mystacinus / brandtii; 000468 P. auritus.	N/A
3x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
26/09/2018 Emergence / Tracking Survey	18:55 – 21:45	South Cubbington Wood	000468 P. auritus.	Wind 0 – 0 Air temp 19 – 19 Rain 1 – 1 Cloud 1 – 1
3x Surveyors using Radio telemetry equipment (Biotrack Sika + 3 element Yagi), infra-red camera and bat detectors.				
27/09/2018 Daytime Tracking Survey	09:15 – 10:30	South Cubbington Wood	000230 M. mystacinus / brandtii; 000468 P. auritus.	N/A
3x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
27/09/2018 Emergence / Tracking Survey	18:45 – 21:00	South Cubbington Wood	000468 P. auritus.	Wind 0 – 0 Air temp 16 – 16 Rain 0 – 0 Cloud 1 – 1
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 – 10:30	South Cubbington Wood	000468 P. auritus.	N/A
3x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				

Date of each survey visit	Start and end times	Location	Bat Details	Weather
28/05/2019 Daytime Tracking Survey	13:30 – 17:30	South Cubbington Wood	237063 B. barbastellus.	N/A
2x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
28/05/2019 Emergence / Tracking Survey	21:00 – 23:00	South Cubbington Wood	237063 B. barbastellus.	Wind 2 – 2 Air temp 11 – 10 Rain 0 – 0 Cloud 0 – 0
2x Surveyors using Radio telemetry equipment (Biotrack Sika + 3 element Yagi), infra-red camera and bat detectors.				
29/05/2019 Daytime Tracking Survey	14:30 – 18:30	South Cubbington Wood	237063 B. barbastellus.	N/A
2x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
29/05/2019 Emergence / Tracking Survey	21:00 – 23:30	South Cubbington Wood	237063 B. barbastellus.	Wind 3 – 2 Air temp 14 – 14 Rain 0 – 0 Cloud 8 – 8
2x Surveyors using Radio telemetry equipment (Biotrack Sika + 3 element Yagi), infra-red camera and bat detectors.				
10/06/2019 Daytime Tracking Survey	17:30 – 21:00	South Cubbington Wood	238338 P. pygmaeus.	N/A
2x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
11/06/2019 Daytime Tracking Survey	18:30 – 20:30	South Cubbington Wood	238338 P. pygmaeus.	N/A
2x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
11/06/2019 Emergence / Tracking Survey	20:30 – 23:30	South Cubbington Wood	238338 P. pygmaeus.	Wind 0 – 1 Air temp 11 – 9 Rain 1 – 0 Cloud 8 – 8
2x Surveyors using Radio telemetry equipment (Biotrack Sika + 3 element Yagi), infra-red camera and bat detectors.				
16/06/2019 Daytime Tracking Survey	17:00 – 19:00	South Cubbington Wood	238338 P. pygmaeus.	N/A
2x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
16/06/2019 Emergence / Tracking Survey	21:05 – 23:30	South Cubbington Wood	238338 P. pygmaeus.	Wind 6 – 6 Air temp 15 – 10 Rain 0 – 0 Cloud 6 – 6
2x Surveyors using Radio telemetry equipment (Biotrack Sika + 3 element Yagi), infra-red camera and bat detectors.				
25/06/2019 Daytime Tracking Survey	15:00 – 17:15	South Cubbington Wood	238338 P. pygmaeus.	N/A
2x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
26/06/2019 Daytime Tracking Survey	16:45 – 18:04	South Cubbington Wood	238338 P. pygmaeus.	N/A
2x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
03/07/2019 Daytime Tracking Survey	15:00 – 19:15	South Cubbington Wood	239422 M. brandtii; 239432 P. auritus.	N/A
3x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
03/07/2019 Emergence / Tracking Survey	21:00 – 23:00	South Cubbington Wood	239432 P. auritus.	Wind 1 – 1 Air temp 17 – 15 Rain 0 – 0 Cloud 1 – 1
3x Surveyors using Radio telemetry equipment (Biotrack Sika + 3 element Yagi), infra-red camera and bat detectors.				

Date of each survey visit	Start and end times	Location	Bat Details	Weather
04/07/2019 Daytime Tracking Survey	14:00 – 19:00	South Cubbington Wood	239432 P. auritus.	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; 239424 M. 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	South Cubbington Wood	239423 M. mystacinus / brandtii; 239424 M. brandtii; 239434 P. auritus; 239436 M. bechsteinii; 239438 N. noctula.	N/A
2x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
10/07/2019 Emergence / Tracking Survey	21:00 – 23:00	South Cubbington Wood	239436 M. bechsteinii.	Wind 0 – 1 Air temp 19 – 18 Rain 0 – 0 Cloud 8 – 7
3x Surveyors using Radio telemetry equipment (Biotrack Sika + 3 element Yagi), infra-red camera and bat detectors.				
11/07/2019 Daytime Tracking Survey	16:00 – 21:00	South Cubbington Wood	239434 P. auritus.	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; 239424 M. brandtii; 239436 M. bechsteinii; 239438 N. noctula.	N/A
2x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
11/07/2019 Emergence / Tracking Survey	21:11 – 23:30	South Cubbington Wood	239436 M. bechsteinii; 239438 N. noctula; 239434 P. auritus.	Wind 2 – 2 Air temp 18 – 17 Rain 0 – 0 Cloud 8 – 3
2x Surveyors using Radio telemetry equipment (Biotrack Sika + 3 element Yagi), infra-red camera and bat detectors.				
14/07/2019 Daytime Tracking Survey	15:10 – 19:36	South Cubbington Wood	239423 M. mystacinus / brandtii; 239424 M. brandtii; 239434 P. auritus; 239436 M. bechsteinii; 239438 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	South Cubbington Wood	239436 M. bechsteinii; 239438 N. noctula.	N/A
2x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
14/07/2019 Emergence / Tracking Survey	21:00 – 23:30	South Cubbington Wood	239436 M. bechsteinii.	Wind 1 – 2 Air temp 18 – 15 Rain 0 – 0 Cloud 7 – 6
2x Surveyors using Radio telemetry equipment (Biotrack Sika + 3 element Yagi), infra-red camera and bat detectors.				

Date of each survey visit	Start and end times	Location	Bat Details	Weather
14/07/2019 Emergence / Tracking Survey	21:05 – 23:56	South Cubbington Wood	239423 M. mystacinus / brandtii; 239434 P. auritus.	Wind 0 – 0 Air temp 19 – 12.5 Rain 0 – 0 Cloud 1 – 1
2x Surveyors using Radio telemetry equipment (Biotrack Sika + 3 element Yagi), infra-red camera and bat detectors.				
15/07/2019 Daytime Tracking Survey	15:30 – 18:49	South Cubbington Wood	239434 P. auritus.	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; 239434 P. auritus; 239436 M. bechsteinii.	N/A
2x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
22/07/2019 Emergence / Tracking Survey	21:10 – 22:22	South Cubbington Wood	239436 M. bechsteinii.	Wind 0 – 0 Air temp 18 – 15 Rain 0 – 0 Cloud 1 – 1
2x Surveyors using Radio telemetry equipment (Biotrack Sika + 3 element Yagi), infra-red camera and bat detectors.				
06/08/2019 Daytime Tracking Survey	15:30 – 19:20	South Cubbington Wood	238360 P. auritus; 238366 M. mystacinus / brandtii; 239872 M. daubentonii; 239874 M. daubentonii.	N/A
3x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
06/08/2019 Emergence / Tracking Survey	20:15 – 22:45	South Cubbington Wood	238360 P. auritus.	Wind 4 – 2 Air temp 18 – 18 Rain 0 – 0 Cloud 8 – 8
2x Surveyors using Radio telemetry equipment (Biotrack Sika + 3 element Yagi), infra-red camera and bat detectors.				
07/08/2019 Daytime Tracking Survey	14:00 – 17:30	South Cubbington Wood	238360 P. auritus; 238366 M. mystacinus / brandtii; 239872 M. daubentonii; 239874 M. daubentonii.	N/A
2x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
07/08/2019 Emergence / Tracking Survey	20:15 – 22:30	South Cubbington Wood	238360 P. auritus.	Wind 1 – 0 Air temp 19 – 18 Rain 0 – 0 Cloud 8 – 8
2x Surveyors using Radio telemetry equipment (Biotrack Sika + 3 element Yagi), infra-red camera and bat detectors.				
08/08/2019 Daytime Tracking Survey	14:00 – 16:30	South Cubbington Wood	238360 P. auritus; 238366 M. mystacinus / brandtii; 239872 M. daubentonii; 239874 M. daubentonii.	N/A
2x Surveyors using radio telemetry equipment (Biotrack Sika + 3 element Yagi).				
08/08/2019 Emergence / Tracking Survey	20:15 – 22:30	South Cubbington Wood	238360 P. auritus.	Wind 0 – 0 Air temp 20 – 18 Rain 0 – 0 Cloud 4 – 4
2x Surveyors using Radio telemetry equipment (Biotrack Sika + 3 element Yagi), infra-red camera and bat detectors.				

