M3 Junction 9 Improvement

Scheme Number: TR010055

6.3 Environmental Statement Appendix 8.1s - Bat Roost Survey Report 2021

APFP Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

Volume 6

November 2022

Infrastructure Planning

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

M3 Junction 9 Improvement
Development Consent Order 202[x]

6.3 ENVIRONMENTAL STATEMENT- APPENDIX 8.1s: BAT ROOST SURVEY REPORT 2021

Regulation Number:	Regulation 5(2)(a)
Planning Inspectorate Scheme Reference:	TR010055
Application Document Reference:	6.3
BIM Document Reference:	HE551511-VFK-EBD-X_XXXX_XX-RP-LE-0007
Author:	M3 Junction 9 Improvement Project Team, Highways England

Version	Date	Status of Version
Rev 0	November 2022	Application Submission

Document Control

The Project Manager is responsible for production of this document, based on the contributions madeby his/her team existing at each Stage.

Document Title	PCF Stage 3b Bat Roost Survey Report
Author	Duncan McLaughlin
Owner	
Distribution	Highways England Consultees, VolkerFitzpatrick and Stantec Team
Document Status	For Review and Comment

Revision History

This document is updated at least every stage.

Version	Date	Description	Author
P01	08 July 2021	For Review and Comment (S3)	Duncan McLaughlin

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M3 Junction 9 Improvement

Bat Roost Survey Report

HE551511-VFK-EBD-X_XXXX_XX-RP-LE-0007

On behalf of **Highways England**

Project Ref: 12345/001 | Rev: AA | Date: July 2021

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Document Control Sheet

Project Name: **M3 Junction 9 Improvement**

Project Ref: **330610074**

Report Title: **Bat Roost Survey Report**

Doc Ref: **HE551511-VFK-EBD-X_XXXX_XX-RP-LE-0007**

Date: **08 July 2021**

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Revision	Date	Description	Prepared	Reviewed	Approved
P01	08/07/2021	For Review and Comment	SF	DM	AS

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1 Executive Summary

1.1.1 Stantec UK was commissioned to undertake additional bat survey work in relation to the M3 Junction 9 Improvement scheme. Specifically, this report relates to two bridges located to the north of Junction 9 of the M3 in Hampshire; hereafter referred to as 'the Site'.

1.1.2 The bat surveys involved undertaking a detailed inspection of the bridges in addition to dusk emergence and dawn return to roost surveys in May and June 2021. No evidence of roosting bats was found during the inspections; however, a number of potential roosting features were identified. No bats were recorded emerging from or returning to roost in either bridge with four species routinely recorded foraging on and commuting along/over the river corridor. Of these bats, the survey data (timing of calls) indicated that the common and soprano pipistrelle bats were utilising nearby trees as a roost with noctule bats also likely utilising tree roosts in the local area. The early timing of Daubenton's bat calls suggests that these bats also roost close by and given the presence of suitable roosting features in the bridges their presence as a roosting species on an occasional basis cannot be ruled out. However, no clear evidence of roosting within the bridges was recorded during these surveys.

1.1.3 The full extent of the works associated with the bridges are unknown at present; however, works could have an adverse impact on bats present locally. Impacts could include damage/destruction of a roost were a roost to be present in affected areas at the time of works, killing/injury of bats if present in the bridge at the time of works and disruption of foraging and commuting bats during works as a result of the insensitive use of lighting. Recommendations to mitigate for impacts in relation to bats roosting on Site are therefore put forward within the report and include:

- An update survey involving dusk emergence and dawn return to roost survey conducted between May and September inclusive. This survey should be undertaken should one year elapse prior to the start of works
- Should the presence of roosting bats be confirmed following this further survey a licence may need to be obtained from Natural England to allow derogation of the legislation protecting bats and their roosts during works
- The provision of alternative roosting opportunities for crevice dwelling species of bats and
- Lighting during works should be avoided where possible. Where this is not possible light spill onto the adjacent watercourse and woodland habitats must be avoided with baffles and louvres used to achieve this.

1.1.4 Biodiversity enhancement measures have also been proposed including the provision of new roosting opportunities over and above those required for mitigation. This could include bat boxes to be affixed beneath the bridges or on nearby mature trees.

1.2 Disclaimer

1.2.1 This Executive Summary contains an overview of the key findings and conclusions. However, no reliance should be placed on any part of the executive summary until the whole of the report has been read.

2 Introduction

2.1 Overview

2.1.1 Stantec UK was commissioned by Volker Fitzpatrick to undertake additional bat survey work in relation to the M3 Junction 9 Improvement scheme. Specifically, this report relates to two bridges, Kingsworthy Bridge and Itchen Bridge, located to the north of Junction 9 of the M3 in Hampshire; hereafter referred to as 'the Site'.

2.2 Project Background

Site Location

2.2.1 The Site comprises two road bridges (Itchen Bridge (Bridge B8) and Kingsworthy Bridge (Bridge B9)) that carry the A34 over the River Itchen at Grid References SU 4934 3145 and SU 4938 3147. The Site is bordered by Winnall Moors (a Hampshire and Isle of Wight Wildlife Trust (HIWWT) reserve) to the west, woodland to the north, Easton Down to the east and the A34 and Winnall Trading Estate to the south.

Project Description

2.2.2 M3 Junction 9 is a key transport interchange which connects South Hampshire and the wider sub-region, with London via the M3 and the Midlands/North via the A34. A significant volume of traffic currently uses the grade separated, partially signalised gyratory (approximately 6,000 vehicles per hour during the peak periods) which acts as a bottleneck on the local highway network and causes significant delay throughout the day. Highways England is looking to reconfigure the junction to improve the situation for vehicle traffic and non-motorised users. The full extent of work associated with the two bridges is unknown at present.

2.3 Ecological Context

2.3.1 A Preliminary Bat Roost Assessment survey (Highways England, 2018) carried out in 2017 by WSP identified that Itchen Bridge (Bridge B8) and Kingsworthy Bridge (Bridge B9) as having moderate potential for roosting bats.

