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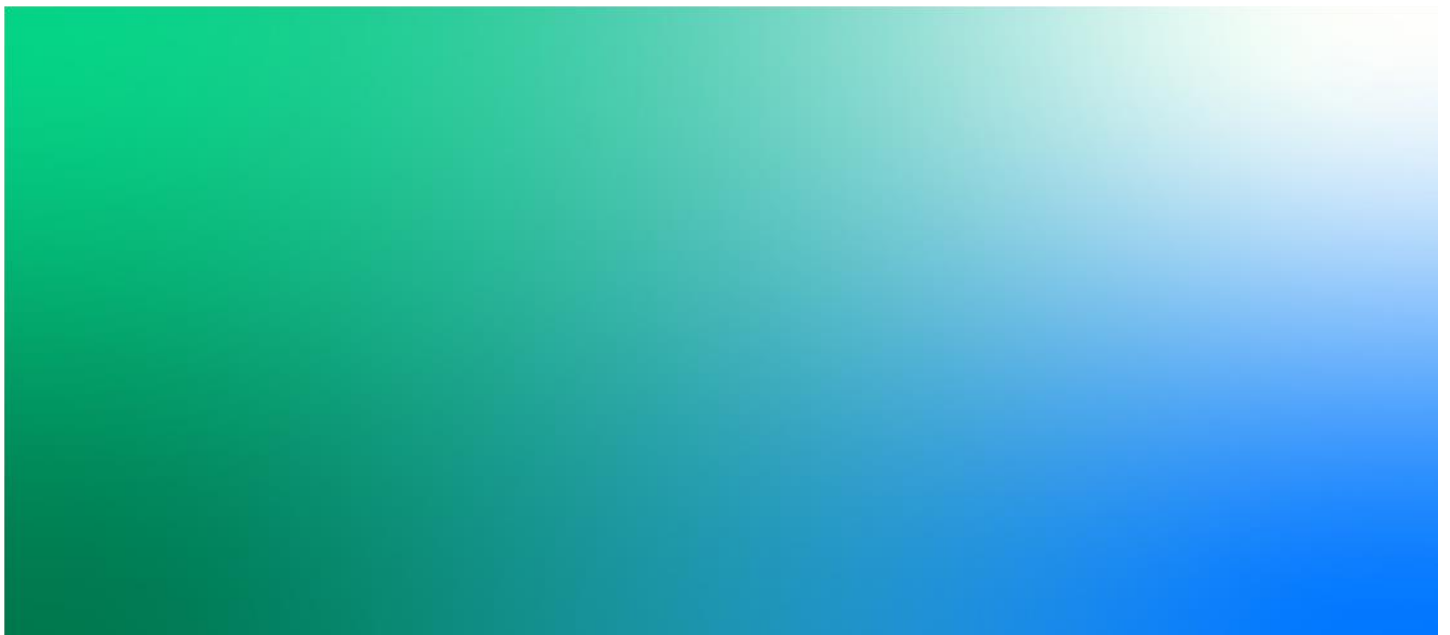
Bat Activity Survey Report

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Executive Summary

Jacobs UK Ltd. (Jacobs) was commissioned by the Environment Agency to undertake bat activity surveys within Area 1 and Area 2 of the Preston and South Ribble Flood Risk Mitigation Scheme. The surveys were considered necessary to assess the potential impacts to bats from the proposed scheme as the works will require the felling of trees to construct the flood defences. The bat activity surveys included the use of transect survey methods and the deployment of automated static bat detectors. The surveys were undertaken once a month during May, July and September. The information gathered during these surveys was also supplemented by a desk study which included the procurement of bat records from Lancashire Environmental Records Network.

Bat activity during the transect surveys was dominated by common pipistrelle (*Pipistrellus pipistrellus*) with foraging activity of solitary or low numbers of bats recorded throughout the proposed scheme. Bat activity was more frequent around Penwortham Old Bridge, the Railway Viaduct and along Ribble Sidings. These features provide an element of shelter for bats to forage. Occasional to frequent activity of low numbers of common pipistrelle were also recorded on the treelines along Broadgate. Other bat species recorded in very low numbers (i.e., one to three passes per survey) included noctule (*Nyctalus noctula*), soprano pipistrelle (*Pipistrellus pygmaeus*), Daubenton's bat (*Myotis daubentonii*) and brown long eared (*Plecotus auritus*).

Common pipistrelle also dominated the activity recorded on the static detectors with the species accounting for 97% of the 4,715 calls recorded. Small numbers of soprano pipistrelle, *Myotis* species (primarily Daubenton's) and noctule were also recorded. Higher levels of bat activity were recorded along Broadgate and Ribble Sidings.

Overall, bat activity within the survey area was generally low. This is likely a result of the urban location and possibly, the tidal nature of the river (although this cannot be verified). The relatively high ambient light levels and the urban location are likely to limit the presence of species which are typically associated with more rural habitats. In the context the habitat requirements of common pipistrelle and the numbers recorded, the potential impacts to this species from scheme (including affects to the distribution and abundance of bats) are not considered to be significant outside of site level. Impacts to other species from the proposed scheme are considered to be negligible given the very low numbers recorded.

The impacts of tree felling can be mitigated and the value of the existing habitats can be enhanced via the implementation of a landscaping scheme which is to be submitted as part of the supporting documentation for the proposed scheme. This landscaping scheme should aim to improve the existing habitat resource via planting and management which would be of benefit to the bat populations recorded in the proposed scheme. Other potential impacts including construction lighting should be avoided or reduced in accordance with good practice guidance.

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1. Introduction

1.1 Background

Jacobs UK Ltd. (Jacobs) was instructed by the Environment Agency (EA) to provide ecological services to inform the proposed works for Area 1 and Area 2 of the Preston and South Ribble Flood Risk Management Scheme ('the Scheme').