C5b 'Other' - Table B Survey Effort Summary: day tracking and night roost characterisation (or night tracking) surveys by tagged bat

The data below comprises a summary of the survey effort. The full survey details of the tracking and roost characterisation (or night tracking) surveys are provided within **Appendix D Data – (C5b Other Surveys – Survey Effort – Bat tracking and roost characterisation / night tracking)**

Woodland where bat was tagged	Date Tagged	Tag	Species	Daytime Tracking	Roost Characterisation / Night tracking
South Cubbington	18/09/2018	000204	<i>P. auritus</i>	6	2
South Cubbington	18/09/2018	000217	<i>M. nattereri</i>	6	2
South Cubbington	23/09/2018	000230	<i>M. mystacinus / brandtii</i>	4	1
South Cubbington	23/09/2018	000468	<i>P. auritus</i>	5	5
South Cubbington	27/05/2019	237063	<i>B. barbastellus</i>	2	2
South Cubbington	06/06/2019	238338	<i>P. pygmaeus</i>	5	3
South Cubbington	30/06/2019	239422	<i>M. brandtii</i>	1	
South Cubbington	30/06/2019	239432	<i>P. auritus</i>	2	1
South Cubbington	07/07/2019	239423	<i>M. mystacinus / brandtii</i>	5	2
South Cubbington	07/07/2019	239424	<i>M. brandtii</i>	4	
South Cubbington	09/07/2019	239434	<i>P. auritus</i>	5	2
South Cubbington	09/07/2019	239436	<i>M. bechsteinii</i>	5	4
South Cubbington	09/07/2019	239438	<i>N. noctula</i>	4	1
South Cubbington	05/08/2019	238360	<i>P. auritus</i>	3	3
South Cubbington	05/08/2019	238366	<i>M. mystacinus / brandtii</i>	3	
South Cubbington	05/08/2019	239872	<i>M. daubentonii</i>	3	
South Cubbington	05/08/2019	239874	<i>M. daubentonii</i>	3	
Total			17 bats	66	28

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.

Lead surveyors are all highly experienced bat ecologists who are covered by the overarching project licence to undertake licensable activities (bat trapping, handling and tagging). Some individuals are licensed and some typically work either as an accredited agent on the Named Ecologist's licence or under a project licence. Other related survey methodologies do not require a licence to be undertaken (tracking, emergence/ re-entry surveys). Second surveyor licence details have not been provided.

2018 Surveyors

BR5 Trapping & Tagging Survey Leads (all named persons under project licence 2018-35897-SCI-SCI-1).

██████████ (2015-10461-CLS-CLS) and ██████████ (2016-23219-CLS-CLS; 2016-23220-CLS-CLS)

BR4 Daytime Tracking & BR1 Roost Characterisation Survey Leads:

██████████ (2015-10461-CLS-CLS), ██████████ (accredited agent), ██████████ (2015-15664-CLS-CLS; 72084:OTH:CSAB:2016), ██████████ (2015-12201-CLS-CLS), ██████████ (2015-13354-CLS-CLS; 78479:OTH:CSAB:2018), ██████████ (2016-23219-CLS-CLS; 2016-23220-CLS-CLS).

Survey Assistants: ██████████
██████████
██████████

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.

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 data capture.

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.

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 m² (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.

Date of walkover survey/check	South Cubbington – 10/10/2019
Details of any changes to conditions and habitats and/or structures, if there are no changes please insert 'None'	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

C6 Visual Inspections Results – tree potential assessments			
Area	PRF assessment	Direct impact area (LLAU)	Indirect Impact Area (20 m buffer)
South Cubbington	High potential	30	25
	Moderate potential	74	61
	Low potential	150	90

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)
18/10/2018	<i>B. barbastellus</i> (x1)	Day (Summer)	F703a	[REDACTED]	Trunk cavity	3m above ground, N aspect

Notes/observations: Surveyor James Patterson recorded a single barbastelle bat in a split / trunk cavity. Visual observation, unambiguous photograph taken. Identification confirmed.



Provide further (brief) comments/explanation if required:

The above details the positive (confirmed roost) results of the PBRA tree inspections October 2018. Tree potential assessed.

[See Figure C6a – Bat Roost Potential]

Dusk 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)
NA							
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)
N/A							
Notes/observations:							

Provide further (brief) comments/explanation if required:

N/A

'Other' results – please specify.

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
19/09/18	Daytime tracking	000204 P. auritus immature nulliparous female from South Cubbington Wood	PRF identified	204b	South Cubbington Wood [REDACTED]
19/09/18	Night tracking	000204 P. auritus immature nulliparous female from South Cubbington Wood	Activity recorded.		
19/09/18	Roost characterisation	000204 P. auritus immature nulliparous female from South Cubbington Wood	Emerged at 19:35	204b	South Cubbington Wood [REDACTED]
19/09/18	Roost characterisation	000230 M. mystacinus / brandtii immature male from South Cubbington Wood	Emerged at 19:35	204b	South Cubbington Wood [REDACTED]

Date	Survey Type	Bat Details	Result	Roost Ref	Roost Location
24/09/18	Daytime tracking	000217 <i>M. nattereri</i> adult male from South Cubbington Wood	PRF identified	217a	Waverley Edge [REDACTED]
24/09/18	Daytime tracking	000468 <i>P. auritus</i> adult male from South Cubbington Wood	PRF identified	468a	South Cubbington Wood [REDACTED]
24/09/18	Night tracking	000217 <i>M. nattereri</i> adult male from South Cubbington Wood	Activity recorded.		
24/09/18	Roost characterisation	000468 <i>P. auritus</i> adult male from South Cubbington Wood	Did not emerge		
25/09/18	Daytime tracking	000230 <i>M. mystacinus</i> / <i>brandtii</i> immature male from South Cubbington Wood	PRF identified	230a	Cubbington [REDACTED]
25/09/18	Daytime tracking	000468 <i>P. auritus</i> adult male from South Cubbington Wood	PRF identified	468b	South Cubbington Wood [REDACTED]
25/09/18	Night tracking	000217 <i>M. nattereri</i> adult male from South Cubbington Wood	Activity recorded.		
25/09/18	Night tracking	000468 <i>P. auritus</i> adult male from South Cubbington Wood	Activity recorded.		
25/09/18	Roost characterisation	000468 <i>P. auritus</i> adult male from South Cubbington Wood	Emerged at 19:46 with 3 other bats	468b	South Cubbington Wood [REDACTED]
26/09/18	Daytime tracking	000230 <i>M. mystacinus</i> / <i>brandtii</i> immature male from South Cubbington Wood	PRF identified	230a	Cubbington [REDACTED]
26/09/18	Daytime tracking	000468 <i>P. auritus</i> adult male from South Cubbington Wood	PRF identified	468c	South Cubbington Wood [REDACTED]
26/09/18	Roost characterisation	000468 <i>P. auritus</i> adult male from South Cubbington Wood	Did not emerge		
27/09/18	Daytime tracking	000230 <i>M. mystacinus</i> / <i>brandtii</i> immature male from South Cubbington Wood	PRF identified	230a	Cubbington [REDACTED]
27/09/18	Daytime tracking	000468 <i>P. auritus</i> adult male from South Cubbington Wood	PRF identified	468c	South Cubbington Wood [REDACTED]
27/09/18	Roost characterisation	000468 <i>P. auritus</i> adult male from South Cubbington Wood	Did not emerge		

