



Bat Activity Survey Report

Client:	Crab and Winkle Trust / Canterbury City Council
Site name:	Land at Crab and Winkle Way, Whitstable
Ref no:	0067_R04
Status:	Planning

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1. SUMMARY

- S.1 This report details bat activity surveys undertaken in respect of four parcels of land which form part of the Crab and Winkle historic railway in Whitstable, Kent.
- S.2 Development proposals include the extension of the current Crab and Winkle Way to form a shared use walking and bicycle path.
- S.3 The habitats on site, including secondary broad-leaved woodland, scrub and mature trees, provide suitable bat foraging and commuting habitat.
- S.4 Three bat activity transect surveys were undertaken in the spring, summer and autumn of 2017, including a dusk and pre-dawn within one 24-hour period in the summer. Automated static detectors were used to collect data on five consecutive nights each month between May and October inclusive.
- S.5 Bat activity survey work was designed to provide an assessment of the value of the site for bats and to determine whether the proposed development is likely to impact on bats.
- S.6 Recommendations for appropriate avoidance, mitigation, compensation and enhancement measures are provided within this report that will reduce the impact to foraging bats to a negligible level (detailed within Section 9).

2. INTRODUCTION

- 2.1 This report details bat activity survey s undertaken in respect of land which forms part of the Crab and Winkle historic railway in Whitstable, Kent (site centred: TR 11425 66607).

COMMISSION

- 2.2 Native Ecology were commissioned by Canterbury City Council on 30th September 2016 to undertake an updated bat activity survey within the site pursuant of Condition 5 of the Planning Permission referenced CA//15/01614, Canterbury City Council.

PROPOSED DEVELOPMENT

- 2.3 Development proposals include the extension of the current Crab and Winkle Way, Whitstable to form a shared use walking and bicycle path.

BACKGROUND

- 2.4 An initial Bat Potential Survey report was produced by Jacobs to assess the overall value of habitats within the site for foraging and commuting bats (Jacobs, 2008).
- 2.5 Jacobs found the site to include habitat that provides suitability for foraging and commuting bats. Therefore, a bat activity survey was undertaken within the site by Jacobs in April and June 2008 (Jacobs, 2008).
- 2.6 The activity surveys undertaken in 2008 found that the site was being used by foraging and commuting common pipistrelle (*Pipistrellus pipistrellus*) and soprano pipistrelle (*Pipistrellus pygmaeus*) bats.
- 2.7 A preliminary ecological appraisal was undertaken by Native Ecology in 2017 to provide an update to the previous scoping survey undertaken in 2014 by Lloyd Bore Ltd (Lloyd Bore, 2014). Bat activity survey work was recommended in order to update the survey data collected in 2008 to provide an assessment of the current value of the site for foraging and commuting bats.
- 2.8 The suitability of the habitat within the site for commuting and foraging bats was assessed as part of the preliminary ecological appraisal (see Appendix 2 for summary table of the assessment of habitat suitability for bats).
- 2.9 Although the development site is assessed as providing moderate suitability, due to the low potential impact of development proposals, the methodology used is based on that recommended for sites that provide low suitability for foraging and commuting bats.
- 2.10 However, in order to provide additional data on which to inform recommendations for avoidance, mitigation, compensation and enhancement measures, a greater level of survey effort was used than that generally employed for sites of low suitability habitat.

- 2.11 Three bat activity transect surveys were undertaken in the spring, summer and autumn of 2017, including a dusk and pre-dawn within one 24-hour period in the summer. Automated static detectors were used to collect data on five consecutive nights each month between May and October inclusive.
- 2.12 The survey effort employed is considered sufficient to inform a reliable baseline for the site, particularly when taken together with the survey data collected by Jacobs in 2008.

SURVEY AREAS

- 2.13 The survey site comprises four compartments; Areas A, B, C and D which form part of the historic Crab and Winkle Railway Line.
- 2.14 Area A comprises a narrow wooded and scrub strip of approximately 1ha which opens into a small patch of scrub and semi-improved grassland to the north. Area B comprises a roughly square parcel of wooded land, approximately 0.1ha, which lies between Bridge Approach and Teynham Road. Area C comprises a relatively narrow wooded strip of approximately 0.5ha with a bare ground track through the centre used by walkers. Area D comprises a small area, approximately 0.04ha, of semi-improved grassland with patches of tall ruderal and scrub.
- 2.15 A preliminary ecological appraisal undertaken by Native Ecology in February 2017 assessed the tree and shrub boundaries, grassland and tracks within Areas A, B, C and D as providing suitable foraging and commuting habitat for bats.
- 2.16 The location of the survey areas are shown in Figure 1, Section 3. Habitat plans are shown in Appendix 3.