2.3.2 In August 2020, one dusk emergence survey was undertaken by Stantec UK at each of the bridges. An infra-red camera was used to aid in the detection of roosting bats. The survey at the Itchen Bridge (B8) detected three bat species foraging and commuting along the river corridor: common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus*, Myotis sp. (likely Daubenton's bat *Myotis daubentonii*) and noctule *Nyctalus noctula*. Myotis bats and an unconfirmed species were recorded/observed in close association with the bridge close to sunset indicating the likely presence of a bat roost within the bridge.

2.3.3 The survey of the Kingsworthy Bridge (B9) recorded the presence of three bat species (common pipistrelle, soprano pipistrelle and Myotis bat). Daubenton's bats were recorded as early as 15 minutes prior to sunset strongly indicating the presence of a roost for this species. In addition, five soprano pipistrelle bats were observed close to the western end of the bridge (close to sunset) again strongly suggesting that these bats emerged from the bridge.

2.3.4 Following the inconclusive results of the 2020 surveys, further surveys were recommended during 2021 (Highways England, 2020).

2.4 Report Objectives/Aims

2.4.1 Given the findings of the initial dusk surveys in 2020, Stantec UK was commissioned by Volker Fitzpatrick to complete further bat survey work in spring and summer 2021 comprising a daytime inspection and dusk emergence and dawn return to roost surveys on the two bridges (B8 and B9).

2.4.2 The aim of this report is to:

- Provide details of the methods used for the study.
- Determine the presence or likely absence of roosting bats from within the Site.
- If present, gather information on the likely species and roost status.
- Summarise the current legislation and policy guidance relevant to bats.
- Provide an outline identification of potential impacts on bats as a result of the proposals and recommendations for appropriate mitigation, compensation or enhancement relevant to bats.

3 Methods

3.1 Overview

3.1.1 The methods used to inform the assessment of the Site in relation to bats is set out below. This includes dusk emergence and dawn return to roost surveys and survey limitations. Details of survey personnel are also included.

3.2 External Inspection of Bridges

3.2.1 The external inspection survey on the two bridges B8 and B9 (where access was possible and deemed safe) was undertaken following standard Bat Conservation Trust (BCT) survey guidance (Collins, 2016).

3.2.2 The inspections were undertaken on 1st June 2021. Weather conditions were dry with a light breeze (Beaufort scale F2) and partially cloudy skies (2/8 cloud cover). Air temperatures ranged between 22°C and 24°C.

3.2.3 The exterior of the bridges was searched from the ground and a ladder using a high powered torch and close-focusing binoculars (where necessary) for:

- features which could provide bats with access into roosting spaces or provide roosting spaces (such as gaps in the structure of the bridge); and
- evidence of the presence of bats such as bat droppings on walls, crevices and the ground, or scratch marks or staining from bat's fur around possible roost access/ egress points.

3.2.4 The bridges were assigned a category defining their potential to support roosting bats in accordance with Table 1 below.

Table 1: Categories of Bat Potential of Buildings (adapted from Collins, 2016)

Level of Bat Roosting Potential	Rationale
Negligible	A structure with no or very limited roosting opportunities for bats and no evidence of use by bats and where the feature is isolated from foraging habitat.
Low	A structure with one or more potential roost sites that could be used by bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions (temperature, humidity etc) and/or suitable surrounding habitat to be used on a regular basis by a larger number of bats (i.e. unlikely to be suitable for maternity or hibernation).
Medium	A structure with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only i.e. maternity or hibernation roosts).
High	A structure with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.
Confirmed	Presence of bats or evidence of recent use by bats.

3.3 Dusk Emergence and Dawn Return to Roost Surveys

3.3.1 Survey visits were conducted on bridges B8 and B9 during May and June 2021. These visits were undertaken in accordance with the Bat Conservation Trust's Good Practice Guidance (Collins, 2016) in suitable weather conditions. The surveys were undertaken at an optimal time of year, when bats are active and are likely to be using summer/maternity roosts. The dusk emergence surveys began 15 minutes before sunset and continued until 1.75 hours after sunset. The dawn return to roost surveys began 1.75 hours before sunrise and finished at sunrise or up to 15 minutes after sunrise depending on current levels of bat activity.

3.3.2 Two surveyors were used during each of the surveys with survey locations selected on each visit to ensure adequate coverage of the bridges. These surveyor locations are shown in Figure 1. The surveyor locations, timings and weather conditions recorded during these visits are shown in Table 1 in Appendix B. Infra-red and thermal imaging cameras were used to assist in the identification of roost sites within the bridges.

3.3.3 Given the findings of the previous surveys in 2020 (likely roosting but unconfirmed roost locations) three survey visits were undertaken at each bridge. These comprised two dusk emergence surveys and a separate dawn return to roost survey. In line with current guidance each visit was separated by a period of two weeks.

3.4 Analysis of Bat Call Data

3.4.1 Bats generate echolocation calls which were recorded by the detectors (Bat Logger M) during the dusk emergence and dawn return to roost surveys. These were analysed using the BatExplorer software.

3.4.2 Once triggered the Bat Logger M has been set to record ultrasound pulses for up to 15 seconds unless there is a break in the pulses for more than 1.5 seconds. If there is a break a new recording file (pass) is created. Where possible, bat calls are identified to species level. However, species of the genus Myotis are grouped together in most cases as their calls are similar in structure and have overlapping call parameters, making species identification problematic (Russ, 2012).

3.4.3 For Pipistrellus species the following criteria based on measurements of peak frequency are used to classify calls:

- Common pipistrelle ≥ 42 and <49kHz
- Soprano pipistrelle ≥ 51kHz
- Nathusius pipistrelle <39kHz
- Common/soprano pipistrelle ≥49 and <51kHz and
- Common/Nathusius pipistrelle ≥39 and <42kHz.

3.4.4 In addition, the following categories are used for calls which cannot be identified with confidence due to the overlap in call characteristics between species or species groups:

- *Myotis*/*Plecotus* sp.
- *Nyctalus* sp. (either Leisler's bat or noctule)
- Serotine/Leisler's; and

- Serotine/*Plecotus* sp.

3.5 Survey Personnel

3.5.1 The surveys were undertaken by two suitably qualified and experienced ecologists who are both full members of the Chartered Institute of Ecology and Environmental Management (CIEEM). Each surveyor has worked as a professional ecologist for more than 16 years. The survey approach was designed by and led by a holder of a (Level 2 Class Licence) since 2010 for surveying bats. During his time as a professional ecologist, he has undertaken an extensive number of external and internal building assessments, dusk emergence and dawn return to roost surveys, activity transect and automated static detector surveys across the UK and Ireland. He has been involved in numerous projects requiring bespoke mitigation to be designed and implemented where proposed development has an impact on roosting bats.