In 2018 a preliminary ecological appraisal was produced for the Scheme (Mott MacDonald, 2018) and an update verification survey was undertaken in May 2020 (Jacobs, 2020). Due to the potential for a trees/woodland to be lost along the River Ribble corridor, it was also determined that a series of bat activity surveys should be undertaken, to determine the importance of habitats along the river for foraging and commuting bats.

The bat surveys were aimed to gather information relating to the species and levels of activity within the scheme so that potential impacts to bats can be fully assessed and addressed through mitigation where required. This report presents the results of bat activity surveys including transect surveys and static detector surveys undertaken within May, July and September 2020.

1.2 Legislation, Policy, and Regulatory Context

An assessment of the legislative and regulatory framework covering bats in the UK has been undertaken. Due consideration has been given to the following statutory instruments and policy frameworks in the preparation of this report:

- Conservation of Habitats and Species Regulations 2017¹ (as amended);
- Wildlife and Countryside Act 1981 (as amended) (WCA), and;
- Natural Environment and Rural Communities Act 2006 (NERC).

Appendix B of this report provides a brief synopsis of how the above relate to the protection of bats in the UK.

¹ Until Implementation Period Completion day (31st December 2020) the Conservation of Habitats and Species Regulations 2017 (as amended) will remain in force without any of the amendments relating to Brexit made by The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019.

2. Methodology

2.1 Desk Study

A request for records of bats within 2km of the scheme was made to Lancashire Environmental Records Network (LERN) in July 2020. These records also included information from South Lancashire Bat Group (SLBG).

In addition, a search for European Protected Species Mitigation (EPSM) licences for bats within a 2km radius of the scheme was also undertaken using the Multi Agency Geographical Information Centre (MAGIC) (www.magic.gov.uk).

2.2 Field Surveys

The scope of bat surveys undertaken for the proposed scheme was designed in consideration of current good practice guidelines (Collins, 2016). Consideration was given to the value of the existing habitats to bats (in terms of the potential of the habitats to support a notable range of species and numbers) and the extent of potential impacts to bats from the construction of the proposed scheme. These considerations were informed by the initial desk and field based work including the first transect survey.

2.2.1 Transect Survey

A transect survey was undertaken within Areas 1 and 2 once a month during May, July and September 2020. The transect route covered all prominent habitat types within the survey area and the proposed construction areas where trees are required to be felled.

Two surveyors walked the transect route at a steady pace, pausing and recording bat activity at pre-determined 'listening points' for five-minute periods along each transect route. Surveyors recorded species, numbers, flight directions (if seen), type of activity and number of passes. One bat pass constituted bat activity within a ten second period with a maximum of 30 bat passes recorded per individual bat over the course of each five minute listening period. Bat activity between transect points was also recorded and described. The dates and times of the transect surveys are presented in Table 2.1.

Variations in the direction walked and/ or starting position was employed for each transect survey to ensure that the results were not influenced by temporal or spatial variations in bat activity over the course of each survey and to gather a greater picture of bat activity along the entirety of the route.

Surveys began at sunset and continued for at least 2 hours after sunset. All transects were undertaken during suitable weather conditions for recording bat activity i.e., the temperature at sunset was 10°C or above, with little or no rain and light winds only. Weather conditions were recorded at the start and the end of the survey. The exact route of the transect along with the six listening point locations (referenced as LP1 to LP6) is presented within Figure 1 (Appendix B).

Bat calls were recorded via a frequency division bat detector (Batbox Duet) with a separate recording facility (Anabat Express). This was supplemented by an Echo Meter Touch 2 Pro attached to tablet to potentially pick up any additional bat calls not recorded by the Batbox Duet and Anabat Express. All recordings were checked to verify species using AnalookW and Kaleidoscope bat call analysis software.

Table 2.1. Transect survey dates, times and equipment

| Date | Sunset | Survey Start / End Time | Recording Equipment |
|----------------------------|--------|-------------------------|---|
| 21 st May | 21:17 | 21:17 / 23:19 | Batbox Duet Anabat Express and Echometer Touch 2 Pro with tablet. |
| 23 rd July | 21:22 | 21:22 / 23:52 | |
| 14 th September | 19:28 | 19:28 / 21:56 | |

2.2.2 Automated Static Bat Detector Monitoring

Four automated static detectors (Model: Anabat Express) were deployed to supplement the transect survey data and provide a greater level of information on bat activity across the entirety of the scheme. Figure 1 (Appendix A) provides an overview of the automated static detector locations (referenced as SD1 to SD4).

The detectors monitored bat activity for at least five consecutive nights at each location. The first period of data collection ran from 25th – 30th May 2020, the second period of data collection ran from 23rd – 28th July and the third period of data collection ran from 8th – 13th September 2020.

Table 2.1 Static detector locations

| Static detector reference | Grid reference location | Description of location |
|---------------------------|-------------------------|---|
| 1 | SD 52836 28685 | Positioned within the treeline along the right bank of the river along Broadgate, directly facing Bird Street. |
| 2 | SD 52897 28486 | Positioned within the treeline along the right bank of the river along Broadgate, directly facing Meath Road. |
| 3 | SD 53423 28187 | Positioned on the edge of the woodland along Ribble Sidings |
| 4 | SD 53423 28187 | Positioned within the treeline in the parkland area adjacent to the Railway Viaduct along the left bank of the river. |

Bat calls were analysed using AnlookW bat call analysis software (with use of bat species classifiers) to identify the species present and quantify the number of bat passes recorded for each species per night. Weather data for each night of recording was obtained from the Met Office website (<http://metoffice.gov.uk>).

Each file containing a bat call was considered to represent a “bat pass”. A total number of bat passes per night was also calculated as well as the species recorded. Although not synonymous with actual numbers of bats, this information provides an indication of the relative abundance of bat species across a study area.