Date	Survey Type	Bat Details	Result	Roost Ref	Roost Location
28/09/18	Daytime tracking	000468 <i>P. auritus</i> adult male from South Cubbington Wood	Tag detected, PRF unidentified	NoRoost	[REDACTED]
28/05/19	Daytime tracking	237063 <i>B. barbastellus</i> adult male from South Cubbington Wood	Not found		
28/05/19	Roost characterisation	237063 <i>B. barbastellus</i> adult male from South Cubbington Wood	Not observed		
29/05/19	Daytime tracking	237063 <i>B. barbastellus</i> adult male from South Cubbington Wood	Not found		
29/05/19	Night tracking	237063 <i>B. barbastellus</i> adult male from South Cubbington Wood	Activity recorded.		
10/06/19	Daytime tracking	238338 <i>P. pygmaeus</i> juvenile male from South Cubbington Wood	Not found		
11/06/19	Daytime tracking	238338 <i>P. pygmaeus</i> juvenile male from South Cubbington Wood	PRF identified	238338a	South Cubbington Wood [REDACTED]
11/06/19	Roost characterisation	238338 <i>P. pygmaeus</i> juvenile male from South Cubbington Wood	Did not emerge		
16/06/19	Daytime tracking	238338 <i>P. pygmaeus</i> juvenile male from South Cubbington Wood	PRF identified	238338b	South Cubbington Wood [REDACTED]
16/06/19	Night tracking	238338 <i>P. pygmaeus</i> juvenile male from South Cubbington Wood	Activity recorded.		
25/06/19	Daytime tracking	238338 <i>P. pygmaeus</i> juvenile male from South Cubbington Wood	Not found		
26/06/19	Daytime tracking	238338 <i>P. pygmaeus</i> juvenile male from South Cubbington Wood	Not found		
03/07/19	Daytime tracking	239422 <i>M. brandtii</i> adult male from South Cubbington Wood	Tag detected, PRF unidentified	NoRoost	[REDACTED]
03/07/19	Daytime tracking	239432 <i>P. auritus</i> adult nulliparous female from South Cubbington Wood	PRF identified	239432a	South Cubbington Wood [REDACTED]
03/07/19	Roost characterisation	239432 <i>P. auritus</i> adult nulliparous female from South Cubbington Wood	Emerged at 22:01 with 23 other bats	239432a	South Cubbington Wood [REDACTED]
04/07/19	Daytime tracking	239432 <i>P. auritus</i> adult nulliparous	PRF identified	239432a	South Cubbington Wood [REDACTED]

Date	Survey Type	Bat Details	Result	Roost Ref	Roost Location
		female from South Cubbington Wood			
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	Daytime tracking	239424 M. brandtii adult male from South Cubbington Wood	Not found		
09/07/19	Roost characterisation	239423 M. mystacinus / brandtii adult lactating female from South Cubbington Wood	Did not emerge		
10/07/19	Daytime tracking	239423 M. mystacinus / brandtii adult lactating female from South Cubbington Wood	PRF identified	239423a	Offchurch - School Hill [REDACTED]
10/07/19	Daytime tracking	239424 M. brandtii adult male from South Cubbington Wood	Not found		
10/07/19	Daytime tracking	239434 P. auritus adult lactating female from South Cubbington Wood	PRF identified	239434c	South Cubbington Wood [REDACTED]
10/07/19	Daytime tracking	239436 M. bechsteinii adult male from South Cubbington Wood	PRF identified	239436a	Mill Lane [REDACTED]
10/07/19	Daytime tracking	239438 N. noctula adult lactating female from South Cubbington Wood	Not found		
10/07/19	Roost characterisation	239436 M. bechsteinii adult male from South Cubbington Wood	Emerged at 22:09	239436a	Mill Lane [REDACTED]
11/07/19	Daytime tracking	239423 M. mystacinus / brandtii adult lactating female from South Cubbington Wood	PRF identified	239423a	Offchurch - School Hill [REDACTED]
11/07/19	Daytime tracking	239424 M. brandtii adult male from South Cubbington Wood	Not found		
11/07/19	Daytime tracking	239434 P. auritus adult lactating female from South Cubbington Wood	PRF identified	239434b	South Cubbington Wood [REDACTED]
11/07/19	Daytime tracking	239436 M. bechsteinii adult male from South Cubbington Wood	PRF identified	239436a	Mill Lane [REDACTED]
11/07/19	Daytime tracking	239438 N. noctula adult lactating female from South Cubbington Wood	Not found		

Date	Survey Type	Bat Details	Result	Roost Ref	Roost Location
11/07/19	Night tracking	239436 <i>M. bechsteinii</i> adult male from South Cubbington Wood	Activity recorded.		
11/07/19	Night tracking	239438 <i>N. noctula</i> adult lactating female from South Cubbington Wood	Activity recorded.		
11/07/19	Roost characterisation	239434 <i>P. auritus</i> adult lactating female from South Cubbington Wood	Emerged at 21:31 with 20 other bats	239434b	South Cubbington Wood [REDACTED]
14/07/19	Daytime tracking	239423 <i>M. mystacinus</i> / <i>brandtii</i> adult lactating female from South Cubbington Wood	PRF identified	239423a	Offchurch - School Hill [REDACTED]
14/07/19	Daytime tracking	239424 <i>M. brandtii</i> adult male from South Cubbington Wood	Not found		
14/07/19	Daytime tracking	239434 <i>P. auritus</i> adult lactating female from South Cubbington Wood	PRF identified	239434a	South Cubbington Wood [REDACTED]
14/07/19	Daytime tracking	239436 <i>M. bechsteinii</i> adult male from South Cubbington Wood	Not found		
14/07/19	Daytime tracking	239436 <i>M. bechsteinii</i> adult male from South Cubbington Wood	PRF identified	239436a	Mill Lane [REDACTED]
14/07/19	Daytime tracking	239438 <i>N. noctula</i> adult lactating female from South Cubbington Wood	Not found		
14/07/19	Roost characterisation	239423 <i>M. mystacinus</i> / <i>brandtii</i> adult lactating female from South Cubbington Wood	Did not emerge		
14/07/19	Roost characterisation	239434 <i>P. auritus</i> adult lactating female from South Cubbington Wood	Emerged at 21:36 with 17 other bats	239434a	South Cubbington Wood [REDACTED]
14/07/19	Roost characterisation	239436 <i>M. bechsteinii</i> adult male from South Cubbington Wood	Emerged at 22:00	239436a	Mill Lane [REDACTED]
15/07/19	Daytime tracking	239434 <i>P. auritus</i> adult lactating female from South Cubbington Wood	PRF identified	239434a	South Cubbington Wood [REDACTED]
16/07/19	Daytime tracking	239423 <i>M. mystacinus</i> / <i>brandtii</i> adult lactating female from South Cubbington Wood	PRF identified	239423a	Offchurch - School Hill [REDACTED]
16/07/19	Daytime tracking	239434 <i>P. auritus</i> adult lactating female from South Cubbington Wood	PRF identified	239434a	South Cubbington Wood [REDACTED]

Date	Survey Type	Bat Details	Result	Roost Ref	Roost Location
16/07/19	Daytime tracking	239436 M. bechsteinii adult male from South Cubbington Wood	PRF identified	239436a	Mill Lane [REDACTED]
22/07/19	Roost characterisation	239436 M. bechsteinii adult male from South Cubbington Wood	Emerged at 21:50	239436a	Mill Lane [REDACTED]
06/08/19	Daytime tracking	238360 P. auritus juvenile male from South Cubbington Wood	PRF identified	238360a	South Cubbington Wood [REDACTED]
06/08/19	Daytime tracking	238366 M. mystacinus / brandtii adult parous female from South Cubbington Wood	PRF identified	238366a	Offchurch - Village Street [REDACTED]
06/08/19	Daytime tracking	239872 M. daubentonii adult male from South Cubbington Wood	PRF identified	239872a	Wappenbury Wood [REDACTED]
06/08/19	Daytime tracking	239874 M. daubentonii adult parous female from South Cubbington Wood	Not found		
06/08/19	Roost characterisation	238360 P. auritus juvenile male from South Cubbington Wood	Emerged at 22:08	238360a	South Cubbington Wood [REDACTED]
07/08/19	Daytime tracking	238360 P. auritus juvenile male from South Cubbington Wood	PRF identified	238360a	South Cubbington Wood [REDACTED]
07/08/19	Daytime tracking	238366 M. mystacinus / brandtii adult parous female from South Cubbington Wood	PRF identified	238366a	Offchurch - Village Street [REDACTED]
07/08/19	Daytime tracking	239872 M. daubentonii adult male from South Cubbington Wood	PRF identified	239872b	Wappenbury Wood [REDACTED]
07/08/19	Daytime tracking	239874 M. daubentonii adult parous female from South Cubbington Wood	Not found		
07/08/19	Roost characterisation	238360 P. auritus juvenile male from South Cubbington Wood	Emerged at 21:20 with 31 other bats	238360a	South Cubbington Wood [REDACTED]
08/08/19	Daytime tracking	238360 P. auritus juvenile male from South Cubbington Wood	PRF identified	238360b	South Cubbington Wood [REDACTED]
08/08/19	Daytime tracking	238366 M. mystacinus / brandtii adult parous female from South Cubbington Wood	PRF identified	238366a	Offchurch - Village Street [REDACTED]
08/08/19	Daytime tracking	239872 M. daubentonii adult	PRF identified	239872b	Wappenbury Wood [REDACTED]