PURPOSE OF REPORT

- 2.17 The objectives of the report are:
- to provide updated survey information to those surveys undertaken by Jacobs in April and June 2008;
 - to determine whether bats use the site, which species use the site and the purpose of the use the site by bats;
 - to provide an assessment of the level of bat activity within the site;
 - to determine the temporal (both seasonally and in relation to time of night) and spatial distribution of recorded bat activity on site;
 - to determine whether bats use some parts of the site more than others, and whether this use varies across the year (and through the night);
 - to provide an assessment of the value of the site for bats (both overall and for different areas of the site);
 - to determine whether the proposed development is likely to impact on bats; and
 - to make recommendations for appropriate avoidance, mitigation, compensation and enhancement measures, where required.

3. SITE LOCATION PLAN



Figure 1: Location of survey areas A (TR 11397 6674), B (TR22495 66494), C (TR 11570 66364) and D (TR 11240 60933). Reproduced from OS Explorer 150 1:25,000 Ordnance Survey © Crown copyright and database rights [2015]. (Site centred TQ 37384 56827).

4. METHODOLOGY

DESK STUDY

- 4.1 Bat records were obtained from the Kent and Medway Biological Records Centre (KMBRC) in October 2017. These include records of maternity roosts, non-maternity roosts, hibernating bats, flying bats and grounded bats within a 5km radius of the survey area.
- 4.2 The Multi Agency Geographic Information for the Countryside (MAGIC) website was used to obtain information on locations where European Protected Species Mitigation Licences for bats have been issued by Natural England.

FIELD SURVEY

- 4.3 Bat activity survey work was undertaken within the site between May and October 2017 following methodology provided within *Bat Surveys for Professional Ecologists: Good Practice Guidelines, 3rd edition, Bat Conservation Trust (Collins, 2016)*.

Transect surveys

- 4.4 Eleven relatively evenly distributed listening points were identified during a daytime walkover of the site. The listening points were designed to sample all habitats present within the site, including a narrow strip of secondary broad-leaved woodland, edge of scrub habitat and road crossing points (Old Bridge Road and Teynham Road).
- 4.5 To allow for seasonal variation within the period of expected peak bat activity, the surveys were carried out in the spring (May), summer (July) and autumn (October) of 2017.
- 4.6 The transect survey undertaken in July comprised a dusk and pre-dawn survey within a 24-hour period. The transect surveys undertaken in May and September comprised dusk activity surveys, which commenced at sunset and continued for two hours and 25 minutes. The pre-dawn survey commenced two hours prior to sunrise and continued up until at least 15 minutes after sunrise.
- 4.7 Two surveyors conducted each survey, recording the number of bat passes, species and behaviour (for example foraging, commuting, flight patterns) at each listening point during five minute intervals. The above data was also recorded during the two minute walk between listening points.
- 4.8 Table 1 provides details of the transect surveys.

Table 1: Survey details for the dusk and pre-dawn bat transect surveys.

Survey date	Bat detectors / equipment used	Times	Surveyors	Weather conditions
11th May 2017 (dusk)	1 Echo Meter Touch 1 Bat box duet	Sunset - 19:04 Start - 19:04 Finish - 21:29	James Madden BSc MSc Grad CIEEM (5 years survey experience (Exp.)) Kari Mcsherry (6 yrs Exp.)	Start : 14°C, 100% cloud cover, light precipitation (until approximately 21:00), light air. Finish : 13°C, 100% cloud cover, no rain, light air.
27th July 2017 (dusk)	1 Echo Meter Touch 1 Bat box duet	Sunset - 20:52 Start - 20:52 Finish - 23:17	Amy Wright BSc MSc CEcol MCIEEM (Class 2 bat survey licence 2015-10994-CLSCLS). Rowan O'Sullivan (8 yrs Exp.)	Start : 18°C, 100% cloud cover, no rain (light precipitation immediately preceding survey), light breeze. Finish : 16°C, 50% cloud cover, no rain, light breeze.
28th July 2017 (pre-dawn)	1 Echo Meter Touch 1 Bat box duet	Sunrise - 05:14 Start - 02:49 Finish - 05:14	James Madden BSc MSc Grad CIEEM Kari Mcsherry	Start : 15°C, 0% cloud cover, no rain, moderate breeze. Finish : 14.5°C, 0% cloud cover, no rain, light breeze.
18th September 2017 (dusk)	1 Echo Meter Touch 2 Pro 1 Bat box duet	Sunset - 19:04 Start - 19:04 Finish - 21:29	James Madden BSc MSc Grad CIEEM Rowan O'Sullivan	Start : 14.5°C, 70% cloud cover, no precipitation, fresh breeze. Finish : 13.5°C, 100% cloud cover, no precipitation, light breeze.