2.3 Limitations

During September, SD1 recorded an unusually large number of files (2,800) suspected to be noise files. During analysis only a limited number of pipistrelle calls were identified. Additionally, it is likely SD2 did not record during September as no calls were recorded. Given the large amount of data obtained throughout the entire scheme via transect survey data and the recording of data with automated static detectors in the previous two surveys (May and July), these equipment failures were considered not to affect the overall survey findings.

Species identification by sonogram is limited (to a certain extent) by similarities in call structure. In addition, all bats can modulate their calls according to the habitats they are navigating, their behaviour and the information they require at the time. This imposes limitations on reliable analysis particularly in the genera *Myotis*. *Myotis* bat species in Lancashire are likely to be either Daubenton's bat (*Myotis daubentonii*), Natterer's bat (*Myotis nattereri*), whiskered bat (*Myotis mystacinus*) or Brandt's bat (*Myotis brandtii*). Although their distribution is currently poorly understood, Alcaholic bat (*Myotis alcaholic*) is thought to be extremely rare in Lancashire and much less likely to be present within the scheme.

Overall, there were no overriding limitations that posed a significant constraint to the bat activity surveys.

The findings of this report represent the professional opinion of qualified ecologists and do not constitute professional legal advice. The client may wish to seek professional legal interpretation of the relevant wildlife legislation cited in this document.

3. Results

3.1 Site Context

Areas 1 and 2 are located on the southern edge of Preston and encompasses Broadgate, Riverside and Riverside Road between Penwortham New Bridge and the Railway Viaduct which carries West Coast Main Line over the River Ribble. This stretch of the River Ribble is bound by residential areas and parklands. Walking and cycling routes bound much of the river including a section of the Guild Wheel on the northern (right) bank. Much of the river within this area has also been subject to previous flood defence works between the 1920s to the 1980s. Habitats along the river include treelines (including planted and self-seeded trees along Broadgate), amenity grasslands and a mix of occasional trees, tall grasslands, ruderal and scrub vegetation. The wider area comprises a mix of residential, commercial and industrial areas along with parklands and farmland.

3.2 Desk Study

3.2.1 Bat Records

A summary of the bats records provided by LERN including records supplied from SLBG is provided in Table 3.1.

Table 3.1. Records of bats within a 2km radius of the proposed scheme

| Data Source | Summary of records |
|--|--|
| Lancashire Environmental Records Network | <p>The bat records provided by LERN included:</p> <ul style="list-style-type: none"> • Ten records of brown long-eared bat (<i>Plecotus auritus</i>) • One record of Daubenton's bat • Two records of 'bats' (no species provided) • 15 common pipistrelle (<i>Pipistrellus pipistrellus</i>) records • One record of Nathusius' pipistrelle (<i>Pipistrellus nathusii</i>) • 14 noctule (<i>Nyctalus noctula</i>) records • One <i>Nyctalus</i> species record (no species provided) • Thirty-four <i>Pipistrellus</i> species records • Three soprano pipistrelle (<i>Pipistrellus pygmaeus</i>) records • Nine records of <i>Myotis</i> bat species <p>The records included roost records of noctule, brown long eared bat and pipistrelle species. The closest record to the proposed scheme was of an unspecified bat record located approximately 120m north of Broadgate. Most records were centred around Penwortham and no roost records were located within 500m of the proposed scheme.</p> |
| South Lancashire Bat Group (via LERN) | <p>SLBG records supplied by LERN included:</p> <ul style="list-style-type: none"> • Two brown long eared bat records • Two Natterer's bat records • 17 pipistrelle species records • 63 common pipistrelle records • Two unidentified bat records <p>Most records related to casualties / grounded bats or general bat activity records. There were also ten bat roost records including common pipistrelle maternity roosts located within the surrounding area. The closest record to the proposed scheme is of a grounded common pipistrelle bat located 235m north. The nearest roost record is of a common pipistrelle roost</p> |

| | |
|--|--|
| | (single adult) located approximately 250m south. There were no further roost records within 500m of the proposed scheme. |
|--|--|

3.2.2 EPSM licences for bats

Table 3.2 provides a list of the EPSM licences granted for bats within a 2km radius of the proposed scheme. A total of five separate licences were identified. These licences covered common pipistrelle and brown long eared bat roosts.

Table 3.2. EPSM licences identified within a 2km radius of the proposed scheme

| Licence reference | Species | Dates | Location |
|-------------------|---|--|--|
| EPSM2012-5236 | Brown long eared bat | Licence Start Date: 23/09/2013 Licence End Date: 31/08/2015 | 590m west of the closest point of the proposed scheme |
| EPSM2010-2655 | Common pipistrelle and brown long eared bat | Licence Start Date: 08/04/2011 Licence End Date: 01/04/2013 | 1km south of the closest point of the proposed scheme |
| 2014-4332-EPS-MIT | Common pipistrelle and brown long eared bat | Licence Start Date: 13/10/2014 Licence End Date: 30/09/2019 | 1km south of the closest point of the proposed scheme |
| EPSM2011-3736 | Common pipistrelle | Licence Start Date: 18/01/2012 Licence End Date: 01/01/2014 | 1.6km north-east of the closest point of the proposed scheme |
| 2014-523-EPS-MIT | Common pipistrelle and brown long eared bat | Licence Start Date: 22/04/2014 Licence End Date: 31/01/2016 | 1.8km east of the closest point of the proposed scheme |

3.3 Transect Surveys

A summary of the results for all transect surveys is provided below, with further information for each transect survey provided in Table C.1 in Appendix C.