3.6 Limitations to Methodology

3.6.1 Surveys were undertaken at an appropriate time of year in suitable weather conditions. As such there are no constraints to the methods of the survey in relation to survey timing and weather.

3.6.2 A full inspection of potential features in the central supports/piers could not be undertaken during the inspection survey as these were in the centre of the deep river channel. It was agreed prior to the survey that the health and safety risks and implications associated with access (e.g. via boat or floating platform) outweighed the benefit of access. However, potential features in these areas of the bridge structure were fully covered/observed during the subsequent dusk emergence and dawn return to roost surveys allowing the presence of any roosts to be identified.

3.7 Report Qualification

3.7.1 The surveys described in this report were undertaken in accordance with the best practice methodologies current at the time of commissioning (Collins, 2016). Site circumstances, scientific knowledge or methodological requirements can change during the course of a project, and these external factors may impact on the scope of subsequent work requirements.

3.7.2 All surveys and reporting were led by experienced and qualified ecologists, in accordance with the Code of Professional Conduct of CIEEM.

3.7.3 All surveys have an expected validity period owing to the tendency of the natural environment to change over time. This validity period varies depending on the ecological feature and also the degree of change in a site's management and overall landscape ecology. Where the potential for change is considered to be relevant to the Site, this is highlighted in Section 4.

3.7.4 This report does not purport to provide detailed, specialist legal advice. Where legislation is referenced, the reader should consult the original legal text, and/or the advice of a qualified environmental lawyer.

4 Results and Interpretation

4.1 External Inspection of Bridges

4.1.1 This section details the results of the external inspection of the two bridges. Photographs are provided in Appendix C.

The Itchen Bridge (Bridge B8)

4.1.2 Bridge B8 had a concrete construction (large concrete slabs) with central concrete supports. The bridge had a width of approximately 15m. The underside of the bridge was approximately 3-4m above the water of the River Itchen. The bridge was generally in good condition and tightly constructed offering limited opportunities that could be exploited by roosting bats. However, in a small number of locations the polystyrene spacers between the concrete beams that span the bridge had eroded offering small crevices that could be used by bats. These were all fully inspected at the time of the survey and no evidence of bats was found. In addition to these, gaps were present at the apex of the central supports possibly allowing bats to roost in the space between the main span of the bridge and the top of the supports. Gaps were also present on the northern and southern ends of the bridge that lead to a deep cavity in the bridge structure. These features could be used year round including as a possible hibernation resource. However, these were also fully inspected with no signs of roosting bats identified. Given the presence of these suitable gaps at various points on the bridge, the bridge was assessed as having a moderate level of roosting suitability.

The Kingsworthy Bridge (Bridge B9)

4.1.3 Bridge B9 located to the east of Bridge B8 also had a concrete construction; however, the structure was more tightly sealed in the interior than bridge B8. This bridge was larger than B8 with a width of 25m. As above this bridge also had concrete central supports. Small gaps were present in empty pipe holes in the central supports with gaps also present on the northern and southern ends of the bridge. These features could also be used year-round. The gaps in the northern and southern ends of the bridge were fully inspected and no signs of roosting bats were found. It was not possible to inspect gaps in the central supports. This bridge was also assessed as having a moderate level of roosting suitability.

4.2 Dusk Emergence/Dawn Return to Roost Surveys

4.2.1 Details of the dusk emergence, dawn return to roost surveys for the buildings on Site are provided below along with an interpretation of the use of the Site by roosting, foraging and commuting bats. Example sonograms of calls are included in Appendix D.

The Itchen Bridge (Bridge B8)

4.2.2 Table 2 below details the survey results and lists the calls closest to sunset and sunrise on each of the survey visits per surveyor location.

Table 2: Bridge B8 Survey Results

Visit No.	Time of Sunset/ Sunrise	Surveyor Locations	Species	Total No. Passes	Earliest/ Latest Call
1	20:31	L1	Soprano pipistrelle	298	20:47 (16 mins after sunset)

Visit No.	Time of Sunset/ Sunrise	Surveyor Locations	Species	Total No. Passes	Earliest/ Latest Call
			Daubenton's bat	125	21:21 (50 mins after sunset)
		L2	Soprano pipistrelle	192	20:47 (16 mins after sunset)
			Daubenton's bat	132	21:21 (50 mins after sunset)
2	21:10	L3	Soprano pipistrelle	251	21:24 (14 mins after sunset)
			Common pipistrelle	13	22:05 (55 mins after sunset)
			Noctule	3	21:18 (8 mins after sunset)
			Daubenton's bat	5	21:59 (49 mins after sunset)
		L4	Soprano pipistrelle	364	21:24 (14 mins after sunset)
			Common pipistrelle	56	21:37 (27 mins after sunset)
			Noctule	1	21:18 (8 mins after sunset)
			Daubenton's bat	10	22:00 (50 mins after sunset)
3	04:49	L1	Soprano pipistrelle	4	04:04 (45 mins before sunrise)
			Common pipistrelle	8	04:15 (34 mins before sunrise)
			Noctule	3	04:33 (16 mins before sunrise)
			Daubenton's bat	73	04:00 (49 mins before sunrise)
		L2	Soprano pipistrelle	8	04:11 (38 mins before sunrise)
			Common pipistrelle	5	04:18 (31 mins before sunrise)
			Noctule	4	04:33 (16 mins before sunrise)
			Daubenton's bat	58	04:01 (48 mins before sunrise)

4.2.3 No bats were recorded emerging from or returning to potential roost features in Bridge B8 during the surveys undertaken in 2021. Incidental activity of four bat species were recorded in the vicinity of the bridge foraging and commuting along the river corridor. A full interpretation of the data is provided below.

The Kingsworthy Bridge (Bridge B9)

4.2.4 Table 3 below details the survey results and lists the calls closest to sunset and sunrise on each of the survey visits per surveyor location.