Automated static surveys

- 4.9 To supplement the data provided by the transect surveys, static detectors were used as a tool to indicate activity levels of different bat species within different areas of the site.
- 4.10 An Anabat Express passive detector was used for zero crossing recording in July and August and an Anabat Swift passive detector was used for recording in September and October to enable full spectrum recording within the site, maximising the identification of bat species from their echolocation calls.
- 4.11 A recording was triggered when bat activity was detected and ended when there was no activity or when 15 seconds had elapsed. Records were made using a 500 ks/s sampling rate, with a trigger frequency of 10kHz to 250kHz and a trigger window of 2 seconds.

- 4.12 The static detectors were set to record bat activity from 30 minutes before sunrise until 30 minutes after sunset.
- 4.13 One automatic static detector was deployed for a minimum of five consecutive nights each month between May and October to provide data across the majority of the period when bats are active. Six locations were identified for the installation of a static detector, which, as far as possible, included all habitat types present within the site (see Figure 2, Section 5).

Data analysis

- 4.14 The echolocation calls generated by bats were recorded by the detectors during the walked transects and by the static detectors placed within different areas of the site.
- 4.15 Sound files recorded during the transect surveys were analysed to provide a measure of activity levels at each listening point (and between listening points) within the site for different species of bats, and thus an indication of the amount of use of different areas of the site by bats.
- 4.16 Echolocation calls recorded as WAV files during the transect surveys were analysed in real-time by Kaleidoscope AutoID software to aid identification in the field. Further desk-based sound analysis was undertaken using Kaleidoscope Pro software where required.
- 4.17 The zero-crossing files recorded using the static Anabat Express were converted to sequence files using AnalookW and analysed as individual sound files.
- 4.18 Zero-crossing files and WAV files recorded by the Anabat Swift were analysed using Kaleidoscope Pro AutoID software, this enabled the large amount of data collected to be processed. With the exception of sound files identified as noise (non-bat) and calls identified as common pipistrelle and soprano pipistrelle, sound files were individually verified to genus or, where possible, species level.
- 4.19 Auto-identification was used as the primary tool to identify common and soprano pipistrelle bats due to greater confidence in the correct auto-identification of the calls for these species. Nevertheless, a sample of 10% of these calls were manually analysed using Kaleidoscope Pro software.
- 4.20 The number of sound files where a bat species was recorded ('encounters') was used as the unit to measure levels of bat activity. The individual sound files recorded may contain more than one individual bat, and this was included within the results.
- 4.21 Where possible, bat calls were identified to species level. However, certain species, particularly some *Myotis* bat species, cannot be reliably separated to species level using sound analysis alone. 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* sp.
 - *Plecotus* sp.
 - *Nyctalus* sp. (either Leisler's bat or noctule) - likely noctule