Date	Survey Type	Bat Details	Result	Roost Ref	Roost Location
		male from South Cubbington Wood			
08/08/19	Daytime tracking	239874 M. daubentonii adult parous female from South Cubbington Wood	Not found		
08/08/19	Roost characterisation	238360 P. auritus juvenile male from South Cubbington Wood	Emerged at 20:57 with 8 other bats	238360b	South Cubbington Wood [REDACTED]

Provide further (brief) comments/explanation if required:

[See Figure C6b – Trapping Locations]

See Figure C6c – Roost Locations]

The results table above 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 (where the bat was not found, or night tracking was undertaken for a bat but with no roost characterisation). 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.

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:

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>					
238338a	P. pygmaeus juvenile male.	*	Lifting bark or knot hole in pedunculate oak [REDACTED] In woodland Within indirect impact area	Day (Summer)	Low
238338b	P. pygmaeus juvenile male.	*	Lifting bark in pedunculate oak [REDACTED] In woodland Outside impact area	Day (Summer)	Low
239434a	P. auritus adult lactating female.	18	Pedunculate oak [REDACTED] In woodland Within indirect impact area	Maternity	High
239436a	M. bechsteinii adult male.	1	Knot hole in common ash [REDACTED] In Mill Lane Within indirect impact area	Day (Summer)	High
239434b	P. auritus adult lactating female.	21	Woodpecker hole in pedunculate oak [REDACTED] In woodland Within direct impact area	Maternity	High
238360a	P. auritus juvenile male.	32	Callus roll in pedunculate oak [REDACTED] In woodland Outside impact area	Maternity	High

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>					
239432a	P. auritus adult nulliparous female.	24	Woodpecker hole in pedunculate oak [REDACTED] In woodland Within indirect impact area	Maternity	High
239434c	P. auritus adult lactating female.	*	Pedunculate oak [REDACTED] In woodland Within indirect impact area	Maternity	High
238360b	P. auritus juvenile male.	9	Knot hole in common ash [REDACTED] In woodland Within direct impact area	Maternity	High
204b	P. auritus immature nulliparous female, M. mystacinus / brandtii immature male.	2	Multiple features in hybrid / uncertain oak [REDACTED] In woodland Outside impact area	Likely maternity	High
468a	P. auritus adult male.	*	Knot hole in silver birch [REDACTED] In woodland Within indirect impact area	Day (Summer)	Low
468b	P. auritus adult male.	4	Rot hole in silver birch [REDACTED] In woodland Outside impact area	Day (Summer)	Low
468c	P. auritus adult male.	*	Rot hole in english elm [REDACTED] In woodland Within direct impact area	Day (Summer)	Low
F703a	B. barbastellus bat.	1	Trunk cavity in silver birch [REDACTED] In woodland Within direct impact area	Day	High
239423a †	M. mystacinus / brandtii adult lactating female.	*	Residential building [REDACTED] In Offchurch - School Hill Outside impact area	Maternity	High
238366a †	M. mystacinus / brandtii adult parous female.	*	Residential building [REDACTED] In Offchurch - Village Street Outside impact area	Maternity	High
239872a †	M. daubentonii adult male.	*	Unknown species [REDACTED] In Wappenbury Wood Outside impact area	Day (Summer)	Low
239872b †	M. daubentonii adult male.	*	Unknown species [REDACTED] In Wappenbury Wood Outside impact area	Day (Summer)	Low
217a †	M. nattereri adult male.	*	Unknown species [REDACTED] In Waverley Edge Outside impact area	Day (Summer)	Low
230a †	M. mystacinus / brandtii immature male.	*	House [REDACTED] In Cubbington Outside impact area	Unknown	Unknown

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, the licence area 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 Visual Tree Assessment Results

[See Figure C6a – Bat Roost Potential]

South Cubbington Wood LWS was subject to ground level tree assessments and tree climbing inspection surveys to assess the potential of trees within the woodland and within 20 m of the LLAU for their potential to support bats. An area of 6.93 ha was assessed (incorporating the direct and indirect impact zones). A small area (0.81 ha) was not surveyed due to refused land access. The surveys identified one tree as a confirmed day roost of Barbastelle bat (*Barbastella barbastellus*).

Impact Area	Total Trees	High	Low	Moderate	Negligible	Confirmed
Direct Impact Area	765	30	150	74	510	1
Indirect Impact Area	409	25	90	61	233	NA
Outside Impact Area	78	9	11	15	43	NA

Data from 2016 and 2018 were collated on these trees (see Figure C6a) with eleven trees identified as having PRFs. No roosts were identified from this assessment. Traditional emergence and re-entry surveys were completed on these trees and any roosts identified from these have been reported below.

Summary of 2018/2019 ALBST Survey Results

[See Figure C6b – Trapping Locations]

[See Figure C6c – Roost Locations]

[See Figure C6d – Bat Movements]

In 2018 and 2019, Advanced Licence Bat Survey Techniques (ALBSTs) were employed to gain a picture of the assemblage of bats using the woodlands, locate roosts of bats within the woodland, and inform licensing and mitigation requirements. 20 roosts were identified in total.

The bat assemblage at South Cubbington as represented by the bats trapped (with numbers caught) is presented in the summary tables below:

Bat Species	No. of bats trapped
<i>P. auritus</i>	11
<i>M. nattereri</i> (Sept 2018 only)	3
<i>M. mystacinus</i> / <i>brandtii</i>	8
<i>P. pygmaeus</i>	6
<i>P. pipistrellus</i>	6
<i>P. nathusii</i> (Sept 2018 only)	1
<i>M. daubentonii</i>	7
<i>N. noctula</i>	4

<i>M. bechsteinii</i>	1
<i>B. barbastellus</i>	1

Summary of Known Assemblage and Roosts:

As a bat roosting habitat, South Cubbington is relatively large and well connected to a large woodland resource in the local landscape. This provides a wide variety of foraging and roosting opportunities for tree dwelling bat species. The data obtained during the course of the surveys detailed above suggests that South Cubbington regularly supports at least 11 bat species overall, with five species confirmed as roosting within the woodland and connecting treelines. Roosting bat species occurring in South Cubbington include a resident brown long-eared maternity population that used a variety of tree roosts within the confines of the woodland and are likely to use a greater number of trees than the survey suggests. Confirmed day tree roosts were also identified for male soprano pipistrelle, male and female brown long-eared, male Bechstein's bat and barbastelle bat. In addition, the remaining assemblage of bats using the site for foraging, social activity and potential day roosting at other times of the year include Nathusius's pipistrelle, Natterer's, Daubenton's, Brandt's, whiskered, common pipistrelle, noctule and potentially Leisler's bat (not confirmed through the trapping and tracking surveys but through acoustic analysis).

Tree roosts identified within the licence area within direct and indirect impact zones							
Bat Species	Conservation Status	Impact	Physical Type	Roost Name	X	Y	Ecology Type
<i>B. barbastellus</i>	High	Direct	Tree	F703a	█	█	Day
<i>P. auritus</i>	High	Direct	Tree	239434b	█	█	Maternity
<i>P. auritus</i>	High	Direct	Tree	238360b	█	█	Maternity
<i>P. auritus</i>	Low	Direct	Tree	468c	█	█	Day (Summer)
<i>M. bechsteinii</i>	High	Indirect	Tree	239436a	█	█	Day (Summer)
<i>P. auritus</i>	High	Indirect	Tree	239434a	█	█	Maternity
<i>P. auritus</i>	High	Indirect	Tree	239432a	█	█	Maternity
<i>P. auritus</i>	High	Indirect	Tree	239434c	█	█	Maternity
<i>P. auritus</i>	Low	Indirect	Tree	468a	█	█	Day (Summer)
<i>P. pygmaeus</i>	Low	Indirect	Tree	238338a	█	█	Day (Summer)

Conclusion

At the landscape scale, the licence area is considered to be of county importance for tree roosting bats, primarily due to the presence of roosting Bechstein's bat and barbastelle bat. This is consistent with the assessment in the HS2 ES. Based on current information the record of Bechstein's bat is likely to confirm this species' northern limit in the UK.