Table 3: Bridge B9 Survey Results

Visit No.	Time of Sunset/ Sunrise	Surveyor Locations	Species	Total No. Passes	Earliest/ Latest Call
1	20:33	L5	Soprano pipistrelle	45	20:49 (16 mins after sunset)
			Daubenton's bat	180	21:07 (34 mins after sunset)
		L6	Soprano pipistrelle	131	20:46 (13 mins after sunset)
			Daubenton's bat	200	21:06 (33 mins after sunset)
2	04:56	L7	Soprano pipistrelle	213	04:29 (27 mins before sunrise)
			Common pipistrelle	12	03:47 (1 hour 9 mins before sunrise)
			Daubenton's bat	12	03:37 (1 hour 19 mins before sunrise)
		L8	Soprano pipistrelle	334	04:29 (27 mins before sunrise)
			Daubenton's bat	8	04:20 (36 mins before sunrise)
3	21:24	L5	Soprano pipistrelle	310	21:31 (7 mins after sunset)
			Common pipistrelle	21	21:42 (18 mins after sunset)
			Noctule	3	21:24 (At sunset)
			Daubenton's bat	112	21:45 (21 mins after sunset)
		L6	Soprano pipistrelle	`233	21:33 (9 mins after sunset)
			Common pipistrelle	71	21:33 (9 mins after sunset)
			Noctule	3	21:25 (1 min after sunset)
			Daubenton's bat	7	22:25 (1 hour and 1 min after sunset)

4.2.5 No bats were observed emerging from or returning to potential roost features in Bridge B9. An identical assemblage of bat species was also recorded during the surveys visits to this bridge. The survey results from 2020 and 2021 indicate that small numbers of pipistrelle and Daubenton's bats do use a roost site close to the bridge. Given the presence of suitable features, it is possible that these bats could use features within the bridge on an occasional basis, although no evidence of this was recorded during the 2021 survey programme.

4.3 Interpretation of Results

4.3.1 As shown in the tables above, incidental activity recorded during each of the surveys was generally high with soprano pipistrelle bats being the most frequently recorded species. This is to be expected as this species along with the common pipistrelle is common and widespread throughout the UK (Dietz *et al*, 2009). The greater numbers of soprano pipistrelle bats is also to be expected as this species is more of a specialist in their habitat preferences being more strongly dependent on riparian forests, lowlands and water bodies of any size, in particular still waters (Dietz *et al*, 2009 and Russ, 2012).

4.3.2 The earliest soprano pipistrelle bat calls recorded were 14 minutes after sunset at Bridge B8 and 9 minutes after sunset at Bridge B9. This species typically emerges from its roost between 10 and 30 minutes after sunset (Russ, 2012). Taking into account the observed activity and timings of the soprano pipistrelle calls recorded during the survey visits, it is likely that these bats roost very close to the bridges. The dawn return to roost survey on 2nd June 2021 provided an insight into a possible roost location with bats observed flying into nearby woodland to the south approximately 27 minutes prior to sunrise. This data suggests that rather than using the bridges, these bats are most likely to be roosting in a tree(s) within nearby woodland habitats, using the cover of the trees at dusk to commute in higher light levels to reach the optimum foraging habitat of the river corridor. This would account for the early emergence times recorded during the surveys.

4.3.3 The next most frequently recorded species was the Daubenton's bat. This species was able to be identified through analysis of sonograms (including the presence of distinctive social calls, see Appendix D) and observation of the flight behaviour of these bats using thermal imaging scopes. Daubenton's bats tend to forage close to the surface of water where it preys on non-biting midges and other small Dipterans (two-winged flies) (Dietz *et al*, 2009). As such the river corridor represents high-quality foraging habitat for this species.

4.3.4 Daubenton's bats typically roost in tree holes and bat boxes but also in cracks in bridges and more rarely in buildings (Dietz *et al*, 2009). This species typically emerges from its roost between 30 minutes and 50 minutes after sunset (Russ, 2012). The earliest call at Bridge B8 was recorded 50 minutes after sunset with the earliest call recorded at Bridge B9 being 21 minutes after sunset. As in the case of the soprano pipistrelles above, this suggests that a roost for this species is close by. No Daubenton's bats were observed emerging from or returning to roost in either bridge despite thermal imaging and night vision survey equipment being used. However, given the timing of the calls the close proximity of a roost is likely and given a large number of roosting opportunities available within the bridges it is possible that bats could use these structures on an occasional basis as a day/summer roost at any time. The survey undertaken in August 2020 on Bridge B9 recorded Daubenton's bats 15 minutes prior to sunset strongly indicating the presence of a roost for this species (Highways England, 2020). Therefore, these surveys have ruled out the presence of a significant roost i.e. a maternity roost with no confirmation of the use of either bridge as a roosting resource gained at this time. However, the large volume of activity around the bridges and the findings from 2020 suggest that the use of either bridge though Bridge B9 in particular on an occasional basis cannot be discounted.

4.3.5 Common pipistrelle bats were the next most frequently recorded species. This species is common and widespread and has very generalist habitat requirements (Dietz *et al,* 2009). The earliest call recorded at Bridge B8 was 31 minutes after sunset and the earliest at Bridge B9 was 9 minutes after sunset. As with the soprano pipistrelles, common pipistrelle bats typically emerge from their roosts between 10 and 30 minutes after sunset (Russ, 2012). The timing of the calls again indicates the presence of a nearby roost for this species though no evidence of use of either of the bridges was observed.

4.3.6 A small number of noctule bat calls were also recorded. This species is found in a range of habitat types including deciduous woodland, parkland and pasture (Russ, 2012) and often

forage over water-bodies (Dietz *et al*, 2009). This species typically forages between 2.5 km-4 km (up to a maximum of 25 km) from a roost (Dietz *et al*, 2009).

4.3.7 Noctule bats primarily roost within cavities in trees and are known to emerge from their roosts between 0 and 26 minutes after sunset and return to the roost at or very close to sunrise (Russ, 1999). The timing of the earliest call on Bridge B8 (8 minutes after sunset) and Bridge B9 (at sunset) indicates that although not roosting in the bridges there could be a roost close by. However, it is worth noting that the noctule bat is a fast-flying species reaching speeds of up to 50 kmph (BCT, 2010) suggesting that the roosts for these bats could still be a considerable distance from the Site, particularly given the abundance of woodland habitats present in the local landscape.