3.3.1 Overview

Common pipistrelle accounted for the vast majority of bat activity over the course of the three surveys. Generally, common pipistrelle bat activity recordings comprised foraging activity of one or two bats and activity was spread across all areas of the survey area. However, the most notable locations of bat foraging activity were recorded around Penwortham Methodist Church (near LP4), Penwortham Old Bridge (LP3) and the Railway Viaduct (LP6) with a maximum of four bats recorded at any one time. Bat activity was generally similar over the course of the three visits. Very low levels (1 to 3 passes per survey) of soprano pipistrelle, noctule, brown long eared bat and Daubenton's bat was recorded over the three visits.

3.3.2 May

Low levels of bat activity were recorded in the May visit which mostly comprised foraging activity of single common pipistrelle bats. Bats were foraging along the treelines of Broadgate, adjacent to the Railway Viaduct and along Ribble Sidings. Noctule bats were also recorded along the left bank of the river adjacent to the Railway Viaduct and one brief pass over the strip of woodland along Ribble Sidings.

3.3.3 July

Bat activity was dominated by common pipistrelle with constant foraging of one to two bats around the bridge structures (LP3 and LP6) and low numbers of passes recorded elsewhere on the transect route. A single soprano pipistrelle call was recorded adjacent to Penwortham Old Bridge (LP3).

3.3.4 September

Common pipistrelle bat activity was spread across the survey area. A notable level of activity was recorded to the direct north of LP4 with four common pipistrelle bats flying around Penwortham Methodist Church shortly after sunset. Similar to the July visit, constant common pipistrelle foraging activity of one to two bats was recorded on Penwortham Old Bridge and the Railway Viaduct. Noctule were recorded briefly between LP5 and LP6. A single pass of a Daubenton's bat was recorded adjacent to Penwortham Old Bridge and a single pass of a brown long eared bat was also recorded between LP5 and LP6.

3.4 Automated Static Bat Detector Surveys

In total, the static detectors recorded 4,715 bat calls, across all three survey periods. As shown in Table 3.3, the most frequently recorded species by far was common pipistrelle which accounted for 97% (4,610 calls) of the total number of calls. *Myotis* species accounted for 1.5% (75 calls), noctule 0.6% (29 calls) and soprano pipistrelle accounted for just 0.02% (1 call) of the total number of calls. Based on the known call parameters of the species flying within a similar environment, the vast majority of *Myotis* species calls were highly likely to be Daubenton's bats. The species composition recorded by the statics detectors was largely reflective of the species recorded during the transect surveys.

As illustrated in Table 3.4 and Graph 3.1, the most notable numbers of passes were recorded by SD1 (Broadgate) in May and by SD3 (Ribble Sidings) in May and September. This data for SD1 and SD3 broadly corresponds with the highest activity levels recorded during the transect surveys. The weather data for the analysed nights is provided alongside the detailed results in Table C.2 in Appendix C.

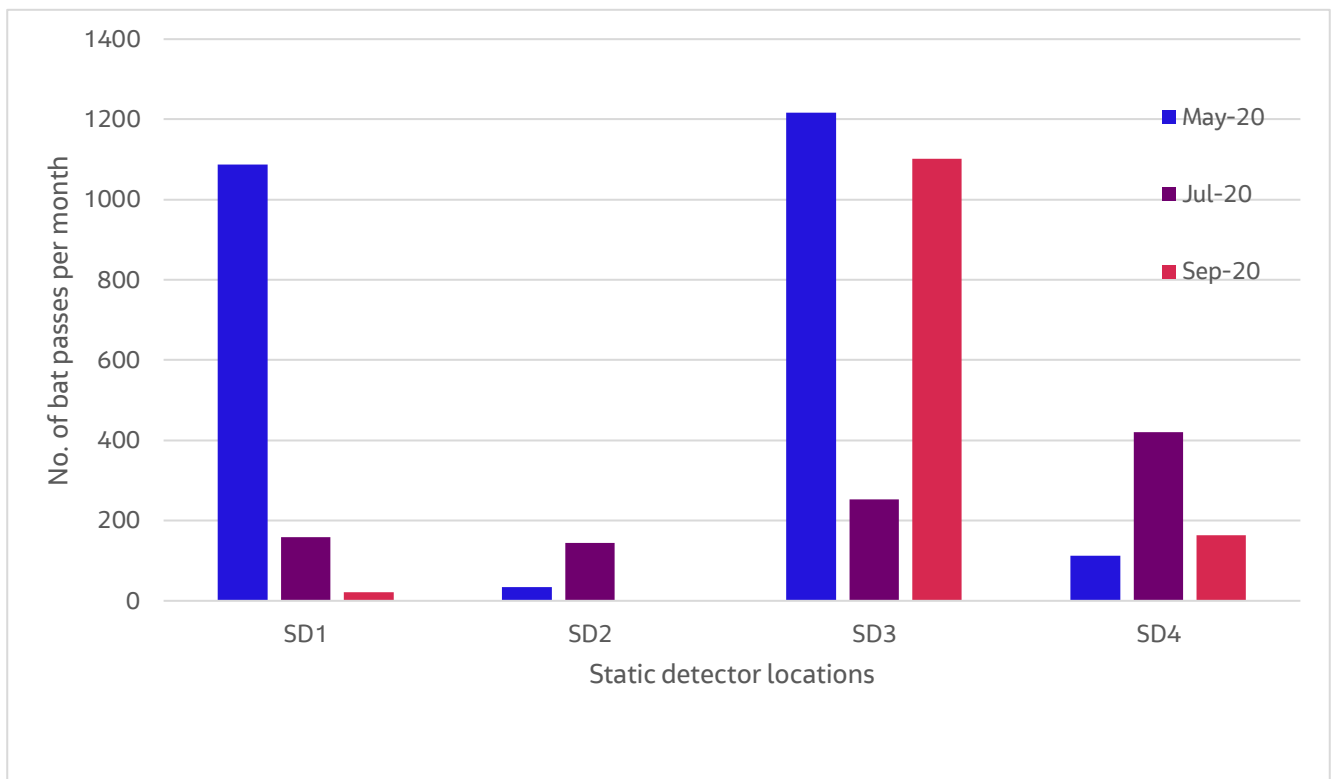
Table 3.3. Total number of calls recorded per species

| Species | Total number of calls |
|-----------------------|-----------------------|
| Common pipistrelle | 4,610 |
| Soprano pipistrelle | 1 |
| <i>Myotis</i> species | 75 |
| Noctule | 29 |