Roosts found outside the licence area or within buildings

Six roosts were found within buildings or structures through ALBST, all outside the impact zone and licence area. All roosts identified by ALBST found within buildings or within trees and within the impact area of the Scheme but falling outside the licence areas are formally notified to HS2. This information is then supplied to an associated licensing team (Work Package 54) responsible for submitting HS2 low and moderate impact class licences and traditional licences. 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

See Figure Da Impacts Plan.

The LLAU broadly defines the direct impact zone, and covers all potential land required during the construction phase of the Scheme, including the Limits Of Deviation (LOD – the land directly required for the route itself), 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 of actual impacts.

Large parts of the margins of South Cubbington Wood lie directly adjacent to the defined LLAU. However, the works in some of these areas comprise woodland habitat creation. To ensure the impact assessment does not overestimate the actual impacts of the works within the LLAU on the woodland, we have assumed that there will be no negative impacts from woodland creation or habitat management works. We have therefore focussed the assessment of impacts on the known tree clearance areas that will enable the construction of the Scheme. 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 to retained habitat and roosts from felling activities and from limited ground

investigation works required prior to vegetation clearance. These will be fairly short-term in nature and relatively localised – the disturbance will comprise noise, vibration (for GI works only), 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 South Cubbington licence area has been assessed as being of county / metropolitan importance. Prior to mitigation, the predicted initial impacts of the Scheme on the bat assemblage at these areas comprises:

- The **direct permanent** loss of approximately 3.57 ha of ancient woodland from the south-west part of South Cubbington Wood which supports at least 11 bat species for roosting, foraging and commuting combined. This combined loss is considered to be a **major adverse impact at the county level**;
- The **permanent loss** of 255 trees in woodland with PRFs (150 of low, 74 of moderate and 30 of high suitability to support roosting bats) which represents a **major adverse impact at the county level**;
- The **direct loss** of four known tree roosts in total across South Cubbington for two species including one Barbastelle day roost **representing major adverse impacts at the local up to the county level**;
- **Indirect impacts** comprising short-term disturbance from felling activities in **4.76 ha of woodland habitat** containing 176 trees with PRFs (90 low, 61 moderate, 25 high suitability to support roosting bats) and **six known roosts** including day roosts for Bechstein's, brown long-eared and soprano pipistrelle, considered a **moderate adverse impact at the county level**.
- **Indirect disturbance impacts** from limited footprint short-duration GI works comprising noise, vibration, dust and exhaust fumes over a period of up to five days in each location over a period of eight weeks, considered a **minor adverse effect at up to the local level**.

Consideration of construction impacts beyond vegetation clearance

Other construction phase impacts will occur over the medium-term once construction of the Scheme commences (excavation of cuttings, construction of embankments, installation of the track and relevant infrastructure etc). The construction phase is expected to last approximately five years 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 lighting, affecting 4.76ha of retained woodland. 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 **major adverse effect**, that may be **significant at up to the county level**.

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 South Cubbington Wood are likely to use far more trees within the same woodland habitat than those listed in this application. Therefore, the potential roosts detailed above may also support the same populations detailed below. This has 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:

Indirect impacts (disturbance) are as follows:

- Indirect impacts to three maternity roosts for brown long-eared bat which represent a **moderate adverse impact** at the **local level**;
- Indirect impacts to one day roost for brown long-eared which represent a **moderate adverse impact** at the **site level**;
- Indirect impacts to one day roost for soprano pipistrelle bat which represent a **moderate adverse impact** at the **site level**;
- Indirect impacts to one day roost for Bechstein’s bat which represents a **moderate adverse impact** at the **county level**; and,

Location	Bat Species	Conservation Status	Physical Type	Roost Name	X	Y	Ecology Type
Mill Lane	<i>M. bechsteinii</i>	High	Tree	239436a	█	█	Day (Summer)
South Cubbington Wood	<i>P. auritus</i>	High	Tree	239434a	█	█	Maternity
South Cubbington Wood	<i>P. auritus</i>	High	Tree	239432a	█	█	Maternity
South Cubbington Wood	<i>P. auritus</i>	High	Tree	239434c	█	█	Maternity
South Cubbington Wood	<i>P. auritus</i>	Low	Tree	468a	█	█	Day (Summer)
South Cubbington Wood	<i>P. pygmaeus</i>	Low	Tree	238338a	█	█	Day (Summer)

- Alteration of conditions (comprising disturbance or alteration of ambient conditions such as light, noise, exposure or airflow) affecting 4.76 ha of woodland and 176 trees with PRFs (61 of low, 90 of moderate and 25 of high suitability to support roosting bats) that are likely to support bats and form part of the overall roosting resource for the species of bat confirmed during the trapping and radio tracking surveys. This would be a **moderate adverse impact** at the **county level** due to the area being used by Bechstein’s bat and barbastelle bats (and potentially roosting in this area).

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:

[See Figure Da – Impacts/Fragmentation Plan]

As a result of vegetation clearance within the woodland the below known roosts will be lost. Overall this represents a **major adverse impact** at the **county level**.

Location	Bat Species	Conservation Status	Physical Type	Roost Name	X	Y	Ecology Type
South Cubbington Wood	<i>B. barbastellus</i>	High	Tree	F703a	██████	██████	Day
South Cubbington Wood	<i>P. auritus</i>	High	Tree	239434b	██████	██████	Maternity
South Cubbington Wood	<i>P. auritus</i>	High	Tree	238360b	██████	██████	Maternity
South Cubbington Wood	<i>P. auritus</i>	Low	Tree	468c	██████	██████	Day (Summer)

It is important to note that the confirmed roosts to be destroyed are likely to under-represent the level of roost use by the brown long-eared, Natterer's and soprano pipistrelle maternity populations, due to the fission-fusion nature of tree roosting bats. The entire woodland area is considered to be the 'breeding site' (as defined by the Habitats Regulations) and other trees within and outside the impact area within the woodland are likely to be used as roosts, but not recorded due to the limitations of the sampling approach.

As such, the Scheme will also destroy 255 trees with PRFs (150 low, 74 moderate and 30 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 **county level**.

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.

[See Figure Da – Impacts/Fragmentation Plan]

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

Predicted fragmentation and isolation impacts prior to any mitigation are as follows:

South Cubbington Wood LWS as a whole is 32.79 ha. Fragmentation impacts are anticipated within the southern section of South Cubbington Wood LWS, as detailed in Figure Da. The area to be lost comprises 3.57 ha. This will sever an area of approximately 1.77 ha from the main body of woodland. This will comprise a **major adverse impact** at the **county level**.

At least one bat roost (Bechstein's bat) occurs to the south of the woodland habitats and observation data show this bat using the woodland being cleared. Other bats are also likely to use the area being fragmented outside the surveys undertaken.

Taken together, fragmentation of bat commuting routes west of South Cubbington (including those used by Bechstein's bat) would represent a **moderate adverse impact** at up to the **county level**.

Loss of part of the woodland area comprises a reduction in foraging habitat for bats at the site and in the wider area. The ALBST surveys identified 20 roosts in total of which ten roosts (soprano, brown long-eared, whiskered/brandt's, Daubenton's and Natterer's bat) were located outside the licence area, seven within trees and three within buildings. These are as follows (and shown on Figure Db):

Location	Bat Species	Conservation Status	Physical Type	Roost Name	Ecology Type
South Cubbington wood	<i>P. pygmaeus</i>	Low	Tree	238338b	Day (Summer)
South Cubbington wood	<i>P. auritus</i>	High	Tree	238360a	Maternity

South Cubbington wood	<i>P. auritus</i> / <i>M. mystacinus</i> / <i>brandtii</i>	High	Tree	204b	Likely maternity
South Cubbington wood	<i>P. auritus</i>	Low	Tree	468b	Day (Summer)
Offchurch - School Hill	<i>M. mystacinus</i> / <i>brandtii</i>	High	Residential building	239423a	Maternity
Offchurch – Village Street	<i>M. mystacinus</i> / <i>brandtii</i>	High	Residential building	238366a	Maternity
Wappenbury Wood	<i>M. daubentonii</i>	Low	Tree	239872a	Day (Summer)
Wappenbury Wood	<i>M. daubentonii</i>	Low	Tree	239872b	Day (Summer)
Waverley Edge	<i>M. nattereri</i>	Low	Tree	217a	Day (Summer)
Cubbington	<i>M. mystacinus</i> / <i>brandtii</i>	Unknown	Residential building	230a	Unknown

These results show that South Cubbington LWS has importance as part of the core sustenance zone (CSZ) of bats roosting outside the woodland itself. Significant other woodlands are present in the surrounds to the north and north-east which will likely also form part of the CSZ of these bats. Good connectivity is being retained between the majority of roosts and the retained South Cubbington LWS and other woodlands in the area. Overall loss of foraging resource as a result of the Scheme for the wider bat assemblage is considered to comprise a **moderate adverse impact** at the **local level**.