- Serotine

- 4.22 Where long-eared bats were recorded during surveys, these are referred to as *likely* brown long-eared bat (*Plecotus auritus*) due to the difficulty in categorically distinguishing this species from the grey long-eared bat (*P. austriacus*) through reliance on sound analysis of calls or observations of behaviour in flight. Quiet calling bats such as brown long-eared can be difficult to detect and therefore may be under represented in the survey results.
- 4.23 The number of bat passes detected during the transect surveys and number of separate sound files recorded during static detector surveys do not provide an assessment for number of individual bats present at any one time. Rather than providing an assessment of bat abundance, the number of passes and sound files recorded indicate the relative level of bat activity at any one point. Therefore, activity could relate to one bat detected frequently or several bats detected infrequently. Data collected during the walked transects provide some ground truthing to the data recorded by the static detectors.
- 4.24 During the transect surveys, constant bat foraging activity was recorded at points along the transect, resulting in difficulty in counting the number of bat passes. Under these circumstances, the species present throughout the period of activity at a certain point were recorded and the number of passes for each species labelled as 20, which is the number of sound files that would be recorded within any 5 minute period where the detector is set to record for a maximum of 15 seconds. Whilst the number of passes is unlikely to be exact, this parameter does give a relative indication of bat activity, which is comparable across different points along the transect.
- 4.25 Transect surveys record bat activity within the site at one location at a given time and during certain light levels. In order to account for this limitation the transect was walked in both directions during each survey. In addition, the start point of the transect was alternated between listening point 1 and 10 each season. A circular route was not possible due to the linear nature of the site.
- 4.26 Table 2 below provides details of the static detector surveys.

Table 2: Survey details for the static surveys.

Survey month	Survey period	No. of survey nights recorded	Location of static detector	Detector type	Weather conditions (mean)
May	19th - 22nd	4	P1	Anabat Express	18.75 - 5.25°C (10°C), no rain, no strong wind.
June	21st - 25th	5	P2	Anabat Express	23.5 - 12.75 °C (17°C), no rain, no strong wind.
July	7th - 13th	4	P3	Anabat Express	24.25 - 10.75°C (16 °C), no rain, no strong wind.
August	6th - 10th	5	P4	Anabat Express	22.5 - 12.25°C (15°C), no rain, no strong wind.
September	26th - 30th	3	P5	Anabat Swift	20.1 - 13.9°C (17 °C), no rain, no strong wind.

Survey month	Survey period	No. of survey nights recorded	Location of static detector	Detector type	Weather conditions (mean)
October	24th - 31st	8	P6	Anabat Swift	24.6 - 6.5°C (13°C), no rain, no strong wind.

ZONE OF INFLUENCE (ZOI)

- 4.27 The 'Zone of Influence' for a project is the area over which ecological features may be subject to significant effects as a result of the proposed project and associated activities (CIEEM, 2016).
- 4.28 This report provides an assessment of the effects of the proposed development on bats where these effects extend beyond the development boundary of the survey area.
- 4.29 Potential sources of impact associated with the proposed development include direct loss of foraging and commuting habitat as well as the indirect effect of light spillage onto bat foraging/commuting habitats.
- 4.30 Significant impacts to habitat within a site has the potential to impact upon bats that may be roosting beyond the site boundary.
- 4.31 Studies have found that habitat within 2km for common pipistrelle and 3km for soprano pipistrelle comprise the core sustenance zone (CSZ). A CSZ "refers to the area surrounding a communal bat roost within which habitat availability and quality have a significant influence on the resilience and conservation status of the colony using the roost" (Collins, 2016).

SURVEY LIMITATIONS

- 4.32 It was not possible to gain access to the area of the site between The Bridge Approach (road) and Teynham Road during survey work. This is not considered to be a significant limitation because the area of habitat (scrub) is small in size and very similar to the majority of the remainder of the site.
- 4.33 Area D was not included in the activity survey. Habitat within Area D was assessed as providing negligible to low suitability for foraging and commuting bats due to isolation by roads and housing, street lighting and lack of trees or shrubs. This is not considered a significant limitation as mitigation recommendations based on the wider site are applicable for Area D.
- 4.34 There was a short period of light rain at the start of the transect survey undertaken on 11th May 2017 (between Points 1 and 4). This was not considered a major limitation because the level of bat activity was consistent with surveys conducted in the dry and the effect of the rain on bat activity was lessened under the protection of the tree canopy.
- 4.35 The automated static detector failed to record five consecutive nights of data during the months of May and September. Instead four consecutive nights of data were recorded in May and three consecutive nights were recorded in September. This is not considered a significant limitation as the amount of data collected during the static surveys, when taken in combination with the transect survey data, provides enough information to provide recommendations for mitigation.

5. PLAN SHOWING LOCATION OF TRANSECT ROUTE AND STATIC DETECTOR POSITIONS



Figure 2: Location of transect route Listening Points and automated static detector positions.