5 Legislation Context

5.1 Overview

5.1.1 Legislation relevant to bats and the Site are summarised in this section. Please be aware that this does not constitute legal advice. Further detail regarding the legislation protecting bats and their roosts is included in Appendix A.

5.1.2 Both bats and their roosts are afforded protection under the Conservation of Species and Habitats Regulations 2017 (as amended) and the Wildlife and Countryside Act 1981 (as amended). In broad terms these pieces of legislation jointly mean that the animals themselves are protected against killing, injury, taking (capture) and disturbance. In addition, their places of shelter are protected against damage, destruction and obstruction. Several species are also classified as Species of Principal Importance (SPIs), including soprano pipistrelle and noctule which were both recorded on Site during this suite of surveys. SPI species are included on a list drawn up in response to the requirements of Section 41 of the Natural Environment and Rural Communities (NERC) Act, 2006 and are considered priority for the conservation of biodiversity in England.

6 Potential Impacts and Recommendations

6.1 Overview

6.1.1 Potential impacts on bats associated with the proposals for the Site are identified in this section together with outline recommendations for how these may be overcome.

6.2 Potential Impacts

6.2.1 The exact extent of works required on the bridges is unknown at the time of writing; however, possible impacts that could result during bridge works (in the absence of mitigation) could include:

- Possible damage or destruction of a day/summer roost in use by individual/small numbers of Daubenton's bats were bats present in features in the bridges at the time of works.
- Killing and/or injury of small numbers of bats were bats found to be using the bridges at the time of works.
- Disruption of foraging and commuting behaviour during works if lighting is used during night working (particularly in the case of light sensitive species including the Daubenton's bat.

6.3 Further Survey

6.3.1 If the proposed works do not commence for a period greater than one year then it is recommended that the bridges be resurveyed to determine the current roosting status. In the event that a bat(s) is confirmed to be roosting during this further survey, a licence from Natural England may be required depending on the extent and nature of the works and whether disturbance or damage to the roost would occur. This licence would allow works to proceed lawfully.

6.4 Mitigation/Compensation for Loss of Potential Roosting Habitat

6.4.1 The following section outlines possible mitigation, compensation and enhancement measures that could be implemented with regard to roosting, foraging and commuting bats.

Roosting Bats

6.4.2 The works associated with Bridge B8 and B9 could result in a reduction of possible roosting opportunities within the Site, therefore alternative roosting provision would need to be included as part of the scheme depending on the nature and extent of the works to the structure of the bridge (particularly beneath the carriageway). In order to minimise the potential for killing, injury or disturbance to bats, and to mitigate for the loss of roosting opportunities for bats, the following recommendations should be adopted:

Timing of Works

6.4.3 As detailed in Section 4 the surveys did not identify bat roosts within the bridges, however there is a possibility that the bridges could be used by individual/small numbers of Daubenton's bats on an occasional basis. Once full details of works to the bridges is known including working methods and timings, and results of update surveys received prior to construction, appropriate mitigation can be developed. Dependent on the results of update surveys and working methods it may be necessary to time works to avoid especially sensitive periods of the bat's yearly cycle.

Provision of Suitable Alternative Roosting Opportunities

6.4.4 In order to compensate for the possible loss of potential roosting opportunities in the bridge structure, roosting opportunities may need to be incorporated into beneath the bridge.

6.4.5 Depending on the extent of works roosting opportunities could be integrated into the external fabric of the bridge. These integrated features are discretely installed and sit within internal cavities. A number of examples are commercially available including Schwegler bat tubes, Ibstock bat bricks and Habibat bat bricks. A number of examples are available commercially in the UK from suppliers including the NHBS [redacted]. These require no maintenance and are ideal for crevice dwelling species of bats like Daubenton's and pipistrelles.

6.4.6 Alternatively, bat boxes could also be installed beneath the bridge. It is recommended that these be affixed beneath the apex on the central supports of the bridge (in the middle of the channel) to avoid interference by members of the public. A number of boxes are available commercially from suppliers like [redacted]

Sensitive Use of Exterior Lighting

6.4.7 In order to avoid impacts to foraging and commuting bats lighting at night should be avoided. However as this is unlikely to be possible given that works are likely to take place at night when carriageways are quiet, the following measures should be adhered to:

- Column heights should be carefully considered to minimise light spill.
- Light spill down the river channel and onto adjacent woodland habitats must be avoided.
- Accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only to where it is needed.

6.5 Enhancement Measures

6.5.1 The following measures are recommended for inclusion as part of the proposed works to enhance the bridges for roosting bats.

New Roosting Opportunities

6.5.2 Bat boxes (above and beyond those required for mitigation) could be installed on both bridges and possibly on mature trees adjacent to the Site. Where bat boxes are affixed to trees they would need to be installed in positions where they are out of reach of people from the ground (so as to limit interference) and high enough to deter cats and other predators. These boxes will not be placed too high as this makes maintenance more difficult and can leave the boxes exposed to weather, particularly strong winds. In practice, placing them between 3 and 4.5 metres from the ground is optimal. Boxes will also be placed in a range of locations at slightly different heights and facing in slightly different directions to give a choice of roost site options (Mitchell-Jones, 2004). The direction of the boxes will also be selected to avoid facing them into the prevailing weather and will preferably be positioned facing in a southerly direction (i.e. south-west through south to south-east) where they will receive a good degree of sunlight.

7 Conclusions

7.1.1 Dusk emergence and dawn return to roost surveys undertaken on Bridge B8 and B9 in 2021 did not reveal any clear evidence of roosting bats within either of the two bridges. However, the use of either bridge as a roosting resource on an occasional basis cannot be entirely ruled out.

7.1.2 Recommendations have been included within this report to ensure that the proposed works minimise any possible adverse impacts to roosting bats. Providing that construction works employ methods to ensure the legislation protecting this species is not contravened and that suitable mitigation/compensation is incorporated, there are no overriding reasons relating to roosting bats that would preclude works to the bridges.

7.1.3 If works do not commence within one year, a further survey would need to be undertaken to ascertain the current status of roosting bats. If a bat roost is identified during any follow-up survey, it is likely that a licence from Natural England will need to be obtained to allow works to the bridge to be undertaken lawfully. Alternative roosting features and recommendations with regard to the timing of works and lighting during works are put forward to ensure that the favourable conservation status of the bats using the Site is maintained post development.