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) impacts of the Scheme on bats relate to bats using or crossing the rail corridor and subsequent mortality due to collision with trains. 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 impacts** comprising mortality of individual bats through collision with trains may also potentially occur (where not avoided by embedded design such as tunnels or deep cuttings) between the hours of dusk and dawn.

Impacts to bats from collision risk within the South Cubbington licence area are avoided through placement of the route within a deep wide cutting where it passes through the woodland itself (designed to reduce collision risk and wind pressure impacts). The cutting 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 up to the county 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 / District / County	Regional	
<i>P. auritus</i>	Maternity		X		2 x maternity roosts destroyed (local importance)
<i>P. auritus</i>	Maternity		X		3 x maternity roosts indirectly affected (local importance)
<i>P. auritus</i>	Day	X			1 x day roost destroyed
<i>P. auritus</i>	Day	X			1 x day roost indirectly affected
<i>M. bechsteinii</i>	Day		X	X	1 x day roost indirectly affected (county importance)
<i>B. barbastelle</i>	Day		X		1 x day roost destroyed (county importance)
<i>P. pygmaeus</i>	Day	X			1 x day roost indirectly affected

* **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 subadult bats of any sex (where found roosting with one or more bats), 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.

As a result of the historical lack of access to South Cubbington Wood LWS for bat surveys to support the HS2 Environmental Statement, 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 ASNW habitats and bat roosts therein, but the scheme design still impacts a total of 3.57 ha of ASNW habitat (8.33 ha of woodland impacted in total both directly and indirectly). 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 South Cubbington Wood LWS.

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.

Mitigation at South Cubbington was designed into the Scheme at the ES stage. This took a long-term landscape-scale approach to providing ecological benefits, through the creation of new woodland along the Scheme and around South Cubbington Wood to increase total coverage and join up fragmented woodland parcels. As such, only very small areas of retained woodland (comprising woodland edges) are available within the Hybrid Bill limits for bat mitigation purposes at the initial stages of the Scheme. The designed woodland planting has therefore been enhanced with planting of early senescent fruit trees, and veteranisation of planting once mature enough. Monoliths and totems have been considered as mitigation and may be created as woodland clearance is ongoing, however there are significant difficulties in moving suitable felled trees intact from their original location to mitigation areas; therefore these have not been counted as providing mitigation for bats as part of this licence.

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 Environmental Site Management Plan (ESMP). Collectively, these measures will ensure impacts on the assemblage of bats at South Cubbington Wood LWS 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.

Yes, I agree / No, I don't agree
Yes I agree

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.

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. 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.

In addition, heightened hygiene and disease control measures will be implemented in the light of the Covid-19 outbreak:

- Hands to be washed with soap or alcohol-based disinfectant hand gel prior to any surveys that may involve direct contact with bats.
- All equipment to which may come into direct contact with bats to be sterilised before and after use using a suitable disinfectant (e.g. endoscopes etc).
- A face mask and disposable gloves (over handling gloves) will be worn if the accredited agents or Named Ecologist are handling bats.
- One-use gloves to be used when handling different bats, one-use bags for housing bats while transported.
- Gloves to be disposed of within sealed bag once a survey is complete.
- All handling bags, handling gloves or other soft equipment to be washed between surveys at least 60°C.
- All hard equipment and PPE to be cleaned between uses using a suitable disinfectant.

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>	10 – during rescue inspections / soft fell
<i>Pipistrellus pygmaeus</i>	15 – during rescue inspections / soft fell
<i>Pipistrellus nathusii</i>	2 – during rescue inspections / soft fell
<i>Nyctalus noctula</i>	10 – during rescue inspections / soft fell
<i>Nyctalus leisleri</i>	2 – during rescue inspections / soft fell
<i>Plecotus auritus</i>	20 – during rescue inspections / soft fell
<i>Myotis nattereri</i>	5 – during rescue inspections / soft fell
<i>Myotis daubentonii</i>	7 – during rescue inspections / soft fell
<i>Myotis mystacinus</i>	7 – during rescue inspections / soft fell
<i>Myotis brandtii</i>	7 – during rescue inspections / soft fell
<i>Myotis bechsteinii</i>	5 – 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 roosts are being retained within the construction areas however six roosts, including three brown long-eared maternity colonies and day roosts of soprano pipistrelle, brown long-eared and Bechstein's bat are being retained within the indirect impact buffer zone which is defined as a 20 m area at the fringes of the tree clearance area. Felling areas will be clearly marked out to ensure that adjacent trees are not felled. Any roosts falling within the indirect impact zone will be clearly marked by the ECOW Site Supervisor to ensure these trees are retained.

Bat Species	ImpactArea	ConservationStatus	Physical Type	RoostName
<i>M. bechsteinii</i>	indirect	High	Tree	239436a
<i>P. auritus</i>	indirect	High	Tree	239434a
<i>P. auritus</i>	indirect	High	Tree	239432a
<i>P. auritus</i>	indirect	Low	Tree	239434c
<i>P. auritus</i>	indirect	Low	Tree	468a

Four other roosts within the licence area but unaffected by the works are all being retained, detailed below:

Bat Species	ImpactArea	ConservationStatus	Physical Type	RoostName
<i>P. pygmaeus</i>	outside	Low	Tree	238338b
<i>P. auritus</i>	outside	High	Tree	238360a
<i>P. auritus</i>	outside	High	Tree	204b
<i>M. mystacinus / brandtii</i>	outside	High	Tree	204b
<i>P. auritus</i>	outside	Low	Tree	468b

- 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 the licence area. 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.

Modification of existing / retained roosts (those within 20m of the LLAU) relates to the change in noise levels and environmental conditions near those roosts as a result of the construction of the Scheme and the subsequent operation of the scheme.

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

The main mitigation approach is to ensure that such roosts are well marked to avoid accidental damage. There are expected to be no lighting impacts.

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**.

Species & Roost type for which new roost creation will be provided Select 'yes' for those species impacted or 'N/A' if not applicable to this application	New roost creation		
	Compensation should be in line with the <i>Bat Mitigation Guidelines</i> . Where compensation is being provided, there should be at least one compensation feature, suitable for the species concerned, per roost and per species to be impacted , 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.		
	Compensation Feature	Quantity	Location of Compensation Feature (as shown on Figure E3)
Common pipistrelle <input type="checkbox"/> Yes <input checked="" type="checkbox"/> N/A Day roost Night roost Feeding Transitional/Occasional	<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):
Soprano pipistrelle <input type="checkbox"/> Yes <input checked="" type="checkbox"/> N/A Day roost Night roost Feeding	<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):

<i>Transitional/Occasional</i>			
Whiskered <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):
Brandt's <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):
Daubenton's <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):
Natterer's <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):
Brown long-eared <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>	<p>Note: boxes for this species will only be acceptable in certain circumstances, where this is justified on an ecological basis</p> <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 type="checkbox"/> Other (specify):
Serotine <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>	<p>Note: bat boxes are not suitable for this species. Compensation should replicate, as closely as possible, the existing roost:</p> <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):
Lesser Horseshoe <input type="checkbox"/> Yes <input checked="" type="checkbox"/> N/A <i>Day roost</i> <i>Transitional/Occasional</i>	<p>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:</p> <p>Specify:</p>		<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).