6. RESULTS

DESK STUDY

- 6.1 Data obtained from the KMBRC in October 2017 include over 500 records of bats within 5km of the survey area comprising the following species: common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistrellus pygmaeus*), Nathusius' pipistrelle (*Pipistrellus nathusii*), serotine (*Eptesicus serotinus*), Daubenton's bat (*Myotis daubentoni*), whiskered bat (*Myotis mystacinus*), noctule bat (*Nyctalus noctula*), Leisler's bat (*Nyctalus leisleri*) and brown long-eared bat (*Plecotus auritus*).
- 6.2 The closest recent record of a known roost is a maternity roost of common pipistrelle bats located approximately 1.1km to the south-east of the site.
- 6.3 There are 11 records of known maternity roosts within 5km of the site: nine of common pipistrelle, one of soprano pipistrelle and one of Long-eared species. In addition, there are six records of bat roosts (type unknown) within 5km of the site: one common pipistrelle, two brown long-eared, one long-eared species and one undetermined bat species.
- 6.4 Data from the MAGIC Map website include one record of an EPSM Licence for bats within 5km of the survey area, located approximately 2km to the south-west.

FIELD SURVEY

Transect surveys

- 6.5 During the transect surveys undertaken in May, July and September the following bat species / species groups were recorded:
- Common pipistrelle;
 - Soprano pipistrelle;
 - Pipistrelle bat species - likely common or soprano pipistrelle;
 - Nathusius' pipistrelle;
 - *Plecotus sp.* - likely brown long-eared;
 - *Myotis sp.* and
 - *Nyctalus sp.* (either Leisler's bat or noctule) - likely noctule
- 6.6 Table 3 provides a summary of the results of the transect surveys.

Table 3: Summary of results for transect surveys, showing total number of passes per bat species for each listening point and walk.

Listening point	Common pipistrelle	Soprano pipistrelle	Pipistrelle sp.	Nathusius' pipistrelle	Likely brown long-eared	Myotis sp.	Nyctalus sp. (likely noctule)	Total passes
1	46	0	0	0	0	0	0	46
1W	11	0	0	0	0	0	0	11
2	27	1	0	0	0	7	0	35
2W	5	0	0	0	0	0	0	5
3	14	1	0	0	0	0	0	15
3W	1	0	0	0	1	0	0	2
4	15	0	0	0	0	0	1	16
4W	4	0	0	0	0	0	0	4
5	18	1	1	1	0	0	0	22
5W	5	0	0	0	0	0	0	5
6	46	4	0	0	0	0	0	49
6W	20	0	0	0	0	0	0	20
7	51	3	0	0	0	0	0	54
7W	15	0	0	0	0	0	0	15
8	20	0	0	0	0	0	1	21
8W	10	0	0	0	0	0	0	10
9	13	0	0	0	0	0	0	13
9W	6	0	0	0	0	0	0	6
10	7	2	0	0	0	0	0	9
10W	9	0	0	0	0	0	0	9
11	28	0	2	0	0	0	0	30
Total no. passes	370	12	3	1	1	7	2	397
% passes	93.5	3.0	0.8	0.3	0.3	1.8	0.5	

- 6.7 Common pipistrelle bats were the most frequently recorded species within the site overall, accounting for 93.5% of all passes. The next most frequently recorded passes were by soprano pipistrelle and *Myotis* sp. bats, which accounted for 3% and 1.8% of passes respectively.
- 6.8 Common pipistrelle bats were recorded at every listening point during each of the transect surveys. Soprano pipistrelle bats were recorded in low numbers in all areas of the site (although not at every listening point) during all transect surveys with the exception of the pre-dawn survey in July.
- 6.9 Seven passes identified as *Myotis* species were recorded during the transect surveys. All passes were recorded in May at Listening Point 2.
- 6.10 Two passes were recorded for likely noctule, at Listening Points 8 in May and Listening Point 4 in September.
- 6.11 A single pass was recorded for Nathusius' pipistrelle during the transect surveys, recorded at Listening Point 5 in September.
- 6.12 A single pass was recorded for likely brown long-eared bat during the transect surveys, recorded at Listening Point 3 during the pre-dawn survey in July.
- 6.13 Three passes identified to genus level only as Pipistrelle bat species (likely common or soprano pipistrelle) were recorded using the Bat Box Duet bat detector during the May survey at Points 5 and 11. These calls were not recorded by the Echo Meter Touch 2 Pro detector.
- 6.14 Figure 3, Section 7 provides a plan showing the activity levels across the site based on the results of the transect survey data.