Table 3.4. Total number of calls per static detector location for all species

| Static Detector | Number of calls (all species) | | |
|-----------------|-------------------------------|------|-----------|
| | May | July | September |
| SD1 | 1087 | 158 | 21 |
| SD2 | 35 | 145 | No data |
| SD3 | 1217 | 253 | 1102 |
| SD4 | 113 | 420 | 164 |
| Total | 2452 | 976 | 1287 |

Graph 3.1. Number of bat passes recorded within a 5 day period per location per month



4. Evaluation and Impact Assessment

4.1 Evaluation

Common pipistrelle was by far the most abundant species recorded during the transect and static detector surveys. Common pipistrelle utilise a very wide range of habitats and is the most urban-dwelling species in the UK. The activity recorded is largely reflective of the urban environment within the survey area. Across the scheme, common pipistrelle activity was generally low, with activity dominated by foraging activity of solitary bats. Common pipistrelle utilised the treelines along Broadgate and along Ribble Sidings and activity was notably higher adjacent to the bridges within the survey area. These features provide an element of shelter for bats to forage.

Very low levels of soprano pipistrelle, noctule, brown long eared bat and *Myotis* species (highly likely to be Daubenton's) were recorded. This low density of bats may be a reflection of the urbanised location of the scheme and associated ambient light and noise levels.

Rivers typically support the highest concentrations of bats. However, the River Ribble within the proposed scheme did not support higher levels of bat activity. The river is tidal within the survey area and the movement of water, combined with the brackishness of the water and the modified nature of the banksides may affect insect abundance (although this cannot be verified).

All bat species recorded within the survey area are relatively common and widespread within the region. No rarer species of bats were recorded. It is likely that other species not recorded during the survey may very occasionally utilise the area including whiskered and Natterer's bats.

4.2 Impact Assessment

In consideration of the proposed plans for the scheme, the loss of trees and riparian vegetation is considered to be the main adverse impact to bats. Bats utilise trees for a variety of reasons. Trees provide protective commuting linkages (i.e., to and from roosts sites and between foraging areas) and support invertebrates which, in turn, provides sustenance for bats. Trees also provide shelter for foraging during suboptimal weather and can 'screen off' artificial light to create darkened corridors for bats (particularly for species with known sensitivity to artificial light sources).

Common pipistrelle were recorded using the treelines and riparian habitat margins within the survey area and the loss of trees and riparian vegetation is likely to adversely affect the foraging distribution of the species within the site. However, in the context of the (low) numbers of common pipistrelle bats recorded, this impact is not considered to be significant outside of site level.

Daubenton's bats were recorded very occasionally along the river in very low numbers. This species is less light tolerant than common pipistrelle and is generally recorded foraging over open water. A loss of trees on the river bank may increase the levels of ambient lighting (derived from street lights, car lights, torches etc) on the river. However, this increase is likely to be negligible in the context of the relatively high ambient light levels already present in the survey area. Overall, the proposed scheme is unlikely to result in a significant impact on the existing distribution or abundance of Daubenton's bats.

Soprano pipistrelle, brown long eared and noctule bats were recorded in very low numbers across the three surveys. The proposed scheme is unlikely to affect the distribution or abundance of these species given the very low densities recorded.

5. Recommendations

It is not possible to replace the treeline along Broadgate, as the habitats will be replaced with a new floodwall. To compensate for this loss of habitat, new woodland and wetland planting should be provided elsewhere. The current proposals include pond, wetland, species rich grassland and woodland creation at Ribble Sidings. The design has been discussed and agreed with South Ribble Council and is illustrated as part of the Landscape Master Plan drawings.

Other opportunities for woodland creation have also been agreed in principle at Golden Way and Fishwick Bottoms. The planting design at these areas should include fruiting and flowering native tree species, to attract pollinating insects and to provide a wider benefit to biodiversity in the area. Fishwick Bottoms allows for new riparian habitat creation. Golden Way is new woodland planting, expanding areas of existing woodland more in-land. Both areas will improve foraging opportunities and woodland connectivity at a landscape scale.

Some bat species are sensitive to artificial light sources. Works should not take place at night, and where this is not possible, task lighting must be directed away from the river corridor and have baffles fitted or screening to avoid light spill.

As a further enhancement measure, opportunities could be sought to provide suitable roost features for bats within the proposed scheme via the implementation of a bat box scheme.

6. References

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

Mott MacDonald (2019). Preston and South Ribble FRMS Preliminary Ecological Appraisal, produced on behalf of the Environment Agency ENV0000009C-MMD-DZ-00-RP-EN-0303001-S2-P01-C0300-EA3-LOD3

Appendix A. Figures

Appendix B. Legislation, Policy and Regulatory Context

All bat species and their roosts and resting places are protected under Schedule 5 & 6 of the Wildlife and Countryside Act 1981 (as amended), the Countryside and Rights of Way (CRoW) Act 2000, and the Conservation of Habitats and Species Regulations 2017. The Conservation of Habitats and Species Regulations 2017 transpose the European Union's 'Habitats Directive' (Council Directive 92/43/EEC) on the Conservation of Natural Habitats and of Wild Fauna and Flora (EC Habitats Directive) into UK law. The Regulations provide for the designation and protection of 'European Sites', the protection of 'European Protected Species' (EPS), and the adaptation of planning and other controls for the protection of European Sites. EPS are listed on Schedule 2 of the Conservation of Habitats and Species Regulations 2017.