Section E3.3b

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) (features assumed to take five years to come into use and remain useful for 15-20 years); and
- 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 or within habitat creation areas connected to the retained woodlands under the direct supervision of the named ecologist / accredited agents. The minimum compensation for loss of roosts and PRFs will be as follows:

Roost feature type (existing confirmed roost or PRF)	Minimum replacement ratio (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 (high and moderate potential)	1:1

The roosts and potential roost features to be impacted (directly or indirectly) in the South Cubbington licence area and the number of roost mitigation features required are detailed in the table below.

Species	Roost Conservation Value	Number affected directly	Number affected indirectly	Compensation ratio	Number of compensatory roost mitigation features required
<i>B. barbastellus</i>	Moderate, High or Unknown	1	0	4:1	4
<i>M. bechsteinii</i>	Moderate, High or Unknown	0	1	4:1	4
<i>P. auritus</i>	Low	1	1	2:1	4
<i>P. auritus</i>	Moderate, High or Unknown	2	3	4:1	20
<i>P. pygmaeus</i>	Low	1	1	2:1	2
NA	Trees with Potential Roost Features –high and moderate potential	(30 + 74) 104	NA	1:1	104
<i>Total</i>					138

Overall, 138 roost mitigation features (RMFs) are required as the minimum mitigation for impacts at South Cubbington. A spatio-temporal strategy to achieve and exceed this number has been adopted and is set out below.

Initial / short-term provision 0-15 years: 45 bat boxes

- A total of 45 bat boxes will be mounted on 16 suitable trees (approximate locations shown in Figure E3) prior to works commencing at South Cubbington. These boxes will remain in place and suitable for bats for at least 15 years. This number of bat boxes ensures that all roosts lost are adequately mitigated for immediately.

Medium-term provision 20-35 years: 45 bat boxes

- Replacement of all bat boxes at 20 years – some to be erected in newly created woodlands if appropriate;

Medium / long-term provision 30-70 years: 98 RMFs

- 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.
- Veteranised features will be added to planted woodlands to the north and east of South Cubbington Wood (4.18 ha of woodland core planting within areas 1 and 3 detailed below) when trees are mature enough, around 30 years. Based on 10 trees per hectare having 2 features created or being present already, this would create an additional 84 PRFs within a further 30-50 years.

Very long-term provision 70+ years:

- Maturation of broadleaf woodland planting through natural formation of Potential Roost Features (PRFs) in the very long-term.

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.

Table 4 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.

E3.3b Table 4: Habitat mitigation and areas (shown in Figure E3A and E3B)

Area Number	Description of Woodland Habitat Creation	Mitigation type	Area (ha)
1	Woodland planting between the north of South Cubbington Wood & Weston Wood	Veteranisation of woodland core planting	4.18
3	East of South Cubbington Wood – grassland and woodland planting	Veteranisation of woodland core planting	
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	<i>Woodland planting in field not connected to South Cubbington Wood</i>	<i>Veteranisation of proposed planting – designated to Ash Beds only</i>	2.3
B	<i>Woodland planting in field not connected to South Cubbington Wood</i>	<i>Veteranisation of proposed planting – designated to Ash Beds only</i>	0.49
C	<i>Woodland planting in field not connected to South Cubbington Wood</i>	<i>Veteranisation of proposed planting – designated to Ash Beds only</i>	0.85

Mitigation within the South Cubbington area has also been designated as medium-term mitigation towards impacts at the adjacent Ash Beds licence area. The two licence areas have been shown to be used by the same whiskered / Brandt's maternity colony in Offchurch, demonstrating the connectivity between these two licence areas, which are well within the ranges of the bat species concerned. The mitigation at areas A, B and C creates stepping stones through the landscape between both licence areas and provides PRFs for use by bats from both areas. The fruit tree planting (F1, F2a, F2b) provides medium-term PRFs in new planting areas and has been allocated as mitigation for impacts at both South Cubbington and Ash Beds licence areas.

Where bat boxes are the selected roost mitigation feature, Table 5 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. All boxes will remain in place and suitable for bats for at least 15 years.

E3.3b Table 5 – Suggested bat box types to mitigate for impacts to different species and roost types

Species	Type preferred	2F	1FF	2FN / 3FN	Kent	Eco Kent	Improved Crevice bat box (ICRBB)	Improved Cavity bat box (ICABB)	1FS / 1FW Maternity / hibernation
Soprano pipistrelle	Crevice	✓	✓		✓	✓	✓		✓
Common pipistrelle	Crevice	✓	✓		✓	✓	✓		
Nathusius 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, including the eastern boundary of South Cubbington Wood, other retained sections of South Cubbington Wood and the woodland at South Cubbington. See Drawings E3A Mitigation Features and E4 Monitoring Plan.

- 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 onsite and in the wider area considered to be relevant to South Cubbington (shown in Figure E3B)

Area Number	Description of Woodland Habitat Creation	Mitigation type	Area (ha)
1	Woodland planting between the north of South Cubbington Wood & Weston Wood	Woodland planting with veteranisation	4.61
F1	Woodland planting between the north of South Cubbington Wood & Weston Wood	Fruit Tree Planting	0.51
3	Woodland planting to the east of South Cubbington Wood	Woodland planting with veteranisation	2.65
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
5	Woodland planting to the west of South Cubbington Wood	Woodland Planting - LMJV Ecological Mitigation Site	0.97
6	Woodland planting to the south of South Cubbington Wood	Woodland Planting - LMJV Ecological Mitigation Site	2.52
A	Woodland planting in field not connected to South Cubbington Wood	Woodland planting with veteranisation	2.3
8	Woodland planting in field not connected to South Cubbington Wood	Woodland Planting - LMJV Ecological Mitigation Site	0.1
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
Total	Mitigation habitat in Licence Area		15.19

Mitigation habitat shared with Ash Beds**3.64**

In total, 15.19 ha of additional new habitat will be created within the licence area, including 5.59 ha of woodland core, as well as woodland edge, species rich grassland and ponds. There will be 10.85 ha of habitat created adjacent to the retained section of South Cubbington Wood, 4.18 ha of which will be woodland core planting. This includes areas southeast of the retained section of South Cubbington Wood and on both sides of the route to the south-east of the realignment of Mill Lane Footpath and Mill Lane accommodation overbridge and along the River Leam. The target habitat will be the habitat of principal importance, lowland mixed deciduous woodland, species rich grassland and a freshwater pond. The woodland compensation planting near South Cubbington Wood will extend the size of the retained woodland to the east of the Scheme. The planting will also link woodland habitats between this retained section of South Cubbington Wood and existing woodland pockets on the banks of the River Leam increasing woodland connectivity.

A further 3.63 ha of woodland is to be created at three small sites that lie in between South Cubbington and Ash Beds. Although these sites fall within the licence area for South Cubbington, the mitigation for impacts have been allocated to Ash Beds. These woodlands are anticipated to create 'stepping stones' through the landscape towards Ash Beds. This will enhance the connectivity between these two licence areas that has been demonstrated by the whiskered / Brandt's maternity colony in Offchurch.

Habitat creation will provide additional foraging, roosting and socialising habitats for bats within the landscape. It will add value to local bat populations from the short to long term through an increase in the number and range of invertebrate prey species availability, as a result of the diversity of habitats and tree species to be provided. In the medium and long-term, the creation of woodland habitat managed to allow the natural provision of PRFs along with targeted veteranisation is considered more beneficial than RMF provision comprising bat boxes in the short-term. This is a key element in the mitigation strategy for South Cubbington.

- Creation of flight lines/routes of connectivity.

Connectivity will be created and enhanced through new habitat creation as above.

- 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. 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 the Cubbington 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.

These documents have been produced, and these are now known as Environmental Site Management Plans (ESMP). The ESMP relevant to South Cubbington Wood (re: 1EW04-LMJ-EV-REP-NS01_NL02-054039) prescribes management and maintenance over 5 – 50 years depending on the habitat type. Maintenance is prescribed for bat boxes but not other roost mitigation feature types. 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 50 year management plan.

The ESMP makes 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. 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. This maintenance is specified in the South Cubbington 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	<i>Day roost</i> <i>Night roost</i> <i>Feeding</i> <i>Transitional/Occasional</i>	<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 Proposed Scheme as per the EcMS
Serotine	<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):
Lesser Horseshoe	<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 winter 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)

Tree felling = Year Zero		Ongoing construction / Pre-operation 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 completed and mitigation planned	Felling of trees occurs – erection of bat boxes and first round of veteranisation of retained trees		First round of monitoring	Reporting	Second round of monitoring	Reporting and review of monitoring strategy in consultation with NE			Third round of monitoring during operational testing. Timing may vary due to construction delays		

Timing of the post-development monitoring for bat boxes will follow Table 5B of the EcMS 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 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).