Automated static surveys

- 6.15 During the static surveys undertaken each month between May and October the following bat species / species groups were recorded:
- Common pipistrelle;
 - Soprano pipistrelle;
 - Nathusius' pipistrelle;
 - *Nyctalus* sp. (either Leisler's bat or noctule) - likely noctule
- 6.16 Table 4 provides a summary of the results of the automated static surveys.

Table 4: Summary of results for static detector survey, showing number of passes per bat species recorded at each static position.

Position of static detector / survey period	Common pipistrelle	Soprano pipistrelle	Nathusius' pipistrelle	Likely noctule	NoID	Noise	Total passes	Average no. of soundfiles record per night
Position 1 19th - 22nd May	273	5	8	0	1	260	287	72
Position 2 21st - 25th June	294	13	8	0	2	660	317	63
Position 3 9th - 13th July	0	0	0	0	4	475	4	<1
Position 4 6th - 10th August	0	1	0	0	0	473	1	<1
Position 5 26th - 28th September	0	0	0	1	0	97	1	<1
Position 6 24th - 31st October	38	1	0	6	1	2203	46	6
Total sound file occurrences	616	21	30	8	15	4218	690	n/a
% sound file occurrences	89.3	3.0	4.3	1.2	2.2	n/a	n/a	n/a

- 6.17 Common pipistrelle bats were the most frequently recorded species within the site overall during the static survey, accounting for 89.3% of all passes. This result is consistent with data recorded during the walked transect surveys.
- 6.18 The next most frequently recorded passes were by Nathusius' pipistrelle and soprano pipistrelle, which accounted for 4.3% and 3% of passes respectively. Recorded passes of likely noctule bat accounted for 1.2% of all passes recorded.
- 6.19 The greatest number of bat calls were recorded at Positions 1 and 2 during May and June respectively. Very low activity levels were recorded at Positions 3, 4 and 5.

7. PLAN SHOWING BAT ACTIVITY LEVELS



Figure 3: Bat activity levels based on total number of bat passes collected at Listening Points during the four transect surveys undertaken in between May and September.

8. DISCUSSION AND EVALUATION

- 8.1 Survey results from the transect and automated static surveys show that the site is used by a range of bat species, with six species/species groups being recorded between May and October. Data show that the majority of bat activity is associated with foraging common pipistrelle bats.
- 8.2 The greatest level of bat activity was recorded along the track located between the former railway and the residential gardens of Clare Road. This area of the site is likely favoured by bats due to a greatest abundance of insect prey, which is likely present due to the edge of scrub habitat and scattered mature broad-leaved trees. In addition, this area is relatively sheltered from wind and is un-lit, apart from a small number of motion activated security flood lights associated with garages.
- 8.3 The track located between the former railway and residential gardens of Clare Road will not be directly impacted by proposals. Mitigation is recommended to ensure this area is kept as a dark corridor for foraging bats.
- 8.4 Higher levels of bat activity were also recorded at Listening Point 1, located at the southern-most tip of the development site. Common pipistrelle bats recorded at Listening Point 1 were seen foraging up and down the existing cycle way located off-site, despite the location of a street light adjacent to Listening Point 1.
- 8.5 Development proposals will involve the clearance of trees and vegetation from the woodland area of the site (Area C). Although general bat activity levels were low within this area, the woodland habitat is likely to be the most important area of the site for *Myotis* species and likely brown long-eared bats. Mitigation is recommended to retain as many trees and shrubs within this area as possible and to retain this area as a dark corridor for the light sensitive bat species recorded in this area.
- 8.6 The small number of recorded passes of *Myotis* species (seven passes) and likely brown long-eared bat (one pass) were recorded at Listening Points 2 and 3 only. These points are located within the area of secondary broad-leaved woodland within the site, which is the darkest area of the transect survey route. Therefore, where health and safety concerns allow, it is important to avoid the use of lighting within the woodland.
- 8.7 The lowest levels of bat activity were recorded at Listening Points 3, 4, 9 and 10. Point 3 lies within the area of woodland and appears to be used less by foraging pipistrelle bats. Points 4 and 10 are located directly adjacent to street lights and in exposed, open habitat. Point 9 is partially illuminated by the nearby street light, which may also have the effect of drawing insect prey away from this area.
- 8.8 Construction of the cycle route within Area A will result in the removal of a linear strip of scrub habitat along the line of the proposed route. Data collected in July by the automated static detector at Position 3 indicate low bat activity levels within the interior of the scrub habitat present in Area A. The transect survey results suggest that edge of scrub habitat in Area A is favoured by foraging Pipistrelle bats.