7.1.4 The scheme has the potential to deliver biodiversity enhancements through the provision of additional roosting opportunities for bats.

8 References

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

8.1.2 Dietz *et al*. (2009) Bats of Britain Europe and Northern Africa. A&C Black.

8.1.3 Highways England (2020) M3 Junction 9 Improvements Bat Survey Report

8.1.4 ILP (2018): Guidance Note 8: Bats and Artificial Lighting (08/18).

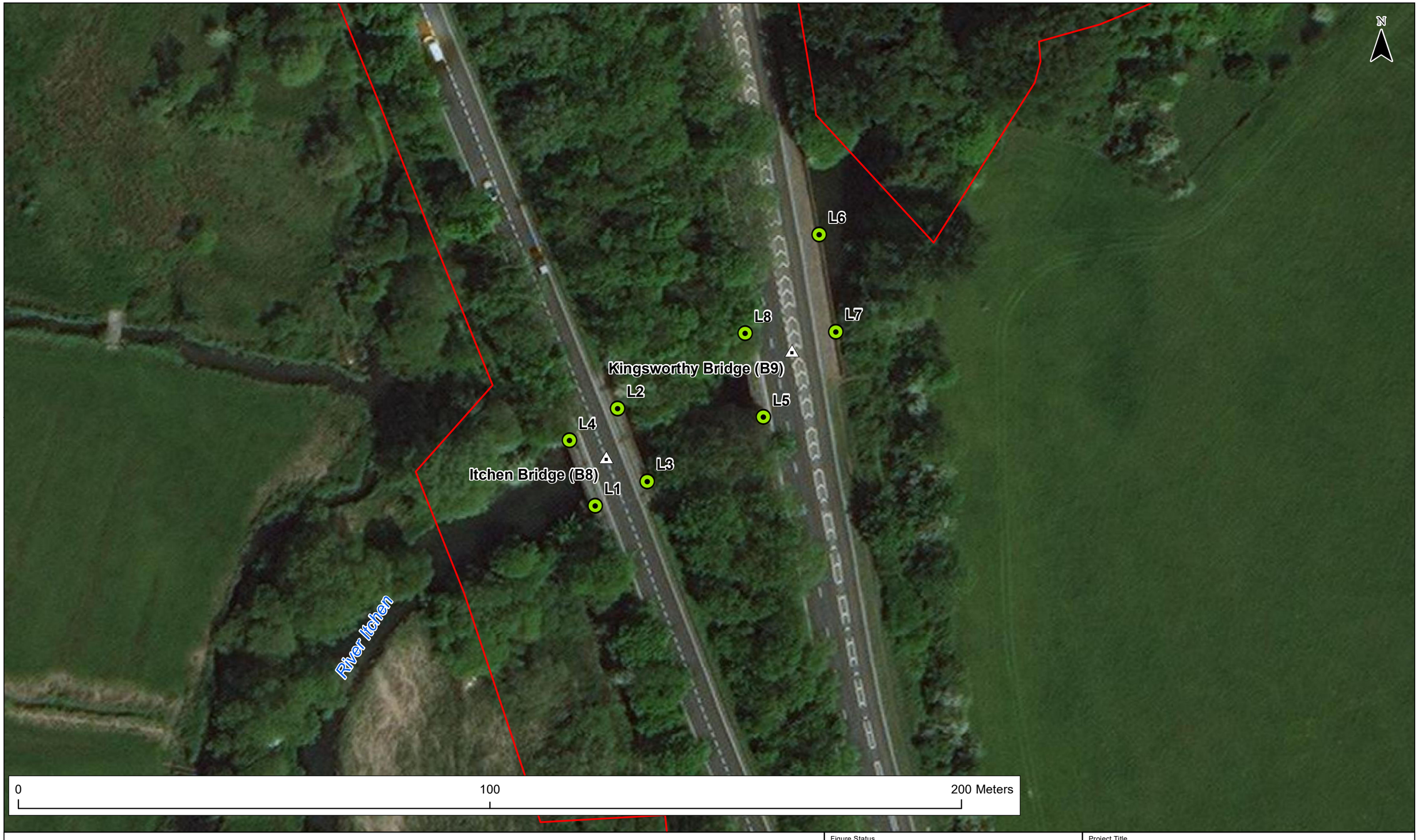
8.1.5 Mitchell- Jones, A.J (2004) Bat Mitigation Guidelines. English Nature.

8.1.6 Russ, J (1999) The Bats of Britain and Ireland: Echolocation Calls, Sound Analysis and Species Identification. Alana Ecology Ltd.

8.1.7 Russ, J (2012) British Bat Calls a Guide to Species Identification. Pelagic Publishing.

9 Figures

Figure 1: Surveyor Locations



KEY

- Application Boundary
- Bridges
- Surveyor Locations

Figure Status: FOR INFORMATION	Project Title: M3 JUNCTION 9 IMPROVEMENT
VolkerFitzpatrick	Figure Title: Bat Roost Survey Plan
Client: highways england	Scale: 1:750 · Designed: MD · Drawn: MD · Checked: GS · Approved: GS
	Original Size: A3 · Date: 04/08/2021 · Date: 04/08/2021 · Date: 04/08/2021 · Date: 04/08/2021
FIGURE 1	Project Ref No. 48176 · Revision: A

Document Path: \\pba.int\cbh\GIS\GIS_central\Projects\48176\02_mxd\Ecology\48176_BatRoostSurveyPlan.mxd

Appendix A Relevant Legislation

A.1.1 This section briefly summarises the relevant legislation pertaining to bats. Please note that the following text does not constitute legal advice.

The Conservation of Habitats and Species Regulations, 2017 (as amended)

A.1.2 The original (1994) "Habitat Regulations" transposed the EC Habitats Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (Council Directive 92/43/EEC) into national law. The Conservation of Habitats and Species Regulations 2017 (as amended) consolidates the various amendments that have been made to the Regulations.