The relevant sections of this legislation (combined) make it an offence to:

- deliberately capture, injure or kill any wild animal listed as a European Protected Species;
- deliberately disturb wild animals of any such species in such a way as to be likely:
 - to impair their ability:
 - i) to survive, to breed or reproduce, or to rear or nurture their young, or;
 - ii) 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.
- damage or destroy a breeding site or resting place of such an animal; and
- intentionally or recklessly obstruct access to a place of shelter or protection

The legislation also makes it an offence to possess or control (live or dead animal, part or derivative); and sell, offer for sale, possess or transport for the purpose of sale (live or dead animal, part or derivative).

The above legislation applies to all life stages of a bat including juveniles and adults. Impacts upon each individual bat as the result of an illegal act constitute a separate offence under the above legislation.

Natural Environment and Rural Communities Act 2006 (NERC 2006)

Section 40 of the Natural Environment and Rural Communities Act 2006 (NERC 2006) Act concerns biodiversity and states: "Every public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity."

Section 41 of the NERC Act states that: "The Secretary of State must, as respects England, publish a list of the living organisms and types of habitat which in the Secretary of State's opinion are of principal importance for the purpose of conserving biodiversity". The list of species can be downloaded from the natural England website at:

<http://www.naturalengland.org.uk/ourwork/conservation/biodiversity/protectandmanage/habsandspeciesimportance.aspx>

The Act stresses that "it is important that public authorities seek not only to protect important habitats and species, but actively seek opportunities to enhance biodiversity through development proposals, where appropriate. Incorporating enhancement opportunities into projects may help applicants to achieve planning permission."

Appendix C. Full Survey Results

Table C.1 – Transect Survey Results

| Survey visit no. | Survey date and sunset time | Survey start and end time | Weather | Listening point | Time | Species, activity notes and no. passes |
|------------------|-----------------------------|--|---|-----------------|-------|--|
| 1 | 21/05/2020 21:17 | 21:17 / 23:19 | 14C - Start 12C - End Dry. 20% cloud cover and wind Bft 2 | LP2 | 21:17 | No bats. |
| | | | | LP1 | 21:26 | X 1 common pipistrelle. Foraging on treeline adjacent to road (7 passes). |
| | | | | LP3 | 21:37 | No bats. |
| | | | | LP4 | 21:49 | X 1 common pipistrelle. Foraging on treeline (6 passes). X 1 noctule. Brief pass overhead. Not seen. X 1 common pipistrelle foraging along treeline and church between points. |
| | | | | LP5 | 22:00 | X 1 common pipistrelle. Frequent foraging along treeline (15 passes). X 1 noctule. Brief pass overhead and 3 passes between points. |
| | | | | LP6 | 22:18 | X 2 common pipistrelle. Frequent foraging loops adjacent to Railway Viaduct. |
| | | | | LP5 | 22:31 | X 1 common pipistrelle. Foraging along treeline (8 passes). X 1 noctule. Brief pass overhead. |
| | | | | LP4 | 22:43 | X 1 common pipistrelle. Frequent foraging along woodland (20 passes). |
| | | | | LP3 | 22:53 | X 1 common pipistrelle. Constant foraging around bridge. |
| | | | | LP2 | 23:04 | X 1 common pipistrelle. Faint passes not seen. |
| LP1 | 23:14 | X 1 common pipistrelle. Brief pass not seen. | | | | |
| 2 | | 21:22 / 23:52 | 18C - Start | LP5 | 21:22 | No bats. |

| Survey visit no. | Survey date and sunset time | Survey start and end time | Weather | Listening point | Time | Species, activity notes and no. passes |
|------------------|-----------------------------|---------------------------|--|-----------------|-------|--|
| | 23/07/2020 21:22 | | 16C - End Dry. 100% cloud cover and wind Bft 2 | LP6 | 21:30 | X 2 common pipistrelle. Commuting and foraging passes under Railway Viaduct. |
| | | | | LP1 | 21:56 | X 1 common pipistrelle. 2 commuting passes along river. |
| | | | | LP2 | 22:04 | X 1 common pipistrelle. 1 commuting pass along river. |
| | | | | LP3 | 22:17 | X 1 common pipistrelle. Foraging along street lights (4 passes). X 1 soprano pipistrelle. Single pass along river. |
| | | | | LP4 | 22:26 | No bats. |
| | | | | LP5 | 22:41 | X 1 common pipistrelle. Foraging along treeline. |
| | | | | LP6 | 22:49 | X 1 common pipistrelle. Constant foraging around Railway Viaduct. |
| | | | | LP1 | 23:12 | No bats. |
| | | | | LP2 | 23:21 | X 1 common pipistrelle. Brief pass. |
| | | | | LP3 | 23:32 | X 1 common pipistrelle. Constant foraging around bridge (30 passes). |
| | | | | LP4 | 23:42 | X 1 common pipistrelle. Occasional foraging in woodland (4 passes). |
| 3 | 14/09/2020 19:28 | 19:28 / 21:56 | 20C - Start 17C - End Dry. 80% cloud cover and wind Bft 0-1 | LP2 | 19:28 | No bats. |
| | | | | LP3 | 19:38 | No bats. |
| | | | | LP4 | 19:49 | X 2 common pipistrelle. Constant foraging (30 passes) along treeline. X 4 common pipistrelle. Foraging around church between points. X 1 noctule. Brief pass overhead. |
| | | | | LP5 | 20:01 | X 1 common pipistrelle. 3 foraging passes along treeline. |
| | | | | LP6 | 20:11 | X 2 common pipistrelle. Frequent foraging loops adjacent to Railway Viaduct (20 passes each). |
| | | | | LP5 | 20:22 | X 1 common pipistrelle. Foraging along river (7 passes). |