- 8.9 Therefore, the construction of the cycle route through Area A has the potential to create foraging habitat for bats, providing that the effect of any proposed lighting is mitigated.
- 8.10 Pipistrelle bats were observed crossing the roads and railway line along the line of the former railway. This behaviour suggests that the former railway is being used by bats commuting to foraging areas. Therefore, any lighting associated with the construction of the new bridges should adhere to recommendations for lighting mitigation.
- 8.11 Without the implementation of suitable avoidance and mitigation measures, development proposals for the construction of a cycle path will likely have a low impact upon foraging bats.
- 8.12 Mitigation measures are recommended within Section 9 that will reduce the impact to foraging bats to a negligible level.

9. MITIGATION AND ENHANCEMENT MEASURES

MITIGATION

Habitat Mitigation and Management Plan

- 9.1 A Habitat Mitigation and Management Plan (HMMP) report will detail overall mitigation and proposals for habitat management and biodiversity enhancement.
- 9.2 The HMMP report will include specific details with regards to habitat creation and management for the benefit of foraging, commuting and roosting bats as well as specific methods and timing of management for the habitat types within the site post-development.
- 9.3 The HMMP will be produced through liaison with the landscape architect so that any planting plans result in benefits to bats.

Lighting

- 9.4 Bats are nocturnal and rely on dark habitat corridors for foraging and commuting, it is therefore possible that indirect impacts could occur through spillage of artificial lighting associated with the cycle path. Since, this is likely to affect only small numbers of common species, the impact is assessed as 'low'.
- 9.5 Mitigation is detailed below that will reduce the impact of artificial lighting during the construction phase on foraging and commuting bats from low to negligible:
 - All contractor compounds will be located away from trees to minimise potential lighting and disturbance impacts.
 - During the time of year that bats are active (March to October), the construction works will be kept to daylight hours with no artificial lighting used.
 - Any security lighting will be low-level and motion activated on short-timers, which will reduce the impact on bats by providing predominantly dark periods.
- 9.6 Mitigation is detailed below that will reduce the impact of lighting post-development on foraging and commuting bats from low to negligible:
 - Any post-development lighting will be designed so as to avoid the illumination of the vegetation bordering the cycle path in order to maintain dark flight corridors for foraging and commuting bats.
 - The height of lighting columns will be limited as far as possible in order to avoid light trespass away from the cycle path itself.
 - Lighting will use only the minimum amount of light required and will be directed to where it is needed. Accessories such as hoods, cowls, louvres and shields will be used where required to ensure that light is directed to the intended areas only. Fixtures will not allow upwards leakage of light.
 - External lighting will use lights that emit low levels of UV light such as LED lighting which is more directional than sodium lighting features. If the use of LED lighting is not possible, then High Pressure Sodium lighting features will be used.

- 9.7 It is the responsibility of the Client to ensure that the above mitigation for foraging and commuting bats is implemented.
- 9.8 Future management of woodland and scrub habitat should ensure that over-management is avoided and trees and shrubs are allowed to develop, providing enhanced habitat corridors for bats and other wildlife.

ENHANCEMENTS

- 9.9 The mature trees to be retained within the site present opportunities to provide additional bat roosting habitat through the installation of at least 5no. bat boxes, such as Schwegler 2F bat box, or similar.
- 9.10 As part of the proposals to create the cycle route, any new planting should include native tree and shrub species that will provide dark corridors for foraging and commuting bats and habitat for insect prey.
- 9.11 New planting could include a variety of native woody species such as hawthorn (*Crataegus monogyna*), field maple (*Acer campestre*), blackthorn (*Prunus spinosa*), spindle (*Euonymus europaea*), hornbeam (*Carpinus betulus*), guelder rose (*Viburnum opulus*) and dogwood (*Cornus sanguinea*).
- 9.12 Plants that produce scent at night will attract night flying invertebrates and as such will also provide foraging opportunities for bats. Such plants, such as evening primrose (*Oenothera sp.*), jasmine (*Jasminum officinale*), verbena (*Verbena bonariensis*), buddleia (*Buddleia davidii*) and hebe (*Hebe 'Great Orme'*), could be included within the planting plan.