A.1.3 "European protected species" (EPS) are those which are present on Schedule 2 of the Conservation of Habitats and Species Regulations 2017 (as amended) and includes all UK bat species. These species are subject to the provisions of Regulation 43 of those Regulations. All EPS are also protected under the Wildlife and Countryside Act 1981 (as amended). Taken together, these pieces of legislation make it an offence to:

- Intentionally or deliberately capture, injure or kill any wild animal included amongst these species
- Possess or control any live or dead specimens or any part of, or anything derived from these species
- deliberately disturb wild animals of any such species
- deliberately take or destroy the eggs of such an animal, or
- intentionally, deliberately or recklessly damage or destroy a breeding site or resting place of such an animal, or obstruct access to such a place

A.1.4 For the purposes of paragraph (c), disturbance of animals includes in particular any disturbance which is likely—

- to impair their ability to survive, to breed or reproduce, or to rear or nurture their young,
- or in the case of animals of a hibernating or migratory species, to hibernate or migrate; or
- to affect significantly the local distribution or abundance of the species to which they belong.

A.1.5 Although the law provides strict protection to these species, it also allows this protection to be set aside (derogation) through the issuing of licences. The licences in England are currently determined by Natural England (NE) for development works. In accordance with the requirements of the Regulations (2010), a licence can only be issued where the following requirements are satisfied:

A.1.6 The proposal is necessary 'to preserve public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment'

- 'There is no satisfactory alternative'

- The proposals 'will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range".

A.2 The Natural Environment and Rural Communities (NERC) Act, 2006

A.2.1 The NERC Act sets a duty on public bodies (including Local Authorities) to have due regard for habitats and Species of Principal Importance for biodiversity in England when carrying out their duties.

A.2.2 Section 41 (S41) the Act requires the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England. The list is used by decision-makers, such as Local Authorities, in implementing their protection duties under this Act when carrying out their functions.

A.2.3 The S41 list includes 7 species of bat (barbastelle, soprano pipistrelle, noctule, Bechstein's bat, lesser horseshoe, greater horseshoe and brown long-eared bat) as Species of Principal Importance in England. Since the UN Convention on Biological Diversity (CBD) in 2010 the UK identify these habitats and species as conservation priorities under the UK Post-2010 Biodiversity Framework, (they were formerly identified as UK BAP habitats and species

Appendix B Survey Metadata

Table 4: Weather Conditions and Survey Personnel - Dusk Emergence and Dawn Return to Roost Surveys

Date	Time of Survey	Time of Sunset/ Sunrise	Building and Location Number (refer to Figures 11 and 12)	Weather Conditions
04/05/21	20:16 – 22:16	20:31	Bridge B8 L1 and L2	Dry with clear skies (1/8 cloud cover) with a light to moderate breeze (Beaufort Scale F2-F3) and temperatures ranging between 10°C and 7°C.
05/05/21	20:18 – 22:18	20:33	Bridge B9 L5 and L6	Dry with partially cloudy skies (2/8 to 3/8 cloud cover) and a light breeze (Beaufort Scale F2). Air temperatures ranging between 11°C and 8°C during the survey.
01/06/21	20:55-22:55	21:10	Bridge B8 L3 and L4	Dry with partially cloudy skies (2/8 cloud cover) and calm conditions (Beaufort Scale F1). Air temperatures ranged between 19°C and 17°C.
02/06/21	03:11-04:56	04:56	Bridge B9 L7 and L8	Dry with clear skies (1/8 cloud cover) and calm conditions (Beaufort Scale F1). The air temperature was 13°C throughout the survey.
21/06/21	21:09-23:09	21:24	Bridge B9 L5 and L6	Dry with overcast skies (8/8 cloud cover) and a light to moderate breeze (Beaufort Scale F2-F3). Air temperatures ranged between 15°C and 14°C.
22/06/21	02:50-04:50	04:50	Bridge B8 L1 and L2	Dry with overcast skies (8/8 cloud cover) and a light to moderate breeze (Beaufort Scale F2-F3). Air temperatures ranged between 14°C and 13°C.

Appendix C Photographs

Photograph 1: Bridge B8 (concrete beam structure)

Photograph 2: Gaps in northern and southern ends of Bridge B8

Photograph 3: Close up of crevices in northern and southern ends of bridge.

Photograph 4: Gaps in central supports of bridge B8

Photograph 5: Bridge B9 with more sealed structure and pipe holes into central supports.

Photograph 6: Close up of pipe holes in central support

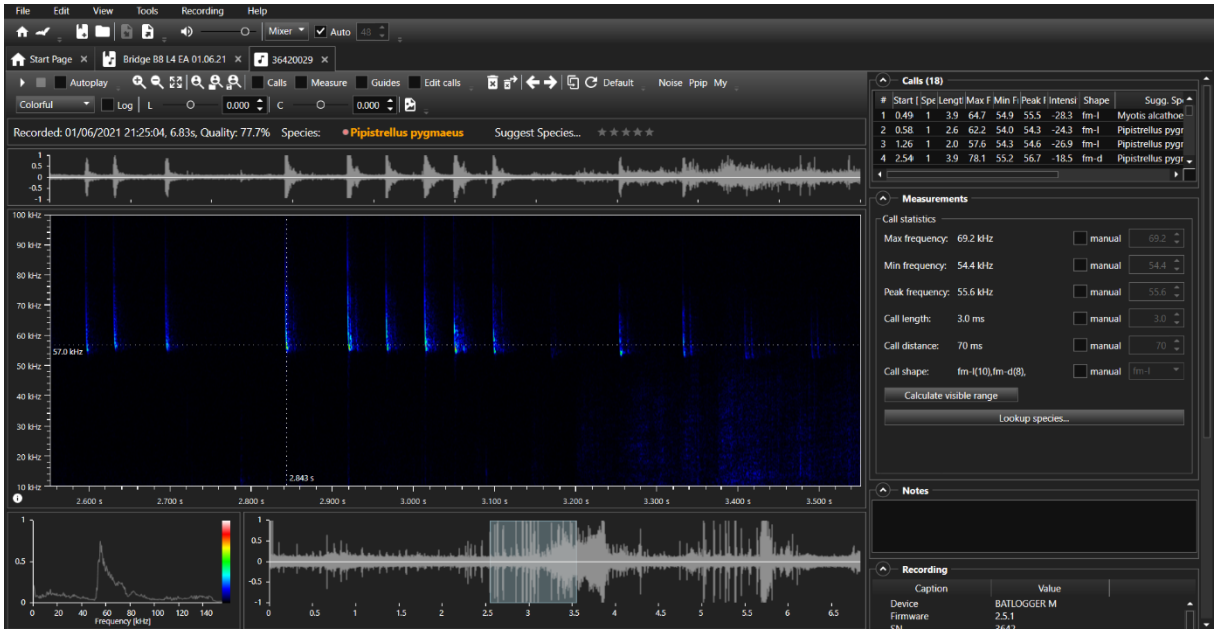
Photograph 7: Gaps behind concrete supports on northern and southern ends of Bridge B9.