| Survey visit no. | Survey date and sunset time | Survey start and end time | Weather | Listening point | Time | Species, activity notes and no. passes |
|------------------|-----------------------------|---------------------------|---------|-----------------|-------|--|
| | | | | LP4 | 20:34 | No bats. |
| | | | | LP3 | 20:43 | X 1 common pipistrelle. 3 passes along river. X 1 Daubenton's. Single pass along river. |
| | | | | LP2 | 20:53 | X 1 common pipistrelle. 8 passes. Not seen. Very faint – along treeline on river. |
| | | | | LP1 | 21:03 | No bats. |
| | | | | LP2 | 21:13 | X 1 common pipistrelle. Not seen. |
| | | | | LP3 | 21:22 | X 2 common pipistrelle. Constant foraging around bridge. |
| | | | | LP4 | 21:30 | No bats. |
| | | | | LP5 | 21:41 | 1 x common pipistrelle. Foraging along treeline (9 passes). X 1 brown long eared bat recorded between points. Very brief. |
| | | | | LP6 | 21:51 | X 1 common pipistrelle. 4 foraging passes not seen. |

Table C.2 – Full automated static detector survey results

| Static detector ref nos. | Date | Maximum overnight temp (°C) | Minimum overnight temp (°C) | Sunrise | Sunset | Weather | Number of passes per species | | | | Total passes per night |
|--------------------------|------------|-----------------------------|-----------------------------|---------|--------|--------------------|------------------------------|---------------------|--------------------|---------|------------------------|
| | | | | | | | Common Pipistrelle | Soprano Pipistrelle | Myotis bat species | Noctule | |
| May | | | | | | | | | | | |
| SD1 | 25/05/2020 | 14 | 13 | 04:53 | 21:19 | Dry, gentle breeze | 113 | 0 | 4 | 0 | 117 |
| | 26/05/2020 | 14 | 8 | 04:52 | 21:21 | Dry, gentle breeze | 105 | 0 | 4 | 0 | 109 |
| | 27/05/2020 | 16 | 9 | 04:51 | 21:22 | Dry, light breeze | 400 | 0 | 2 | 4 | 406 |
| | 28/05/2020 | 22 | 12 | 04:50 | 21:23 | Dry, light breeze | 150 | 0 | 1 | 1 | 152 |
| | 29/05/2020 | 21 | 10 | 04:49 | 21:24 | Dry, gentle breeze | 298 | 0 | 2 | 3 | 303 |
| SD2 | 25/05/2020 | 14 | 13 | 04:53 | 21:19 | Dry, gentle breeze | 0 | 0 | 0 | 0 | 0 |
| | 26/05/2020 | 14 | 8 | 04:52 | 21:21 | Dry, gentle breeze | 5 | 0 | 0 | 0 | 5 |
| | 27/05/2020 | 16 | 9 | 04:51 | 21:22 | Dry, light breeze | 15 | 0 | 0 | 1 | 16 |
| | 28/05/2020 | 22 | 12 | 04:50 | 21:23 | Dry, light breeze | 2 | 0 | 0 | 0 | 2 |
| | 29/05/2020 | 21 | 10 | 04:49 | 21:24 | Dry, gentle breeze | 12 | 0 | 0 | 0 | 12 |
| SD3 | 25/05/2020 | 14 | 13 | 04:53 | 21:19 | Dry, gentle breeze | 211 | 0 | 0 | 1 | 212 |
| | 26/05/2020 | 14 | 8 | 04:52 | 21:21 | Dry, gentle breeze | 206 | 0 | 2 | 0 | 208 |
| | 27/05/2020 | 16 | 9 | 04:51 | 21:22 | Dry, light breeze | 316 | 0 | 2 | 1 | 319 |
| | 28/05/2020 | 22 | 12 | 04:50 | 21:23 | Dry, light breeze | 181 | 0 | 0 | 2 | 183 |
| | 29/05/2020 | 21 | 10 | 04:49 | 21:24 | Dry, gentle breeze | 295 | 0 | 0 | 0 | 295 |
| SD4 | 25/05/2020 | 14 | 13 | 04:53 | 21:19 | Dry, gentle breeze | 30 | 0 | 0 | 1 | 31 |
| | 26/05/2020 | 14 | 8 | 04:52 | 21:21 | Dry, gentle breeze | 28 | 0 | 0 | 0 | 28 |
| | 27/05/2020 | 16 | 9 | 04:51 | 21:22 | Dry, light breeze | 41 | 0 | 0 | 0 | 41 |
| | 28/05/2020 | 22 | 12 | 04:50 | 21:23 | Dry, light breeze | 7 | 0 | 0 | 0 | 7 |
| | 29/05/2020 | 21 | 10 | 04:49 | 21:24 | Dry, gentle breeze | 6 | 0 | 0 | 0 | 6 |
| July | | | | | | | | | | | |
| SD1 | 23/07/2020 | 16 | 14 | 05:13 | 21:22 | Light rain | 36 | 0 | 2 | 0 | 38 |
| | 24/07/2020 | 19 | 14 | 05:14 | 21:21 | Light rain | 31 | 0 | 8 | 4 | 43 |
| | 25/07/2020 | 17 | 15 | 05:16 | 21:19 | Light rain | 24 | 0 | 13 | 0 | 37 |
| | 26/07/2020 | 19 | 14 | 05:18 | 21:18 | Dry | 23 | 0 | 3 | 0 | 26 |
| | 27/07/2020 | 18 | 14 | 05:19 | 21:16 | Light rain | 9 | 0 | 0 | 5 | 14 |
| SD2 | 23/07/2020 | 16 | 14 | 05:13 | 21:22 | Light rain | 27 | 0 | 7 | 0 | 34 |