10. REFERENCES

- Bat Conservation Trust (2009). Bats and lighting in the UK and the Built Environment.
- Collins, J. (ed.) (2016) Bat surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London.
- Jacobs, 2008. (Bat Activity Survey Report). B07010400/01
- Lloyd Bore Ltd (2014). 2409/R02 EcologicalAppraisal.
- Mitchell-Jones, A.J. (2004). Bat mitigation guidelines. English Nature (now Natural England).

11. APPENDIX 1: SUMMARY OF PLANNING POLICY AND LEGISLATION

LEGAL PROTECTION OF BATS

- 11.1 All UK bat species are protected under the Habitats and Species Directive 992/43/EC) enacted through the Conservation of Habitats and Species Regulations 2017. These are also known as European Protected Species.
- 11.2 European Protected Species relate to those listed under Schedule 2 of the Conservation of Habitats and Species Regulations 2017 (as amended) and are afforded the highest level of protection. These species are also protected under the Wildlife and Countryside Act 1981. Taken together this level of protection makes it an offence to:
- deliberately capture, injure or kill any wild animal of a European protected species,
 - deliberately disturb wild animals of any such species
 - damage or destroy a breeding site or resting place of such an animal.
- 11.3 Disturbance of animals includes in particular any disturbance which is likely to:
- 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, impair their ability to hibernate or migrate
 - to affect significantly the local distribution or abundance of the species to which they belong.
- 11.4 The legislation requires that any derogation be dealt with by licencing through an appropriate licencing body (Natural England in England). In determining whether a licence can be granted the licencing body must apply the requirements of Regulation 55, and in particular, the three tests:
1. Regulation 55(2)(e) states: a licence can be granted for the purposes of “preserving public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment”.
 2. Regulation 55(9)(a) states: the appropriate authority shall not grant a licence unless they are satisfied “that there is no satisfactory alternative”.

12. APPENDIX 2: ASSESSMENT OF HABITAT SUITABILITY FOR BATS

Table 5: Assessing potential suitability of proposed development sites for bats and survey effort required. Adapted from Bat Surveys for Professional Ecologists, Good Practice Guidelines 3rd Edition (Collins, 2016).

Suitability	Description of commuting and foraging habitats	No. of bat activity surveys recommended to achieve a reasonable survey effort.	
		Transect surveys	Static bat detector surveys
Negligible	Negligible habitat features on site likely to be used by commuting or foraging bats.	None required.	None required.
Low	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.	One survey visit per season (spring – April/May, summer - June/July/August, autumn - September/October) in appropriate weather conditions for bats. Further surveys may be required if these survey visits reveal higher levels of bat activity than predicted by habitat alone.	One location per transect, data to be collected on five consecutive nights per season (spring - April/May, summer - June/July/August, autumn - September/October) in appropriate weather conditions for bats.
Moderate	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.	One survey visit per month (April to October) in appropriate weather conditions for bats. At least one of the surveys should comprise dusk and pre-dawn (or dusk to dawn) within one 24-hour period.	Two locations per transect, data to be collected on five consecutive nights per month (April to October) in appropriate weather conditions for bats.
High	Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge. High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broad-leaved woodland, tree-lined watercourses and grazed parkland. Site is close to and connected to known roosts.	Up to two survey visits per month (April to October) in appropriate weather conditions for bats. At least one of the surveys should comprise dusk and pre-dawn (or dusk to dawn) within one 24-hour period.	Three locations per transect, data to be collected on five consecutive nights per month (April to October) in appropriate weather conditions for bats.

13. APPENDIX 3: PHOTOGRAPHS



Photograph 1: Southern end of Area C.



Photograph 2: Worn pedestrian path runs along centre of Area C.



Photograph 3: Area of grassland at southern end of Area B visible from Old Bridge Road.



Photograph 4: Dense woodland scrub located at northern end of Area C.



Photograph 5: Area A looking north.



Photograph 6: Northern end of Area A showing more open bat foraging habitat.