Baseline Data

The baseline data collected using ALBST relating to the assemblage of bats consists of the following:

- Capture information of free flying bats, including species, location, sex and breeding status - provides the **assemblage of bat species**;
- Radio-tracking target species (target species were tagged) provides **confirmed roost locations** and **type / feature**, even those well outside of the licenced area;
- Emergence surveys (with IR cameras) of the confirmed roosts provides **number of bats** (population estimate), **status of the roost(s)** (i.e. day/maternity/mating);
- In addition, **habitat information** such as number of PRF's, woodland type, extent (ha) and anticipated losses (ha) as a result of the scheme have also been obtained.

With the level of baseline data gained using ALBST, the distribution and abundance of the populations of species in their natural range may be robustly measured. Using the same techniques for monitoring over the long term, the FCS can be confidently assessed.

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 at the relevant sites 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 site is the woodland parcel/habitat directly and indirectly impact by tree clearance.

** Target bat species for South Cubbington Wood are brown long-eared and Bechstein's bat. The licence area also supports barbastelle which is of particular conservation interest.

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.

Rationale for proposed monitoring methods

It has been established that South Cubbington Wood primarily supports a resident maternity population of brown long-eared bats. Day roosts for Bechstein’s bat and Barbastelle also occur.

Monitoring will therefore be required to confirm the continued presence of these species and roost types in numbers comparable to those determined from baseline survey data obtained in 2018 and 2019.

It is therefore important for the monitoring approach to include methods for assessing:

- the effectiveness of the replacement roost features (such as bat box inspections); and
- the continued presence of roosts of the bat population within retained woodland areas where they may still be using other trees.

The monitoring methods proposed to achieve these objectives are a mix of traditional roost checks and ALBST surveys comprising trapping, tagging and radio-tracking. These are set out in the monitoring matrix below. This work will be undertaken by ecologists approved by the named ecologist to ensure consistency in monitoring survey methods employed pre- and post-mitigation. Thermal imaging cameras will be used to support roost characterisation where necessary.

Should monitoring be confined to roost replacement features only, there is a danger that low uptake of these mitigation features by bats could provide for a poor assessment of FCS, when in fact the tree roosting bat populations may still be adequately provided for within the retained woodland areas or, as the evidence suggests, in the surrounding residential areas and mature woodland. Therefore, the proposed combined approach not only provides data on the compensatory roost use, but can also place the mitigation roosts in context with the retained natural roosting habitat of the site as a whole.

ALBST monitoring surveys will be undertaken as part of the licence monitoring taking into consideration the following factors:

- The requirement to gain data comparable to that obtained during pre-construction surveys;
- The ability to more accurately assess FCS by gathering data relating to the use of roosts across the full extent of the habitat concerned, rather than just the mitigation features created or installed;
- The ability to deliver each of the above at comparable or lower cost than a ‘traditional’ monitoring approach, whilst simultaneously requiring fewer skilled ecologists (a recognised potential constraint to future monitoring activities); and
- Potential to avoid unnecessary further intervention due to greater confidence in monitoring.

Monitoring methods

The monitoring matrix below has therefore been developed to address the monitoring objectives and has taken in account the challenges associated with tree roosting bat species. It is acknowledged that there are limitations with all methods, especially in determining the population aspects of FCS. All monitoring will be undertaken or overseen by the ecologist / accredited agents named on the mitigation licence.

The monitoring matrix outlines the FCS value the monitoring will inform, the objective and broad methodology. In addition, broad success indicators are given from which mitigation effectiveness can be assessed. Where assessed as ineffective, remedial action will be proposed.

Detailed survey methodologies for the monitoring approaches will be developed to achieve the aims of the monitoring strategy. As set out in section E4.2, a review of the monitoring strategy is proposed following the tree climbing prior to felling and then in Year 5 following the first two rounds of monitoring, in accordance with the approach outlined in the EcMS. This is to incorporate any relevant changes, such as a better understanding in the number of roosts (that may be found during tree climbing inspections prior to felling), 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 and any relevant amendments to monitoring will be agreed with HS2 and Natural England.

Bat box / roost mitigation feature inspection methodology will follow that of the Bat Worker’s Manual and BCT Bat survey Guidelines (Collins 2016).

Monitoring matrix

FCS value	Objective (with monitoring)	Method	Timing	Location	Broad success indicators
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	objective number)				
Distribution	Monitoring of mitigation feature uptake by bats (5) and comparison of species assemblage (1) and breeding status (2,3) 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	Years 2 and 4 post tree clearance (per ECMS) Review following year 4	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.
	Comparison of species assemblage (1) and breeding status (2) pre and post clearance works	Trapping surveys in June, August and September	Years 2, 4 and 10 post tree clearance Review following year 4	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).
	Where species baseline data is sufficient, compare roosting presence (3,5) within same woodland parcel.	Radio tracking of target bat species to locate roosts in June, August and September. Activity surveys if no tagged bats found.	Years 2, 4 and 10 post tree clearance Review following year 4	Retained and new / planted mitigation woodland areas	Continued presence of roost types and associated species. (comparing pre-clearance works tracking data e.g. roost types, locations and numbers present).
Population	Comparison of the population type (3) of bat species where baseline data of target species* is sufficient for comparison.	Radio tracking of target bat species to locate roosts, followed by emergence surveys using Infra-red / Thermal Imaging devices in June, August and September.	Years 2, 4 and 10 post tree clearance Review following year 4	Retained and new/planted mitigation woodland areas	No decline or an increase in established baseline population presence and type of target bat species
Habitat	Comparison of new habitat creation in relation to habitat areas lost (4)	Assessment of woodland areas	As per EcMS	Mitigation areas only - New woodland creation / planting areas Figure E3	Woodland creation in place and meeting creation targets
Roost Mitigation Feature	Monitoring of bat boxes confirming the presence of bat species (1,5) and breeding status (2,3)	2 x roost mitigation inspections in June and September. Dropping collection for eDNA analysis to confirm species where possible.	Years 2 and 4 post tree clearance as per the ECMS Review following year 4	Retained and new / planted mitigation woodland areas	The baseline assemblage of bat species recorded using bat boxes and other mitigation features.
	(if relevant) Monitoring of other roost replacement features, e.g. monoliths salvaged from woodlands and 'veteranised' retained trees.	Ground-based, inspections (and tree climbing inspections where needed / safe); recommendations for replacement as necessary;	Years 2 and 4 post tree clearance as per the ECMS		

	Confirms the presence of bat species (1,5) and breeding status (2,3)	supervision of replacement. Emergence / re-entry surveys to confirm use or otherwise inform requirement for re-siting / additional features.	Review following year 4		
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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).

[See Figure E4 – Monitoring Specification]

- Bat boxes erected to compensate for loss of confirmed roosts and loss of moderate and high potential roost features.
- Woodland creation/ planting areas including soft fruit trees.
- Veteranised planted trees, and any roost mitigation features created on these trees.

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 South Cubbington Wood (ref: 1EW04-LMJ-EV-REP-NS01_NL02-054039 Revision: C05) prescribes management and maintenance for the mitigation and compensatory habitats and features over 5 – 50 years depending on the habitat type.

The ESMP makes 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:

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

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

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;

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 included 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).
Figure B2.1	-	Yes, if the application is part of a phased or multi-plot development	Master plan overview- note – this is not the same as a master plan document, for which you should follow the guidance as stated in section B2.1.
Figure B2.2	-	Yes, if applicable	Locations of other nearby bat licensed sites, or sites which will be impacted on by future development.
Figure C5a	-	Yes	Location map at an appropriate scale for the application (often 1:50,000 or 1:25,000)
Figure C5b	-	Yes	Survey area 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.
Figure C6	-	Yes	Survey results - 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.
Figure D	Yes	-	Impacts plan – 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.
Figure E2	Yes – but only if applicable to the application	-	Non-standard capture and exclusion apparatus. If these are proposed please include diagrams/photographs.
Figure E3	Yes	-	Specifications for mitigation / compensation (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.
Figure E4	Yes – when monitoring and maintenance will	-	Monitoring, management and maintenance map. Please indicate the specific structures and habitat that are to be managed, maintained and monitored as part of this licence proposal. Ensure

	be included in the licence		that they are correctly referenced and are consistent with other parts of the Method Statement and figures.
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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.