| Static detector ref nos. | Date | Maximum overnight temp (°C) | Minimum overnight temp (°C) | Sunrise | Sunset | Weather | Number of passes per species | | | | Total passes per night |
|--------------------------|------------|-----------------------------|-----------------------------|---------|--------|--------------------|------------------------------|---------------------|--------------------|---------|------------------------|
| | | | | | | | Common Pipistrelle | Soprano Pipistrelle | Myotis bat species | Noctule | |
| | 24/07/2020 | 19 | 14 | 05:14 | 21:21 | Light rain | 38 | 0 | 1 | 0 | 39 |
| | 25/07/2020 | 17 | 15 | 05:16 | 21:19 | Light rain | 11 | 0 | 15 | 0 | 26 |
| | 26/07/2020 | 19 | 14 | 05:18 | 21:18 | Dry | 29 | 0 | 6 | 1 | 36 |
| | 27/07/2020 | 18 | 14 | 05:19 | 21:16 | Light rain | 8 | 0 | 0 | 2 | 10 |
| SD3 | 23/07/2020 | 16 | 14 | 05:13 | 21:22 | Light rain | 11 | 0 | 0 | 0 | 11 |
| | 24/07/2020 | 19 | 14 | 05:14 | 21:21 | Light rain | 54 | 0 | 0 | 0 | 54 |
| | 25/07/2020 | 17 | 15 | 05:16 | 21:19 | Light rain | 15 | 0 | 0 | 0 | 15 |
| | 26/07/2020 | 19 | 14 | 05:18 | 21:18 | Dry | 131 | 0 | 0 | 0 | 131 |
| | 27/07/2020 | 18 | 14 | 05:19 | 21:16 | Light rain | 42 | 0 | 0 | 0 | 42 |
| SD4 | 23/07/2020 | 16 | 14 | 05:13 | 21:22 | Light rain | 33 | 0 | 0 | 0 | 33 |
| | 24/07/2020 | 19 | 14 | 05:14 | 21:21 | Light rain | 74 | 0 | 0 | 0 | 74 |
| | 25/07/2020 | 17 | 15 | 05:16 | 21:19 | Light rain | 172 | 0 | 0 | 0 | 172 |
| | 26/07/2020 | 19 | 14 | 05:18 | 21:18 | Dry | 72 | 0 | 0 | 0 | 72 |
| | 27/07/2020 | 18 | 14 | 05:19 | 21:16 | Light rain | 68 | 0 | 1 | 0 | 69 |
| September | | | | | | | | | | | |
| SD1 | 08/09/2020 | 17 | 14 | 06:34 | 19:43 | Dry, light breeze | 0 | 0 | 0 | 0 | 0 |
| | 09/09/2020 | 15 | 11 | 06:36 | 19:41 | Dry, wind moderate | 8 | 0 | 0 | 0 | 8 |
| | 10/09/2020 | 15 | 14 | 06:38 | 19:38 | Dry, wind moderate | 13 | 0 | 0 | 0 | 13 |
| | 11/09/2020 | 15 | 14 | 06:40 | 19:36 | Dry, wind moderate | 0 | 0 | 0 | 0 | 0 |
| | 12/09/2020 | 16 | 15 | 06:41 | 19:33 | Dry, wind moderate | 0 | 0 | 0 | 0 | 0 |
| SD2 | 08/09/2020 | 17 | 14 | 06:34 | 19:43 | Dry, light breeze | - | - | - | - | - |
| | 09/09/2020 | 15 | 11 | 06:36 | 19:41 | Dry, wind moderate | - | - | - | - | - |
| | 10/09/2020 | 15 | 14 | 06:38 | 19:38 | Dry, wind moderate | - | - | - | - | - |
| | 11/09/2020 | 15 | 14 | 06:40 | 19:36 | Dry, wind moderate | - | - | - | - | - |
| | 12/09/2020 | 16 | 15 | 06:41 | 19:33 | Dry, wind moderate | - | - | - | - | - |
| SD3 | 08/09/2020 | 17 | 14 | 06:34 | 19:43 | Dry, light breeze | 205 | 0 | 1 | 2 | 208 |
| | 09/09/2020 | 15 | 11 | 06:36 | 19:41 | Dry, wind moderate | 32 | 0 | 0 | 1 | 33 |
| | 10/09/2020 | 15 | 14 | 06:38 | 19:38 | Dry, wind moderate | 143 | 0 | 0 | 0 | 143 |
| | 11/09/2020 | 15 | 14 | 06:40 | 19:36 | Dry, wind moderate | 68 | 0 | 0 | 0 | 68 |
| | 12/09/2020 | 16 | 15 | 06:41 | 19:33 | Dry, wind moderate | 650 | 0 | 0 | 0 | 650 |

| Static detector ref nos. | Date | Maximum overnight temp (°C) | Minimum overnight temp (°C) | Sunrise | Sunset | Weather | Number of passes per species | | | | Total passes per night |
|--------------------------|------------|-----------------------------|-----------------------------|---------|--------|--------------------|------------------------------|---------------------|---------------------------|---------|------------------------|
| | | | | | | | Common Pipistrelle | Soprano Pipistrelle | <i>Myotis</i> bat species | Noctule | |
| SD4 | 08/09/2020 | 17 | 14 | 06:34 | 19:43 | Dry, light breeze | 66 | 1 | 0 | 0 | 67 |
| | 09/09/2020 | 15 | 11 | 06:36 | 19:41 | Dry, wind moderate | 34 | 0 | 0 | 0 | 34 |
| | 10/09/2020 | 15 | 14 | 06:38 | 19:38 | Dry, wind moderate | 10 | 0 | 1 | 0 | 11 |
| | 11/09/2020 | 15 | 14 | 06:40 | 19:36 | Dry, wind moderate | 11 | 0 | 0 | 0 | 11 |
| | 12/09/2020 | 16 | 15 | 06:41 | 19:33 | Dry, wind moderate | 41 | 0 | 0 | 0 | 41 |