Photograph 8: View looking west on northern side of the river (Bridge B9)

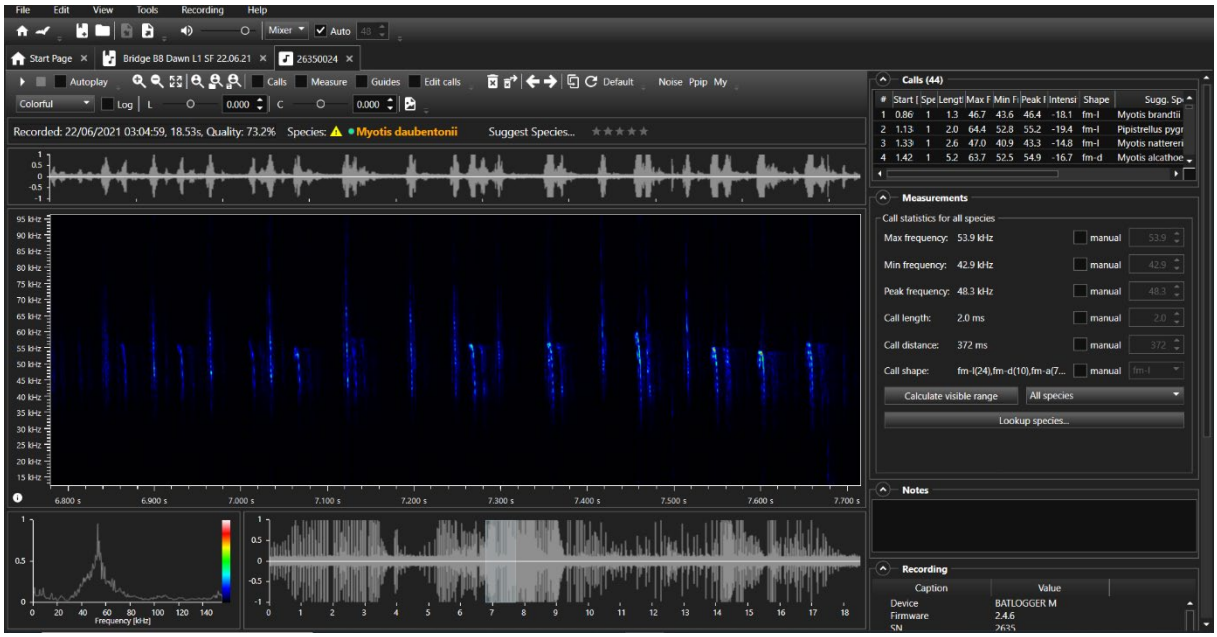
Photograph 9: Daubenton's bat foraging close to the water below bridge B9

Appendix D Sonograms of Bat Calls Recorded

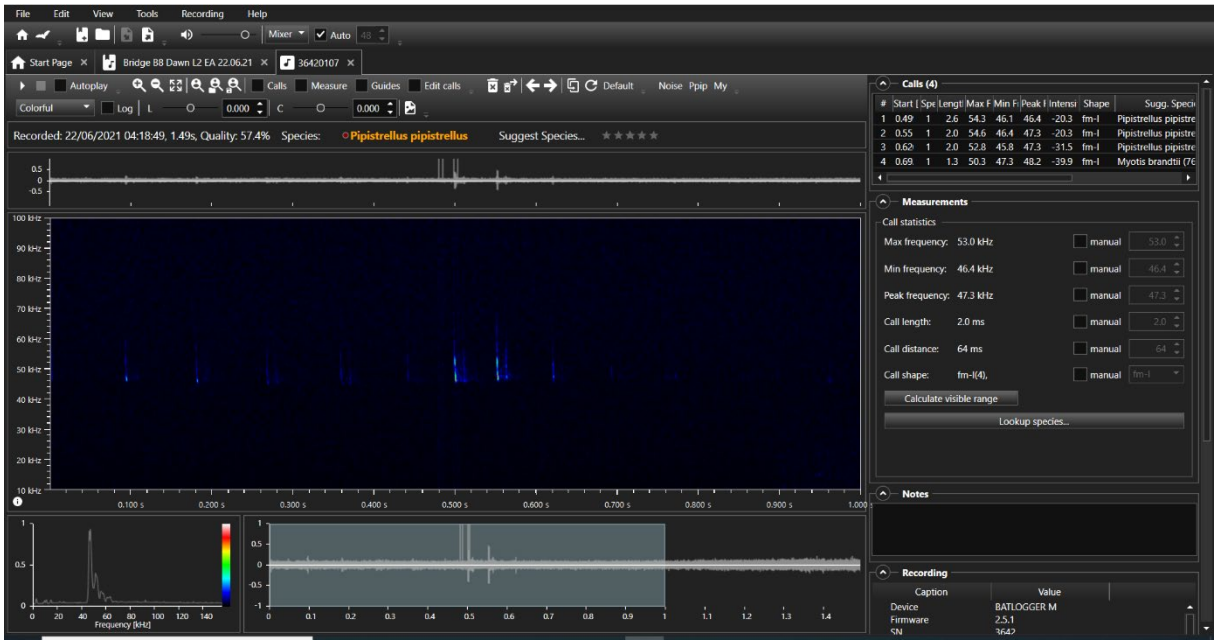
Soprano pipistrelle bat recorded during the dusk survey at Location L4 on Bridge B8 on 1st June 2021



Daubenton's bat call recorded during the dawn survey at Location 1 on Bridge B8 on 22nd June 2021. Characteristic social call of this species ("inverted hockey stick shape") is visible in this sonogram.



Common pipistrelle call recorded during the dawn survey at Location 2 on Bridge B8 on 22nd June 2021.



Noctule call recorded during the dusk survey at Location 5 on Bridge B9 on 21st June 2021.